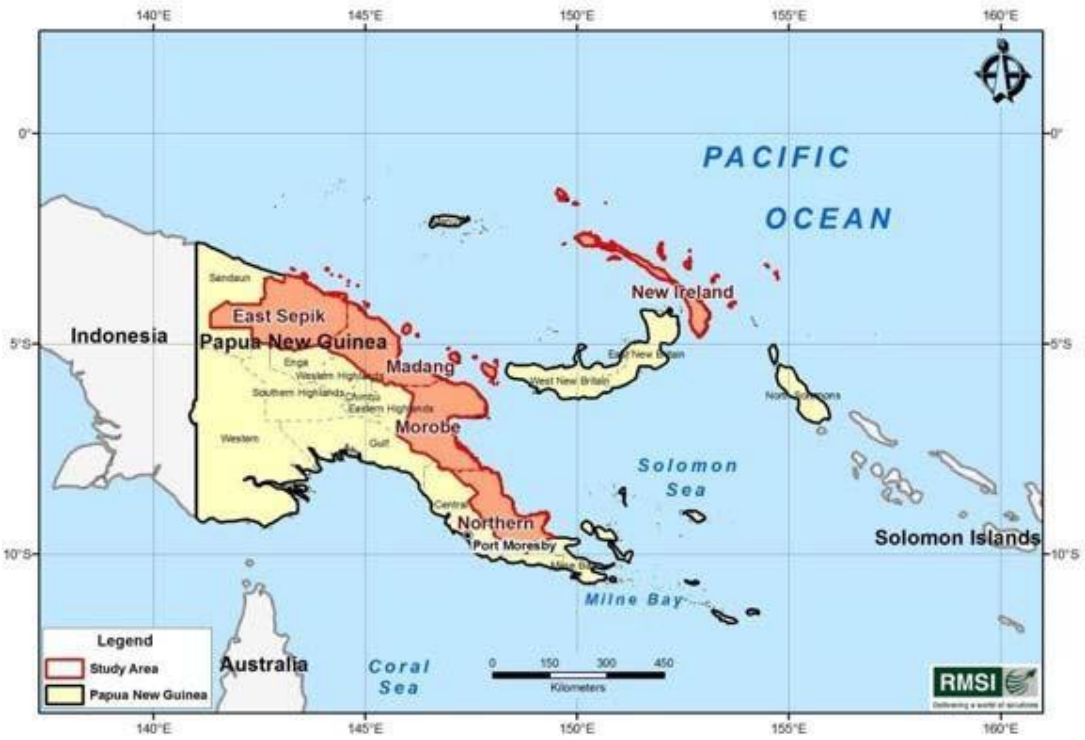
FINAL REPORT for

FINAL EVALUATION of **"**Enhancing adaptive capacity of communities to climate change-related floods in the North Coast and Islands Region of Papua New Guinea**" Project**



RMSI (2014), Map of Papua New Guinea showng the five pilot provinces

Eduardo R. Quiroga
Sylvagro, Reg.
www.sylvagro.ca sylvagro@aol.com

20 December, 2018

Table of Contents

List of Tables

List of Boxes

List of Annexes

List of Abbreviations and Acronyms

AF	Adaptation Fund
ADRA	Adventist Development and Relief Agency
APR	Annual Progress Report
ATWG	Adaptation Technical Working Group
AWP	Annual Work Plan
AWS	Automated Weather Station
CBO	Community Based Organization
CC	Climate Change
CCA	Climate Change Adaptation
CCDS	Climate Compatible Development Strategy
CDR	Combined Delivery Report
CO	Country Office
CSR	Corporate Social Responsibility
DFAT	Department of Foreign Affairs and Trade (Australia)
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DSP	Development Strategic Plan
EWS	Early Warning System
FPRR	Final Project Review Report
GHG	Greenhouse Gas
GoPNG	Government of Papua New Guinea
M&E	Monitoring and Evaluation
MTDP	Medium Term Development Plan
MTE	Mid-Term Evaluation
NCCC	National Climate Change Committee
NEC	National Executive Council
NGO	Non-Governmental Organization
NIM	National Implementation Modality
NPC	National Planning Committee
NPD	National Project Director
NPM	National Project Manager
NWS	National Weather Service
OCCD	Office of Climate Change and Development
PCCC	Provincial Climate Change Committee
PM	Project Manager
PMU	Project Management Unit
PNG	Papua New Guinea

PPR	Project Progress Report
PSC	Project Steering Committee
TOR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
UNDAF	United Nations Development Assistance Framework
UNEG	United Nations Evaluation Group
USD	United States Dollar
VPC	Village Planning Committee
WCS	Wildlife Conservation Society
WMO	World Meteorological Organization
WPC	Ward Planning Committee
WVI	World Vision International
WWF	World Wildlife Fund

ACKNOWLEDGEMENTS

The Mission wishes to express its gratitude to the representatives of the Government of Papua New Guinea at the national, provincial and local levels for the courtesies extended while executing its executing its mandate. Wherever the Mission went, it was met with the utmost hospitality and generosity by the beneficiaries, stakeholders and government officials.

The Mission acknowledges its appreciation for the effective support provided by Ms Tracy Vienings, the United Nations Development Programme's Deputy Resident Representative; Mr. Edward Vrkic, Senior Climate Change Advisor; Ms. Gwen Maru, Programme Analyst, Energy & Environment; and Ms Fiona Tsikula, Project Administration and Finance Assistant. As the project wrapped up in December 2017, I am grateful for informative skype sessions organized by the CO with the professionals of the former management unit: Ms. Aishath Azza, Regional Technical Specialist, Climate Change Adaptation; Ms. Shoko Takemoto, Regional Technical Specialist, Climate Change Adaptation; and Mr. Rabi Narayan Gaudo, Project Manager.

Everyone made available every possible resource to the Mission, including deploying the Mission's field visits to five provinces, with the skillful organization of Ms. Gwen Maru with the support of Ms. Fiona Tsikula. It should be noted that all errors are the consultant's. Although I benefitted from all of the international vaccines, at the end of the mission I succumbed to typhoid fever. The CO also generously provided all of the necessary support during my convalescence.

Gratitude is extended to the managers and staff of the implementing agency, the Climate Change Development Authority, in particular Mr. Jacob Ekinye, Director, Adaptation and Projects Division; Ms. Emmajil-Bogari-Ahai, Adaptation Branch Manager, Adaptation and Projects Division ; Mr. Jonah Auka Manager, Projects Branch and GCF Focal Point, Adaptation and Projects Division; Ms. Lydia Bobola Senior Projects Officer, Adaptation and Projects Division; and all of the Project Officers: Messrs. Ordy Wefin, Albert Milala, Benedict Goiye and Manau Renagi. Each took turns to accompany the Mission to the five provinces and provided focused information and comments.

Likewise, gratitude is extended to the management of the National Weather Services; the Conservation and Environment Protection Authority in Port Moresby; and the management and staff of the provincial administrations of the provinces of Madang, Morobe, Northern, New Ireland, and East Sepik. All provided generous support in supplying information and participating in focused interviews.

We acknowledge the working sessions with NGO management and staff in Port Moresby, Morobe, Madang and New Ireland. In particular, the discussions with the participating villages of the WWF Mangrove Reforestation Initiative in Madang Province and the WCS Mangrove Reforestation Initiative, in New Ireland Province were insightful and informative. All the participant names are listed in Annex 3.

The Mission has been moved by the openness with which beneficiaries interviewed during the field work have shared their enthusiasm and motivation to help achieve the expected outcomes.

EXECUTIVE SUMMARY

Project Summary

Table 1: Project Summary

Project Title:	Enhancing adaptive capacity of communities to climate change-related floods in the North Coast and Islands Region of Papua New Guinea			
AF Project ID:			*at endorsement (Million US$)*	*at completion (Million US$)*
UNDP Project ID:	00074956 PIMS 4452	AF financing:	6,018,777	7,037,574
Country:	Papua New Guinea	IA/EA own:	100,000	
Region:	Asia Pacific	Government:	220,000	
Focal Area:		Other (DFAT)r:	500,000	
FA Objectives, (OP/SP):		Total co-financing:	820,000	
Executing Agency:	Climate Change Development Authority	Total Project Cost:	6,838,777	
Other Partners involved:	National Weather Service, Conservation and Environmental Protection Authority, National Disaster Centre, Provincial Governments of Morobe, New Ireland, East Sepik, Madang and Northern Province, World Vision International, WCS, WWF, ADRA, Asian Disaster Preparedness Centre	ProDoc Signature (date project began):		17 May 2012
		(Operational) Closing Date:	Proposed: October 2016	Actual: December 2017

Project Description

The National Vision of PNG recognizes that climate change and variability is inevitable and poses one of the greatest challenges to achieving a Smart, Wise, Fair, Healthy and Happy Society by 2050 ranked among the top 50 countries on the United Nations Human Development Index. The impact of climate change-related hazards in Papua New Guinea (PNG) has been increasing in intensity and frequency. With the onset and multitude of climate change impacts, the country's economy, environment and people are becoming more vulnerable and are at risk of not meeting basic human development needs. Climate change puts at risk achievement of the goals set out in PNG's major development plans. Flooding in the coastal and riverine areas is one of the most important climate change related hazards in the North Coast and the Islands Region as settlements are usually located in the coasts, particularly the provincial capitals of East Sepik (Wewak), Madang (Madang), Morobe (Lae). In response to the increasing climate change impacts, Government of PNG with support from UNDP designed the enhancing adaptive capacity of communities to climate change related floods project with financing from the Adaptation Fund. The project contributes to realization of strategic focus area five of the PNG 2010-2050 on environmental sustainability and climate change. Under this focus area, the Vision and the National Development Strategy 2030 aim to manage environmental issues such as the health of the environment as well to address the issues of climate change in ways that best suit PNG's developmental needs. The PNG Strategic Plan (2010-2030) climate change goal states "Adapt to the domestic impacts of climate change and contribute to global efforts to abate greenhouse gas emissions".

The project was designed to contribute towards UNDAF/CPAP 2012-2017 outcome 4 on environment, climate change and disaster risk management: "By 2015, Government and civil society have enhanced their capacity to implement biodiversity conservation, low carbon and climate resilient development initiatives for environmental sustainability and improved community livelihoods to reduce the vulnerability of women, girls, men and boys to disaster risks; CPAP outputs of Output Theme: Promote Low Carbon Growth and Climate Resilient Economic Development. Output Statement: "Public institutions, private sector and local communities enhance the implementation of low carbon growth and climate resilient development initiatives for environmentally sustainable economic growth.

Implementation of the project was led by the Climate Change and Development Authority in collaboration with the National Weather Services, Conservation and Environmental Protection Authority; National Disaster Center and Provincial Administrations of Morobe, Northern, East Sepik, Madang, and New Ireland. The targeted beneficiaries of the project include: 9 coastal communities and 8 riverine communities in the five provinces of Morobe, Madang, New Ireland, East Sepik and Northern.

Evaluation Ratings

Specific ratings as per the terms of reference for the evaluation (see Annex 1) are summarized below:

Table 2: Evaluation Ratings Summary

Evaluation Ratings:			
1. Monitoring and Evaluation	**Rating**	**2. IA& EA Execution**	**Rating**
M&E design at entry	MS	Quality of UNDP Implementation	MU
M&E Plan Implementation	MU	Quality of Execution - Executing Agency	MS
Overall quality of M&E	MU	Overall quality of Implementation / Execution	MU
3. Assessment of Outcomes	**Rating**	**4. Sustainability**	**Rating**

Relevance*	2	Financial resources:	ML
Effectiveness	U	Socio-political:	MU
Efficiency	U	Institutional framework and governance:	MU
Overall Project Outcome Rating	MU	Environmental:	MU
		Overall likelihood of sustainability*:	ML

* Relevance Rating: 2-Relevant (R) and 1-Not Relevant (NR).
* Sustainability Rating: 4-Likely (L): negligible risks to sustainability; 3-Moderately Likely (ML); moderate risks; 2-Moderately Unlikely (MU); significant risks; 1-Unlikely (U): severe risks

Recommendations and Lessons Learned

Recommendations

Mangrove Rehabilitation and Development

Priority and Timeframe	Proposed Implementing Agency
Should be launched as soon as practicable It is a long-term investment as it needs necessary institutional adjustments led by GoPNG The same group of beneficiaries should be considered in order to consolidate learning	The implementation of this investment should be conducted by a national organization with knowledge and experience in national resource management and development. Long term technical assistance is critical from an organization either public, educational or international with established proficiency continuity in the subject matter The TE did not carry out an institutional assessment of potential candidates.

Fostering investment of mangrove rehabilitation by the villagers themselves could make villagers the solution to the hazards of climate change adaptation. The cost of rehabilitating one Hectare of mangrove is approximately USD 950 [PGK 2850], including the yearly cost of artisanal fishing equipment; as it represents nearly 40% of the yearly family income, outside capital investments are necessary. There are several inferences that can be flagged for programming purposes.

First, adequate tenure arrangements over land where the investments will be laid out should be negotiated with traditional authorities before the investments are carried out. Those villagers who might consider investing in the rehabilitation of mangroves need assurance that they can reap the benefits in the long term. As it takes about 6-10 years for the mangrove to mature, the time lapse needed to benefit from such an investment is probably around one generation [33 years].

Second, if such tenure arrangements can be negotiated with traditional authorities, and these arrangements are registered with the relevant national organizations, this legal arrangement itself could be used as collateral with financing institutions. This would be an important step towards financing the rehabilitation of mangroves by the villagers themselves, which would require the total policy support of the national and provincial authorities, as well as the national financial system.

Third, the repayment schedule needs to take into consideration the biological context of the investment. As mentioned, it takes approximately 6-10 years for mangroves to reach full maturity and the fish stocks can double by the 6th year according to estimates of fishermen interviewed. Therefore, if villagers take out a loan, they will be unable to begin repaying the loan until the 7th or 8th year.

Fourth, since mangrove rehabilitation will require long-term financing, understanding the economic structure of a village and the livelihood strategies used by menfolk and womenfolk to meet the needs of a family unit is essential. An adapted Farming System Research [Annex 9] can provide principles and reasoning to conduct programming, leading to operations that are viable economically, acceptable socially and environmentally sustainable.

Enhanced Opportunities for Training in Regional Economic Planning & Geospatial Data Processing within the Framework of DRM/DRR

Priority and Timeframe	Proposed Implementing Agency
Should be launched as soon as practicable It is a long-term investment as it needs necessary institutional adjustments led by GoPNG The same group of beneficiaries should be considered in order to consolidate learning	The implementation of this investment should be conducted by a national organization with knowledge and experience in national resource management and development. Long term technical assistance is critical from an organization either public, educational or international with established proficiency continuity in the subject matter The TE did not carry out an institutional assessment of potential candidates.

To advance the process of climate change adaptation, each province needs a development policy and planning unit, with the purpose of incorporating adaptation measurers to protect the national assets and physical infrastructure achieved. This will allow PNG to continue with its objectives of achieving long term development goals. The socio-economic development planning process that incorporates climate change adaptation measures includes the verification of the existence of explicit regulations in the public administration for climate related disaster risk management, and the existence of a series of legal, institutional and budgetary conditions. These are fundamental for adequate disaster risk management, including economic decentralization, land use planning, public investment, monitoring and other factors that are site-specific. In a sense, the regulatory and institutional framework that upholds the processes of DRM/DRR can be considered a development strategy within the context of the provincial development planning process. Only that which can be understood and to some extent measured can then be planned.

The TE found the level of progress incipient in the elaboration of the provincial planning process (PPP). The PPP needs strengthening and consolidating so it can incorporate the DRM/DRR data to generate the adaptation plans for inland/coastal flooding- related risks and hazards. The absence of these adaptation plans compromises the protection from risk and hazards for the targeted communities. The driver for this incipient progress appears to be a defective training process.

Imparting of training to implement a planning process for provincial development is complex. Development experience suggests that the didactic method is productive because it focuses on building on the baseline knowledge the trainee possesses, ensuring the practical application of the learning imparted.
Another technique is "job instruction training" where the trainee is taught how to do a job. This technique involves explaining the key points [techniques, processes, etc.], encouraging practice and passing on full control when the trainee has fully learned the job.

A planning process must reflect the specific conditions of a given context. This takes a coordinated effort between the trainer, trainee andUNDP/CCDA's PMU. The theoretical training must be accompanied by practicums specifically related to the eventual task for which the training is conducted. In this manner, it is possible to advance

the theoretical learning of planning theory and associated techniques, and actually conduct practical exercises on the themes, problems or issues of the eventual planning job, as exemplified by the "job instruction training technique". This approach brings about tangible results but requires close coordination and flexibility between the trainees, the trainer and the UNDP/CCDA's PMU ministry.

Once the planning process is understood, the geo spatial data related to DRR/DRM and other data relevant to the planning process can be incorporated in the provincial planning process. There may be two conditions that need to be vetted by national consultant with expertise in geomatics.
In order to use geo spatial data, there is the need for the functional requirements of ICT infrastructure for sharing the required layers of data. The available information indicates that PNG's Mineral Resources Authority, who advocates for a Human Geoscience, is the first step in enabling access to the Authority's IT infrastructure management.

There is the need to wield the appropriate tools and coordinate efforts. If there is a single crucial thread, it is the importance of coordination within the framework of an IT infrastructure in such a way that interoperability is ensured. Interoperability facilitates institutional work, given that by sharing information in a consistent and readable way, greater added value can be given to the institutional products themselves. This approach needs to be validated by the respective national economic authorities, while being simultaneously coordinated with the national IT infrastructure to determine the possible need for a common platform, with data being updated/curated by each separate department of the province. These procedures will enable the geo spatial data to be used in the provincial planning process leading, ultimately, to CCA.

Accountability and Transparency

Priority and Timeframe	Implementing Agency
Should be conducted as soon as practicable	The CO should take charge of this operation The evaluator does not know the legal and administrative procedures for the application of this important control.

Considering the alleged inconsistent application of UNDP procurement principles and the possible inequitable repercussions from the a priori delivery of outputs on an undetermined number of villagers, an audit should be considered to review the execution of all vendors' contracts and ascertain whether equity, effectiveness and efficiency has been achieved in the use of Project funds.

In any event the TE has not received what is known as Value for Money Audit for the works undertaken during implementation by vendors and partners, that is, an independent evidence-based audit which examines and reports on whether economy, effectiveness and efficiency has been achieved in the use of UNDP funds

It would have been productive if such an audit had been conducted before this Project's TE, as it would have settled the concerns of many stakeholders and beneficiaries as well as help delineate the nature of development results.

Lessons Learned

Choice of Partners with Sustainable Strategy

The object lesson here is to select partners with proven comparative advantage to intervene directly in the communities in the context of DRM leading to CCA without introducing unintended inequity issues. This lesson is also applicable if the delivery of outputs is intended to select beneficiaries for specific reasons. Under both contexts, the overarching purpose is to promote long-term resilience among the communities while avoiding introducing unintended inequity in the short term in the distribution of resources to those who need the most. IFAD and WFP both carry out regular analysis on the strategic framework with the countries they work, supported

by logistic analysis. In this manner, the issues of inequality and sustainability are reviewed adequately. Specifically, the WFP has proven comparative advantage in the area of disaster risk reduction and management.[1] Mastering these techniques can enable the process of CCA. In a recent intervention in Ethiopia and Kenya, WFP demonstrated that supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives contributed to a sustainable increases in household and community-level food security, supporting long-term resilience-building in traditionally food-deficit areas. The critical result is the long term resilience, and the fact that the women and men in communities do not become dependent on donors.

The Role of Institutions in the Transfer of Technology

Geo-spatial data and Geomatics deal with the technology of maps and map making; this technology is neutral. On its own, it has no impact on the sustainability of its use. It is not an automatically adopted tool. As a result, the illusion that algorithms function on their own without upgrading human skills and organizations must be avoided. New organizational arrangements are needed to ensure that the benefits of technology reach the end-user. In effect, one encouraging note from the October 2018 IPCC report 2 was that we already have all the technology we need. What is missing is the organizational infrastructure, 3 based on the capacity building efforts of different organizations to enable the successful transfer of know-how for dealing with climate change hazards. If there is a single crucial thread that has persisted through this development experience, it is the importance of coordination.4 Coordination allows communities to accomplish tasks that folks working alone cannot. Folks of all walks of life can build on one another's strengths and make up for one another's weaknesses. Coordination, in turn, depends on communication — the exchange of information and motivation that allows all folks to work together.

1-INTRODUCTION

1.1-Purpose of Evaluation

In conformity with TOR [Annex 1] the objective of the evaluation is

- to assess the achievement of Project results, and
- to draw lessons learned that can both improve the sustainability of benefits from this Project, and aid in the overall enhancement of UNDP programming.

During the evaluation review, the UNDP CO suggested adding the following objectives

- promote accountability and transparency,
- gauge the extent of the project's convergence with other UNDP priorities [including harmonization with UNDAF]

1.2 –Scope and Methodology

Within the mandate set out in the Terms of Reference [Annex 1] and outlined in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, AF-financed Projects, the approach and methodology of this TE is described in Annex 7. It articulates a narrative to validate the procedures used in the field for the collection of evidence, with special reference to clarifying the differences from the planned procedures set out in

---

[1] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011. WFP. Policy on Disaster Risk Reduction and Management. Building Food Security and Resilience. Policy Issues. Agenda item 4. Rome, 14–17 November 2011. WFP. Policy on Building Resilience for Food Security and Nutrition. Policy Issues. Agenda item 5. Rome, 25–28 May 2015.Extracted on 10 July 2018 from www.wfp.org

[2] IPCC Summary for Policymakers formally approved at the First Joint Session of Working Groups I, II and III of the IPCC and accepted by the 48th Session of the IPCC, Incheon, Republic of Korea, 6 October 2018.

[3] BBC Five things we have learned from the IPCC report. By Matt McGrath, Environment correspondent, Incheon, South Korea. Extracted on 09 October, 2018, from www.bbc.com

[4] NYT Data and Capitalism, What Data Has Done to Capitalism, by David Leonhardt. Reinventing Capitalism In The Age Of Big Data, By Viktor Mayer-Schönberger and Thomas Ramge. Basic Books. Extracted on June 8 2018 from www.nyt.com

the Inception Report [IR]. It also explicates the use of rapid surveys and other techniques, where possible, to collect evidence.

The Terminal Evaluation [TE] was carried out by one international consultant/evaluator who was supported by a project officer from the Country Office [CO] that specialized in ecosystems and environmental management.

- The TE's execution of activities in PNG began on 09 April and was completed on 07 May 2018. The TE field work took place in five provinces: Morobe, New Ireland, East Sepik, Madang and Northern Province, and was carried out from 13 April through 02 May 2018; the itinerary is compiled in Annex 2.
- The evaluator interviewed key project stakeholders including the national executing agency, the Climate Change and Development Authority, and partners involved such as the National Weather Service, Conservation and Environmental Protection Authority, Provincial Governments of Morobe, New Ireland, East Sepik, Madang and Northern Province, as well as NGO partners: World Vision International, Adventist Development and Relief Agency, Wildlife Conservation Society, and World Wide Fund. The list of persons interviewed is in Annex 3.

The Project's management team had already disbanded in December 2017 when the Project ended. Post-mission skype sessions were coordinated by the Country Office to discuss project management matters as the management team is now located in Africa and Asia-Pacific, respectively.

- Visits were made to all five provinces, including villages where practicable. The Evaluator met with stakeholders to discuss progress and what worked and did not. When security arrangements allowed, the Evaluator interacted with men and women folk of all walks of life concerning the access and distribution of Project outputs, with special reference to capacity building activities used to cope with climate variability. A outline of the field visits is presented in Annex 4; and Annex 7 critically reviews the findings arising from these field interactions.
- The Evaluator drafted a debriefing report on 7 May based on field findings and discussed the report with the CO and the national implementing agency before departing to his home office to write the mission report.
- In a post-mission timeframe, the Evaluator received additional information via e-mail from the project team and stakeholders. This information was incorporated into the core data from the Project's basic documents, strategic studies, progress reports and pertinent development literature.
- Several matters arose that were tied to the alleged inconsistent application of UNDP procedures. These matters were taken into account to the extent they affected development. Evaluators ordinarily cannot adjudicate on compliance to existing regulations. Therefore, these matters are listed in Annex 13 for the attention of the auditors.
- The evaluation matrix was adapted from the generic set of questions included in the TOR to the specific conditions as reflected from the field conditions shown in Annex 6. Evidence gathered during the field interviews and observations have been documented in the matrix. To ensure validity the evidence was cross-checked using as many sources as practicable. Thus, the evaluation question matrix was used as a data collection and analysis tool.
- One critical fact is that the Project's results are grounded on outputs rather than outcomes. To assess the Project's progress towards outcomes, the Evaluator tabulated the list of outputs within the objectives of the present TE [Annex 12]. Subsequently, based on this tabulation, the Evaluator assessed project outputs against higher level effects which could be characterized [or hypothesized] as intermediate outcomes [Annex 7]. Through this process it has been possible to assess qualitatively and even subjectively the Project's progress towards outcomes. And thereby triangulate, using all the lessons available and the evaluator's insight into the objective conditions in the field, a pathway forward. This was critical in sketching future directions to continue enhancing the adaptive capacity of communities to endure climate change-driven hazards. Thus, in a way, the logical results framework was used as an evaluation tool.
- This evaluation is a forward-looking, evidence-based assessment and relied on feedback from direct beneficiaries, implementing agencies, strategic studies conducted by the Project, and NGOs. It focused primarily on development matters contributing towards enhancing the adaptive capacity to climate change-driven hazards.

Deviations from the planned data collection methods and analysis that were indicated in the Inception Report [IR]. Expounding on the reasons for such deviations.

Prior to the preparation of the IR, the CO's procurement office could not inform the consultant on the evaluability of the assessment and the logistics associated with visiting field sites. As shown below, these factors and others in the field influenced the IR's deviations in terms of [1] evaluation method and [2] data collection procedures.

Variation in Evaluation Method

The TOR's Annex A shows that the Project's logical framework had no data to indicate whether the targets at the end of the project were achieved. On the assumption that there was an outcome- based results framework, I drafted an outcome-oriented IR at home-base and sent it to the CO one week before my arrival at the PNG.5 During the IR review, the Project supplied a Final Project Review Report [FPRR] which listed the outputs delivered. There was no outcome-based results framework available. Therefore, in order to move forward:

The evaluation became output-oriented as there was the need to assess progress towards outcomes from outputs. Specifically, the task was to assess the transformation of project outputs into higher level effects which could be characterized [or hypothesized] as intermediate outcomes.6 The sub-tasks conducted are described and analyzed in Annexes 7 and 12.

The number of field visits had increased from three [as indicated in TOR] to five, without a corresponding increase in real time for field work. In addition, twice the airlines either cancelled or delayed flights occasioning loss of time and unexpected strain on mission implementation.

To continue with the output analysis, working sessions with the former management team were organized by the CO via skype. The sessions shined light on the administration and management of implementation . It was clear that the data array was fragmentary, especially for the period after the MTE, based on outputs and anecdotal evidence. In brief : [1] to estimate the progress made towards outcomes, the FPRR 's output data and field observations were triangulated; [2] and international/ regional development experience was triangulated with local data [interviews with stakeholders, beneficiaries' perceptions] to draw lessons learned from their experience.

Variations in Field Procedures for Data Collection

As noted, the IR proposed an outcome-oriented methodology, including instruments for collecting the evidence (e.g., crop budgets, Most Significant Change [MSC] technique, income-expenditures statements) and field visits to three pilot sites. Further, as evaluative data was scanty, the field data collection focused on reconstituting the framework of activity implementation geared to the outcome levels, so as to estimate if the results were achieved. This also allowed the identification of the causes that facilitated or precluded the realization of Project outcomes as well as the determination of whether the conditions had changed with the Project's implementation. Therefore, three days per field site was proposed so that a rapid appraisal could be conducted at each site as discussed in Annex 7.

The CO increased the number of field visits from three to five pilot provinces, without a corresponding increase in real time in the field. This was aggravated by the fact that instead of being organized to optimize data collection, the field visits had to fit airline schedules as the sites could only be reached by air. Twice the airlines either cancelled or delayed flights, occasioning further loss of time. Annex 2 contains the mission's itinerary.

Approximately one to two days were assigned for each site. In-depth reviews of any implementation issues was not possible, as the priority was to reconstitute the framework of activity implementation to estimate the results achieved. Sometimes, however, a glimpse of the causes that facilitated or precluded the realization of project outcomes appeared.

.

Although the proposed rapid appraisal at each site did not take place, the beneficiaries' participation in the meetings with the Evaluator was limited; with the exception of the Madang site where a large number of

---

[5] The intention was to save DSA resources

[6] This procedure of assessing outputs to a higher level effects which could be characterized [or hypothesized] as intermediate outcomes has been carried in cases of project implementation under considerable stress, like in Sudan just before it was divided into South Sudan and Sudan. Cf: The Republic of the Sudan/United Nations Development Programme. Country Programme Evaluation. Second Country Cooperation Framework [2002-2006] & the Bridging Programme for [2007-2008]. An Independent Evaluation. Mission Report. Ms. Afaf Abu-Hasabo, Mr. Abraham Matoc Dhal, Mr. Eduardo Quiroga, Team Leader. Karthoun, 2009

beneficiaries showed up. The MSC was administered to more than 50 informants [cf Annex 8]. With the support of local informants and partners, the Evaluator conducted a rapid assessment of the unitary investment costs associated with mangrove reforestation and management [cf Annex 10]. The information gathered provided insights about the current conditions and potential to rehabilitate degraded mangrove areas [cf Annex 9].

Another technique omitted was to sketch an outcome model as a visual map of the causal logic of the results achieved that were being evaluated. This could have shown how activities and outputs were perceived as contributing to a tangible outcome. This procedure would also have been useful to ascertain a reliable baseline based on the perception of stakeholders.

Lastly, in the evaluator's opinion the Project's results could have been underreported due to the insufficient time and resources assigned to gather information on the Project's development issues in the field. In particular, as the monitoring efforts on development results appeared limited. [7]

Additional Purposes of the Evaluation

During the review process, the UNDP reviewer suggested adding the following themes to the purpose of the evaluation.

. To promote accountability and transparency
. To gauge the extent of project convergence with other UNDP priorities (including harmonization with the UNDAF)

These two topics are reviewed at the end of section 3.3 as Project result. From a methodological standpoint, the analysis for both themes needs to follow the ex-post-facto research approach.[8] Put differently, it is research " from what is done afterwards." It uses data already collected but not necessarily amassed for the intended purpose. The advantage is that the data is already collected. The limitation is that generalization is limited as the data is already collected, with its inherent limitation in scope. It is undeniable, however, that the results of the analysis would have been different if these themes had been incorporated at the beginning of the evaluation, as there would have been opportunities to specifically discuss both themes with stakeholders and beneficiaries.

1.3-Structure of the Evaluation Report

The description of the Project is the first topic,[9] indicating the duration, main stakeholders, and the immediate and developmental objectives. Subsequently, the findings of the evaluation are broken down into the following sections in the report:

· Project Formulation
· Project Implementation
· Project Results

The review of the project formulation focuses on an evaluation of how clear and practicable the project's objectives and components were, and whether project outcomes were designed according to SMART criteria.[10] The project formulation also covers the capacities of the executing agencies, i.e. to what extent they were considered when

---

[7] It must be recorded that even though I took all of the international vaccines required, I was overcome by typhoid fever after two weeks of work in the field and missed the last field visits. At that point, however, the field data collected had begun accumulating into a recognizable pattern, meaning it made more sense to continue with the exercise. In any event, the second mission member followed the procedures to guide CCDA collect the information. In retrospect, all lessons drawn hereunder would have been missed if the TE had been aborted at that point. Back in home base it took sometime before I could resume work on full time basis. Medical documents are available if requested.

[8] http://www.dissertationrecipes.com/wp-content/uploads/2011/04/Ex-Post-Facto-research.pdf

[9] This report follows the recommendations of TOR's Annex F: Evaluation Report Outline.

[10] SMART. S=specific, M=measurable, A=attainable, R=relevant, T=time-bound.

designing the project, and if partnership arrangements were identified and negotiated prior to project approval. An assessment of how assumptions and risks were taken into account in the development phase is also included.

The report section on project implementation begins by reviewing how the logical results framework was used as an M&E tool during the course of the project, as well as the effectiveness of partnerships and the degree of involvement of stakeholders. Project finance is reviewed by looking at the actual level of co-financing as compared to what was committed, and also whether or not additional or leveraged financing was secured during the implementation phase. The cost-effectiveness of the project is reviewed by analyzing how the planned activities met or exceeded the expected outcomes over the designed timeframe, and whether an appropriate level of due diligence was maintained when managing project funds.

The quality of execution by both the implementing agency and the executing agency is also evaluated and rated in the project implementation section of the report. This TE considers whether there was sufficient focus on results, looks at the level of support provided, the quality of risk management, Government ownership (in the case of the executing agency), and the candor and realism represented in the annual reports.

The project implementation section also contains an assessment and rating of the project M&E system. The appropriateness of the M&E plan is assessed, as well as a review of how the plan was implemented, e.g., compliance with progress and financial reporting requirements, how the adaptive measures were taken in line with M&E findings, and management's response to the recommendations from the mid-term review.

The project results include direct project outputs, short- to medium-term outcomes, and longer term impacts, including global environmental benefits, replication efforts, and local effects. The main focus is at the outcome level, as most UNDP supported AF financed projects are expected to achieve anticipated outcomes by project closing, and recognize that global environmental benefit impacts are difficult to discern and measuring outputs is insufficient for capturing project effectiveness. Project outcomes are evaluated and rated according to relevance, effectiveness, and efficiency.

In addition to assessing outcomes, the report includes an evaluation of country ownership, mainstreaming, sustainability (which is also rated), and impact. The findings are then summarized into comprehensive and balanced conclusions. Conclusions are substantiated with evidence and connected to the key evaluation questions. Finally, the evaluation presents recommendations for reinforcing and following up on initial project benefits. The report concludes with a discussion of lessons learned and good practices which should be considered for other GEF and UNDP interventions.

Evaluation Ratings

The findings of the evaluation are compared against the targets set forth in the logical results framework, and also analyzed in light of particular local circumstances. The effectiveness and efficiency of the project outcomes are rated according to the 6-point scale, ranging from Highly Satisfactory (no shortcomings) to Highly Unsatisfactory (severe shortcomings). Monitoring & evaluation and execution of the implementing and executing agencies were also rated according to this scale. Relevance is evaluated to be either relevant or not relevant. Sustainability is rated according to a 4-point scale, ranging from Likely (negligible risks to the likelihood of continued benefits after the project ends) to Unlikely (severe risks that project outcomes will not be sustained). Impact was rated according to a 3-point scale, including significant, minimal, and negligible. The rating scales are found in the TOR [Annex 1].

Limitations

These are thoroughly discussed in the Scope and Method sections. In a nutshell, the key problem was that the IR was drafted on the assumption that there was an outcome- based results framework. During the IR review, it became clear that there was only a Final Project Review Report [FPRR] which listed the outputs delivered. Because there was no outcome-based results framework available, in order to move forward:

. The evaluation became output-oriented as there was the need to assess progress towards outcomes from outputs. Specifically, the task was to assess the transformation of project outputs into higher level effects

which could be characterized [or hypothesized] as intermediate outcomes.[11] The sub-tasks conducted are described and analyzed in Annexes 7 and 12. This took an exceedingly time consuming effort aggravated by the fact that the necessary project data was provided in bulk to the evaluator, meaning there was the need to sift through the data to separate the wheat from the chaff. It is possible that because the data was not consistent with the criteria of evaluability, results were underreported.

. As climate science knowledge is evolving, every lesson learned is precious. Similarly, every opportunity lost has immeasurable costs. The manpower composition of the TE should be expanded to increase the opportunities for harvesting data on good practices, lessons learned and other relevant information tied to climate science. For example, in this TE, issues concerning geomatics were reviewed summarily.

. As time was limited, key stakeholders interviewed agreed to forward by email their response to some of the evaluation questions. They did not respond except for issues related to procurement [Annex 13]. The Evaluator must therefore assume that the information obtained over the course of the evaluation time period is representative.

PROJECT DESCRIPTION

2.1-Project Start and Duration

Key project dates are listed below:

Pro Doc signature	2012 May 17
Date project began	2012 May 17
Mid-term evaluation	2016 February
Project completion [proposed]	2016 October
Project completion [actual]	2017 December
Terminal evaluation	2018 April

2.2-Problems that the Project Sought to Address

The impact of climate change-related hazards in Papua New Guinea (PNG) has been increasing in intensity and frequency. The impacts from climate change include:

· the loss of food gardens due to extensive flooding (both in coastal and riverine areas) combined with extended periods of drought;

· the rising sea level is causing some of PNG's islands to be gradually submerged. Salt water intrusion is affecting groundwater, particularly in the islands and in coastal areas, threatening domestic water supplies and agriculture;

· as a consequence of the onset and multitude of climate change impacts, the country's economy, environment and people are becoming more vulnerable and are at risk of not meeting basic human development needs. In essence, climate change puts the achievement of the goals set out in PNG's major development plans at risk.

Moreover, in the context of climate change-related hazards:

[11] This procedure of assessing outputs to a higher level effects which could be characterized [or hypothesized] as intermediate outcomes has been carried in cases of project implementation under considerable stress, like in Sudan just before it was divided into South Sudan and Sudan. Cf: The Republic of the Sudan/United Nations Development Programme. Country Programme Evaluation. Second Country Cooperation Framework [2002-2006] & the Bridging Programme for [2007-2008]. An Independent Evaluation. Mission Report. Ms. Afaf Abu-Hasabo, Mr. Abraham Matoc Dhal, Mr. Eduardo Quiroga, Team Leader. Karthoun, 2009

- flooding in the coastal areas is one of the most important sites in the North Coast and the Islands Region as settlements are usually located along the coasts, particularly the provincial capitals of East Sepik (Wewak), Madang (Madang), Morobe (Lae), and West New Britain (Kimbe);
- in the hinterland areas, climate change-related inland flooding is the most pressing hazard with the largest potential for wide-spread damage.

In response to these conundrums, the GoPNG anticipated enabling :

- the systematic assessment of the vulnerability of these coastal and riverine communities to enable the necessary institutional and individual capacity at a national, provincial, district, and local level to enable decentralized and well-informed decision-making;
- to foment the development of guidance on climate resilient coastal and inland protection, land-use planning, and early warning systems to assist planners, decision-makers and practitioners understand climate risks when making development and investment decisions; and
- at the community level, address specific vulnerabilities in two geographic areas : [1] coastal flooding risks in selected communities of the Northern and Island Coastal Provinces of East Sepik, Madang, Morobe, New Ireland and Northern, [2] the inland flooding risk in selected river communities in Northern Coastal Provinces.

2.3-Immediate and Development Objectives of the Project

The objective of the Project is to strengthen the ability of coastal and riverine communities in Papua New Guinea to make informed decisions; and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations. This objective was to be achieved through the following four outcomes, that include eleven outputs:

1. Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and 3 cities of the 11 provinces of the North Coast and Islands Region;
2. Reduced exposure and increased adaptive capacity of 8 riverine communities of the 4 provinces (East Sepik, Oro, Morobe and Madang Provinces);
3. Strengthened institutional capacity at the national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices;
4. Strengthened awareness, education and advocacy to promote ownership of adaptation and climate change-related risk reduction processes at the national and sub-national levels.

From the Prodoc [page 15], it can be logically inferred that the long-term objective is to promote an inclusive economy-wide approach to building climate resilience with the common goal of protecting communities, property and economic infrastructure.

2.4-Baseline Indicators Established

Baseline indicators, established according to the strategic results framework, are listed below.

Table 3: Baseline Indicators [source : Prodoc, pp 73-78]
Objective : Strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations Baseline ⇨ In the current scenario, risk-exposed communities are to a large extent unable to adapt to climate change due to a lack of resources, capacity, knowledge and the necessary support through provincial and national institutions as well as policy frameworks. ⇨ With the scale of adaptation measures planned for implementation the total population in the 16 targeted communities would be an estimated 32,000

Outcome 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region.
Baseline:

- ⇨ The vast majority of communities exposed to coastal flooding is inadequately equipped with resources, capacity and support to adapt to the heightened risks from climate change
- ⇨ The total number of inhabitants in the 8 target coastal communities that are vulnerable to coastal flooding is estimated at 16,000. An additional population of 120,000 in the cities of Lae, Wewak and Madang will benefit from the programme's implementation
- ⇨ There is lack of equipment and capacity of the PNGNWS, hence, the forecasting of disasters and extreme weather events is severely limited
- ⇨ The provincial and national-level disaster management frameworks are evidently inadequate to address the risks
- ⇨ No effort has been done on this aspect in the target provincial capitals
- ⇨ Community-based mangrove projects are undertaken ad-hoc and largely without sufficient expertise and support

Outcome 2: Reduced exposure and increased adaptive capacity of 8 riverine communities in 4 provinces
Baseline

- ⇨ The vast majority of communities exposed to inland flooding risk is inadequately equipped with resources, capacity and support to adapt to the changed scenario
- ⇨ The total number of inhabitants in the 8 target riverine communities that are vulnerable to coastal flooding is estimated at a minimum 32 000 people.
- ⇨ Disaster preparedness is limited by the lack of and state of facilities and plans
- ⇨ There is lack of equipment and capacity of the PNGNWS is weak, hence the forecasting of disasters and weather patterns is limited.
- ⇨ The provincial and national-level disaster management frameworks are evidently inadequate

Outcome 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices
Baseline

- ⇨ Adaptation to the changed climate scenario of the present and future is inadequately considered in national and provincial level policies and planning frameworks
- ⇨ At the provincial level the lack of resources, capacity and in some cases basic management mechanisms/plans is evident.

Outcome 4: Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels
Baseline:

- ⇨ Awareness raising efforts to date remain ad-hoc, uncoordinated and often undertaken with insufficient technical basis
- ⇨ Only few schools cover climate change in their classes and activities; there is very limited guidance for teachers
- ⇨ CSR funding sources is currently nil.

2.5-Main Stakeholders

The Prodoc [pp 54-56] includes a summary of the consultative process that occurred during Project formulation with a list of stakeholders consulted. It is noteworthy that the Project was reviewed by the Adaptation Technical Working Group (ATWG) to ensure that the Project would respond to national priorities. This working group includes the CCDA Director for Adaptation and key partners such as development partners, government agencies [National Weather Service, Department of Mineral Policy and Geo-hazard Management, Office of Urbanization, Department of National Planning and Monitoring, Treasury Department, Office of Climate Change and Development, Forest Authority, National Maritime Safety Authority, and National Disaster Center], NGOs [WWF, Conservation International, University of PNG, The Nature Conservancy, Wildlife Conservation Society], and the Private sector (Digicel).

With respect to climate change, the CCDA is the lead coordinating institution. The CCDA reports directly to the Prime Minister through the NCCC. Through these links, the CCDA can draw on the support of the line agencies and departments represented in the NCCC. The NCCC is comprised of eleven secretaries from different government departments, including the executive director of the CCDA and is chaired by the Chief Secretary, PNG's highest ranking civil servant.

It is clear that since the launching of the CCDA in 2010, the Project has profited from both consultations and the engagement of stakeholders to address climate change-induced hazards and identify adaptation- solutions. This process ensured that the Project responded to national priorities. If we take this fact as a proxy baseline, the level of engagement reported by MTE [page 33] is weak, with the possible exception of the CCDA; and the current level of engagement has stagnated or slightly deteriorated.

Despite the Project's relevance, the stakeholders' interviewed seemed to display an attitude of limited or no engagement with other stakeholders involved with the Project, such that one stakeholder's component is unable to interact with another stakeholder to induce synergy. It seemed as if stakeholders revealed interest in Project activities because their organization benefitted from something, i.e. equipment, consultancies, etc. Put differently, the bulk of the stakeholders interviewed lacked the vision of the Project's immediate and long-term objectives. Since Project activities were completed as of December 2017, they were ready to move on to something else, with few exceptions—as noted above.

There may be several drivers operating here. First, it was argued that the design of the outcomes appear indeterminate, as they seem to reflect imprecision and vagueness as to what to do once outcomes are attained [Annex 7]. There is no articulation between the outcomes, as they are indeterminate. Further, the paradigm's expected pathway is undefined [Prodoc page 10]. A sketch of the paradigm shift would have aligned the implementation and post-implementation pathways of change. An exit-strategy was not anticipated neither was there institutional arrangements to house the outputs/outcomes once the Project was complete.

Perhaps the critical factor that could have prompted these unintended conditions was the management pattern in which the Project evolved from its beginning [2012] to its completion [2017] . The operational setting of the project management was asymmetrical and characterized by an absence of coordination and inconsistent adherence to UNDP management principles and policies. Indeed, the facts show that

- from October 2012 to October 2013 there was no PM in place;
- from October 2013 to October 2014 a PM was hired but resigned after one year;
- October 2014, the UNDP appointed a UNDP Officer to head the project as Interim Project Manager on a part time basis and they remained in the post until December 2017;
- In addition, this asymmetrical pattern was compounded by a one-year suspension of the Director of the Adaptation Division at OCCD – who had been the NPM.

During the implementation of the MTE [February 2016], the PMU office was not operational, so project management activities were conducted from a project office based at UNDP, without the benefit of an on-hand approach. This asymmetrical pattern of management adversely affected the implementation of the Project.[12] The Mid Term Review [MTE] concluded that this anomalous management structure became a barrier to the implementation of project activities and the development of a shared vision for the project [MTE page 3]. This pattern continued with minor improvements until the end of the Project in December 2017.

2.6-Expected Results

[12] In this TE the analysis of project management focuses on the analytical structure and its implications on overall performance. It does not intend to assess, directly or indirectly, those officers or professionals that were involved in the management activities from 2012 to 2017.

The expected results envisaged under the Project can be evidenced by the following summary of expected outcomes and outputs.

Table 4: Expected Outcomes and Outputs [Source: Prodoc pp 20-21]

EXPECTED OUTCOMES	EXPECTED CONCRETE OUTPUTS
1. Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and 3 cities of the 11 provinces of the North Coast and Islands Region	1.1 Coastal early warning system established for observation, data collection and information management and dissemination in the provinces of the North Coast and Islands Region
	1.2 Coastal flood preparedness and response plan and systems established in the provinces of the North Coast and Islands Region
	1.3. Support system for community-led mangrove reforestation and conservation projects
	1.4 Integrated coastal adaptation measures[19] implemented to protect 8 communities in East Sepik Province, Oro Province and New Ireland Province
2. Reduced exposure and increased adaptive capacity of 8 riverine communities of the 4 provinces (East Sepik, Oro, Morobe and Madang Provinces)	2.1 Inland flooding early warning systems established for observation, data collection and information management and dissemination in the North Coast provinces
	2.2 Inland flood preparedness and response plan and systems established in the North Coast provinces
	2.3 Integrated riverbank protection measures implemented to protect communities in East Sepik Province, Oro Province and Morobe and Madang Provinces
3. Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices	3.1 Climate change-related risks and resilience to coastal and inland flooding integrated into coastal zone management related polices, legal and planning frameworks at the national and sub-national levels
	3.2 Policy makers and planners at the national, provincial and district offices, institutions and extension services systemically trained to implement climate-sensitive policies and plans
4. Strengthened awareness, education and advocacy to promote ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels	4.1 Lessons learned and best practices generated, captured and distributed to other communities, civil society, policy makers in government and globally through targeted mechanisms
	4.2 Climate change awareness and education programs carried out to build next generations' resilience to climate change

3- FINDINGS AND CONCLUSIONS

3.1- Project Design / Formulation

3.1.1- Analysis of Logical Results Framework

The Project was designed around four outcomes [Prodoc, page 20]. For analytical purposes, these can be subsumed into two larger outcomes:

- One outcome dealt with adaptation to flood-related risks and hazards in two ecosystems: [1] coastal ecosystems in the North Coast and Island region communities and [2] inland riverine ecosystems in the East Sepik, Oro, Morobe and Madang Provinces.

- The second outcome dealt with institutional strengthening to support climate- and disaster- resilient policy frameworks and supporting awareness raising and knowledge management.

Were the project's objectives and outcomes clear and feasible within the project's time-frame?

As partially discussed in Annexes 7,11, and 14, the Project's objective was clearly stated.[13] However the design for the supporting outcomes reflected imprecision and ultimately did not contribute towards attaining the objective. Outcomes were not achieved, and consequently, neither was the objective realized.

- However, a set of outputs bounded by mangrove rehabilitation showed considerable potential to foster investments in mangrove reforestation by the villagers themselves. This could make villagers the solution to the hazards of climate change adaptation. The preliminary investment figures per hectare are promising and growing mangroves is socially acceptable, economically viable and environmentally sustainable .
- Most techniques proposed in the Project have the potential to solve the environmental problems linked to climate change adaptation in PNG. However the techniques were located in outcomes without synergy, that is, the combined power of a group of things when they are working together that is greater than the total power achieved by each working separately. Concretely, team work at its best results in a synergy that can be very productive. People can build on one another's strengths and make up for one another's weaknesses.

In sum, fpeople of different trades need to work together under the same roof, and bring along women as well. Folks under the same roof need to work in such a way that they can learn together, and take away lessons from things that work and do not work, because things often need to be done slightly differently to make sure they are viable. If there is no synergy among activities, the silo mindset[14] ("you do your work, and I'll do mine") can prevent stakeholders from jointly designing and implementing an appropriate technology solution to move forward toward climate change adaptation.[15]

The Project was expected to be completed in four years [2016] but was actually extended for one more year [2017]. There is no evidence indicating that the Project's time-frame was insufficient to achieve its outcomes, as the technical tasks were straightforward. It was not cutting edge technology. Other implementing factors had a decisive influence on practical matters that shaped outcome realization; coordination was critical.

There is vertical coordination [with management within one ministry and between ministries] and horizontal coordination [with colleagues from different divisions and even ministries] which are both essential, but were absent or inadequate. For example, for the maintenance and operation of geo spatial data, on which the project spent a considerable amount of resources is currently underutilized. The functional requirement of Information and Communication Technology [ICT] infrastructure for sharing the required layers of data became evident as a result of reviewing the output performance data. This issue was not contemplated in the TOR as it arose as an unexpected problem during the implementation of the TE.

The viability of an outcome is critically influenced by coordination. This is exemplified by the lack of interaction between the Project and PNG's government agencies and policies tied to ICT infrastructure. The available information indicates that PNG has a Geological Database at the Mineral Resources Authority. Recently, one Geological Database Specialist indicated to the Coordinating Committee for Geoscience Programmes for East and South-East Asia that the current PNG Geo Information Sharing Infrastructure advocates integrating Geoscience into Geoscience for Mining, Energy and Humanity. The latter is highly pertinent for our purposes.

---

[13] From the output-based implementation results [Annex 12] and field observations supported by focused beneficiaries interviews [Annex 7], the Mission has triangulated intermediate outcomes [Annex 15] .

[14] All societies have groups and functions that operate in silos for reasons of their own. Silos can harness knowledge-based skills and can be vital to productivity, or they can be geographic and culture-based. It is undeniable that in a country where 840 languages are spoken, even with the presence of Pidjin, many folks from different walks of life will be unable to communicate with one another for many reasons.

[15] Augusto Giacoman & Frank Ribeiro. Seven strategies for breaking down silos. Extracted on 30 July 2018 from www.strategyand.pwc.com

"GEOSCIENCE FOR HUMANITY A silent task, but very important in the nation's development, is our contributions to meet demand brought about by the growth in population. This focus area also addresses other cross-cutting issues such as poverty alleviation and health. Our Projects under this Focus Area include: ØWater Supply and Sanitation ØUrban Geology and infrastructure development Industrial Minerals Fig.1.5. Chart showing Geology Survey Division Primary Focus Areas and data work flow Current status of Spatial Data Information System in MRA Geology Survey Division (GSD)" https://www.slideshare.net/FionaKaumu/papua-new-guinea-geoinformation-sharing-infrastructure

Although the absence of coordination, particularly sequencing, provides a mechanical explanation of the non-realization of outcomes, the formal cause is the design of outcomes which was incompatible with the skills of the end-users. Specifically, the design anticipated an assemblage of four expected and scarcely related outcomes. There were no conceptual linkages or a recognizable structure, as the purpose appeared to be indeterminate. The design did not specify a viewpoint of what level of skills was required if outcomes were to be achieved or if problems were encountered that created delays.

From a methodological standpoint, the proper principles and tools needed to conduct the activities within each outcome were not explained. There seemed to be an attempt to find a universal solution, without understanding the problem being tackled. In essence, it seems that the flawed design was a key driver that conditioned the non-realization and under-performance of expected results.

There were, however, extenuating circumstances that were preventable. The implementation of Project activities in five provinces which were difficult to access geographically and without coordination either among themselves or with central headquarters, made effective execution nearly impossible, as it is not possible to implement activities remotely. Almost everything seemed to indicate that management was using methods and procedures to implement activities without a clear strategy to meet remarkable challenges.

Were the planned outcomes specific/ measurable/ achievable/ relevant and time-bound ?

Based on the above review of outcomes, the evidence indicates that outcomes were specific in terms of achieving macro measurable features like the number of communities. However, the core element of the project was capacity development. The capacity features related to development were not depicted; in fact, even though these features are vital for sustainability, they were not captured in any measure of specificity from development perspectives.

- The outcomes were measurable in the context of quantifiable items like the number of communities involved in the Project. But in terms of the overall objective of "strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations" The core issue of "ability" remained undefined in all outcomes, as important as it was.
- Outcomes were not easily achievable. The project itself was anchored on capacity development and lacked a framework to target the attainment of specific skills to ensure the attainment of outcomes. In addition, the project, either wittingly or unwittingly, contemplated a massive transfer of know-how without a strategic framework for this purpose.
- As outcomes did not anchor themselves in the processes of capacity development, the time bound factor was overlooked. The skills uptake needed, for example, to exploit the spatial data in the context of outcome 1 or 2, could take and an undetermined number of years, and this was underestimated.
- All outcomes were relevant to the priorities of the national development framework tied to climate change adaptation. However, this TE concurs with the MTE [page 35] in that the national initiatives contained in this project are complex and long-term and necessitate the involvement and engagement of all levels of government to ensure sustained support for community level changes. In this connection, as noted, there are formidable logistical constraints. Nearly all provinces are connected with the capital through airlines alone, which is aggravated by the high cost of lodging. Consequently, the transaction costs of project management when compared to other countries in the region are considerably higher. In a sense, the Evaluator agrees that this is the " high *cost of doing business in PNG*" and emphasizes the need for stakeholders to participate in an inclusive framework to ensure the long term sustainability of project achievements.

3.1.2- Assumptions and Risks

The essence of the risks assessed in the Prodoc were realized during project implementation but mitigation measures were not easily amenable to implementation. This is reflected in Table 2 where a comparison of risk levels between the conditions during the preparation of the Prodoc and those prevailing during the implementation of the TE shows slight differences.

The assumptions for the political stability and commitment to climate compatible development are maintained, as are the assurances of the PNGNWS to expand and manage their weather monitoring and forecasting activities. Likewise the relative support from district and provincial level officials continues to enable cooperation among communities, districts and provinces. Provincial governments encourage expanding the role and resources for the climate change officers/focal points, and in particular, the Department of Education remains committed to the integration of climate change in school curricula.

On the other hand, the required coordination amongst climate change stakeholders in the country, especially at the provincial level, did not materialize. And the role of corporate social responsibility did not gain any momentum, meaning it will not be possible to deduce contributions in the area of climate change and adaptation.

Table 5. Risk Levels [Source: Adapted from Prodoc pp 64-65]

Symbology: M=medium; L=low

Risk	Level	Mitigation Measures	TE Estimate
Insufficient collaboration between project implementation partners and stakeholders	M	- Develop detailed inception work plan to guide inception phase and clarify roles and responsibilities through agreements - Continuous stakeholder engagement throughout the implementation	- M
Weak cooperation by communities at proposed sites	M	- Initial site selection and implementation of activities is based on proactive and community-led initiative. - One of the central principles of the replication support is to support activities that are initiated by communities and have appropriate management/support structures in place	- M
Land use disputes within the communities affect implementation of project activities and plans activities and plans	L	- Community consultations will be held and the risk assessed as part of the site selection process. - Agreements from traditional village management bodies are a prerequisite for the project activities to be undertaken in the communities	L
Limited human resources in PNG's national and provincial agencies to adequately support to the activities and ensure the sustainability of the adaptation measures	M	- Capacity building at provincial and national levels is an integral part of the project's implementation. - As coordinating body, the OCCD will identify, monitor and address any gaps in the capacity of implementing agencies involved.	- L
A series of unusually adverse climatic conditions impacts the adaptation measures being implemented, or weakens the interest of key stakeholders to address adaptation issues.	L	- Schedule project activities to avoid adverse weather conditions as far as possible - Address the potentially cyclical nature of climate change events in awareness raising efforts	- L

The best practices and adaptation measures adopted are not gender sensitive – i.e. they increase inequity between men and women or change the social roles of men and women in a way that reduces self-reliance.	M	- Conduct training on gender analysis for project team and use guidelines during selection of adaptation measures and identification of best practices	L
The selection of pilot sites does not follow the established criteria and is derailed due to political processes and influences.	M	- Selection criteria and decisions of the PMU are clearly communicated and endorsed through national (NCCC, ATWG) and provincial level agencies and bodies (Provincial Climate Change Committees)	M
The government is not supportive, politically and financially, to a cross-sectoral and integrated approach to the management of climate risks	L	- Foster links between OCCD and GoPNG through regular involvement of the NCCC	L

3.1.3-Lessons from other Relevant Projects

There were several other GEF funded interventions [see Table 3] in the context of community-based climate change adaptation, including regional climate change adaptation in a pilot site in PNG. These climate-related projects were well analyzed. Other projects dealt with awareness raising and institutional strengthening that were complementary to the current Project—where the focus was on the integration of climate change related issues into established awareness raising and institutional training platforms. These project experiences led to a solid understanding of local and national institutional frameworks, and working relationships were established with several officers within ministerial and agency organizations.

Table 6 List of Projects [Source: Prodoc pp 50-52]

Project	*Status and Results*
The Pacific Adaptation to Climate Change [PACC] 2009-2011 [UNDP-GEF]	PACC is a regional UNDP- GEF funded programme executed through SPREP involving 13 countries of the PIC. In PNG the activities under this programme focused at aspects of food security and droughts in, and limited to the pilot communities at Kivori, southern coast of PNG
Mangrove planting initiatives by Motupore Island Research Centre in East Hiri and a Wildlife Conservation Society project in Manus, PNG	The mangrove planting initiatives have been facing some limitations in regards of the survival rate of mangrove seedlings, both factors being essential for long-term sustainability.
NDC-OCCD-Digicel Partnership	The coastal warning system set up through this public- private partnership has already demonstrated to be a cost- efficient warning dissemination system for disaster preparedness. The system, however is not fully integrated and there is insufficient capacity and equipment to allow the system's use as coastal flood warning.
Coastal and Marine Resources Management in the Coral Triangle of the Pacific	This GEF-funded project falls under the purview of the Pacific Alliance for Sustainability Programme and is being implemented by ADB. It seeks to address vulnerability to various forms of risk including the impacts of climate change. As part of the project outcomes lessons learned on targeting the development of broad-scale resilience strategies (social, economic and biological) will be shared.
PNG Pilot Project under the UN HABITAT Cities and Climate Change Programme.	The global programme aimed to identify and reduce the impact of city-based sources of climate change while implementing measures to increase resilience to the effects of climate change in city areas. The pilot project in Papua New Guinea will focus on Port Moresby.

WB-Climate Investment Fund, Pilot Programme on Climate	PNG is one of the 3 pilot countries in the Pacific PPCR Project and the PNG national pilot is directed at climate proofing
GFDRR – Japan Policy and Human Resources Development [PHRD] Technical Assistance [TA] Programme to Support Disaster Reduction Recovery	The programme has been approved as of October 2011 and has been implemented within the timeframe of the Planned AF programme
UNDP-SGP PNG Community-Based CC Adaptation [CB CCA]	UNDP-SGP allocated $50,000 for CB CCA. Training have been implemented on mangrove conservation in Madang And similar trainings are planned in other provinces, Including the National Steering Committee member in 2012

3.1.4-Planned Stakeholder Participation

The information available indicates that during the project preparation, stakeholders' involvement and consultation were strong in addressing climate change impacts, adaptation and mitigation risks. The specific topics focused were mangrove rehabilitation, perceptions and behavior patterns in a specific geographical area concerning climate issues. Undoubtedly these consultations provided sound insights to ensure that the project responded to national priorities.

Although there is no conclusive evidence, it seems that the choice of partners, especially NGOs, were short of criteria for selection and procedures to assign roles and responsibilities. Concretely, during working sessions, a few stakeholders alleged that some contracts to NGOs were granted without proper bidding procedures.

The MTE [page 41] found that the Project had supported initiatives such as: awareness campaigns on DRR/CCA conducted in 4 primary schools; and another 6 schools along the tributaries of the Ramu River [Madang] received awareness raising sessions on flooding, disaster preparedness and community based adaptation strategy; and website stories and TV Infomercials - El Niño Preparedness (45 Second infomercial broadcasted on National TV for two months); and another website story titled "*Local communities of Papua New Guinea are committed to fight climatechange*" as well as an exposure photo story: "*Take Care of the Mangroves*" [https://undpadaptation.exposure.co/take-care-of-the-mangroves.] These messages used current media to reach a limited digitally- literate sub sector. However, it has the potential to reach the rural population with the support of the available systems that user-friendly for deployment.

Other mass media in the form of handbooks reach a larger number of potential beneficiaries and have more durability as they can be stored in local libraries. The Project has produced 3 handbooks :

- [1] A teaching guide on Climate Change Adaptation [primary schools],
- [2] Community Based Mangrove Planting Handbook, and
- [3] Handbook on Mainstreaming Climate Change Adaptation.

The Evaluator requested copies of these manuals, several times, for review. They were not made available. This small indicator speaks volumes about the sustainability of training. It is difficult to disseminate technical information to beneficiaries without a handbook. Experience shows that without handbooks the information fades away, as does the sustainability of the training activities undertaken.

The MTE [page 42] concluded that the "internal project communications with stakeholders is [limited] and/or not very effective. There are not enough feedback mechanisms among stakeholders, particularly at the provincial and local levels and beneficiaries – coastal and inland communities – are especially remote from the project, its activities and its progress. [MTE page 42] " The situation has not improved. Handbooks, produced by the Project but unused, are productive tools to spread techniques and know- how and in this manner synergize stakeholders and beneficiaries. Perhaps what is more productive, in the context of the men and women that live in the villages, is communication using visual and auditory techniques, such as videos, cassettes, drawings, and dramatizations. These can be created digitally and shown on screens projected from laptops. What is more important is that the local language can be used, and in this manner reach more beneficiaries. It appears that alternative means of communication perhaps should have been the preferred mode of communication with the communities in a country that speaks 840 different languages. All the necessary means and technology needed to do so were available

and have been purchased by the Project. Although there is evidence that visual and auditory techniques have been used, there is no evidence collected to assess its effectiveness with respect to other techniques used.

Underusing training materials, like handbooks, may reflect shortfalls in the in the preparation of the provincial climate change adaptation planning among the five (5) provincial authorities. The first draft of the planning process of the regional economic growth is in progress. This a critical product necessary to generate the adaptation plans to inland/coastal flooding- related risks and hazards to protect the communities at risk.

3.1.5 Replication Approach

Replication is defined as lessons and experiences coming out of the project that are replicated or scaled up in the design and implementation of other projects. The realities on the ground are that this Project has a long maturation period. The Project results currently available include only outputs [FPRR pp 7-17]. In GEF terms, the main focus is at the outcome level. Most UNDP supported GEF financed projects are expected to achieve anticipated outcomes by project closing, and recognizing that global environmental benefit impacts are difficult to discern and measuring outputs is insufficient to capture project effectiveness. Therefore, it would be premature to submit experiences from this Project to be replicated or scaled in the design and implementation of other projects.

Nonetheless it seems productive in this section to review the conditions to foster the organization and functioning of one key training output. Each province needs a functioning unit of regional economic planning with the purpose of incorporating DRM as a factor in socio-economic development planning. Generically, the planning process that incorporates DRM includes the verification of the existence of explicit regulations in the public administration for disaster risk management, the existence of a series of legal, institutional and budgetary conditions. These are fundamental for adequate disaster risk management including economic decentralization, land use planning, public investment, monitoring and others that are site-specific. In a sense, the regulatory and institutional framework that upholds the processes of DRM can be considered a development strategy within the context of the regional economic planning process. Only that which can be understood and to some extent measured can then be planned.[16]

The TE found the level of progress incipient in the elaboration of the provincial planning process [Annex 7]. Although sporadic progress has been made in certain provinces [FPRR, page 24], the provincial planning process [PPP] needs strengthening and consolidating so it can incorporate the DRM/DRR data to generate the adaptation plans for inland/coastal flooding- related risks and hazards. The absence of these adaptation plans compromises the protection from risk and hazards for the targeted communities. The driver for this incipient progress appears to be a defective training process.

Indeed, the provincial officers interviewed stated that the vendor conducted the training without coordinating with the provincial administration in terms of the content of training modules and the timeframe. It was underlined that the content of the subject matter was somewhat theoretical for their needs. The number of days [5] used to impart the training was considered to be too short and did not provide opportunities for discussions and review. Perhaps the most unconstructive aspect was the vendor's proposed modality to draft the provincial planning process the provincial teams: a template was provided so the trained officers could simply incorporate generic data into the template. The officers did not have the opportunity to discuss specific problems reflecting their specific context with the vendor-trainer. The approach was uncoordinated and non-didactical. This was compounded by the fact that the officers in each provincial administration continued carrying their ordinary workload in addition to being in charge of drafting. There was no incentive to get involved in drafting the plan.

---

[16] Inter-American Development Bank. Status of Incorporation of Disaster Risk Management in National Public Investment Systems. Barbados and Trinidad and Tobago. Environment, Rural Development and Disaster Risk Management Division. TECHNICAL NOTE No. IDB-TN-527. Washington DC 2014.; Banco Interamericano de Desarrollo. Integración de la Gestión de Riesgo de Desastres y la Adaptación al Cambio Climático en la Inversión Pública. Centroamérica. División de Medio Ambiente, Desarrollo Rural y Gestión del Riesgo de Desastres. Nota Técnica. # IDB-TN-509. Washington, DC 2013; Jesica Viand y Fernando Briones (compiladores) Riesgos al Sur. Diversidad de riesgos de desastres en Argentina. La Red de Estudios Sociales en Prevención de Desastres en América Latina (LA RED) 1a ed, Ediciones Imago Mundi. Buenos Aires: 2015 .

As with any transfer of know how and skills, the imparting of training to implement a planning process for provincial economic development to enable CCA is complex. Development experience suggests that the didactic method is productive because it focuses on building on the baseline knowledge the trainee possesses, ensuring the practical application of the learning imparted. One possible technique is "job instruction training" where the trainee is taught how to do a job. This technique involves explaining the key points [techniques, processes, etc.] encouraging practice and passing on full control when the trainee has fully learned the job. [17]

In the real world, a planning process must reflect the specific conditions of a given context. This takes a coordinated effort between the trainer, trainee, provincial administration and the UNDP/CCDA and PMU, to avoid the trial and error method that is costly in terms of time. The theoretical training must be accompanied by practicums specifically related to the eventual task for which the training is conducted. In this manner, it is possible to advance the theoretical learning of planning theory and associated techniques, and actually conduct practical exercises on the themes, problems or issues of the eventual planning job, as exemplified by the "job instruction training technique". This approach brings about tangible results but requires close coordination and flexibility between the trainees, the trainer, provincial administrations and the UNDP/CCDA PMU Also, pre-testing the content of the training modules in terms of its theoretical underpinnings and the practical elements of planning is essential.

Once the planning process is understood, the geo spatial data available within the DRR/DRM Atlas and the EWS hydrological and climate services can be incorporated in the provincial planning process for the purpose of the management of inland flooding. There may be two conditions that need to be vetted by national consultant with expertise in geomatics. In order to use geo spatial data, there is the need for the functional requirements of ICT infrastructure for sharing the required layers of data. The available information indicates that PNG's Mineral Resources Authority, who advocates for a Human Geoscience, is the first step in enabling access to the Authority's IT infrastructure management.

As with any other processes involving technology transfer, there is the need to wield the appropriate tools and coordinate efforts. If there is a single crucial thread, it is the importance of coordination within the framework of an IT infrastructure in such a way that interoperability is ensured. Interoperability facilitates institutional work, given that by sharing information in a consistent and readable way, greater added value can be given to the institutional products themselves. This approach needs to be validated by the respective national economic authorities, while being simultaneously coordinated with the national IT infrastructure to determine the possible need for a common platform, with data being updated/curated by each separate department of the province.

The officers involved in the PPP need to acquire the skills to use geo- spatial data to produce pertinent information in their PPP reports. The conclusion is that the provincial government structure needs to elaborate on the provincial planning process and incorporate the climate data to generate the adaptation plans for inland/coastal flooding- related risks and hazards. In the meantime, the communities targeted are exposed to risk and hazards.

Summation

Consider coordinating with relevant stakeholders on the provincial development plan content of the planning process so it encompasses the key economic sectors; and update the skills needed [i.e. elements of geomatics] to incorporate the geo spatial DRM/DRR data into the planning process in such a way that interoperability is ensured. interoperability facilitates institutional work given that by sharing information in a consistent and readable way, greater added value can be given to the institutional products themselves. This approach needs to be validated by the respective national economic authorities and simultaneously begin coordinating with national IT infrastructure to determine the possible need for a common platform with data being updated/curated by each separate department of the province. All over the world the use of DRM/DRR geospatial data is essential for many economic management procedures within the framework of climate change variability.

[17] IBRD. Training manager's workbook. Training techniques. EDI training materials. Washington, DC 1982, pp 111-154

The use of consultants to simply update the geospatial data or "copy and paste" the relevant sections for the use of provinces are no solutions. The object lesson here is that forward-looking institutions drive the use of new technologies, such as geomatics. Geomatics technology is neutral; and on its own it has no impact on the sustainability of its use. It is not an automatically adopted tool. New organizational arrangements are needed to ensure that the benefits of a new technology reach the end-user. Concretely, it is the institutional infrastructure, based on the capacity building efforts of different organizations, that is the key factor in a successful transfer; this is based on experience the world over.

3.1.6 - UNDP Comparative Advantage

UNDP has been assisting PNG in designing and implementing activities consistent with national sustainable development plans, while reflecting on the UNDP's comparative advantage. This is supported by the UNDP's global network of country offices, its experience in integrated policy development, human resource development, institutional strengthening, and non-governmental and community participation. Furthermore, UNDP assures an effective facilitation of partnerships with fellow UN Agencies and long- standing experience in the fields of policy support and capacity development. UNDP was well placed to provide the institutional and technical support required for this project.

3.1.7-Linkages between Project and other Interventions[18]

Within the UN framework there are several ongoing interventions focused on land use systems, village water supply, drought resistant food production, and enhanced governance for disaster risk management. These interventions indicate the continued relevance of the Project.

. In partnership with the Conservation and Environment Protection Authority, the UN contributed to improving the management of protected areas following parliament's pending approval of the Protected Areas Bill. The bill allows incentives for landowners to manage environmentally significant ecosystems and corridors. To ensure people's access to healthy food at all times, the UN supported the development of the National Implementation Plan by chalking out actions and technologies for the National Food Security Policy framework. This led to the development of food security plans and programmes for the Madang, Milne Bay and Chimbu provinces.
. The Satellite Land Monitoring System lab continued generating important data on forest cover change in the country. Moreover, data was collected on the ground about trees, vegetation, entomology, ornithology, and soils. Initial surveys on land use were conducted in the Eastern Highlands, Madang, Morobe, and Northern and Western Highlands Provinces.
. One-hundred-and-two communities were engaged in seasonal calendar monitoring, land use planning, coastal area management, mangrove management, sea weed farming, sustainable water supplies, wet-land management, climate safe shelter typology designing, and gender for climate initiatives.
. The UN supported the protection of 480,000 hectares of a protected area with the help of 80 communities in six provinces including East and West Sepik, Morobe, East and West New Britain and Central Province. The production and sale of cocoa, coffee Moringa oil, soap and other products supported increased incomes. Twenty-seven communities earned approximately USD 56,000 from the sale of coffee and cocoa.
. Under the Global Environment Facility's small grants programme, two solar powered water systems for clean and safe water were installed in the Northern Province, benefitting 1,300 people. Solar kits were distributed to 105 households to pump water from boreholes. A mini-hydro system was installed in the Autonomous Region of Bougainville to generate electricity for local communities.
. Through the Small Grants Environment Facility, the UN worked to improve livelihoods and better farming in rural communities. In Manus, 100 households, (550 people) benefited from sustainable rice farming. A

[18] UN PNG Delivering as One. Annual Progress Report, Port Moresby, 2017, pp 53-57

women's group in the Pari village in the National Capital District and a community organization in New Ireland are protecting coastal zones through mangrove reforestation.

- In 102 prone-to-drought communities, including the atolls islands, coastal communities and Highlands provinces, 1,110 people were engaged in conservation farming for high yield crops. This contributed to 500 farmers producing 67 tonnes of drought-tolerant rice in Jiwaka and Simbu. In the Terebona village of Yongomugl, Simbu Province, 14.4 hectares were cultivated with cash crops and tree seedlings of pinus strobus. In the villages of the Eastern Highlands and Western Highlands provinces drought and frost resistant crops were introduced.
- In 2017, the UN expanded its support to develop the Government's institutional and human capacities to manage disaster risks. Thirty-Six Deputy Provincial Administrators, Provincial Disaster Coordinators and Provincial Monitoring and Evaluation Officers from 12 disaster prone provinces were trained on responding to mass evacuations in case of disasters, integrating disaster risks into provincial development plans, and standard operating procedures used during disasters.
- In 19 provinces, managers were trained on mass evacuation and disaster management. Government officials at the national, provincial and district levels were trained on Information Management Systems (IMS) for disaster data management.
- Awareness sessions on climate change were delivered in 19 villages on Nisan Island. Six river communities in the Angoram District of East Sepik were trained on building floating gardens. After receiving training on climate smart agriculture and seven varieties of crops, 1,100 households (5,500 people) increased their production of rice and sweet potato.
- The UN worked with the Government to improve humanitarian coordination and support El Nino Early Action Planning and La Nina preparedness planning. Six humanitarian clusters were formed. In 12 provinces 362 government officers were trained as trainers on community-based disaster risk management. The Food Security Cluster (FSC) at the national and sub-regional level provided an action-oriented forum to improve humanitarian food security assistance.
- The UN supported the development of Community-Based Disaster Risk Management plans by 67 wards in 23 districts of 12 disaster-prone provinces. Of these 67 wards, 75 per cent (32 605) of the female population were engaged in the planning. Moreover, the UN provided material to each community to implement the plan.

3.1.8- Management Arrangements

According to the original organigram [Box 1], the core arrangements for management were as follows.

- A Project Steering Committee (PSC) made up of high level representatives from CCDA, UNDP and other key stakeholders is co-chaired by the Executive Director of CCDA and the local UNDP Resident Representative. The Provincial Administrators or their delegates from the 5 provinces are also members of the PSC. There can be other PSC members from pertinent national organizations. The PMU assumes the function of secretariat.
- A National Project Management Unit (PMU) consisting of a National Programme Director (NPD), a National Programme Manager (NPM), a Programme Administrative and Finance Assistant, a Programme Associate, and Technical Specialists. The current NPD is the Director of the Adaptation & Projects Division at CCDA.
- Provincial Climate Change Committees (PCCC) have been established at the provincial level and chaired by the Provincial Administrator to coordinate project-supported activities at this level, but also at the local government and community level. The PCCC was expected to oversee the processes of integrating and coordinating climate change-related activities, to monitor progress of the AF project, and to ensure the necessary cooperation within and among agencies and communities. The Provincial Administrator shall appoint a focal person who would act as Provincial Coordinator in support of the National PMU.
- UNDP was to provide oversight (both financial and technical) in conformity with the National Implementation Modality (NIM). Further to the request of the GoPNG, the UNDP-CO was responsible for technical and operational services including: covering identification, sourcing and screening of ideas, feasibility assessment/due diligence review, development and preparation, implementation and reporting.
- UNDP retains ultimate accountability for the Project to the donor, the Adaptation Fund, as the Multilateral Implementing Agency. The CCDA was the national organization entrusted with and fully accountable to

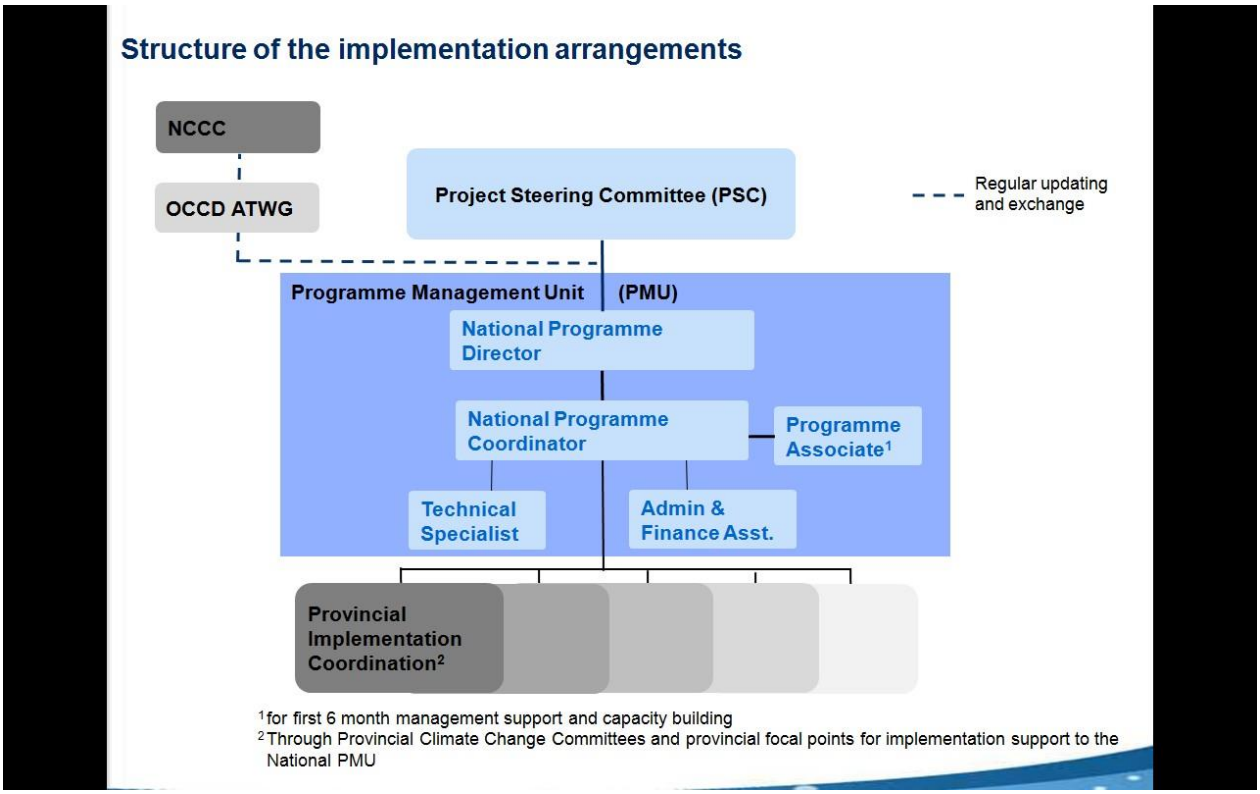
UNDP for managing and delivering project outputs, in conformity with the norms and procedures of UNDP NIM manual for programme execution. This includes the preparation and implementation of project work plans and annual audit plans; preparation and operation of project budgets and budget revisions; disbursement and administration of funds; recruitment of national and international consultants and project personnel; financial and progress reporting; and monitoring and evaluation.

. In essence, the overarching Project implementation modality is known as the "UNDP Country Office Support to NIM." To simplify, project activities are conducted by a Project Team in partnership with CCDA and report to UNDP as per the guidelines.

The Evaluator concurs with the MTE [page 31] that the Prodoc outlined roles and responsibilities clearly within the administrative framework and procedures of the UNDP and the Government of PNG. During the project implementation some disconcerting issues arose. The combination of these issues may have triggered the asymmetrical management that emerged, as discussed below.

First, apparently it was assumed that the PCCC who [1] was a recipient of knowledge and skills [i.e. mainstreaming climate change adaptation], could at the same time [2] discharge the function of overseeing the processes of integrating and coordinating climate change-related activities, to monitor progress of the AF project and to ensure the necessary cooperation within and among agencies and communities. These are implementing responsibilities of consequence and may be the reasons why the PMU did not have a budget to travel to conduct activities in the provinces [Prodoc Annex 5]. It may have been assumed that the PCCC was going to substitute the PMU in the provinces.

Indeed, the MTE's [page 32] perception is that these committees were tasked with the coordination of project-supported activities at the provincial level but also at the local government and community level. However, this coordination mechanism did not work out in the end. As a matter of fact, the PCCC has not delivered the provincial planning process of key sectors to be integrated with the DRM/DRR geospatial data to develop provincial plans to cope with coastal/inland flooding [see 3.1.5]. The MTE [page 32] assessed that Provinces lack clear strategy in terms of what the Project is trying to achieve, including the kind of sustained results that are anticipated. In fact, in this TE, in almost every meeting with members of PCCC, they shared the fact that they unsuccessfully requested the presence of the PM on site several times to review technical and administrative matters for which they themselves could not find a solution at that time.



Box 1 The Project Organigram [Source: Prodoc page 60]

The second issue was, wittingly or unwittingly, the fact that PMU's implementation was asymmetric from the start, as has been documented by the MTE [page 31]. The unremitting gap was the absence of hands-on execution by the PM and the Technical Specialist on climate change out in the provinces. The Project objectives and expected outcomes were feasible, but required exacting coordination to ensure adequate take up of data to generate the expected outputs so they could be amalgamated into expected outcomes. Likewise, it is clear that the techniques required to be learned or managed are conventional, however each time these techniques are grounded on different ecosystems and within specific social structures they need calibration by a Technical Specialist. It is possible that during the Project inception, though the technological complexity and the exacting coordination needed was understood, it was underestimated. The key personnel for the PMU, as defined by the Prodoc organigram, were not contracted, for reasons outside the responsibility of the individuals who later on took the post. It should be reiterated that the above analytical discussions on the PMU and the PM intend to catch a glimpse of the management issues under complex circumstances. Evaluations address what works and what does not in the context of projects. In consequence, this is not an assessment of potential liability of the project team that worked from 2012 to 2017.

The third issue ensuing from the above was the absence of synergy during implementation. As implementation began, vendors began delivering their products. As their job description stipulates, they are not responsible for the amalgamation of outputs into outcomes. In project management, synergy often results from the exploitation of complementary activities or from the carry-over of management capabilities, synchronizing individual, group or organizational activities in a way that achieves a better result than any of the activities by themselves. The preferred and logical source for synergy is a management process like the PMU. Synergy in this Project may have enabled the amalgamation of outputs into outcomes. This is a critical element in a knowledge-based project purporting to build institutions at the national and sub national levels together with the communities in the targeted provinces, within the framework of the reduction of hazards and disaster risks.

The evidence points to the assumption that activities would be executed by vendors, and eventually activities on their own would morph into outputs and ultimately into outcomes. Under the circumstances, in principle, it was the PMU's responsibility, more specifically the PM and the Expert in climate change, to inform vendors and all stakeholders of the need to calibrate the products delivered by vendors so they could induce synergy with other activities and eventually generate outputs with the potential to turn into outcomes. But there was no budget for the PMU to review and supervise implementation in the five sites.

This is further evinced by the fact that the DRM/DRR geospatial data is currently underutilized and to that extent CCA possibilities are compromised. Annex 5 contains a partial list of the data produced. The abundant data is not being processed by the different stakeholders to generate information that would enable the amalgamation of outputs so they become an outcome with the developmental momentum for climate change adaptation. For instance, there is one key study on climate hazards, exposure and vulnerability: Composite Risk Atlas and Maps/Indexes for five pilot provinces [East Sepik, Madang, Morobe and Northern and New Ireland]. The study contained comprehensive hazard profiles and maps in a geospatial format that could be integrated into the National Risk Information System. This study was costly and is underutilized and to that extent the possibilities of CCA is compromised.

As partially discussed earlier with the potential community of end-users revealed that this valuable and precious documentation does not have a "home" where it is maintained and updated regularly. The FPRR [page 25] indicates that the contract with the vendors that produced the reports, using digital information and a geospatial format, did not include a clause requiring training for the maintenance and updating of the data. Instead, it states that the government can update the digital information from the vulnerability assessment using their own resources.

The crux of the matter is to enable this geospatial-based data to generate information that is adequate for the needs of the community of end-users. The specific requirements from the community of end-users can be varied in terms of time and technical requirements. There might be the need for a common platform, with data being updated/curated by each separate department or province [not a clearinghouse, the data would stay with and be maintained by the responsible province or department], connected by modern ICT infrastructure for sharing the required layers of data. This does not mean that all data would be shared to start with, however the most important data would be.

To put these facts into chronological perspective, these products were delivered by the vendors about two years ago and in principle the PMU, specifically the Technical Specialist in climate change, would have been expected to inform vendors and stakeholders that the technical products required additional calibration so they could be used by the intended beneficiaries. The crux of the matter was to induce synergy among the data producers and the community of end-users.

Summation

The available evidence points to the fact that the pattern of project management that emerged during implementation did not respond to the Project's development objectives. Wittingly or unwittingly, the PMU's implementation was asymmetric from the start, as has been documented by the MTE [page 31].

. The Prodoc [pp 60-63] outlined management arrangements with clear roles and responsibilities and consistent with the administrative framework and procedures of the UNDP and the Government of PNG. During implementation, the core elements were not adhered to for reasons undetermined. The PCCCs were assigned with substantive implementing responsibilities in the provinces---while the PMU did not have a budget to execute works in the provinces. It is clear that it is not possible to manage activity implementation remotely and simultaneously in five distinct geographically dispersed areas with difficult access. UNDP has conducted efforts in the Asia –Pacific region and Africa where it became evident [in reconstruction efforts in Iraq, Afghanistan, Liberia, Nicaragua, and others] that there is no effective remote activity implementation, especially for capacity building.

. The Project's core work was capacity building. Because the Project was knowledge-based and purports to build institutions, it is labor-intensive work. It is a process by which individuals, institutions and organizations

improve their ability to perform functions, identify and solve problems so they can deal with their developmental needs in the broad context of sustainable climate change adaptation.[19] This work cannot be done remotely.

. In addition to managerial skills, project manager must command the technical skills needed to provide knowledge-based leadership. Because upgrading specific skills, procedural improvements, and organizational strengthening,[20] enables the connection of climate change adaptation and disaster risk reduction to provide a framework for responding to climate change risks. Ultimately, the reduction of climate change- hazards and disaster risks ensures economic development results with some degree of sustainability. Project management had to lead this transfer of knowledge by inducing synergy; the vendors can only deliver their intended product.

. The absence of synergy permeated throughout the Project during implementation. As implementation began, vendors commenced delivering their products without inducing synergy, as this is not their function. The evidence shows that the techniques and technical data delivered by the different vendors is currently underutilized. The abundant data is not being processed by the different stakeholders in order to generate information that enables the amalgamation of outputs so they become an outcome with the developmental momentum for climate change adaptation. Yet the [5] provincial planning process shows an incipient progress, as they lack the skills to integrate climate risks data into the provincial planning process of key economic sectors in order to generate provincial plans to cope with coastal/inland flooding.

3.2-Project Implementation

3.2.1-Adaptive Management

Adaptive management measures were implemented, stemming from the MTE recommendations submitted in February 2016. The MTE [pp 22-33] concluded that the Project had made almost no progress from October 2012 to February 2016. This was reflected starkly in one indicator. The Project had disbursed less than 3% of the AF grant while the timeline had already used 31% of its total. This sluggish progress reflected by the lethargic disbursement stemmed from the pattern of asymmetrical management, as partially discussed earlier. Despite the fact that in 2015 activity execution had shot up, without an extension in time, the Project would have compromised the achievement of an undetermined number of targets.

1. Therefore, the MTE recommended an extension to December 2017 to enable the extension of the disbursement of funds into " better developmental results and contribute to `strengthen the ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations` " The extension came with three recommendations:
2. The Project had to stop conducting additional "assessments and studies and focus on the implementation of concrete actions to address impacts of coastal and riverine flooding in the 5 provinces, including planning activities, flooding risk preparedness but also flooding mitigation activities."
3. Given the fact that the Project management structure "is not conducive to engage and work with government entities and other stakeholders it was recommended to UNDP and CCDA to address this issue and appoint/hire a full time PM and settle the PMU at the CCDA office for the remaining period of the project."
4. To develop a common vision for the Project, "it [was] recommended to increase communication at the provincial and local levels through various media such as flyers, bulletins, emails and other traditional communication means and also to increase the presence of the project at these levels with a more participative approach in project decision making through more project stakeholder meetings."

Before discussing how these recommendations affected Project results, it may be helpful to explain that the recommendation concerning the development of a common vision for the Project is a consequence of the Project

[19] UNDP Capacity Development Group, New York, 2005

[20] Elliot Berg, Rethinking technical cooperation, New York, 1993

focusing almost exclusively on implementing studies and assessments with limited coordination with the end-users of the assessments, i.e. governmental agencies. Thus a "piecemeal" implementation approach emerged. This was compounded by a lack of a clear shared vision about what the project is trying to accomplish. In fact, interview data revealed that very few people have reasonable knowledge about the Project and its strategy [MTE page 33]. Similarly, among the (5) province's counterparts there was no clear strategy on what the project is trying to achieve and even less about potential mechanisms that can sustain the results that are anticipated to be achieved by the end of the project. For instance, NGO grantees were conducting awareness activities in some communities, including the development of excellent community-based DRM plans. However, it was unknown how these plans would be implemented and sustained and, more importantly, if they were replicable in other communities [MTE page 30].

Results from Adaptive Management Measures

The MTE recommendations were far-reaching. They intended to enable developmental results and contribute to the adaptation to climate change-driven hazards affecting specific locations. The evidence indicates that the one-year extension in the disbursement of funds facilitated the disbursement of most of the funds.

[a] Financial Results from Extension

Financial Summary [source: FPRR page 26]

- The project had a total initial budget of USD 6,338,777.
- During implementation, the project received an additional amount of USD $649,394 from the Australian Department of Foreign Affairs and Trade and UNDP provided an additional $443 945 in TRAC resources, bringing the total project investment to $7,412,116.
- As of November 2017, the total expenditures reached USD $ 7,037,574, representing 95% of the total. By 31 December 2017, expenditures were expected to reach 100% of the total

[b] Development Results from the Extension Recommendations

The previous part-time PM became a full time PM. The disbursement of funds improved significantly, but there is evidence indicating that development results had improved. Although there was no management response to the MTE recommendations, the Evaluator will attempt to triangulate the response to the MTE recommendations by taking into consideration perceptions from interviews with beneficiaries, a review of the documentation and working sessions with stakeholders.

During the approximately 18 month time- lapse {from the MTE [February 2016]} to the execution of the TE [April 2018]} there is no evidence of measurable improvement in development results to contribute to strengthening the ability of coastal and riverine communities to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations. The timeline was too short, as the issues had taken root. Logically the immediate cause for this shortfall was the pattern of asymmetrical project management that emerged almost from the project's inception to the present; and the material cause was the defective project design discussed earlier [Annex 7].

As partially discussed before the Prodoc [pages 60-63] outlined management arrangements with clear roles and responsibilities and consistent with the administrative framework and procedures of the UNDP and the Government of PNG. During implementation, for reasons undetermined, the core elements of the PMU were not adhered to. Wittingly or unwittingly, the PMU's implementation became asymmetric from the start, as has been documented by the MTE [page 31]. A hands-on execution by the PM and the Technical Specialist on climate change was the missing link. Technical leadership was critical to develop synergies among users of data that the Project began generating, and the data delivered by vendors began accumulating and increasingly became underutilized.

From the start, as partially discussed earlier and defined in Prodoc, the PMU was not assigned with a budget to travel to conduct implementation work in the five provinces. It is not clear if the [5] PCCCs were to substitute

the PMU implementing functions in the provinces, as they were assigned with substantive implementing responsibilities. The facts indicate that the idea of the PCCC as an implementing agency was impracticable. Everything indicates that there was no installed capacity among the PCCCs for the implementation of a project of the present scope. The PCCC officers interviewed indicated their unsuccessful request for the PM to come to their site and discuss implementation issues.

In fact, the [5] PCCCs were recipients of training activities to carry out the planning process of key provincial economic sectors. Currently, the provincial planning process shows an incipient progress. Thus it is not possible to integrate DRM/DRR data into the provincial planning process of key economic sectors in order to generate provincial plans to cope with coastal/inland flooding. This is a developmental result that has not improved in the last 18 months or so.

All evidence points to the fact that during project implementation there was an absence of synergy among outputs and within outputs to enable their morphing into outcomes. As argued earlier, the design of outcomes reflect ambiguity because it was indeterminate as to what to do once the outcome or subordinate outputs were attained [Annex 7]. There was neither an exit strategy nor an anticipated institutional- arrangement to house the Project's outputs/outcomes after Project completion.

As implementation was launched, vendors began delivering their products without inducing synergy, as this is not their function. There is no evidence indicating that the Technical Specialist on climate change reviewed the products to determine if they were operational for the end-users. This was the time to determine training requirements of the potential users of the geo-spatial data. As result, the abundant data is underutilized. The bulk of the potential users lack the skills to generate information that enables the amalgamation of outputs so they become an outcome with the developmental momentum for climate change adaptation.

Finally, this 18 month time-lapse was an opportunity to increase communication at the provincial and local levels through the a priory delivery of outputs such as water tanks, seedlings, and training for flooding risk preparedness and others]. Approximately USD 1.7 M was disbursed within this time-lapse. The FPRR does not specify what proportions went to distribute resources to communities and what proportion to complete studies. However, the inadequate implementation of adaptation measures through a priory delivery of outputs have brought unintended results, as the TE had the opportunity to verify when interacting with communities, as discussed below.

3.2.2-Partnership Arrangements

Partnerships are vital as they provide the foundation for multi-sectoral collaboration to enhance the adaptive capacity of communities to build resilience. The Project has benefited from a multi-donor partnership between UNDP, Adaptation Fund and the Australian Government through the Department of Foreign Affairs and Trade [FPRR, page 19].

The working relationship between CCDA, NWS, NDC and CEPA has been strengthened. This has been helpful in establishing an integrated early warning system for Bumbu River flooding and developing integrated climate change adaptation and disaster risk management plans.

The Project established partnerships with national and international NGOs through micro capital grants for the implementation of on-ground activities, as a priory output delivery, that is, delivery of outputs without reference to an economic development principle or a sustainable structure. Through these partnerships, project delivery increased from USD 122,445 in 2013 when the first micro capital grant was signed to USD 1,278,094 in 2015. Accordingly, the Project has been able to use up all the project funds and deliver on all outputs by the end of 2017, despite the loss of 12 months due to start up challenges. During field visits to beneficiaries, men and women in different villages, the TE encountered unexpected substandard work conducted by NGO partners. It is clear that these results have adversely affected development results.

- In the village of Wom one partner installed only two of the four water tanks agreed on, despite the villagers' cautions that the installation was defective. The partner did not return to bring the two missing water tanks or to fix the defective water tanks. Another partner delivered the components of a mangrove nursery, including

the first one thousand seedling plants. No instructions or training was delivered on the tending of the seedlings. The lapse of time required for transplanting seedlings, depends on the season, and can be up to five months. The partners never returned so the villagers lost 1000 seedlings and the hope to reconstitute the mangrove area they badly needed, as the sea has begun entering into their home gardens where they raise crops. It should be added that the men and women raise crops in their gardens. They had never dealt with mangrove seedlings previously

- Also in Wom, villagers underwent awareness raising about climate change-hazards and organizational procedures for risk management. They thought this training was abstract, and they did not retain anything practical. They were already painfully aware of the increase in temperatures and unpredictable rain that seriously impact their livelihoods. One women present went to the beach and brought back a yellowish sea weed; she indicated that this has appeared since the temperatures have shot up. She added "the fish appear afraid of this sea weed. They go deep in the ocean so we can no longer rely on fishery as before."
- In the village of Mengar, one partner came to install one water tank. Using their own resources, the villagers built a cement structure to hold the tank. A few days after the water tank was installed, the partner came back and took back the water tank, indicating that he would come back with another one. The partner never came back and the villagers have an empty cement structure.
- The villagers of Moem went through two days of training about the organizational requirements for disaster management. They are acutely suffering from limited water supplies and sea incursion into their food gardens. One partner agreed to the delivery of 3 water tanks instead of the 7 requested. One water tank was delivered and installed on a cement structure paid for by the villagers. The water tank installed began leaking but the partner did not leave any information on maintenance. The villagers have already purchased cement to install the other two water tanks but the partner has not returned, either for the maintenance of the water tank or for the delivery of the two additional water tanks. The partners had also agreed to provide support to rehabilitate the mangroves surrounding their food gardens to manage the sea water incursion. The partner has put the village's livelihood means on hold for an indeterminate time. Men and women do not have reserves to wait for the partner to return.

There was no performance information on the execution of micro grants. The substandard delivery of outputs borders on negative impact. It cannot be argued that it is only three isolated cases, as there could be more than three. Because the choice of sites visited by the TE was opportunistic due to extreme time constraints. These results have caused moderate negative reactions on UNDP financing modalities by partners and stakeholders. Indeed, it was alleged that some partners [NGOs] received assignments without going through the bidding process or any other selective criteria. The Evaluator interviewed representatives of the partners [NGOs] that implemented the micro grants. They all agreed that the time available to conduct the work was brief, sometimes no more than 6 months. Improvisation was evident as in the few cases reviewed there was no RBM used. As discussed in Annex 16, for the purposes of transparency and accountability, these cases of dubious performance of micro grants could be audited together with the procurement issues found in Annex 13.

Vulnerability and Inequity

One stakeholder [cf Annex 13] has expounded that climate change impacts are unevenly distributed in PNG and communities at risk need to know their level of vulnerability to cope with related challenges. Climate-risk and climate-shocks have worsened the poverty conditions. As issues cascade and escalate, populations may react negatively in order to survive, thus precautionary approaches must be prioritized through the lens of equity and justice, as reviewed in Annex 11.

As discussed in Annex 11, the a priory delivery of outputs brings about unintended equity issues. In addition, there are policy issues associated with the direct intervention of the UNDP in the distribution of resources. UNDP and other UN organizations are mandated to conduct normative work. The core work of UN agencies is normative work, [21] that is, work that deals with international codes and standards. This includes food safety, environmental protection, health standards, agriculture health including marine life, and capacity development. The impact of

[21] UNEG Handbook for Conducting Evaluations of Normative Work in the UN System. 2013, pp 5-7

normative work can benefit the lives of millions of people around the world. However, the central characteristic of normative work is its indirect nature and long-term effect. Concretely, the delivery of benefits requires the participation of various partners. If partners perform as expected, then the benefits accrue on the beneficiaries—and the UN agency can take relative ownership.

By contrast, a regional development bank can conduct projects designed to a target population, deliver the key inputs through a production-project, and in four years or so increase the target of the income population. All of this is often accomplished without or little State participation.

IFAD and WFP both carry out regular analysis on the strategic framework with the countries they work, supported by logistic analysis. In this manner, the issues of inequality and sustainability are addressed adequately. Specifically, the WFP [22] has proven comparative advantage in the area of disaster risk reduction and management. This comparative advantage is vital for the realization of CCA efforts. For instance, in a recent intervention in Ethiopia and Kenya, WFP demonstrated that supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives contributed to a sustainable increases in household and community-level food security, supporting long-term resilience-building in traditionally food-deficit areas. The critical result is the long term resilience, and the fact that the women and men folks of communities do not become dependent on donors.

In the matter of a priory delivery of outputs to entice participation of the communities, if it is a strategy, the choice of partner for this process is critical. In the process of CCA, the object lesson here is to select partners with proven comparative advantage to intervene directly in the communities in the context of DRM leading to CCA without introducing unintended inequity issues. The overarching purpose is to promote long-term resilience among the communities while avoiding introducing unintended inequity in the short term in the distribution of resources to those who need the most.

The MTE recommended to strengthen community disaster management capacity in the identified 33 climate-risk hotspot communities. It seems that if these 33 communities would have been validated jointly by stakeholders as being climate-risky, the resulting selection would have avoided inequity issues.

In this vein, it is also crucial that future project design include economic and social incentives that address urgent and immediate needs in order to bring about value added to the society . People tend to work more cooperatively when adaptation interventions are perceived as important in addressing immediate needs and where traditional knowledge is integrated. This is exemplified in the Pati communities in the Kavieng District, New Ireland Province. Mangrove planting and reforestation plays a key role 'to dissipate wave energy and shoreline protection', the marginal benefits from fishery accumulation can be integrated into adaptation projects. Fishery development combined with timber and non timber products from mangrove can address food security and entice rural economic growth.

3.2.3-Feedback from M&E Activities used for Adaptive Management

Annual reports register the progress made during the past quarters and document the progress made against the project objective and outcomes. A review and update of the risks identified at the outset of the Project and the steps taken to mitigate these risks are also found in these reports. There is insufficient information about any adaptive management issues faced by the Project and management changes made. This is exemplified by the situation when the Project was facing difficulties in setting up an operational PMU at CCDA, including periods where there was no PM and then a change in PM between 2014 and 2015. The information available in these reports is undergoing a risk assessment, whereby a risk was logged that finding a PM is difficult because of the competition with private sector companies. This assessment is, however, moot because the skills profile needed

[22] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011 Extracted on 10 July 2018 from www.wfp.org

by the UNDP and other UN organizations, especially for project work, do not coincide with the skills normally in demand in the private sector, especially the extractive industry [MTE page 40].

The TE was conducted three months after the Project was closed. The project team has already disbanded to take on different assignments, and so the information for the evaluation came sparsely. The Final Project Review Report issued on 30 November 2017 came with the TOR as well as with a list of publications from the Project. There was, however, no information provided on the Adaptive Management matters, although there were references about the availability of funds from disbursements made possible by the extension of project end date.

3.2.4-Project Finance

The financial information comes from the Final Project Review Report [FPPR] submitted by project management on 30 November 2017; it is based on financial information for the project, with an operational closure date of 31 December 2017. On this date, as previously mentioned, the project team disbanded to take on new assignments. The Terminal Evaluation was launched on 9 April 2018 and all of the financial information used comes from the FPPR.

The Project had a total initial budget of USD 6,338,777, including USD 100,000 from UNDP TRAC, and an USD 220,000 in kind contribution from the government, as shown in Table 5. During implementation, UNDP co-financing resources increased.

The Project received an additional USD 649,394 from the Australian Department of Foreign Affairs and Trade; and the UNDP provided an additional USD 443,945 in TRAC resources, bringing the total project budget to USD 7,412,116. A GoPNG in-kind contribution of staff time was also attained through staff being given time to participate in all project activities.

As illustrated in Table 5, the Project disbursed nearly all of the donor funds. As of 30 October 2017, the total cumulative delivery, of funds including commitments, reached 98%. It is expected that the final disbursement will reach 100% by 31 December 2017. Table 6 shows the disbursement by outcome and donor.

Table 7: Financial Balance [source : FPRR page 26]

DONOR	**COMMITTED as per cost sharing (US D)**	**RECEIVED (USD)**	**EXPENDITURES (USD)**			**REMAINING FUNDS [USD] [2] – [5]**
			Completion/ proposed [2016]	Completion/ actual [2017]	TOTAL [3] +[4]	
	[1]	[2]	[3]	[4]	[5]	
Adaptation Fund	6,018,777	6,018,777	4,619,337	1,314,930	5,934,267	84,510
Australian Department for Foreign Affairs and Trade		649,394	229,007	404,048	633,054	16,340
Go PNG	200,000					
UNDP TRAC F	100,000	543,945	400,356	69,896	470,252	73,693
TOTAL	**6,318,777**	**7,212,116**	**5,248,700**	**1,788,874**	**7,037,574**	**174,542**

Table 8: Project Expenditures by Outcome and Donor [source: FPRR page 26]

Outcome	AF	DFAT	UNDP	TOTAL
Outcome 1: Adaptation to Coastal Flooding- related Risks and Hazards	2,169,392.26	185,841.12	57,994.16	**2,413,227.54**
Outcome 2: Adaptation to Inland Flooding-related Risks and Hazards	2,091,025.30	198,331.30	95,897.16	**2,385,253.76**
Outcome 3: Institutional Strengthening	736,548.66	185,650.50	123,902.80	**1,046,101.96**
Outcome 4: Awareness Raising and Knowledge Management	395,144.55	3,487.57	0.00	**398,632.12**
Outcome 5: Project Management and Coordination	626,666.23	150.00	130,963.61	**757,779.84**
Total	**6,018,777.00**	**573,460.49**	**408,757.73**	**7,000,995.22**

The Evaluator had difficulties assessing financial control, as there was limited information available because the management team had disbanded in December 2017. One outstanding concern for stakeholders and villagers were procurement issues. In nearly every working session scheduled with the Evaluator and stakeholders and beneficiaries, issues related to procurement matters were brought to the attention of the TE. As discussions on these issues began taking time away from the brief time assigned to the TE, it was suggested that these queries be sent by email. These emails can be found in Annex 13, for the attention of auditors. On the whole, stakeholders questioned why the resources took so long to reach them. Stakeholder concerns are exemplified by one procurement case outlined in Box 2. This case outlines a situation where UNDP procurement principles are apparently applied unevenly and villagers indicated that the resources they received were insufficient. This is a complex situation because to adjudicate on procurement matters requires reviewing the contracts of each partner related to the execution of the works, in the context of the legal and administrative norms prevailing in the PNG. This is why these matters are in Annex 13 for the attention of auditors.

Evaluators do not get involved when it comes to compliance with existing regulations. If development results have been affected by the management of procurement procedures, evaluators ordinarily report on such occurrences as has been done during the Mid Term Evaluation [MTE page 3]. The crux of the above issues appear to stem from the fact that during the last 18 months of the Project timeline, approximately USD 1.7 M, was disbursed. The FPRR does not specify what proportion of the funds were delivered as a priory outputs—and what proportion was to complete anticipated studies. However, it is clear that the delivery of a priory outputs among villagers brought about limited development results.

The evidence indicates that the trigger for the Project's distribution of a priory outputs to the communities was to entice their participation or mitigate their climate-risk conditions. As development experience shows, whenever there is an a priory delivery of outputs equity issues arise because almost everyone is equally deserving to access to these outputs essential for the realization of CCA process.

However, there is evidence indicating that it is possible to reach development results by using a special project design. The a priory outputs are delivered to vulnerable or food insecure communities under the arrangement that they contribute labor to public work/asset building projects that the community has identified themselves. As mentioned, WFP[23] has successfully worked with these types of communities by supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives that could contribute to sustainable increases in household and community-level food security by supporting long-term resilience-building in traditionally food-deficit areas.

Box 2: Billboard Procurement

[23] CF WFP Policy on Disaster Risk Reduction and Management. Policy issues… op cit

Issue : After nearly two years of following up with the Procurement procedure to purchase awareness billboards for Northern (Oro) Province, ultimately the account closed down

General Timeline
2015 = All Provinces agree at the Project Steering Committee Meeting (PSCM) that they would like to produce billboards to raise awareness on the effects of climate change in their Provinces.
July 2016 = Oro Provincial Climate Change Committee (PCCC) meet. One agenda is the development and setting up of awareness billboards.
Sept 2016 = Oro submits billboard design draft CCDA for comment.
Feb 2017 = PSCM discusses billboards as an agenda ite,, all provinces provide their updates
April 2017 = Oro work plan for 2017 submitted with billboard erection planned for Q3/2017
May 2017 = Agenda for June PCCC meeting submitted to CCDA. Billboard locations to be be discussed in June meeting.
July 2017 = Billboard quotations submitted for approval and payment
Sept 2017 = Oro further follow-up on billboards.
Nov 2017 = Follow-Up on billboards from Oro Province. Number of Billboards for Oro reduced from 5 to 3.
Dec 2017 = Number of Billboards for Oro reduced from 3 to 2.
Final Status = Billboards not delivered for Oro.

Source: Project stakeholder [Annex 13]

There are object lessons. The first is operational. In retrospect, it would have been productive if an audit had been done of this Project before the TE. The audit data may have shown the results [financial and otherwise] of the approaches used and would have already adjudicated on the outstanding procurement issues. To this extent, the distinction between financial and development results would have been clearer, as would have been the results obtained.

Considering the alleged inconsistent application of UNDP procurement principles and the possible unequal effects from the a priory output delivery , an audit could be considered to clarify these matters.
There is a policy issue here. As partially discussed above, UN organizations are mandated to conduct normative work. This includes food safety, environmental protection, health standards, agriculture health including marine life, and capacity development. The central characteristic of normative work is its indirect nature and long-term effect. Likewise, the project design of a UN organization requires the participation of various partners. If partners perform as expected, then the benefits accrue on the beneficiaries—and the UN agency can take relative ownership of the project.

Further, the a priori delivery of outputs as a strategy to reach special segments of the population requires a special project design for this purpose to avoid unintended inequality effects. WFP and others have a comparative advantage in the area of distributing free goods directly to meet the population needs. This is conducted through the systematic analysis of the strategic framework with the countries they work, supported by logistic analysis. In this manner, the issues of inequality and sustainability are adequately reviewed.

For instance, it is worth noting that while operating in war zones or fragile states, UN organizations have needed to deliver outputs to the communities for humanitarian purposes. WFP, IFAD and others within the UN system have developed project designs to deliver outputs while avoiding unintended inequitable results. Specifically, the WFP[24] has proven comparative advantage in the area of disaster risk reduction and management in the context of CAA. For instance the project design applied in an intervention in Ethiopia and Kenya, WFP demonstrated that supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives contributed to a sustainable increases in household and community-level food security, supporting long-term resilience-building in traditionally food-deficit areas. It is reiterated that the critical result is long term resilience,

[24] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011 Extracted on 10 July 2018 from www.wfp.org

and the fact that the women and men of communities do not become dependent on donors. A resilient project design is a vital step towards the realization of CCA.

3.2.5-Monitoring & Evaluation

In conformity with UNDP standards and AF procedures, including the UNDP M&E practices for NIM projects, a comprehensive M&E plan was developed during the formulation of the project. The M&E budget of USD 83,000 was allocated representing only about 1.4% of the AF grant.

As is standard, the plan listed M&E activities that were to be implemented during the lifetime of the Project, including a mid-term evaluation and a terminal evaluation. For each M&E activity, the responsible party(ies) was/were identified, as well as a budget and schedule. The plan was based on the logical framework matrix that included a set of performance monitoring indicators along with their corresponding means of verification. During the inception phase, the M&E plan was reviewed and there were no modifications.

The operating modalities of the M&E plan follows with evaluative commentaries when relevant: Performance indicators: The Strategic Results Framework documented a set of indicators with their baselines and yearly targets.

- Inception workshop: with the participation of 60 participants from government agencies, academic institutions, the private sector, donor agencies and civil society organizations, directly or indirectly involved with climate change, was conducted from July 25 to 27 of 2012. It was an opportunity to summarize to all stakeholders the project objective, the overall project strategy, management arrangements, monitoring indicators, risks, and reviewing the project work plan and budget. A project inception report concluded the inception phase.
- Quarterly Assessments: were regularly produced since 2014, recording progress towards the completion of key results, based on quality criteria and methods captured in the Strategic Results Framework. Quarterly
- Issue Log: It was to be updated by the Programme Manager annually to facilitate tracking and response of potential problems or requests for change. It was used often even for substantive issues like management matters.
- Project Progress Report (PPR): Using the UNDP standards for project progress reporting, these annual progress reports are submitted by the Project Manager to the PSC. It comprises a summary of results achieved against pre-defined annual targets at the output level.
- Results Tracker: Projects funded by the AF use this tool to track results achieved. It is to be updated annually and submitted as part of the annual PPR. It documents results achieved against the AF objectives, outcomes and outcome indicators.
- Annual Project Review: Based on the annual PPR, an annual project review was to be conducted during the fourth quarter of the year or soon after, to assess the performance of the project and appraise the Annual Work Plan (AWP) for the following year.
- It is significant that project management presented the Final Project Review Report, which focused on output achievement aligned to outcomes.
- Project Lesson Learned Log: The lessons learned from the final project review report were drawn from POPP and Atlas as they ensured the lessons learned.
- External mid-term and final project evaluations: The mid-term evaluation took place in February 2016. The terminal evaluation is underway. Both evaluations follow the UNDP practice and evaluation guidelines.
- Audits: Audits are supposed to be conducted in accordance with the UNDP Financial Regulations and Rules and applicable audit policies for UNDP projects by a legally recognized auditor of the Government, or by a commercial auditor engaged by the Government. So far no audit has been conducted—at least none has been made available. However, the TE recommends an audit be conducted to clarify issues arising regarding the alleged inconsistent application of UNDP procurement principles, as raised by stakeholders.

It is pertinent to underline that the MTE report flagged [page 36] that during the inception phase, the CCDA had recommended conducting provincial level inception meetings to clarify the project management arrangements between the national and provincial level within the pilot communities and to clarify the Project's overall implementation strategy. Also, "that a formal project governance mechanism with clear roles and responsibilities including a project management unit be established immediately following the inception workshop." This was considered a critical step in ensuring that the Project is implemented within the scheduled timeframe". It appears that these recommendations were not adhered to.

The MTE [pp 36-39] reviewed the set of 21 key indicators and their respective targets that have not been modified since the outset of the Project. The review of these indicators and their respective targets revealed that they were mostly quantitative indicators. Quantitative indicators measure quantifiable things and are numerically comparable. They provide a simple comparison of Project progress over time and are easy to track down. These indicators have been used yearly to report progress made in the PPRs. These quantitative indicators do not portray the evolution of behavior in qualitative terms; for example, the change in capacity development is captured by qualitative indicators such as:

- "Number of provincial and national-level officers trained in climate adaptation planning and implementation" corresponds to the outcome
- "Policy makers and planners at the national, provincial and district offices, institutions and extension services systemically trained to implement climate- sensitive policies and plans."
- There are no quantitative measures for capacity, so there is the need to identify qualitative criteria that describes either a certain kind of skill or aptitude for certain work.

In this vein, the indicators do not fully measure up to the SMART[5] criteria. Although the indicators are specific, easily measurable, attainable and time-bound, they are not pertinent to the outcome and objectives of the Project. The Project is knowledge-based and intends to build institutions at the national and sub national levels together with the communities in the targeted provinces. It is therefore critical to the upgrading of both general and specific skills, procedural improvement, and organizational strengthening.

The set of current indicators do not capture the effect on the Project when building up the capacity of stakeholders and organizations at different levels. The MTE [page 39] recommended adding qualitative indicators to measure the development of these skills, especially at the outcome level.

3.2.6 UNDP and Implementing Partner Implementation / Execution

The Project design was complex and there was activity execution in five sites without practically any coordination. There was also a large number of training activities conducted, and it was not easy to ascertain what the expected results were. Also, as discussed above, a Project's vision was missing, and all of these factors made it difficult to focus on results.

UNDP support for the implementing partner and project team were adequate and timely. In turn, the implementing partner was enthusiastic about the support provided by UNDP. UNDP carried out risk management activities to mitigate adverse impacts on achieving objectives and facilitated extensive international expertise to support project components, including South-South cooperation with a global climate adaptation initiative. Concretely, as part of capacity building for operation and maintenance of the Early Warning System, four staff of the National Weather Service and the Conservation, Environment and Protection Agency participated in a south to south learning exchange to Australia. It provided training for the establishment of the Bumbu river early warning system [FPRR page 17].

The implementing partner displayed concern about country ownership, and was eager and motivated to acquire the know-how to work with UNDP---especially since this was their first experience with a UN organization. The members of the implementing partner disclosed that they have not fully understood the battery of procedures applicable in procurement. It is possible that whatever information was provided during the Inception Mission about UNDP procedures was insufficient. UNDP and other UN organizations also change their procedures from

time to time. It can be challenging to understand UNDP procedures if you come from the outside the UNDP. Most likely, however, the characteristics of the country are such that it was not always possible to apply the standard procurement procedures in every province. Some provinces have a fewer number of providers than others, meaning it is not always possible to obtain three quotes from every province and the prices change drastically because of the costly air transportation.

Many UNDP CO in Africa and Asia-Pacific bundle all the procedures to be used by the UNDP and the country in one volume with the support and acknowledgement of the respective authorities. If such a volume as available in this case it was not mentioned in the discussions about procurement.

UNDP was proactive in its efforts to disentangle the issue of asymmetric management pattern. The MTE and this TE agree on the fact that another critical missing link was the shortage of national personnel with management skills consistent with UNDP programmes. The skills of personnel that extractive industries demand is different than those required by UN programmes, and they are not necessarily transferable. As in many other countries within Africa and Asia-Pacific, UNDP needs to attract national young professionals and provide opportunities for job instruction training. For example, to conduct evaluation exercises, the idea is to identify a number of graduates [male and female] from economics, business or any other social science departments of the local university. Select a few from those who command the minimum skills for social research and elementary statistical analysis, and give them the opportunity to work with UNDP professionals or consultants as research assistants. Since this is an entry level salary, the job should not be cumbersome. Sometime donors can provide small funds for this purpose. The idea is to foster a pool of skilled researchers, as has been done successfully in many countries. The trainees are shown how to design a data collection framework, and what techniques to use to gather and process the data and summarize the findings. The trainees are encouraged to begin assessing findings until they are in full control of an assessment. Experience shows that those trainees that become competent as evaluation assistants can carry out much of the programmatic work of the UNDP because they are already acquainted with the project design and supporting mechanism, i.e. procurement guidelines and others

3.3-Project Results

3.3.1-Overall results [attainment of objectives] [*]

The focus to assess overall results is at the outcome level. The Project has not attained the expected outcomes. Under the circumstances, the Guidelines signposts procedures to assess project results in the absence of outcome results.[25] Thus, from the output-based implementation results [Annex 12] and field observations, supported by focused beneficiary interviews [Annex 7], the Mission has triangulated intermediate outcomes [Annex 15] . Annex 15 is the Mission's composite estimate of the Project's progress in outcome achievement --derived from annexes 7,12 and 14. However on October 20, 2018 the CO shared with the Evaluator another estimate of outcome progress [Annex 17]. Therefore, Annex 17 was given preference when assessing the overall results.

Objective	**Overall Rating**
Strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about, and to undertake concrete actions towards, adapting to climate change-driven hazards affecting their specific locations.	MU

[25] The Guideline stipulates that "project results include direct project outputs, short- to medium-term outcomes, and longer-term impacts, including global environmental benefits, replication efforts, and local effects. Most UNDP supported AF financed projects are expected to achieve anticipated outcomes by project closing. Measuring outputs alone is insufficient for capturing project effectiveness. Also the fact that global environmental benefit impacts are difficult to discern. Annex 5 of Guidelines propose a procedure if outcomes were not achieved. Cf. UNDP. Guidance for Conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Projects. Evaluation Office, 2012, page 19

TE Comments
All combined evidence indicates that the outcomes were not achieved, and consequently, neither was the objective realized.

Target	Achievement Rating
. By the end of the project at least eight coastal communities are protected against coastal flooding scenarios through adaptation measures, with attention paid to the special concerns of women as participants and beneficiaries. . Eight riverine communities are protected through adaptation measures against inland flooding, with attention paid to the special concerns of women as participants and beneficiaries. . At the end of the programme, adaptation to climate change is managed, monitored and planned at the provincial level in the targeted provinces and supported by a framework of policies and plans, including disaster preparedness and response plans, as well as coastal zone management plans.	MU

T E Comments
There were possibly marginal achievements with respect to the MTE attainments [p 23]. However, the changes have not been reported or quantified. All necessary data should be available to undertake Climate Change Adaptation plans. There is political commitment in the targeted provinces for engagement in a framework for disaster preparedness, response plans and coastal zone management.

Outcome 1	Overall Rating
Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region.	MU

Targets	Achievement Rating
. By the end of the project, eight communities are protected from coastal flooding through adaptation measures that were put in place in a community-led way with agreed upon agreements/compacts by communities to preserve the mangrove forests. . At least six tidal gauges and at least six Automated Weather Stations [AWS] and ten voluntary weather stations established at strategic locations, that meet World Meteorological Organization standards and contribute to the monitoring and early warning system. . One AWS will have been installed in each of the eight target communities. . At least four provinces will have a comprehensive disaster preparedness and response plan for coastal flooding in place and will have conducted dry run tests. . The three provincial capitals of Lae, Madang and Wewak will have suitable coastal engineering measures for adaptation that are identified and addressed through respective planning and funding. . Thirty three community-led mangrove conservation and/or reforestation projects, covering about 100 hectares, are supported through the support network and nurseries. . Eight regional nurseries operate sustainably, supplying the requirements of the target sites and replication areas. . Before the end of the project, sufficient resources are allocated by the government for the continued operations of the nurseries beyond the life of the project.	MU

TE Comments.

. The data indicates [Annex 17] that intermediate outcomes were attained by virtue of the following accomplishments:
. Mangrove restoration: a community-based/led coastal adaptation initiative, with considerable potential to foster investment In mangrove reforestation by the villager. This initiative could make villagers the solution to the hazards of climate change adaptation. However, there are no regional nurseries as yet and Nurseries serve the specific needs of the participating communities.
. Nine Automated Weather Stations that met World Meteorological Organizations standards were installed in the five pilot provinces. The Morobe Province has five separate pilot flood early warning system for the Bumbu River, which included the installation of three rain gauges and three tidal gauges. The integrated data management systems from these stations are transmitted through NIWA's NEON telemetry systems to the National Weather Service and the Conservation and Environmental Protection Authority. Nothing was installed at the community level due to uncertainties over ownership issues, which threatened the security of the equipment and the poor infrastructure in rural areas covering the project sites.
. The Provincial Adaptation Plans for all five pilot Provinces are in progress. Two provinces developed disaster preparedness and response plans that are pending Provincial Executive Council approval. These plans articulate the hazard risks in the provinces, contain an institutional framework for disaster risk management, and outline the roles and responsibilities of key stakeholders and standard operating procedures for disaster response. Three provinces are at different stages of identifying engineering measures to adapt to climate related coastal flooding.

Outcome 2	**Overall Rating**
Reduced exposure and increased adaptive capacity of eight riverine communities in four provinces	MU

Targets	**Achievement Rating**
. By the end of the project, eight communities are protected from inland flooding through adaptation measures that were put in place in a community-led way. . At least 6 AWS and at least 20 voluntary weather stations are established at strategic locations, meet WMO standards and contribute to the monitoring and early warning system. . One AWS will have been installed in each of the 8 target communities. . At least four provinces will have a comprehensive disaster preparedness and response plan for inland flooding in place and will have conducted dry run tests.	MU

TE Comments

The data indicates [Annex 17] that intermediate outcomes were attained by virtue of the following accomplishments:

. Reduced exposure and increased adaptive capacity efforts will be commencing shortly in the East Sepik, Oro, Morobe, and Madang provinces.
. In communities in the East Sepik, Northern, Morobe, and Madang provinces that are covered by the improved warning system and weather information, Automated Weather Stations and voluntary weather stations will be installed shortly . Additional stations were established in the Morobe province.
. Two provinces are preparing Provincial Disaster Risk Management Plans whereas in Madang Province, six Ward Disaster Risk Management Plans completed developed and implemented.

Outcome 3	**Overall Rating**

Strengthened institutional capacity at the national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices.	MU

Targets	**Achievement Rating**
. At the end of the project, all major development plans in the targeted provinces reflect climate change and adaptation considerations and ensure that coastal zone management policies are developed for the most populated areas (especially Wewak, Kavieng, Madang, Lae). . At the provincial level, there is a strong link between all climate change officers/focal points and the communities in their respective provinces and the officers are equipped with the resources and capacity to identify and manage adaptation needs in the province. . Increased (at least 20%) number of women participating in capacity building activities at the national and subnational level.	MU

TE Comments

The data indicates [Annex 17] that intermediate outcomes have been attained by virtue of the following accomplishments

. Five Provincial Climate Change Committees for all pilot provinces have office equipment and functioning at their own level.
. One Provincial Disaster Management Plan is complete [East Sepik] . Another Provincial Disaster Risk Management Plan is pending finalization [New Ireland].
. In Madang, there are twelve Community-based Disaster Risk Management Plans, six Ward Disaster Risk Management Plans and twenty-five ward disaster management committee members.

Outcome 4	**Overall Rating**
Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at the national and sub-national levels.	MU

Target	**Achievement Rating**
. Seventy-five percent of the risk-affected population is exposed to awareness raising activities and materials. . The topics of climate change and adaptation are introduced in PNG's school curricula and university academic programmes and teachers are equipped with the required knowledge and . material. . By the end of the project agreements on the continuation of awareness raising and adaptation activities (especially replication) through contributions from Corporate Social Responsibilty programmes and private sector participation are reached (including projects under infrastructure tax credit schemes) and make resources available for community-led adaption in at least 10 further communities (estimated 500,000 USD).	MU

TE Comments

The data indicates [Annex 17] that intermediate outcomes have been attained by virtue of the following accomplishments:

The following materials are in the process of being incorporated into the formal school curricula :

- "Introduction to Climate Change: Supporting Existing Education Curricula in Papua New Guinea schools". Supplementary teaching material on the impacts of climate change;
- Other supplementary resources for teachers: One online photo gallery on climate change stories of 23 individuals;
- six minute video on climate change adaptation and 18 short videos in local languages on climate change adaptation.

Summary

The techniques proposed bt the project have the potential to solve the environmental problems linked to climate change adaptation in PNG. When the level of human skills is enhanced to realize gains in productivity , supported by resources and institutional arrangements that are calibrated to ensure sustainable results, it is possible to obtain transformative change. One case in point is the potential to rehabilitate mangroves, as demonstrated by encouraging test results. The preliminary investment figures per hectare are promising. In addition, the reforestation of mangroves is socially acceptable, economically viable and environmentally sound.

When all is said and done, it was the lack of coordination between vendors, government agencies, and Project management that led to the Project's shortfall. In fact, on the whole, data was delivered by vendors when government agencies had not received the training to upgrade their skills so they could exploit the data. As a result, for now the data is largely underutilized. Although the absence of coordination, particularly sequencing, provides a mechanical explanation of the non-realization of outcomes, the formal cause is the design of outcomes which was incompatible with the skills of the end-users. The outcome design did not specify what the required level of skills were if outcomes were to be achieved or if problems that were encountered that created delays were to be solved. The project itself was anchored on capacity development and lacked a framework to target the attainment of specific skills to ensure the attainment of outcomes. The project, wittingly or unwittingly, contemplated a massive transfer of know-how without a strategic framework for this purpose.

More importantly, though it is intuitively clear, we seem to forget that the process used to create a product or service that is efficient often involves a lot of inefficiency; inefficiency in its different manifestations is a normal process of learning while doing. [26] These inefficiencies act as a source of learning for moving forward. Specifically, current technology has many efficient algorithms from which society in general and organizations in particular benefit. For example, if understanding the context of an ecosystem and the surrounding sub systems is required, GPS is not helpful. "A GPS isn't going to tell you where the bad ice is, says an Inuit man, the only way to find out is to go and find it where it is."[27] Geo spatial data can provide a considerable amount of data on many development topics, national resource planning, and management and disaster risk reduction, etc., however if the specific techniques and software used to process the data is not mastered, a downward spiral can follow. It is important to avoid the illusion that algorithms function on their own without upgrading human skills and organization.

In the end, it is organization that is the decisive factor to attain results as well as the most fortuitous. There are planning techniques that can provide support to organizational arrangements, like Gantt charts, the Critical Path Method and the Logical Framework. Ultimately, coordination is the critical step in reaching sound organization. If there is a single crucial thread that has persisted through successful development efforts, it is the importance of coordination.[28] Coordination allows communities to accomplish tasks that individuals working alone cannot. People can build on one another's strengths and make up for one another's weaknesses. Coordination, in turn, depends on communication — the exchange of information and motivation that allows people to work together.

---

[26] NYT The Efficiency Paradox. What Big Data Can't Do by Edward Tenner. Alfred A. Knopf. Extracted on June 4 2018 from www.nyt.com

[27] Globe and Mail. At the edge of Canada, climate change brings "ecological grief" to Labrador Inuit. Montreal, 23 Oct 2018

[28] NYT Data and Capitalism, What Data Has Done to Capitalism, by David Leonhardt. Reinventing Capitalism In The Age Of Big Data, By Viktor Mayer-Schönberger and Thomas Ramge. Basic Books. Extracted on June 8 2018 from www.nyt.com

3.3.2 Relevance

Relevance Rating : Relevant [R]

PNG is on the frontline when it comes to climate change impacts, even though it is a small contributor to climate change. With rising sea levels and increasingly extreme weather events, the daily reality in the country leaves little room for climate skepticism. Environmental impacts are already irrevocably changing life in these island states – with rising sea levels exacerbating rising sea levels. The Project is in line with supporting development priorities at all levels of the GoPNG's efforts to lead planning, coordination and on-the-ground implementation of measures to facilitate adaptation at all administrative levels. GoPNG intended to place particular focus on increasing vulnerable communities' resilience to climate change.

The available information indicates that target group priorities were dealt satisfactorily. However, the a priory distribution outputs to stimulate the communities to begin the process of CCA required a more refined methodology. This is to avoid introducing unintended inequities among the communities and members within the communities, as has been alleged.

UNDP has been assisting PNG in designing and implementing activities consistent with national sustainable development plans. UNDP's comparative advantage is reflected in its global network of country offices, its experience in integrated policy development, human resource development, institutional strengthening, and non-governmental and community participation.

3.3.3 Effectiveness and Efficiency

Effectiveness and Efficiency Rating: Moderately Unsatisfactory [MU]
Effectiveness

From October 2012 to February 2016, there was almost no progress in terms of activity implementation.[29] The Project had disbursed less than 3% of the AF grant, while the timeline had already used 31% of its total. This lethargic disbursement seemed to stem from a pattern of asymmetrical management [Annex 14]. During 2015 activity implementation had picked up, however without an extension in disbursement time the Project would have suffered an even greater shortfall of implementation targets. The MTE recommended an extension to December 2017 to allow extra time for fund disbursement to help expediate development results—with particular reference to concrete actions in the adaptation to climate change-driven hazards affecting the target areas.

From March 2017 to December 2017, nearly 99% of the total funds were disbursed [Table 7]. There is no specific information on fund disbursement by activity during the second half of the Project. Project authorities did not produce an outcome-based results framework; only an output-based final report is available [FPRR]. The combined evidence from the Evaluator's field visits and the FPRR output-information indicates that an undetermined number of outputs were delivered a priori—as analyzed in detail in Annex 11. Put differently, the logic applied to the delivery of outputs lacked reference either to an economic development principle or an approach that ensured sustainable and equitable results.

The available evidence indicates that increased disbursement did not help attain expected outcomes. The evidence gathered by the Evaluator during field visits to several villages shows that the activities implemented did not lead to the meshing of outputs into expected outcomes. There is inconclusive evidence indicating that the a priori delivery of outputs may have induced possible inequitable repercussions on an undetermined number of villagers. There are also alleged concerns from stakeholders [Annex 13] on the Project's inconsistent application of UNDP procurement procedures.

[29] Mid Term Evaluation 2016 [pp 22-33]

In the absence of the Project's final results framework, this TE is unable to assess to what extent the expected outcomes have been achieved. Accountability considerations do not allow the Evaluator to sketch a proxy- Final Results Framework. With the purpose of moving forward with the assessment and to draw lessons learned and recommendations, Annex 15 is the Mission's composite estimate of progress in outcome achievement --derived from estimates in annexes 11,12 and 14. As noted, these estimates are the Mission's, with the purpose of moving forward in the assessment of possible lessons learned and conclusions.

These estimates indicate the emergence of four sets of intermediate outcomes. 1- Early Warning Systems and Disaster Risk Management for Climate Change Adaptation [containing six outputs]. 2- Community-based Mangrove Reforestation and Conservation. [1 output]. 3- Planning at all levels of Government [containing two outputs]. 4- Knowledge Management and Education Curriculum for Climate Change Adaptation [two outputs]. All outputs appear complete even though no inspection was conducted.

The outputs within each set have the potential for amalgamation if synergy is induced. These outputs could morph into outcomes leading to [1] instituting a tangible and measurable change in behaviour among the population and [2] enhancing institutional performance among the organizations involved at the national and semi-national levels, including communities inhabited by all walks of men and women. It is critical to understand that the lynchpin of these knowledge-based intermediate outcomes is the capacity development needed to build institutions at the national and sub national levels together with the communities in the targeted provinces, within the framework of the reduction of hazards and disaster risks. Ultimately, the goal of a reduction in climate change- hazards and disaster risks is to ensure the achievement of economic development results, including current physical assets that are the country's endowment, and preserving biological and cultural diversity.

Efficiency

There is little or no data available to assess the appropriate allocation and economic use of resources to produce the expected outcomes. Information like yearly audit results, or a complete terminal report with an outcome-based results framework are not available. In the absence of relevant information for a rigorous review, in order to advance the assessment on efficiency, an insight can be perceived by reviewing the allocation of resources assigned in the Prodoc [Annex 5, pp 94-97] in the context of the output-based final report [FPRR] and the data reviewed by the Mission [Annexes 7, 12 and 14]. The intent is to triangulate guesstimates about the economic logic of resource allocation with respect to generating the expected results as teachable moments.

Table 9. Project's Total Budget and Work Plan [source: Prodoc, Annex 5]

	International consultants	Local consultants	Travel	Contractual services companies	Training, workshops and conferences	Equipment	Material & supplies	Total
Item	[1]	[2]	[3]	[4]	[5]	[6]	[7]	
Outcome1	200,000	226,000	233,000	781,500	357,500	403,250	286,000	248,7250
Outcome2	240,000	182,500	265,000	746,500	293,500	338,000	11,000	2,076,500
Outcome3	210,000	66,000	39,500	50,000	202,000	0	17,000	584,500
Outcome4	90,000	81,000	39,000	54,000	36,000	500	52,000	352,500
PMO	95,000	14,000	0	372,633	7,000	28,394	0	517,027
Total	83,5000	569,500	576,500	200,4633	896,000	770,144	366,000	601,7777

Source: Prodoc, Annex 5: Total budget and work plan, pp 94-96 [The differences in figures with original are due to rounding off]

The Prodoc's allocation of resources [Table 9] shows that approximately 57% of total resources were allocated to international / local consultants and contractual services companies[30] [i.e. columns 1+2+4]. Training workshop and conferences were allocated 15% total funds. Travel took 10% of resources and equipment material and supplies took another 19%. The lion's share of the resources went to national/international consultants that were allocated primarily for activity implementation in outcomes 1 and 2 . In fact, when both outcomes are added together, they used up to 76% of total resources.

If a Value for Money Audit was conducted on the above allocation of resources, an independent evidence-based investigation would have examined the reports produced and determined whether economy, effectiveness and efficiency had been achieved in the use of Project funds. In the absence of these audits, combining the output-based final report [FPRR] with the interviews with stakeholders revealed that abundant data was generated [Annex 5 contains a partial list of these studies and reports]. Many of these reports are in a geo spatial format. The Evaluator interacted with several members of the community of end-users. They indicated that the valuable and precious documentation does not have a "home" where it is maintained and updated regularly for use in the preparation of disaster risk management plans and other development initiatives.

In brief, a crude yardstick emerged. The Project moved from: data- poor/information- poor to data-rich/information- poor conditions. The teachable moment is that the economic logic of resource allocation did not generate the expected results. Despite the abundant data generated by vendors, the community of end-users are unable to exploit the data to integrate the geo spatial data with disaster risk management and development plans. The economic allocation of funds underestimated the concomitant need of skill development with the generation of data spatial and otherwise.

3.3.4 Country Ownership

The project concept was in line with the GoPNG's development priorities and plans reflected in the Climate Compatible Development Strategy (CCDS) set out in March 2010. At the same time, the Cabinet also established the Office of Climate Change and Development [OCCD] as well as the National Climate Change Committee [NCCC], who took full and exclusive responsibility of climate change and environmental sustainability in PNG. The OCCD then created four Technical Working Groups: REDD+, Adaptation, Consultations, and Low-carbon Growth [Prodoc page 10].

The GoPNG representatives were involved at the department level level and management arrangements were conducted through the CCDA. The CCDA played the role of implementing partner and five provincial governments were also involved in the implementation, including NGOs.

The government has not yet enacted any legislation or developed policies and regulations derived from the Project's outputs. Some outputs are about to be completed. Five provincial governments are in the process of preparing plans to control and manage risk from coastal and riverine flooding. Likewise, the automatic early warning systems will be operational soon. Indeed, all Project outcomes are consistent with national policies and can be incorporated into the national and sectoral development plans. The national government has maintained financial commitment to the project

3.3.5 Mainstreaming

With the purpose of managing the hazards of flooding in the coastal areas of the North Coast and the Islands Region as settlements are usually located along the coasts, the Project has already conducted a systematic assessment of the vulnerability of these coastal and riverine communities to enable the necessary institutional and

[30] The term "contractual services companies" is undefined. It is assumed these are the vendors involved in the process of providing services.

individual capacity at a national, provincial, district, and local level to enable decentralized and well-informed decision-making.

It was anticipated that through the Project, the GoPNG intends to foment the development of guidance materials on climate resilient coastal and inland protection, land-use planning, and early warning systems to assist planners, decision-makers and practitioners understand climate risks when making development and investment decisions. At the community level, women and men in villages around the country are facing considerable stress from the loss of food gardens due to extensive flooding (both in coastal and riverine areas) combined with extended periods of drought; even worse, the rising sea level is causing some of PNG's islands to be gradually submerged. Salt water intrusion is affecting groundwater, particularly in the islands and in coastal areas, threatening domestic water supplies and agriculture.

Several efforts of rehabilitating mangroves have already been conducted in the provinces of Madang and East Sepik, among others. The local populations are enthusiastic about the potential to improve their livelihoods with the conservation and development of mangroves. In these efforts of mangrove rehabilitation, women folk provide a key input in the development of nurseries for mangrove propagation. The mainstreaming of mangrove conservation and development intersects with the UNDP's efforts in sustainable environment, poverty alleviation and gender in development.

This is because all data indicates that the root cause of poverty is the dwindling resource base aggravated by the ongoing shocks of climate variability, and compounded by a formidable constraint: ancestral tenure regime. Annex 10 is a preliminary investment schedule, collected in the field by the evaluator with the support of vendor and beneficiaries. The early results from the village of Numur [Medeng province] are encouraging. With investment of approximately USD 1000/ha it is possible to rehabilitate mangrove forest. By the Year 6 the eco services kick in in the form of increased supply of fisheries and non- timber forest products. According to the fishermen interviewed the fish stocks can double including crustaceans, frogs, snakes. Women interviewed in the area indicated their interest in getting involved in the marketing the increased fish -supply, including limited processing in the form of dry- fish.

Women are also interested in non- timber forest products, such as Sago palms, with considerable nutritional value that is underestimated. The literature indicates that two kg of sago has the nutritional value of 1.5 kg of rice. Similarly, there could be an expansion of the three varieties of sweet potato cultivated in the area [cf Annex 7]. Regrettably there was not sufficient time in the field to collect crop budgets from the different staple crops, as proposed in the Inception Report. Crop budgets would have provided estimated economic returns per crop either in the form of labor or net returns from the investment. However, it must be underlined that all work activities associated with mangrove rehabilitation and development are gender neutral. With the exception of limited carpentry work, most of the activities involved in mangrove reforestation can be carried out by men and women. Annex 10 contain a detailed classification of work-activities in the investment and operation of mangroves.

Gender mainstreaming was considered in the design and implementation of the Project. From a total of 50 316 of Project direct beneficiaries, 41% were women. Specific training was carried out on climate smart agriculture and food preservation attended by 375 people of which half were women. But women continued being underrepresented in community leadership structures largely because the cultural setting prescribe men as leaders of organizations. Out of the total of 25 ward disaster management committee members, only one is female [FPRR page 18]. Last, the potential contribution of UNDAF in this context is outlined in section 3.3.8.

3.3.6 Sustainability

Overall Sustainability Rating: Moderately Likely [ML]

The Prodoc estimates that the prospects for long-term sustainability of Project achievements is rated as "likely sustainable." The GoPNG has shown commitment to address climate change. Its intentions have been reflected in the country's CCDS, and the establishment of the NCCC and the CCDA. Indeed, this Project has been a direct

response to government priorities in the climate change adaptation area. Therefore, it can be inferred that the GoPNG will continue financing and implementing CCA actions in the near and medium term timeframe.

Financial risks: Moderately Unlikely [MU]
Financial risk is a key area concerning long-term sustainability of intermediate project achievements . There are outstanding financial expenditures to complete key intermediate outputs. One relates to supplementary investments needed to establish a EWS. This system requires additional hardware, software and communication devices. Additionally, the Project needs to support the development of capacities to operate and maintain EWS , which should be housed at the National Weather Service (NWS). There is a certain financial risk attached to the sustainability of the EWS.

The mainstreaming of climate change adaptation for planning process of key--econo sectors attached to the five provinces is delayed. There is the need to train all the personnel required, not only in the economics of regional planning but also in geospatial data processing. All the data related to climate change adaptation must be integrated with provincial development planning to generate community level plans addressing coastal andriverine flooding. This is part of promoting an inclusive, economy-wide approach to building climate resilience to protect communities, property and economic infrastructure.

In the context of CCA, the regional planning process of key economic **and non-economic sectors** related to the five provinces is delayed. There is the need to train all the personnel required, not only in the economics of regional planning but also in geospatial data processing. This will enable the personnel to integrate the data related to the DDR/DMR with provincial regional planning in order to generate community level plans addressing coastal / riverine flooding . This is part of promoting an inclusive, economy-wide approach to building climate resilience to protect communities, property and economic infrastructure.

The mangrove community-based reforestation and development had a sound start. There is some know-how that has been transferred to the villagers through pilot efforts. The communities are enthusiastic about the potential of mangrove rehabilitation for enhancing livelihood opportunities, but most of all as a tool to cope with climate change-related hazards. There is potential of possible self-financing provided competitive and sustainable micro credit funds are channeled to the different areas. There will be the need for financing start up operations linked to numeracy, literacy and elementary financial accounting to enable women and men to run their investments profitably. Likewise, tenure systems should be reconsidered jointly with the traditional authorities so tenure system become an incentive to expand mangrove rehabilitation.

Socio-Economic Sustainability : Moderately Likely [ML]

In the Madang province, where the Evaluator interacted with women and men involved in mangrove rehabilitation, the beneficiaries perceived the Project activities under implementation as consistent with their own interests. In fact, there were sufficient beneficiaries to apply the Most Significant Change [MSC] technique [Annex 8]. Women and men alike manifested that mangrove rehabilitation was an important avenue to enhance their opportunities for food security under the harsh conditions of climate variability. This is a clear instance where the sustainability of the project's actions was anchored in the socio-economic improvement of the beneficiaries.

- By contrast, in the villages visited [sec 3.2 Main Report] where outputs were distributed a priori [without reference to either an economic development principle or a sustainable structure], where those who received the outputs with relatively better off, two issues arose. Those who received the outputs did not consider the quantity adequate to meet their current needs, for example, the number of water tanks to store rain water was insufficient; or the vendor installed the water tanks without reference to the villagers' needs. Worse even, many beneficiaries with the same needs were excluded from this distribution by necessity, thus raising unintended inequality within villages and among villages by extension. No socio-economic sustainability is possible under these circumstances.

.

The opportunities for eco-tourism in Madang, specifically in the village of Numuru, exemplify the context of long term sustainability anchored in socio-economic development. One informant, interviewed by the Evaluator, had

already used his own resources to invest in the rehabilitation of several hectares of mangroves. As the fishery improved due to the presence of mangrove vegetation, the eco services kicked in. With a sustainable supply of fish, he built a few rustic log-cabins with mangrove logs. Then he set up a small restaurant and hotel. He had plenty of customers. He did not offer financial figures on his operation, implying that it was a good business, as is customary among villagers.

The teachable moment is that investment in the facilitateion of the recovery of the eco services flow , through improvements in capacity development tied to management for natural resource enhancement, is a better option for improving the welfare of communities, as opposed to the a priori distribution of outputs that generate unintended inequality among villagers. This is summarized in the maxim: the best way to help someone hungry is to teach them how to fish instead of giving him one fish.

Institutional Framework and Governance : Moderately Unlikely [MU]

The strengthening of institutional capacity at the national and sub-national levels has only begun with the establishment of five provincial Climate Change Committees and the preparation of provincial disaster management plans, including in the communities and wards [Annex 17]. There is insufficient evidence to ascertain what the actions are that should be taken or not to pave the way for institutional sustainability[31] to enable the delivery of benefits for an extended period of time, and beyond the project completion date as the project is phased out in December 2017.

The project management data [Annex 14] provides a glimpse of partners that can advance the institutional sustainability of the Project efforts. As discussed, the Project's organizational structure was characterized by isolated or semi-isolated teams situated in five provinces that were difficult to access. The teams lacked communication on technical matters with the PMU, which was situated in the capital, and lacked a budget to facilitate the coordination of on-site activities with the five teams.

Though the techniques proposed for use were not cutting-edge technologies, the crux of the matter was inadequate coordination to exploit the geo spatial and other kinds of data delivered by the vendors. It was almost inevitable that under these conditions the Project became dependent on product supply from vendors. As contractual arrangements did not include training procedures for the grounding of the data and its maintenance [i.e. geo spatial data], the conditions for sustainability dissipated. The targeted institutions were unable to enhance their capabilities for climate change adaptation and to that extent launch a regime of institutional sustainability for society.

Without placing liability or culpability on vendors for the shortfall of the project implementation targets, it is important to acknowledge that vendors' business is business. Once the output is delivered a good vendor is ready for the next delivery somewhere else. It is not the vendor's concern if there was a sound environmental or socio-economic fit with the requirements of the recipient's social unit where the output was delivered. Unintentionally, therefore, the conditions of institutional sustainability were compromised by an output delivery solely controlled by vendors.

Annex 11 thoroughly discussed that the selection of implementing partners should identify those with a proven comparative advantage to intervene directly in the context of strengthening institutional capacity. An implementing partner's overarching purpose is to promote long-term sustainability in society, including resilience among the communities

Environmental Risks : Moderately Unlikely [MU]

[31] Serenella Salam, Biaggio Ciuffo, Peter Njikamp. A systematic framework for institutional assessment. Ecological Economics. Vol 119, Nov 2015, pp 31-325

The Project activities did not yield any environmental risk. On the contrary, they were intended to conserve the environment and biodiversity and increasing livelihood opportunities at the same time. The most immediate interventions to conserve the biodiversity and increase livelihood opportunities are related to mangrove rehabilitation actions. Mangrove rehabilitation is at a point of convergence with a sustainable framework , as key institutional reforms are needed to hedge the risk of continued degradation.

First, adequate tenure arrangements over land where the investments will be laid out should be negotiated with traditional authorities before the investments are carried out —as nearly all the land in the country is under ancestral tenure. In reality, there is no available land outside of ancestral tenure arrangements. This is a critical feature that was reflected during discussions with villagers in the context of food gardens. Villagers made it very clear that besides the land-area where their current food gardens are situated, there was no additional land anywhere. This was because the land of the surrounding villages was already prescribed by the ancestral land regime.

Those villagers who might consider investing in the rehabilitation of mangroves need the assurance that they can reap the benefits in the long term. As it takes about 6-10 years for the mangrove to mature, the time lapse needed to benefit from such an investment is probably around one generation [33 years]. This time lapse can allow the play of economic incentives so villagers can embark themselves in mangrove reforestation operations to enhance their family income and overall wellbeing. In this manner, the villagers themselves become the solution to the hazards of climate change adaptation

More on the programmatic level, there was an absence of principles and reasoning to conduct viable operations in mangrove reforestation. The mangrove forest is inhabited by men and women. The techniques and procedures involved in Farming System Research [FSR] were adapted to fit a climate change adaptation context. An early statement of this is in Annex 9. It provides principles and reasoning to conduct programming leading to viable operations in mangrove reforestation. To this end, Annex 9 advances the principle of selecting representative villagers from the intervention area, in particular women , for participation in livelihood activities. This ensures that the development arrangements are responsive to the villagers' priorities and objectives. Annex 9 also outlines the approach and procedures for mangrove reforestation.

3.3.7 Impact

The Project has potential to positively effect on the ecological status and contribute decreasing the stress on the ecosystem of two regions: [1] coastal flooding risks in selected communities of the Northern and Island Coastal Provinces of East Sepik, Madang, Morobe, New Ireland and Northern, [2] the inland flooding risk in selected river communities in Northern Coastal Provinces.

By ecological status, it is understood, the expression of the quality of the structure and functioning of aquatic ecosystems associated with surface waters.[32] Whereas stress in ecological system it refers to the detrimental effect on some biological entity [individual, population, food web, etc] which occurs following some disturbance. [33] At the closing of this Project the evidence is inconclusive in terms of the Project having modified positively the structure and functioning of the ecosystem associated with surface waters; or having reduced the detrimental effect on some biological entity.

Furthermore, at this point it is difficult to identify mechanisms at work of any type, because the environmental analysis has been uneven so far. For example, the Project's final report has been grounded at the output level for reasons discussed in section 3.2

[32] Extracted on 24 July 2018 from http://www.eionet.europa.eu/gemet/concept/15130 Eionet European Environment Information and Observation Network

[33] Cf Stress on ecological systems. Oikos, vol 86, no 1, july 1999, pp 179-184

3.3.8 Promoting Accountability and Transparency[34]

Broad concerns about accountability and transparency arose in the presence of the Evaluator, during focused interviews and unstructured interaction with stakeholders and beneficiaries, both during field visits and in working sessions with partners held both in the capital and the five provincial offices. The queries raised by beneficiaries and stakeholders are collected in one annex [Annex 13] for the attention of the Auditors. As it was important to listen to these concerns.

Queries on procurement were prominent among stakeholders and beneficiaries. The evidence suggests that UNDP procurement procedures were apparently applied unevenly as alleged by some stakeholders. Further, the beneficiaries' concerns, arising from the interactions with the Evaluator in the few villages visited, are of a different nature and more complex.[35] Villagers' key concerns were that the resources received were insufficient. This disapproving query is consistent with the a priori delivery of outputs discussed in detail in Annex 11. The needs of , both men and women, in a community are practically unlimited. This is why, as argued in Annex 11, it is unsustainable to directly distribute goods and services to communities whose unmet needs can be almost endless.

The a priory delivery of outputs, without reference to a sustainable procedure or economic development principle, became prominent from the fact that during the last 18 months of the Project timeline, approximately USD 1.7 M was disbursed. The FPRR does not specify what proportion of these funds was delivered to the communities as a priory outputs and what proportion was used to continue efforts for data collection with vendors.

. The TE has not received what is known as Value for Money Audit for the works undertaken during implementation by vendors, that is, an independent evidence-based audit which examines and reports on whether economy, effectiveness and efficiency has been achieved in the use of UNDP funds.
. One query shared by one stakeholder [Annex 13] argued coherently that the climate-risk and climate-shocks have worsened the poverty conditions in PNG and that consequently, actions in the rural communities should take into consideration measures to avoid amplifying socio-economic inequality. This stakeholder brought this up to the Evaluator, suggesting that [1] management did not take into consideration the unintended inequalities introduced in the rural sector by delivering outputs a priori, and that [2] there was an absence of mechanisms for stakeholders and beneficiaries to submit their perceptions as well as their grievances and complaints.

In the context of an accountability framework, which is expected to enhance the management performance of organizations, a pivotal element in assessing results leading to the enhancement of the resilience of communities, is the evaluability of an evaluation undertakings within programmes. There is simply no other way than evaluations to learn what went right or wrong and for what reasons, in initiatives intending to adapt to climate variability. As noted, the daily reality of PNG is that climate change impacts are already irreversibly changing life for folks of all walks of life -- especially those living in the coastal areas. The capacity to track results is now imperative in PNG because the survival of society is at stake.

UNEG Norms for Evaluation in the UN System, Geneva, 2005, page 9, stipulates that :

> " Before undertaking a major evaluation requiring a significant investment of resources, it may be useful to conduct an evaluability exercise. This would consist of verifying if there is clarity in the intent of the

[34] Accountability and transparency are multi-dimensional as they depend on the lens through which they are viewed. In particular because of the asymmetrical pattern of management discussed in Annex 14. The evaluator to avoid inaccuracies in good faith discusses these matters in Annex 16. Underlying the fact that evaluations do not address possible liability or culpability of management actions.

[35] It is acknowledged that the observations below are triangulated from projects in the region and from villagers under the same circumstances as the ones visited. In addition, it must be recognized that the linguistic diversity slowed down significantly the interaction with villagers and folks of different walks of life. In many circumstances, the villagers' message had to be translated first to pidgin and then to English. Something was lost in the translation, but the observation of non verbal behavior in the surroundings of their material culture where villagers live expanded understanding of the issues discussed.

subject to be evaluated, sufficient measurable indicators, assessable reliable information sources and no major factor hindering an impartial evaluation process."

When the data is not consistent with evaluability standards, there is considerable risk of underreporting the findings. The project managers are responsible for delivering the results of the project. If an evaluator was responsible for preparing the results achieved, it would be tantamount to an auditor preparing the financial data he /she is going to review.

Providing raw data to the evaluator is ineffective. Those responsible are accountable to deliver, with precision, the kind of data needed to support progress or the reasons for the lack of progress. The specific evidence must be provided to the evaluator by the appropriate authority. Otherwise, the evidence is only fit for journalism or research purposes.[36] This is not what the UN system envisages as evaluation. [cf: UNEG Norms for Evaluation in the UN System, Geneva, 2005, page 5.]

This critical issue is reflected specifically in preparing the final results framework to determine to what extent the Project has achieved the expected outcomes. In this context, there is a measure of accountability as the implementing agency has the obligation to (i) demonstrate that work has been conducted in accordance with the agreed upon rules and standards and (ii) report fairly and accurately on performance results vis-à-vis mandated roles and/or plans.[37]

As shown in the TOR's Annex A, project management authorities did not submitted the results framework showing the achievement of outcomes by the end of the project. In the absence of the final results framework, accountability considerations do not allow the Evaluator to sketch a proxy- Terminal Results Framework. By contrast, as discussed, based on the output- performance data tabulated from the Final Project Review Report, it was possible to triangulate intermediate outcomes from outputs that were listed in the contextual information of field observations and focused interviews with beneficiaries and stakeholders [Annex 15]. This was done with the purpose of moving forward as the country, especially communities living in coastal areas, are enduring the shocks of climate change daily. However, the CO on October 20, 2018, sent the Evaluator an estimate of final results framework. This estimate [Annex 17] were used to establish project results attained.

From field observations supported by the available evidence [Annex 14] it seemed that vendors commanded nearly the total delivery of outputs without the necessary filters to ensure that outputs "fit" the biological and cultural diversity of the country. On the one hand Project management seemed to lack the mechanism for quality control of outputs, and on the other hand, vendors seem to deliver outputs on the ground without due diligence. Contractually, vendors are obliged only to deliver outputs to the communities without ensuring the procedures and training needed to transfer the know-how to the community.

For example, in the work done on reforestation and the rehabilitation of mangroves. The villagers' perceptions about the importance of mangrove restoration in terms of improving food security through enhanced adaptive capacity to respond to the risks posed by the effects of climate change was established in Annex 8 using the Most Significant Change Technique [MSC] applied in the field by the Evaluator. Vendors did not provide guidelines to carry on interacting with the communities and continue expanding the opportunities of mangrove rehabilitation and reforestation. The evaluator drafted Annex 9 outlining an approach to understand the reasons why family-units participate in project initiatives. If it was understood, it needs to be recorded. This is indispensable to ensuring that the proposed changes [1] are responsive to the priorities and objectives of those family-units under environmental and economic stress; [2] reflect the reality that family-units in these provinces are the product of a

[36] In countries with fragile institutional framework, evaluations are conducted with less than perfect data array, as discussed in Annex 7 in the case of Sudan before it was divided in two different countries.

[37] Executive Board of the United Nations Development Programme and of the United Nations Population Fund. The UNDP accountability system Accountability framework and oversight policy. New York, 2008

complex and dynamic interaction of risk-prone and resource-poor factors; and [3] continue the process of incorporating the know-how in the community such that results are economically feasible, socially acceptable and environmentally sustainable.

3.3.9 Project Convergence with UNDP Priorities Including UNDAF Harmonization

Although the Project has not achieved outcomes tied to the UNDAF outcome area " Environment, Climate Change and Disaster Risk Management", several sets of outputs share common ground with UNDAF.[38] This budding set of outputs, ostensibly, provide an understanding of the root causes of poverty and conflict. This can be helpful to achieve MDG goals as well.

All data indicates that the root cause of poverty is the dwindling resource base aggravated by the ongoing shocks of climate variability, and compounded by a formidable constraint: ancestral tenure regime. In a country with 840 languages with as many social structures, all the land available is under ancestral regime. These overwhelming combination of constraints were illustrated in the village of Wom during the evaluator's consultations on the devastating effect of sea-level rising, with special reference to the salinization of soils. Put differently, when the sea water that has reached the garden plots evaporates, salt is left behind. Unless crops grown are salt tolerant, the productivity of most crops decrease considerably or the plant simply tilts and dies.

One women walked to the beach and brought back sea weeds. She said: "since the sea water has warmed up, a new kind of sea weed sprung up." She added "fish do not like this sea weed so they go deeper in the ocean. We cannot go after the fish so we no longer have fish to feed our children." An elder person added: "we are loosing our gardens because ocean water is coming and making the land barren. Now the fish are moving away because of the new see weeds. We have less and less to feed our children and ourselves." The elder man concluded: " We cannot go anywhere else. The land surrounding us is taken up already since the time of our forefathers." Visibly this remark caused anxiety with the community representatives present in the meeting.

When communities are in a survival mode they will move to the surrounding lands. And that's when conflicts begin. How do you cope with dwindling resource base aggravated by the damaging shocks of climate variability and respecting ancient tenure arrangements by historical necessity? Under the circumstances, there is no other option than to increase the productivity of all the resources already engaged in the current livelihood system. This can be done by enhancing simultaneously every feature of the production system either by introducing [cost saving and/or productivity enhancing] techniques or alternative ways of doing things [management improvements]. The combination of both is ideal. Although this is most challenging, a glimpse of this process provides the budding mangrove rehabilitation efforts in Madang that needs substantive support so it takes off the ground.

The teachable moment for UNDAF is that the UN system with its variety of specialized organizations each with its own comparative advantage is the system by excellence that can provide a comprehensive approach integrating technical and institutional components to begin unraveling the complexities of poverty linked with resources base under the constraint of ancestral tenure. The UNDAF system could simultaneously provide assistance and support, as it is essential to enhance the whole production system, with the least amount of conflict—as compared with any other alternative.

One basic step is to work with as much detail as possible with the current mangrove development, use it as a laboratory, to learns all matters related to the investment process, the implementation, the essential linkages with the fisheries sector, the market and marketing development of fish and non timber forest products. And above all the participation of women not only in the marketing but also in the processing of fish and other foods. A preliminary handbook for this purpose has been outlined in Annex 9. UNDAF as compared with any other development

[38] United Nations Development Assistance Framework (UNDAF) 2012-2015Papua New Guinea. 17 April 2012 Port Moresby. Papua New Guinea

organizations has specialized agencies that can address every feature of the development process. However, the coordination and sequencing of this effort will be the most challenging

4-Conclusions, Recommendations & Lessons

4.1 Corrective actions for the design, implementation, monitoring and evaluation of the project

Alleged Inconsistent Application of UNDP Procurement Procedures for Goods and Services

One outstanding concern for stakeholders and villagers was procurement issues. In nearly every working session scheduled with the Evaluator, stakeholders and beneficiaries, issues related to procurement matters were brought to the attention of the TE. As discussions on these issues began taking time away from the brief time assigned to the TE, it was suggested that these queries be sent by email. This information can be found in Annex 13, for the attention of auditors.

On the whole, villagers indicated that the resources they received were insufficient. Stakeholders also questioned why the resources took so long to reach them. These concerns are exemplified by one procurement case outlined in Box 2, which details a situation where UNDP procurement principles are allegedly applied unevenly. A billboard was requested for one province, however after one year of processing the request the item was not approved because the Project account closed.

Partners have openly disclosed that they have not fully understood the battery of UNDP procedures applicable in procurement and other management functions. It is possible that whatever information was provided during the Inception Mission about UNDP procedures was insufficient. UNDP and other UN organizations also change their procedures from time to time. There is no reason for procedures to become a block to development management. Many UNDP CO in Africa and Asia-Pacific bundle all the procedures to be used by the UNDP and the country into one volume with the support and acknowledgement of the respective authorities. If such a volume was available in this case it was not mentioned in the discussions about procurement.

4.2 Actions to follow up or reinforce initial benefits from the project

Mangrove rehabilitation and development

Project estimates indicate that in the North Coast of the Madang Province, the Project has made important strides in awareness raising and training on mangrove reforestation. This is confirmed by the TE rapid survey, which was conducted using the Most Significant Change technique [Annex 8]. Fomenting investment of mangrove rehabilitation by the villagers themselves could make villagers the solution to the hazards of climate change adaptation.

. The data shows [Table 10.1 in Annex 10] that the cost of rehabilitating one Hectare of mangrove is approximately USD 950 [PGK 2850], including the yearly cost of artisanal fishing equipment;
. the cost of investing in one hectare of mangroves for rehabilitation represents nearly 40% of the yearly family income. As villagers may not be able to absorb the necessary investment from their savings, outside capital investments are necessary. There are several inferences that can be flagged for programming purposes.
. First, adequate tenure arrangements over land where the investments will be laid out should be negotiated with traditional authorities before the investments are carried out, as nearly all the land in the country is under ancestral tenure. Those villagers who might consider investing in the rehabilitation of mangroves need assurance that they can reap the benefits in the long term. As it takes about 6-10 years for the mangrove to mature, the time lapse needed to benefit from such an investment is probably around one generation [33 years].

- Second, if such tenure arrangements can be negotiated with traditional authorities, and these arrangements are registered with the relevant national organizations, this legal arrangement itself could be used as collateral with financing institutions. This would be an important step towards financing the rehabilitation of mangroves by the villagers themselves, which would require the total policy support of the national and provincial authorities, as well as the national financial system.
- Third, the repayment schedule needs to take into consideration the biological context of the investment. As mentioned, it takes approximately 6-10 years for mangroves to reach full maturity and the fish stocks can double by the 6th year according to estimates of fishermen interviewed. Therefore, if villagers take out a loan, they will be unable to begin repaying the loan until the 7th or 8th year.
- Fourth, since mangrove rehabilitation will require long-term financing, understanding the economic structure of a village and the livelihood strategies used by menfolk and womenfolk to meet the needs of a family unit is essential. As previously discussed, Farming System Research [Annex 9] can provide principles and reasoning to conduct programming, leading to operations that are viable economically, acceptable socially and environmentally friendly.
- Fifth, the implementation of this investment is long-term and requires necessary adjustments to PNG's institutional framework. This operation should be conducted by a national organization with knowledge and experience in national resource management and development. The TE did not carry out an institutional assessment of potential candidates.

4.3 Proposals for future directions underlining main objectives

Enhanced Opportunities for Training in Mainstreaming Climate Change Adaptation.

Each province needs a functioning planning unit, with the purpose of incorporating climate change adaptation as a factor in socio-economic development planning. In principle, the planning process that incorporates climate change adaptation includes the verification of the existence of explicit regulations in the public administration for disaster risk management, and the existence of a series of legal, institutional and budgetary conditions. These are fundamental for adequate disaster risk management, including economic decentralization, land use planning, public investment, monitoring and other factors that are site-specific. In a sense, the regulatory and institutional framework that upholds the processes of climate change can be considered a development strategy within the context of the provincial planning process. Only that which can be understood and to some extent measured can then be planned.[39]

Enhanced Opportunities for Training in Regional Economic Planning & Geospatial Data Processing within the Framework of DRM/**DRR leading to CCA**

Each province needs a functioning regional economic planning unit, with the purpose of incorporating DRM/DRR information as a factor in socio-economic development planning—**leading to CAA.** In principle, the planning process that incorporates DRM/DRR includes the verification of the existence of explicit regulations in the public administration for disaster risk management, and the existence of a series of legal, institutional and budgetary conditions. These are fundamental for adequate disaster risk management, including economic decentralization, land use planning, public investment, monitoring and other factors that are site-specific. **All these factors enable the process of CCA.** In a sense, the regulatory and institutional framework that upholds the processes of DRM/DRR can be considered a development strategy within the context of the regional economic planning

[39] Inter-American Development Bank. Status of Incorporation of Disaster Risk Management in National Public Investment Systems. Barbados and Trinidad and Tobago. Environment, Rural Development and Disaster Risk Management Division. TECHNICAL NOTE No. IDB-TN-527. Washington DC 2014.; Banco Interamericano de Desarrollo. Integración de la Gestión de Riesgo de Desastres y la Adaptación al Cambio Climático en la Inversión Pública. Centroamérica. División de Medio Ambiente, Desarrollo Rural y Gestión del Riesgo de Desastres. Nota Técnica. # IDB-TN-509. Washington, DC 2013; Jesica Viand y Fernando Briones (compiladores) Riesgos al Sur. Diversidad de riesgos de desastres en Argentina. La Red de Estudios Sociales en Prevención de Desastres en América Latina (LA RED) 1a ed, Ediciones Imago Mundi. Buenos Aires: 2015

process **leading to CCA**. Only that which can be understood and to some extent **measured can then be planned and mainstreamed towards CAA.**[40]

The TE found the level of progress incipient in the elaboration of the provincial planning process [Annex 7]. Although sporadic progress has been made in certain provinces [FPRR, page 24], the provincial planning process [PPP] needs strengthening and consolidating so it can incorporate the climate-related risk data to generate the adaptation plans for inland/coastal flooding- related risks and hazards. The absence of these adaptation plans compromises the protection from risk and hazards for the targeted communities. The driver for this incipient progress appears to be a defective training process. This has been reviewed in Annex 7. It is clear that five days of training and the template that the vendor left is inadequate for the preparation of a regional economic plan for one province.

As with any transfer of know-how and skills, the imparting of training to implement a planning process for provincial development is complex. Development experience suggests that the didactic method is productive because it focuses on building on the baseline knowledge the trainee possesses, ensuring the practical application of the learning imparted. Another possible technique is "job instruction training" where the trainee is taught how to do a job. This technique involves explaining the key points [techniques, processes, etc.], encouraging practice and passing on full control when the trainee has fully learned the job. [41]

In the real world, a planning process must reflect the specific conditions of a given context. This takes a coordinated effort between the trainer, trainee, provincial administration and the UNDP/CCDA PMU. The theoretical training must be accompanied by practicums specifically related to the eventual task for which the training is conducted. In this manner, it is possible to advance the theoretical learning of planning theory and associated techniques, and actually conduct practical exercises on the themes, problems or issues of the eventual planning job, as exemplified by the "job instruction training technique". This approach brings about tangible results but requires close coordination and flexibility between the trainees, the trainer and the ministry. Also, pre-testing the content of the training modules in terms of its theoretical underpinnings and the practical elements of planning is essential.

Once the planning process is understood, the geo spatial data related to DRR/DRM and climate risk information relevant to the planning process can be incorporated in the provincial planning process. There may be two conditions that need to be vetted by national consultant with expertise in geomatics. In order to use geo spatial data, there is the need for the functional requirements of ICT infrastructure for sharing the required layers of data. The available information indicates that PNG's Mineral Resources Authority, who advocates for a Human Geoscience, is the first step in enabling access to the Authority's IT infrastructure management.

As with any other processes involving technology transfer, there is the need to wield the appropriate tools and coordinate efforts. If there is a single crucial thread, it is the importance of coordination within the framework of an IT infrastructure in such a way that interoperability is ensured. Interoperability facilitates institutional work, given that by sharing information in a consistent and readable way, greater added value can be given to the institutional products themselves. This approach needs to be validated by the respective national planning authorities, while being simultaneously coordinated with the national IT infrastructure to determine the possible need for a common platform, with data being updated/curated by each separate department of the province.

---

[40] Inter-American Development Bank. Status of Incorporation of Disaster Risk Management in National Public Investment Systems. Barbados and Trinidad and Tobago. Environment, Rural Development and Disaster Risk Management Division. TECHNICAL NOTE No. IDB-TN-527. Washington DC 2014.; Banco Interamericano de Desarrollo. Integración de la Gestión de Riesgo de Desastres y la Adaptación al Cambio Climático en la Inversión Pública. Centroamérica. División de Medio Ambiente, Desarrollo Rural y Gestión del Riesgo de Desastres. Nota Técnica. # IDB-TN-509. Washington, DC 2013; Jesica Viand y Fernando Briones (compiladores) Riesgos al Sur. Diversidad de riesgos de desastres en Argentina. La Red de Estudios Sociales en Prevención de Desastres en América Latina (LA RED) 1a ed, Ediciones Imago Mundi. Buenos Aires: 2015

[41] IBRD. Training manager's workbook. Training techniques. EDI training materials. Washington, DC 1982, pp 111-154

During the implementation of the IP, the national infrastructure related to the provincial planning province, the website currently used as a resource hub, as well as the web-based curriculum material for education, should be incorporated in the system and updated and strengthened as required.

The implementation of this proposal is long-term and requires necessary adjustments to PNG's institutional framework. This operation should be conducted by a national organization with knowledge and experience in financial management and development as well as banking of development funds. The TE did not carry out an institutional assessment of potential candidates.

4.4 Best and worst practices in addressing issues relating to relevance, performance and success

Bad Practice: A Priory Output Delivery without Sustainable Strategy

In recent decades, while operating in war zones or fragile states, UN organizations have conducted a priory output delivery the communities for humanitarian purposes. In certain areas, food assistance was provided to vulnerable or food insecure individuals and households under the condition that they work on public work/asset building projects that the community identified themselves. For instance, in a recent intervention in Ethiopia and Kenya, WFP[42] demonstrated that supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives contributed to a sustainable increases in household and community-level food security, supporting long-term resilience-building in traditionally food-deficit areas.

The critical result in both cases is long term resilience, and the fact that the women and men folk of communities do not become dependent on donors. The project designs can deliver free goods or services to the communities while avoiding unintended inequitable results through the participation of the communities in commonly agreed goals within the community.

The Project began distributing free goods following the one- year extension recommended by the MTE. The recommendations intended to enable developmental results and contribute to the adaptation to climate change-driven hazards affecting specific locations. Within the time-lapse of 18 months, approximately USD 1.7 million was disbursed. The FRRP does not specify what proportion was used to finish anticipated studies and what proportion was used as free-goods for the communities. In fact, it was not clear if the distribution of free goods was part of the 33 climate-risk hotspot communities identified that the Project was expected to reach with support [MTE, page 7].

When the Evaluator visited the communities of Wom, Mengar and Moem, he found substandard delivery of a priory outputs bordering on a negative impact. Water tanks were not delivered in the number promised; the installed tanks were defective and water tanks were taken away once installed. And the NGO partners never came back as promised to repair or deliver the rest of the water tanks promised. Another partner delivered 1000 seedlings of mangrove. The partner never explained to the community the procedures of running a nursery to ultimately transplant them in the selected areas. As the partner never returned and there are no extension services available, the villagers lost the lot of seedling and their hopes to stop the incursion of sea water into their food gardens. Despite the presence of UNDP through its partners, the communities are still vulnerable. It is difficult to undo such a negative experience from the minds of villagers. What is detrimental to the work of UNDP in community-based climate change adaptation is that there is no evidence to determine if the three cases were exceptional or if, in fact, this was a pattern of substandard implementation with a potential negative impact.

Lessons Learned

[42] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011 Extracted on 10 July 2018 from www.wfp.org

Choice of Partners with Sustainable Strategy

In the matter of distributing a priory outputs to entice participation of the communities, if it has to be done, the choice of partner for this process is critical. The object lesson here is to select partners with proven comparative advantage to intervene directly in the communities in the context of climate change adaptation without introducing unintended inequity issues. The overarching purpose is to promote long-term resilience among the communities while avoiding introducing unintended inequity in the short term in the distribution of resources to those who need the most.

IFAD and WFP both carry out regular analysis on the strategic framework with the countries they work, supported by logistic analysis. In this manner, the issues of inequality and sustainability are reviewed adequately. Specifically, the WFP[43] has proven comparative advantage in the area of disaster risk reduction and management in the context of CCA. In a recent intervention in Ethiopia and Kenya, WFP demonstrated that supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives contributed to a sustainable increase in household and community-level food security, supporting long-term resilience-building in traditionally food-deficit areas. The critical result is the long-term resilience, and the fact that the women and men in communities do not become dependent on donors.

The Role of Institutions in the Transfer of Technology

The object lesson here is that forward-looking institutions that drive the use of new technologies, such as geomatics. Geomatics technology is neutral; and on its own it has no impact on the sustainability of its use. It is not an automatically adopted tool. New organizational arrangements are needed to ensure that the benefits of a new technology reach the end-user. Concretely, it is the institutional infrastructure, based on the capacity building efforts of different organizations, that is the key factor in a successful transfer; this is based on experience the world over.

[43] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011 Extracted on 10 July 2018 from www.wfp.org

ANNEX 1: TERMINAL EVALUATION TERMS OF REFERENCE

INTRODUCTION

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support GEF financed projects are required to undergo a terminal evaluation upon completion of implementation. These terms of reference (TOR) sets out the expectations for a Terminal Evaluation (TE) of the Enhancing adaptive capacity of communities to climate change-related floods in the North Coast and Islands Region of Papua New Guinea (PIMS 4452)

The essentials of the project to be evaluated are as follows:

PROJECT SUMMARY TABLE

Project Title:	Enhancing Adaptive Capacity of Communities to Climate Change-Related Floods in the North Coast and Island Region of Papua New Guinea			
GEF Project ID:	PIMS 4452		at endorsement (Million US$)	at completion (Million US$)
UNDP Project ID:	00074956	GEF financing:	6,018,777	
Country:	Papua New Guinea	IA/EA own:	100,000	
Region:	Asia Pacific	Government:	220,000	
Focal Area:		Other (DFAT)r:	500,000	
FA Objectives, (OP/SP):		Total co-financing:	820,000	
Executing Agency:	Climate Change Development Authority	Total Project Cost:	6,838,777	
Other Partners involved:	National Weather Service, Conservation and Environmental Protection Authority, National Disaster Centre, Provincial Governments of Morobe, New Ireland, East Sepik, Madang and Northern Province, World Vision International, WCS, WWF, ADRA, Asian Disaster Preparedness Centre	ProDoc Signature (date project began):		17 May 2012
		(Operational) Closing Date:	Proposed: October 2016	Actual: December 2017

OBJECTIVE AND SCOPE

The impact of climate change-related hazards in the Papua New Guinea (PNG) country has been increasing in intensity and frequency. Further impacts from climate change include the loss of food gardens due to extensive flooding (both in coastal and riverine areas) combined with extended periods of drought. The rising sea level is causing some of PNG's islands to be gradually submerged. Salt water intrusion is affecting groundwater particularly in the islands and in coastal areas, threatening domestic water supplies and agriculture. With the onset and multitude of climate change impacts, the country's economy, environment and people are becoming more

vulnerable and are at risk of not meeting basic human development needs. Climate change puts at risk the achievement of the goals set out in PNG's major development plans.

Flooding in the coastal areas is one of the most important climate change related hazards in the North Coast and the Islands Region as settlements are usually located in the coasts, particularly the provincial capitals of East Sepik (Wewak), Madang (Madang), Morobe (Lae), and West New Britain (Kimbe). Similarly, in the hinterland areas, climate change-related inland flooding is the most pressing hazard with the largest potential for wide-spread damage.

The project was designed to enable the government of PNG to systematically assess vulnerability of these coastal and riverine communities to develop the necessary institutional and individual capacity at national, provincial, district, and local level to enable decentralized and well-informed decision-making. The project has supported development of guidance on climate resilient coastal and inland protection, land-use planning; and early warning relevant to the PNG context to assist planners, decision-makers and practitioners understand climate risks when making development and investment decisions. Project interventions at the community level seek to address specific vulnerability characteristics of two distinct geographic areas which are: i) selected coastal and island communities of the Northern and Island Coastal Provinces of East Sepik, Madang, Morobe, New Ireland and Northern, which face coastal flooding risks; ii) selected river communities in Northern Coastal Provinces exposed to inland flooding risks.

The objective of the project is to strengthen the ability of coastal and riverine communities in Papua New Guinea to make informed decisions; and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations. This objective was to be achieved through four outcomes (and 11 outputs):

1. Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and 3 cities of the 11 provinces of the North Coast and Islands Region;
2. Reduced exposure and increased adaptive capacity of 8 riverine communities of the 4 provinces (East Sepik, Oro, Morobe and Madang Provinces);
3. Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices;
4. Strengthened awareness, education and advocacy to promote ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels.

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

The objective of the evaluation is to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

EVALUATION APPROACH AND METHOD

An overall approach and method[44] for conducting project terminal evaluations of UNDP supported GEF financed projects has developed over time. The evaluator is expected to frame the evaluation effort using the criteria of relevance, effectiveness, efficiency, sustainability, and impact, as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. A set of questions covering each of these criteria have been drafted and are included with this TOR (fill in Annex C) The evaluator is expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is expected to follow a participatory and consultative approach ensuring close engagement with government

[44] For additional information on methods, see the Handbook on Planning, Monitoring and Evaluating for Development Results, Chapter 7, pg. 163

counterparts, in particular the GEF operational focal point, UNDP Country Office, project team, UNDP GEF Technical Adviser based in the region and key stakeholders. The evaluator is expected to conduct a field mission to at least 3 of the 5 pilot locations including the following project sites New Ireland, Madang and Morobe. Interviews will be held with the following organizations and individuals at a minimum: Provincial governments of Morobe, New Ireland and Madang. World Vision, Wildlife Conservation Society, World Wildlife Fund, beneficiary communities, schools in the above three provinces.

The evaluator will review all relevant sources of information, such as the project document, project reports – including Annual APR/PIR, project budget revisions, midterm review, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and any other materials that the evaluator considers useful for this evidence-based assessment. A list of documents that the project team will provide to the evaluator for review is included in Annex B of this Terms of Reference.

EVALUATION CRITERIA & RATINGS

An assessment of project performance will be carried out, based against expectations set out in the Project Logical Framework/Results Framework (see Annex A), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: relevance, effectiveness, efficiency, sustainability and impact. Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary. The obligatory rating scales are included in Annex D.

Evaluation Ratings:			
1. Monitoring and Evaluation	rating	2. IA& EA Execution	rating
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		Overall quality of Implementation / Execution	
3. Assessment of Outcomes	rating	4. Sustainability	rating
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental:	
		Overall likelihood of sustainability:	

PROJECT FINANCE / COFINANCE

The Evaluation will assess the key financial aspects of the project, including the extent of co-financing planned and realized. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed and explained. Results from recent financial audits, as available, should be taken into consideration. The evaluator(s) will receive assistance from the Country Office (CO) and Project Team to obtain financial data to complete the co-financing table below, which will be included in the terminal evaluation report.

Co-financing (type/source)	UNDP own financing (mill. US$)		Government (mill. US$)		Partner Agency (mill. US$)		Total (mill. US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Actual	Actual
Grants	100,000	100,000	220,000	222,000	500,000	500,00	820,000	820,000
Loans/Concessions	-	-	-	-	-	-	-	-

• In-kind support	-	-	-	-	-	-	-	-
• Other	-	-	-	-	-	-	-	-
Totals	100,000	100,000	220,000	222,000	500,000	500,00	820,000	820,000

MAINSTREAMING

UNDP supported GEF financed projects are key components in UNDP country programming, as well as regional and global programmes. The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

IMPACT

The evaluators will assess the extent to which the project is achieving impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project has demonstrated: a) verifiable improvements in ecological status, b) verifiable reductions in stress on ecological systems, and/or c) demonstrated progress towards these impact achievements.[45]

CONCLUSIONS, RECOMMENDATIONS & LESSONS

The evaluation report must include a chapter providing a set of conclusions, recommendations and lessons.

IMPLEMENTATION ARRANGEMENTS

The principal responsibility for managing this evaluation resides with the UNDP CO in Papua New Guinea. The UNDP CO will contract the evaluators and ensure the timely provision of per diems and travel arrangements within the country for the evaluation team. The Project Team will be responsible for liaising with the Evaluators team to set up stakeholder interviews, arrange field visits, coordinate with the Government etc.

EVALUATION TIMEFRAME

The total duration of the evaluation will be for 60 calendar days according to the following plan:

Activity	Timing	Completion Date
Preparation	4 days (recommended: 2-4)	5/02/2018- 08/02/2018
Evaluation Mission	15 days (r: 7-15)	19/02/2018-09/03/2018
Drafting Evaluation Report and stakeholder validation	10 days (r: 5-10)	12/03/2018-23/03/2018
Final Report	2 days (r;: 1-2)	29/03/2018-30/03/2018

EVALUATION DELIVERABLES

The evaluation team is expected to deliver the following:

Deliverable	Content	Timing	Responsibilities

[45] A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROtI) method developed by the GEF Evaluation Office: ROTI Handbook 2009

Inception Report	Evaluator provides clarifications on timing and method	No later than 1 weeks before the evaluation mission.	Evaluator submits to UNDP CO
Presentation	Initial Findings	End of evaluation mission	To project management, UNDP CO
Draft Final Report	Full report, (per annexed template) with annexes	Within 3 weeks of the evaluation mission	Sent to CO, reviewed by RTA, PCU, GEF OFPs
Final Report*	Revised report	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC.

*When submitting the final evaluation report, the evaluator is required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report.

QUALIFICATIONS AND EXPERIENCE

The international consultant will be the Team Leader responsible for preparing the final evaluation report and its submission to UNDP. The consultant shall have prior experience in evaluating similar projects. Experience with GEF/Adaptation Fund financed projects is an advantage. The evaluator selected should not have participated in the project preparation and/or implementation and should not have conflict of interest with project related activities.

The Team Leader must present the following qualifications:

a) Advanced degree and minimum 10 years of relevant professional experience
b) Previous experience with results-based monitoring and evaluation methodologies;
c) Technical knowledge in the targeted focal area(s) such as climate change adaptation, disaster risk management, environmental policy/planning/science, international development, public policy, engineering, other social sciences
d) Experience in managing or evaluating multi-donor funded projects particularly in Small Island States or Developing Countries;
e) Experience working with the AF, GEF or GEF evaluations, AF evaluations or other UN agencies and/or international organizations is recommended;
f) Experience in leading small multi-disciplinary, multi-national teams to deliver quality products in high stress, short deadline situations.

EVALUATION

Cumulative analysis

The proposals will be evaluated using the cumulative analysis method with a split 70% technical and 30% financial scoring. The proposal with the highest cumulative scoring will be awarded the contract. Applications will be evaluated technically and points are attributed based on how well the proposal meets the requirements of the Terms of Reference using the guidelines detailed in the table below:

When using this weighted scoring method, the award of the contract to be made to the individual consultant whose offer has been evaluated and determined as:

a) Responsive/compliant/acceptable, and

b) Having received the highest score out of a pre-determined set of weighted technical and financial criteria specific to the solicitation.

* Technical Criteria weighting; 70%

* Financial Criteria weighting; 30%

Only candidates obtaining a minimum of 49 points in the Technical Evaluation would be considered for the Financial Evaluation. Interviews may be conducted as part of technical assessment for shortlisted proposals.

Evaluation Matrix

Criteria	Points	Percentage
Qualification		10%
▪ Advanced degree in relevant field	10	
Experience		60%
• Minimum 10 years of relevant professional experience • Previous experience with results-based monitoring and evaluation methodologies; • Technical knowledge in the targeted focal area(s) such as climate change adaptation, disaster risk management, environmental policy/planning/science, international development, public policy, engineering, other social sciences • Experience in managing or evaluating multi-donor funded projects particularly in Small Island States or Developing Countries; • Experience working with the AF, GEF or GEF evaluations, AF evaluations or other UN agencies and/or international organizations is recommended; • Experience in leading small multi-disciplinary, multi-national teams to deliver quality products in high stress, short deadline situations.	10 10 10 10 10 10	
Technical Criteria (Minimum score (49 out of 70) to be technically competent		70%
**If necessary interviews shall also be conducted as part of the technical evaluation to ascertain best value for money.		
Financial Criteria – Lowest Price		30%
Total		100%

EVALUATOR ETHICS

Evaluation consultants will be held to the highest ethical standards and are required to sign a Code of Conduct (Annex E) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluations'

PAYMENT MODALITIES AND SPECIFICATIONS

(this payment schedule is indicative, to be filled in by the CO and UNDP GEF Technical Adviser based on their standard procurement procedures)

%	Milestone
10%	At contract signing
40%	Following submission and approval of the 1ST draft terminal evaluation report
50%	Following submission and approval (UNDP-CO and UNDP RTA) of the final terminal evaluation report

APPLICATION PROCESS

a) The application should contain a current and complete C.V. in English with indication of the e-mail and phone contact
b) Letter of Confirmation of Interest and Availability using the template[46] provided by UNDP;
c) CV and a Personal History Form (P11 form[47]);
d) Brief description of approach to work/technical proposal of why the individual considers him/herself as the most suitable for the assignment, and a proposed methodology on how they will approach and complete the assignment; (max 1 page)
e) Financial Proposal that indicates the all-inclusive fixed total contract price and all other travel related costs (such as flight ticket, per diem, etc), supported by a breakdown of costs, as per template attached to the Letter of Confirmation of Interest template. If an applicant is employed by an organization/company/institution, and he/she expects his/her employer to charge a management fee in the process of releasing him/her to UNDP under Reimbursable Loan Agreement (RLA), the applicant must indicate at this point, and ensure that all such costs are duly incorporated in the financial proposal submitted to UNDP.

Applicants are requested to submit their quotes and availability for the assignment addressed to (UNDP Resident Representative, UNDP PNG, P.o.Box 1041, Port Moresby, Papua New Guinea) in a sealed envelope indicating the following reference "Consultant for (Climate Change Adaptation Project) Terminal Evaluation" or by email at the following address ONLY: (registry.pg@undp.org) This email address is being protected from spam bots, you need Javascript enabled to view it by (5pm, 3 November, 2017). Incomplete applications will be excluded from further consideration.

UNDP applies a fair and transparent selection process that will consider the competencies/skills of the applicants as well as their financial proposals. Qualified women and members of social minorities are encouraged to apply.

[46] https://intranet.undp.org/unit/bom/pso/Support%20documents%20on%20IC%20Guidelines/Template%20for%20Confirmation%20of%20Interest%20and%20Submission%20of%20Financial%20Proposal.docx

[47] http://www.undp.org/content/dam/undp/library/corporate/Careers/P11_Personal_history_form.doc

ANNEX A: PROJECT LOGICAL FRAMEWORK

Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Objective Strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations	Number of risk-exposed coastal communities protected through adaptation measures	In the current scenario, risk-exposed communities are to a large extent unable to adapt to climate change due to a lack of resources, capacity, knowledge and the necessary support through provincial and national institutions as well as policy frameworks. With the scale of adaptation measures planned for implementation the total population in the 16 targeted communities would be an estimated 32,000	By the end of the project at least 8 coastal communities are protected through adaptation measures against coastal flooding scenarios, with attention to the special concerns of women as participants and beneficiaries.	Project reports Minutes form the ATWG & PSC Provincial policy documents, development plans Disaster preparedness and response plans, project monitoring and evaluation reports Gender-disaggregated data reflecting participation of women and in terms of project impacts	Policital stability and commitment to climate compatible development is maintained Political will and commitment by senior government officials to integrate climate change and adaptation Strong coordination amongst climate change stakeholders in the country, especially at provincial level Strong community leadership, cooperation and support for project activities. Financial resources are allocated from government budgets and cofinanciers to address climate-related risks
	Number of risk-exposed riverine communities protected through adaptation measures		Eight (8) riverine communities are protected through adaptation measures against inland flooding, with attention to the special concerns of women as participants and beneficiaries		
	Number of provinces with improved climate-related planning and policy frameworks to increase resilience		At the end of the programme, adaptation to climate change is managed, monitored and planned at the provincial level in the targeted provinces and supported by a framework of policies and plans including disaster preparedeness and response plans, coastal zone management plans.		

Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region.	Number of communities benefitting from improved protection from coastal floods	The vast majority of communities exposed to coastal flooding is inadequately equipped with resources, capacity and support to adapt to the heightened risks from climate change The total number of inhabitants in the 8 target coastal communities that are vulnerable to coastal flooding is estimated at 16,000. An additional population of 120,000 in the cities of Lae, Wewak and Madang will benefit from the programme's implementation	By the end of the project, 8 communities are protected from coastal flooding through adaptation measures that were put in place in a community-led way with the agreements/compacts agreed on by communities to preserve the mangrove forests	Project reports, monitoring & evaluation reports, Minutes from the ATWG, project reports, verification through reports from local CBOs and NGOs Procurement records of relevant agencies Site plans for establishment of AWS. Progress reports from PNGNWS	There is a strong commitment from the communities and their leadership throughout the time of the project PNGNWS remains committed to expand and manage their weather monitoring and forecasting activities and is adequately funded through government resources to allow for maintenance and further expansion after the project. There is strong support from district and provincial level officials that ensure the continued cooperation among communities, districts and provinces

Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
	Number of AWS and voluntary weather stations in operation Number of communities covered by the improved coastal warning system and weather information	There is lack of equipment and capacity of the PNGNWS, hence, the forecasting of disasters and extreme weather events is severely limited.	At least 6 tidal gauges and at least 6 AWS and 10 voluntary weather stations established at strategic locations, meet WMO standards and contribute to the monitoring and early warning system. One AWS will have been installed in each target 8 communities.	Distributed weather information reports Provincial policies, disaster managment plan, project reports Feasibility studies, provincial coastal infrastructure development plans	Provincial governments are supportive in expanding the role and resources for the climate change officers/focal points Landowners allowing their land to be used to establish the AWS and voluntary weather recorders are committed and consistently recording data. The provincial administrations support the identified coastal engineering measures and adopt them in their development plans Financial resources are allocated from government budgets and cofinanciers to address climate-related risks The mangrove-focussed training concept will translate into new community-driven mangrove
	Number of provinces wth comprehensive disaster prepared ness and response plans for coastal flooding in place	The provincial and national-level disaster management frameworks are evidently inadequate to address the risks	At least four provinces will have a comprehensive disaster preparedness and response plans for coastal flooding in place and will have conducted dry run tests.		
	Number of provincial capitals with assessed engineering measures for adaptation	No effort has been done on this aspect in the target provincial capitals.	For three provincial capitals of Lae, Madang and Wewak suitable coastal engineering measures for adaptation are identified and addressed through respective planning and funding. For three provincial capitals of Lae, Madang and Wewak suitable coastal engineering measures for adaptation are		

Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
			identified and addressed through respective planning and funding.		rehabilitation and conservation initiatives as indicated by feedback from the consultation
	Number of community-led mangrove projects benefitting from support system for mangrove projects	Community-based mangrove projects are undertaken ad-hoc and largely without sufficient expertise and support	33 community-led mangrove conservation and/or reforestation projects, covering about 100 hectares are supported through the support network and nurseries	Project reports, monitoring and evaluation reports Annual reports from the nurseries	
	Number of mangrove nurseries established and sustainably operating Resources allocated for continued operations of the nurseries	None	Eight (8) regional nurseries operate sustainably supplying the requirements of the target sites and replication areas Before the end of the project, sufficient resources are allocated by government for the continued operations of the nurseries beyond the life of the project.	Government budgets at local and national levels indicating allocation for operation of nurseries	

Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 2: Reduced exposure and increased adaptive capacity of 8 riverine communities in 4 provinces	Number of communities benefitting from improved protection from inland flooding	The vast majority of communities exposed to inland flooding risk is inadequately equipped with resources, capacity and support to adapt to the changed scenario The total number of inhabitants in the 8 target riverine communities that are vulnerable to coastal flooding is estimated at a minimum 32000 people.	By the end of the project, eight communities are protected from inland flooding through adaptation measures that were put in place in a community-led way.	Project reports, monitoring & evaluation reports, Minutes from the ATWG, project reports, verification through reports from local CBOs and NGOs Procurement records Site plans for establishment of AWS. Progress reports from PNGNWS Distributed weather information reports	There is a strong commitment from the communities and their leadership throughout the time of the project PNGNWS remains committed to expand and manage their weather monitoring and forecasting activities and is adequately funded through government resources to allow for maintenance and further expansion after the project. There is strong support from district and provincial level officials that ensure the continued cooperation among communities, districts and provinces Provincial governments are supportive in expanding the role and resources for the climate change officers/focal points
	Number of communities covered by the improved warning system and weather information Number of AWS and voluntary weather stations in operation	Disaster preparedness is limited by the lack of and state of facilites and plans There is lack of equipment and capacity of the PNGNWS is weak, hence theh forecasting of disasters and weather patterns is limited.	At least 6 AWS and at least 20 voluntary weather stations established at strategic locations, meet WMO standards and contribute to the monitoring and early warning system. One AWS will have been installed in each target 8 communities.		

	Number of provinces with comprehensive disaster preparedness and response plan for inland flooding	The provincial and national-level disaster managment frameworks are evidently inadquate	At least four provinces will have a comprehensive disaster preparedness and response plan for inland flooding in place and will have conducted dry run tests.	Provincial policies, disaster management plan	Landowners allowing their land to be used to establish the AWSs. Voluntary weather recorders are committed and consistently recording data.

Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices	Number of national and provincial level policies, strategies, plans and coordinating mechanisms reviewed and incorporating resilience to climate change	Adaptation to the changed climate scenario of the present and future is inadequately considered in national and provincial level policies and planning frameworks	At the end of the project, all major development plans in the targeted provinces reflect climate change and adaptation considerations and coastal zone management policies are developed for the most populated areas (especially Wewak, Kavieng, Madang, Lae)	Development plans, monitoring and evaluation reports Coastal zone management policies and their gazettment Project reports, monitoring and evaluation reports, verification through CBOs and NGOs	Senior officials of the provincial administrations are supportive of the project and the integration of climate change and adaptation in development plans and policies. Climate change officers / focal points at the provincial level are able to utilise trainings and resources to build their own and local capacity for adaptation The Climate Change Act is gazetted and the CEPA is established
	Number of provincial and national-level officers trained in climate adaptation	At the provincial level the lack of resources, capacity and in some cases basic management mechanisms/plans is evident	At the provincial level, there is a strong link between all climate change officers/focal points and the communities in their respective provinces and the officers are equipped with the resources		

	planning and implementation Participation of women in project activities	To be established at project inception	and capacity to identify and manage adaptation needs in the province Increased (at least 20%) number of women participating in capacity building activities at national and subnational level	Minutes of high-level policy meetings (NEC/NCCC/OCCD, etc) Gender-disaggregated data analysis	The government remains committed to the CCDS
Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 4: Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels	% of the risk-affected population exposed to awareness raising activities and materials	Awareness raising efforts to date remain ad-hoc, uncoordinated and often undertaken with insufficient technical basis	75 % of the risk-affected population is exposed to awareness raising activities and materials.	Awareness raising materials, best practice toolkits, monitroing and evaluation reports, Field reports, project monitoring and evaluation reports	Strong community leadership allows for capacity building and awareness raising to translate into community-led replication activities Department of Education remains committed to the integration of climate change in school curricula
	Integration of climate change into the national school curricula and university academic programmes	Only few schools cover climate change in their classes and activites; there is very limited guidance for teachers	The topics of climate change and adaptation are introduced in PNG's school curricula and university academic programmes and teachers are equipped with the required knowledge and material	School curricula documents Training materials and records of trainings	The role of corporate social responsibility in PNG gains further momentum and can be tapped for contributions in the area of climate change and adaptation

	Amount of funding mobilized via CSR and sponsorship agreements	CSR funding sources is currently nil.	By the end of the project agreements on continuation of awareness raising and adaptation activities (especially replication) through contributions from Corporate Social Responsibilty programmes and private sector participation are reached (including projects under infrastructure tax credit schemes) and make resources available for the community-led adaption in at least 10 further communities (estimated 500,000 USD)	MOUs/agreements	Infrastructure tax credit schemes remain in place

ANNEX B: LIST OF DOCUMENTS TO BE REVIEWED BY THE EVALUATORS

1. Project Document
2. Mid-term Review Report
3. Project Progress Reports for 2013, 2014 and 2015
4. Final Project Progress Report 2017
5. Project Budget Revisions
6. GEF CCA Tracking Tool and mid-term review
7. Project files, national strategic and legal documents
8. National Inception Workshop Report, Community Based Mangrove conservation Handbook, Hazard Assessment report & maps for the 5 provinces, East Sepik), Early warning systems field assessment reports, Assessment of Flood Early Warning System in five province of Papua New Guinea, Roadmap for establishment of Flood Early Warning System in PNG, Communication Strategy, Climate Change Institutional and Capacity Assessment report, Early Warning Systems Inception report, Micro-Grant Agreements progressive reports (World Wide Fund for Nature, Foundation for People & Community Development, World Vision PNG and Adventist Development Relief Agency - PNG, Asian Disaster Preparedness Centre), Training course -Mainstreaming Climate Change Adaptation into Development Planning Process, Additional resources titled- Reader-Mainstreaming Climate Change Adaptation into Development Process, ADPC mission report, CCA mainstreaming training modules, draft CCA provincial plans, Teaching Guide for Climate Change Adaptation for Lower Primary Schools in PNG, Draft CCA curriculum for primary Schools, communication materials including posters: restoring mangrove in your community, benefits of mangrove for coastal communities, vegetable gardens, floating vegetable gardens, Guide for Yam planting, drought coping strategies, 21 photo stories on climate change impact on people, 18 digital stories on climate change impact on people. Press coverage - Inception Workshop on Flood Early Warning, Press coverage- Mangrove planting and conservation in East Sepik, Press Website Story on TV Infomercial - El Nino Preparedness (45 Second infomercial broadcasted on National TV for two months), Website story titled 'Local communities of Papua New Guinea are committed to fight climate change' Exposure Photo Story: Take Care of the Mangroves (https://undp-adaptation.exposure.co/take-care-of-the-mangroves).

ANNEX C: EVALUATION QUESTIONS

This is a generic list, to be further detailed with more specific questions by CO and UNDP GEF Technical Adviser based on the particulars of the project.

Evaluative Criteria Questions	Indicators	Sources	Methodology
Relevance: How does the project relate to the main objectives of the GEF focal area, and to the environment and development priorities at the local, regional and national levels?			
• Was/Is the project a good idea given the situation needing improvement?	• Strengthened ability of coastal and riverine communities in PNG to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports	• Individual interviews • Desk reviews • Reports
• Does it deal with target group priorities? Why or why not?	• Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports	• Individual interviews • Desk reviews • Reports • FGDs
Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?			
• Have the planned purpose and component objectives, outputs and activities been achieved?	• Coastal and riverine communities are protected through adaptation measures against coastal and inland flooding • Climate change adaptation is managed, monitored and planed at the provincial level in the targeted provinces and supported by a framework of policies and plans including disaster preparedness and response plans, coastal zone management plans	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports • Provincial policy documents, development plans • Disaster preparedness and response plans	• Individual interviews • Desk reviews • Reports • FGDs

Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?			
• Were inputs (resources and time) used in the best possible way to achieve the outcomes?	• Human and technical capacities of the central and provincial government institutions, NGOs and CBOs is developed • Regional and international expertise bringing in state-of-the-art technologies, good practices are used	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports • Training reports	• Individual interviews • Desk reviews • Reports • FGDs
• What could be done differently to improve implementation, thereby maximizing impact, at an acceptable and sustainable cost?	•	•	•
Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?			
• To what extent has the project contributed towards its longer-term goals? What unanticipated positive or negative consequences did the project have? Why did they arise?	• Improved longer-term resilience and adaptive capacity of coastal and riverine communities to withstand climate change impacts	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports	• Individual interviews • Desk reviews • Reports • FGDs
• What are the remaining risks to project sustainability?	•	•	•
Impact: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved ecological status?			
• To what extent has better managed, monitored and planned adaptation to climate change impacted environmental stress and/or ecological stress?			

ANNEX D: RATING SCALES

Ratings for Outcomes, Effectiveness, Efficiency, M&E, I&E Execution	Sustainability ratings:	Relevance ratings
6: Highly Satisfactory (HS): no shortcomings 5: Satisfactory (S): minor shortcomings 4: Moderately Satisfactory (MS) 3. Moderately Unsatisfactory (MU): significant shortcomings 2. Unsatisfactory (U): major problems 1. Highly Unsatisfactory (HU): severe problems	4. Likely (L): negligible risks to sustainability 3. Moderately Likely (ML):moderate risks 2. Moderately Unlikely (MU): significant risks 1. Unlikely (U): severe risks	2. Relevant (R) 1.. Not relevant (NR) Impact Ratings: 3. Significant (S) 2. Minimal (M) 1. Negligible (N)
Additional ratings where relevant: Not Applicable (N/A) Unable to Assess (U/A		

ANNEX E: EVALUATION CONSULTANT CODE OF CONDUCT AND AGREEMENT FORM

Evaluators:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study imitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Evaluation Consultant Agreement Form[48]

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: _____

Name of Consultancy Organization (where relevant): _____

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at place on date

Signature: _____

[48]www.unevaluation.org/unegcodeofconduct

ANNEX F: EVALUATION REPORT OUTLINE[49]

i. Opening page:
- Title of UNDP supported GEF financed project
- UNDP and GEF project ID#s.
- Evaluation time frame and date of evaluation report
- Region and countries included in the project
- GEF Operational Program/Strategic Program
- Implementing Partner and other project partners
- Evaluation team members
- Acknowledgements

ii. Executive Summary
- Project Summary Table
- Project Description (brief)
- Evaluation Rating Table
- Summary of conclusions, recommendations and lessons

iii. Acronyms and Abbreviations
(See: UNDP Editorial Manual[50])

1. Introduction
- Purpose of the evaluation
- Scope & Methodology
- Structure of the evaluation report

2. Project description and development context
- Project start and duration
- Problems that the project sought to address
- Immediate and development objectives of the project
- Baseline Indicators established
- Main stakeholders
- Expected Results

3. Findings
(In addition to a descriptive assessment, all criteria marked with (*) must be rated[51])

3.1 Project Design / Formulation
- Analysis of LFA/Results Framework (Project logic /strategy; Indicators)
- Assumptions and Risks
- Lessons from other relevant projects (e.g., same focal area) incorporated into project design
- Planned stakeholder participation
- Replication approach
- UNDP comparative advantage
- Linkages between project and other interventions within the sector
- Management arrangements

3.2 Project Implementation
- Adaptive management (changes to the project design and project outputs during implementation)
- Partnership arrangements (with relevant stakeholders involved in the country/region)
- Feedback from M&E activities used for adaptive management

[49] The Report length should not exceed 40 pages in total (not including annexes).
[50] UNDP Style Manual, Office of Communications, Partnerships Bureau, updated November 2008

[51] Using a six-point rating scale: 6: Highly Satisfactory, 5: Satisfactory, 4: Marginally Satisfactory, 3: Marginally Unsatisfactory, 2: Unsatisfactory and 1: Highly Unsatisfactory, see section 3.5, page 37 for ratings explanations.

- Project Finance:
- Monitoring and evaluation: design at entry and implementation (*)
- UNDP and Implementing Partner implementation / execution (*) coordination, and operational issues

3.3 Project Results

- Overall results (attainment of objectives) (*)
- Relevance(*)
- Effectiveness & Efficiency (*)
- Country ownership
- Mainstreaming
- Sustainability (*)
- Impact

4. Conclusions, Recommendations & Lessons

- Corrective actions for the design, implementation, monitoring and evaluation of the project
- Actions to follow up or reinforce initial benefits from the project
- Proposals for future directions underlining main objectives
- Best and worst practices in addressing issues relating to relevance, performance and success

5. Annexes

- ToR
- Itinerary
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Evaluation Question Matrix
- Questionnaire used and summary of results
- Evaluation Consultant Agreement Form

ANNEX G: EVALUATION REPORT CLEARANCE FORM

(to be completed by CO and UNDP GEF Technical Adviser based in the region and included in the final document)

Evaluation Report Reviewed and Cleared by

UNDP Country Office

Name: _____

Signature: _____ Date: _____

UNDP GEF RTA

Name: _____

Signature: _____ Date: _____

ANNEX 2: MISSION ITINERARY

Date	Day	Province
08/04/18	Sunday	Consultant arrives to Port Moresby
09/04/18	Monday	Port Moresby- Working sessions with stakeholders
10/04/18	Tuesday	Port Moresby- Working sessions with stakeholders
11/04/18	Wednesday	Port Moresby- Working sessions with stakeholders
12/04/18	Thursday	Port Moresby- Working sessions with stakeholders
13/04/18	Friday	Port Moresby Flight PX852, 06:25 to Popondetta
		Popondetta Visit to Girua Airport for Automated Weather Station
14/04/18	Saturday	Flight PX853, 07:00 From Popondetta to Port Moresby
15/04/18	Sunday	Port Moresby to Lae, Morobe Province Flight PX102, 09:25 Lae
16/04/18	Monday	Lae Working session& Visit to Bumbu River& Bumbu Communities
17/04/18	Tuesday	PX101, 7:25am From Lae to Port Moresby in transit to Wewak
18/04/18	Wednesday	Wewak
20/04/18	Thursday	Wewak PX141, 13:10 flight to Port Moresby
22/04/18	Sunday	Port Moresby PX274,15:20 flight from to Kavieng
23/04/18	Monday	Kavieng
240/4/18	Tuesday	Kavieng Field visit to Pati Island at 0900
25/04/18	Wednesday	Kavieng PX275, 05.45 flight to Port Moresby
25/04/18	Wednesday	Port Moresby
25/04/18	Wednesday	Port Moresby
26/04/18	Wednesday	Port Moresby
29/04/18	Sunday	Port Moresby PX112, 15.30 flight Port Moresby to Madang
30/04/18	Monday	Madang
1/04/18	Tuesday	Madang
2/05/18	Wednesday	Madang PX113, 07:00 flight from Madang to Port Moresby
3/05/06	Thu-Sun	Preparing debriefing session
7/05/18	Monday	Debriefing with Executing Agency and UNDP
8/05/18	Tuesday	Return to home base

ANNEX 3: LIST OF PERSONS MET

1. United Nations Development Programme and Government Agencies

United Nations Development Programme	
Tracy Vienings	Deputy Resident Representative
Edward Vrkic	Senior Climate Change Advisor
Gwen Maru	Programme Analyst, Energy & Environment
Fiona Tsikula	Project Administration and Finance Assistant
Aishath Azza	Regional Technical Specialist – Climate Change Adaptation
Rabi Narayan Gaudo	Project Manager (former)
Shoko Takemoto	Regional Technical Specialist – Climate Change Adaptation (former)
Climate Change Development Authority	
Jacob Ekinye	Director, Adaptation and Projects Division

Emmajil-Bogari-Ahai	Adaptation Branch Manager, Adaptation and Projects Division
Jonah Auka	Manager-Projects Branch and GCF Focal Point, Adaptation and Projects Division
Ordy Wefin	Projects Officer, Adaptation and Projects Division
Albert Milala	Projects Officer, Adaptation and Projects Division
Benedict Goiye	Adaptation Officer, Adaptation and Projects Division
Lydia Bobola	Senior Projects Officer, Adaptation and Projects Division
Manau Renagi	
National Weather Service	
Samuel Maiha	Director
Robert Thomson	Assistant Director
Elizah Garietz	
Conservation and Environment Protection Authority	
Maino Virobo	Director,
Walimu Apaka	Principle Hydrologist
Heni Kay	Hydrologist
John Ari	Hydrologist
Morobe Provincial Administration	
Robin Kiki	Acting Advisor-Environment, Natural Resources and Climate Change Division
Arthur Forape	Provincial Project Assistant (Former AF funded project staff)
Charlie Masange	Provincial Disaster Coordinator, Provincial Disaster Office
East Sepik Provincial Administration	
Jefferey Yawi	Senior Planning, Planning and Corporate Division
Derek Warakai	Climate Change Coordinator and Provincial Project Assistant (Former AF provincial focal point)
New Ireland Provincial Administration	
Gideon Bogosia	Director Environment and Climate Change
Benjamin Kaube	CEO Economics
Nigel Tahija	A/Program Manager Planning
Tala Oboko	Planner/Aid Coordinator
Northern Provincial Administration	
Eddie Malaisa	Environment Officer and Former AF provincial focal point
McGuill Taimbari	Advisor, Monitoring and Evaluation
Madang Provincial Administration	
Rudolph Mongalle	Provincial Disaster Coordinator, Provincial Disaster Office

2. Non-Government Organisations and Participating Communities

Adventist Development and Relief Agency, Morobe Province	
Margaret Mandao Pais	Senior Project Office, CHURCH Project
Jennifer Taiko	Secretary, Community Disaster Management Committee, Ward 4, Bumbu
Martin Thomas	Community Disaster Management Committee, Ward 4, Bumbu
Edwin Ambia	Community Disaster Management Committee, Ward 5, Bumbu
Stanley Barman	Chairman, Community Disaster Management Committee, Ward 5, Bumbu
World Vision PNG, Port Moresby Office	
Smith Sapaka	Operations Manager, Momase (Madang, Morobe and Sepik Area)
Foundation for People and Community Development, Inc. Port Moresby Office	
Steward Serawe	Acting Executive Director Evaluator did not meet the NGO despite constant follow-ups nor did members in communities attended meetings at provincial level

World Wide Fund for Nature, Madang Office	
Kafuri Yaro	Programme Development Manager, WWF - Pacific, PNG Country Office
Oscar Pileng	Forest Program Officer, WWF - Pacific, PNG Country Office
Wildlife Conservation Society	
Annisah Sapul	Program Manager, New Ireland Province
Participating Villages in WWF Mangrove Reforestation Initiative in Madang Province	
Gelin Gitaung	Women's Representative, Boroi Village
Micha Rait	Councillor, Boroi Village
George Jeremiah	Community Facilitator, Boroi Village
Lydia Jeff	Women's Representative, Sisimagun Village
Daniel Sogae	Community Facilitator, Sisimagun Village
David Mongri	Community Facilitator, Sisimagun Village
Jefrey Bai	Councillor, Sisimagun Village
Eslyn Sogae	Women's Representative, Sisimagun Village
Peter Boror	Community Facilitator, Yambayamba Village
Nick Ambikuas	Councillor, Yambayamba Village
Kenny Moira	Community Facilitator, Yambayamba Village
Dorothy Kenny	Women's Representative, Yambayamba Village
Cathy Maragin	Women's Representative, Numuru Village
Alfred Masil	Community Facilitator, Numuru Village
Samson Kalimak	Councillor, Numuru Village
Cathreen Bubu	Women's Representative, Numuru Village
Rebecca	Women's Representative, Rurunat Village
Susie	Women's Representative, Rurunat Village
Joe Rauk	Community Facilitator, Rurunat Village
Cosmas Yapa	Councillor, Rurunat Village
Rufina Waina	Women's Representative, Sikor Village
Celsius Yafi	Community Facilitator, Sikor Village
Isidor Gemon	Councillor, Sikor Village
Edna Kiramaten	Women's Representative, Sikor Village
Enest Kaket	Community Facilitator, Tokain Village
Brian Sanara	Councillor, Tokain Village
Denis Saub	Community Facilitator, Sarang Village
Viviana Kafai	Women's Representative, Sarang Village
John Salib	Community Facilitator, Kubukam Village
Adolf Nabes	Councillor, Kubukam Village
Julie Robert	Women's Representative, Kubukam Village
Magreth Salib	Women's Representative, Kubukam Village
Langos Yass	Women's Representative, Kavailo Village
Awei Aikum	Community Facilitator, Kavailo Village
Ngas Mianung	Councillor, Kavailo Village
Gawal Nugur	Women's Representative, Kavailo Village
Cathy Babau	Women's Representative, Burag Village
Selan Kagol	Community Facilitator, Burag Village
Talung Sibon	Ward Committee, Burag Village
Maban Rex	Women's Representative, Burag Village
Participating Villages in WCS Mangrove Reforestation Initiative, in New Ireland Province	
Jospath Apegan,	Former Chairman, WCS
Obson Poka	Community Chairman

Gibson Michael,	Chairman, WCS
Boas Lapan	
Magreth Ngamilan	
J. Lapan	
Jenet Mesay	
Nguruet Marisa	
Parai Stella	
Tony Puka	
Kepas Tom	
Jospath Apegan,	Former Chairman, WCS
Participating Villages in World Vision Initiative, in East Sepik Province	

ANNEX 4: SUMMARY OF FIELD VISITS

Date	Day	Province	Activity	Stakeholder	Beneficiary
10/04/18	Tuesday	Port Moresby	Working session	National Weather Service	
11/04/18	Wednesday	Port Moresby	Working session	Conservation and Environment Protection Authority World Vision	
12/04/18	Thursday	Port Moresby	Working session	Climate Change Development Authority	FPDC at 1300
13/04/18	Friday	Port Moresby Flight PX852, 06:25 to Popondetta	Domestic flight Working session	Northern Provincial Administration	
		Popondetta	Visit to Girua Airport for Automated Weather Station	National Airport Corporation	
14/04/18	Saturday	Flight PX853, 07:00 From Popondetta to Port Moresby	Domestic flight		
15/04/18	Sunday	Port Moresby to Lae, Morobe Province Flight PX102, 09:25 Lae	Domestic flight Working session	ADRA	
					LLG reps possibly the councillors from Bumbu Communities
16/04/18	Monday	Lae	Working session	Morobe Provincial Administration	

			Visit to Bumbu Rive Bumbu Communities	Morobe Provincial Administration Office Flood Early Warning Establishment led by Provincial Disaster Office	
17/04/18	Tuesday	PX101, 07:25 From Lae to Port Moresby in transit to Wewak			
18/04/18	Wednesday	Wewak	Working session	09:00 East Sepik Provincial Administration Provincial Administration Office 11:00pm World Vision contracted staff at at Boutique Hotel	Wom community at 0900 Mengar ommunity at 13: 00 Mandi/Turubu community at 14:00
20/04/18	Thursday	Wewak PX141, 13:10 flight to Port Moresby	Domestic flight		
22/04/18	Sunday	Port Moresby PX274,15:20 flight from to Kavieng	Domestic flight		
23/04/18	Monday	Kavieng	Meeting	New Ireland Provincial Administration i.e. Gideon Bogosia and team at 0900 at NIPA office Wildlife Conservation Society at 1100 at WCS office	Community leaders of communities who participated in the AF project at 13:30
240/4/18	Tuesday	Kavieng	Field visit to Pati Island at 0900		Interview participating community members
25/04/18	Wednesday	Kavieng PX275, 05.45 flight to Port Moresby	Domestic flight		
25/04/18	Wednesday	Port Moresby	Skype call	Former Project Manager, Former UNDP Technical Specialist, UNDP Technical Specialist	
25/04/18	Wednesday	Port Moresby	Phone call	Deputy Country Manager, Wildlife Conservation Society Former project assistant	
26/04/18	Wednesday	Port Moresby	Meeting	Head of FPCD, Port Moresby office	
29/04/18	Sunday	Port Moresby	PX112, 15.30 flight Port		

			Moresby to Madang		
30/04/18	Monday	Madang	Working sessions	Madang Provincial Administration Rudolph Mongallee, Peter K at 0900 WWF Karufi Yaro at 11:00 World Vision at 13:30 FPDC at 15:30	Community leaders of who participated in the mangrove reforestation activities at 11:00 Community leaders of Communities who participated in the Ramu area at 1330 Community leaders of communities who participated in the AF supported project with FPCD at 15:30
1/04/18	Tuesday	Madang	Field Trip		Mangrove sites i.e. Numuru for interview of participating community members 0800 Ramu sites (if security and time permits) for interview of participating community members 1300
2/05/18	Wednesday	Madang	PX113, 07:00 flight from Madang to Port Moresby		

ANNEX 5: SELECTED LIST OF REFERENCES

[a] Documents from the Project

Project Document
Mid-term Review Report
Project Progress Reports for 2013, 2014 and 2015
Final Project Progress Report 2017
Project Budget Revisions
GEF CCA Tracking Tool and mid-term review

National Inception Workshop Report,
Community Based Mangrove conservation Handbook,
Hazard Assessment report & maps for the 5 provinces, East Sepik),
Early warning systems field assessment reports,
Assessment of Flood Early Warning System in five province of Papua New Guinea,
Roadmap for establishment of Flood Early Warning System in PNG,
Communication Strategy,
Climate Change Institutional and Capacity Assessment report,
Early Warning Systems Inception report,
Micro-Grant Agreements progressive reports (World Wide Fund for Nature, Foundation for People & Community Development, World Vision PNG and Adventist Development Relief Agency -
PNG, Asian Disaster Preparedness Centre), Training course -Mainstreaming Climate Change Adaptation into Development Planning Process,
Additional resources titled- Reader-Mainstreaming Climate Change Adaptation into Development Process,
ADPC mission report,
CCA mainstreaming training modules, draft
CCA provincial plans,
Teaching Guide for Climate Change Adaptation for Lower Primary Schools in PNG, Draft
CCA curriculum for primary Schools, communication materials including posters: restoring mangrove in your community, benefits of mangrove for coastal communities, vegetable gardens, floating vegetable gardens,
Guide for Yam planting, drought coping strategies,
21 photo stories on climate change impact on people,
18 digital stories on climate change impact on people.
Press coverage - Inception Workshop on Flood Early Warning, Press coverage-
Mangrove planting and conservation in East Sepik, Press Website Story on TV Infomercial –
El Nino Preparedness (45 Second infomercial broadcasted on National TV for two months),
Website story titled 'Local communities of Papua New Guinea are committed to fight climate change' Exposure Photo Story: Take Care of the Mangroves (https://undp-adaptation.exposure.co/take-care-of-the-mangroves).

[b] Other Documents

Augusto Giacoman & Frank Ribeiro. Seven strategies for breaking down silos. Extracted on 30 July 2018 from www.strategyand.pwc.com

Banco Interamericano de Desarrollo. Integración de la Gestión de Riesgo de Desastres y la Adaptación al Cambio Climático en la Inversión Pública. Centroamérica. División de Medio Ambiente, Desarrollo Rural y Gestión del Riesgo de Desastres. NOTA TÉCNICA. # IDB-TN-509. Washington, DC 2013

Bangladesh Agricultural Research Institute. On-Farm Research Division. Farming systems research and development site Goyeshpur. Agricultural Research Station, Pailanpur, Pubna September 1998]

FAO [2018] Biodiversity a-z Mangrove. Extracted from: fao.org on 2018/05/02

Food-Water-Shelter. Extracted on 22-05-18 from www.ttp://wildernessarena.com/food-water-shelter

Hirschman, A. Development projects observed. The Brooking Institution, Washington, DC 1967 page 31

Hallegatte, Stephane, Mook Bangalore, Laura Bonzanigo, Marianne Fay, Tamaro Kane, Ulf Narloch, Julie Rozenberg, David Treguer, and Adrien Vogt-Schilb. . Shock Waves: Managing the Impacts of Climate Change on Poverty. Climate Change and Development Series. Washington, DC: World Bank. 2016 Overview [pp1-29]

Inter-American Development Bank. Status of Incorporation of Disaster Risk Management in National Public Investment Systems. Barbados and Trinidad and Tobago. Environment, Rural Development and Disaster Risk Management Division. TECHNICAL NOTE No. IDB-TN-527. Washington DC 2014.

Info sheet. Facts and Details. [2018] Mangroves And The Plants And Animals That Live There . Extracted on 2018/05/02. http://factsanddetails.com/world/cat53/sub335/item2182.html

IUCN/WWF [no date] Mangroves – A Life-Saving Coastal Ecosystem Scaling up protection and restoration for achieving the SDGs Info sheet. Federal Ministry of Economic Cooperation and Development /IUCN/WWF [no date]

Pablo Muñoz-Rodríguez, et al. [2018] Reconciling Conflicting Phylogenies in the Origin of Sweet Potato and Dispersal to Polynesia. Current Biology. Volume 28, Issue 8, p1246–1256. 2018

Sawyer, E. John "Entrepreneurial error and economic growth" In Explorations in entrepreneurial history. Vol 4 [May 1952] pp 199-200 Cited in Hirschman, A. Development project observed, page 16

The Republic of the Sudan/United Nations Development Programme. Country Programme Evaluation. Second Country Cooperation Framework [2002-2006] & the Bridging Programme for [2007-2008]. An Independent Evaluation. Mission Report. Ms. Afaf Abu-Hasabo, Mr. Abraham Matoc Dhal, Mr. Eduardo Quiroga, Team Leader. Karthoun, 2009

UNDP [2016] Human Development Report. Table 10 National Income and Composition of Resources. New York

UNEG Norms for Evaluation in the UN System, 2005, pp 6-9

WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011

WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011. WFP. Policy on Disaster Risk Reduction and Management. Building Food Security and Resilience. Policy Issues. Agenda item 4. Rome, 14–17 November 2011. WFP. Policy on Building Resilience for Food Security and Nutrition. Policy Issues. Agenda item 5. Rome, 25–28 May 2015.Extracted on 10 July 2018 from www.wfp.org

World Vision International Leveraging Food Assistance For A Hunger-Free World. Published by Food Programming and Management Group (FPMG) on behalf of World Vision International. 2014 This Research and publication was made possible with the generous support of World Vision Korea. Publication designed by Everyday Practice. For further information on this report, please contact: yejin_oh@wvi.org or sheri_arnott@worldvision.ca

ANNEX 6: EVALUATION QUESTIONS MATRIX

Symbology: MSC= most significant change technology; CB= crop budget; KI = key informants ; FG = focus groups

Evaluative Criteria Questions	Indicators	Sources	Methodology	TE Findings
Relevance: How does the project relate to the main objectives of the GEF focal area, and to the environment and development priorities at the local, regional and national levels?				

Evaluative Criteria Questions	Indicators	Sources	Methodology	TE Findings
• Was the project worth given the situation needing improvement? • Did the project dealt with target group priorities? • Did UNDP engagement reflected comparative advantages ?	• Strengthened ability of coastal and riverine communities to make informed decisions about undertaking concrete actions to adapt to climate change-driven hazards • Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports	• MSC • Desk review • KI • FC	The Project was worthwhile for the development priorities at all levels. The target groups were reached but the resources and approach used allowed a symptomatic treatment of needs No other donor approached the development matter as UNDP
Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?				
• Have the planned objectives, outputs and outcomes been achieved? • What has been the contribution of partners and other organizations to the outcome ? • To what extent did the outcomes achieved benefit women and men equally?	• Coastal and riverine communities are protected through adaptation measures against coastal and inland flooding • Climate change adaptation is managed, monitored and planed at the provincial level and supported by a framework of policies and plans including disaster preparedness and response plans, coastal zone management plans	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports • Provincial policy documents, development plans • Disaster preparedness and response plans	• KI • Desk reviews • FG	The planned objective was not achieved; outcomes are intermediate and most outputs were achieved Partners contribution to outcomes has been weak with exceptions Intermediate outcomes have benefitted men and women equitably in most cases.
Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?				

Evaluative Criteria Questions	Indicators	Sources	Methodology	TE Findings
• To what extent were partnership modalities conducive to the delivery of outputs? • Did monitoring systems provide management with a stream of data that allowed it to learn and adjust implementation accordingly?	• Human and technical capacities of the central and provincial government institutions, NGOs and CBOs is developed • Regional and international expertise bringing in state-of-the-art technologies, good practices are used	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports • Training reports	• CB • Desk reviews • KI • FG	Partnership modalities lacked supervision from management so output delivery was not optimum with exceptions. Management was unstable to learn from any monitoring system. In any case, as there were five implementing sites, it was challenging to stream pertinent data.
Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?				
• To what extent are policy and regulatory frameworks in place that will support the continuation of benefits? • To what extent have partners committed to providing continuing support? • What are the outstanding risks to project sustainability?	• Improved longer-term resilience and adaptive capacity of coastal and riverine communities to withstand climate change impacts	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports	• CB • Desk reviews • KI • FG	Possible regulatory frameworks and policies are in the making. The completion of intermediate outcomes is critical for this purpose. Current partners are opportunistic- Need to search for partners that complement with skills and experience UNDPs comparative advantage. If intermediate outcomes are left unfinished the current results will be unsustainable
Impact: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved ecological status?				

Evaluative Criteria Questions	Indicators	Sources	Methodology	TE Findings
• Has the project contributed to improve the ecological status of coastal and riverine communities? • What would be the likely outcomes had the intervention not occurred?	• Investment in necessary physical infrastructure is made • New areas are identified for inclusion in the project	• Project reports (annual and quarterly) • Mid-term review reports • Media articles/reports	• CB • Desk reviews • KI • FG	• Despite the Project's potential, the ecological status of coastal and riverine communities has not improved. • Without the intervention the five sites would have less hope than otherwise

ANNEX 7: SUMMARY OF RESULTS AND FIELD DATA COLLECTION PROCEDURES

Summary

The Project has been able to generate outputs hence the TE proceeded with the following: [1] triangulate available output data[52] with field assessment of the project's pilot sites in the selected five provinces to ascertain the progress made towards outcomes; [2] to triangulate from international and regional information including development experience with local data as well as interviews with stakeholders, particularly the beneficiaries' lessons from their experience. In the consultant's opinion, from the results obtained it is possible to formulate lessons learned and an actionable agenda to go forward, with special reference on how to replicate and scale-up the good practices.

Preliminary Metrics

All evidence showed that awareness raising was positive in enabling informed-decisions by Project beneficiaries to adapt to climate related-hazards . Moreover, the organizations that the TE mission interacted with [cf Annex 4] are clearly aware that there are technological options available to adapt to climate change-driven hazards. This trend is consistent with historical patterns of the country's efforts in experimenting and making informed decisions. [53]

Performance Assessment of Intermediate Outcomes: Key Features

The tabulation of the available output- performance data [Annex 12] shows the emergence of four sets of intermediate outcomes. These sets are knowledge-based purporting to establish institutions at the national and sub national levels together with the communities on climate change adaptation in the targeted provinces, within the framework CCA.

Feature One: Data Rich / Information Poor?

- The unifying observation is that three intermediate outcomes contain the bulk of Project outputs and have produced nearly all of the studies and reports listed in Annex 5. The data that has been produced is abundant.

[52] "Since TE will ascertain the extent of results or change towards a development impact through climate change adaptation interventions, I propose TE uses the word assessment rather than word " [UNDP comment] Agreed

[53] These refer to the overall historical development the country, the region, has undergone in the last decades. No society remains unchanged. When society does no change then it will progressively disappear. These historical trends are inherent to human societies. Sometimes they are called the law of general evolution.

- Another characteristic of these reports is that they are in geospatial format.
- The TE mission's discussions with several members of the community of end-users, indicated that the valuable and precious documentation does not have a "home" where it is maintained and updated regularly.
- To enable these three intermediate outcomes to generate information from available data that is adequate for the needs of the community of end-users, requires an additional effort. There is clearly a need for a common platform, with data being updated/curated by each separate department or province [not a clearinghouse, the data would stay with and be maintained by the responsible province or department], connected by modern ICT infrastructure for sharing the required layers of data. The crux of the matter is to induce synergy among the data producers and the community of end-users.

Feature Two: Data Rich AND Information Rich: Potential Synergy ?

- The functional requirement of ICT infrastructure to share the required layers of data became evident as a result of reviewing the output performance data. This issue was not contemplated in the TOR as it arose from the analysis during and after the in-country field mission. Unsurprisingly, during the mission there were no interaction with PNG's government agencies and policies tied to ICT infrastructure.
- The information available indicates that PNG has a Geological Database at the Mineral Resources Authority. Recently, one Geological Database Specialist informed the Coordinating Committee for Geoscience Programmes for East and South-East Asia that the current PNG Geo Information Sharing Infrastructure advocates integrating Geoscience into Geoscience for Mining, Energy and Humanity.
- The first step for the Project's intermediate outcomes would be to touch base with the Authority's management of IT infrastructure.[54] As in any other processes involving technology adaptation, there is the need to wield the appropriate tools and coordinate efforts. If there is a single crucial thread, it is the importance of coordination within the framework of an IT infrastructure. Coordination, in turn, depends on communication; the exchange of information that allows people to work together: in short, synergy begins taking place.
- Experience has shown that if tangible results are expected on the ground, it is critical to involve the potential community of end- users very early in the design stage. It is forward-looking institutions that drive the use of new technologies, such as geomatics. Geomatics technology is neutral; and on its own it has no impact on the sustainability of its use; it is not an automatically adopted tool.
- Due to a lack of time, the TE did not have the opportunity to assess what governmental agencies or civil society organizations could be considered as a potential home- organization.

Feature Three: Levering up the Provincial Planning Committees with Geospatial Information

- The set of outputs under "Management planning at all government levels" are associated with the development planning process in the five pilot Provinces. The outputs have the potential to incorporate development of mechanisms for CCA in the key sectors of the five provinces.
- Fomenting DRM to remedy the adverse effects of climate change is an essential condition [including adaptation measures] in protecting the national assets and the level of physical infrastructure achieved so that PNG can continue towards achieving its long term development goals.
- The TE mission findings on the conditions of the provincial planning process in the provinces visited show a level of incipient progress. This indicates the need for strengthening and consolidating the provincial planning process [PPP] in order to have effective management of disaster risks in PNG.
- Once the planning process is understood, the geo spatial data available within the DRR/DRM Atlas including the climate risk information and the EWS hydrological and climate services can be incorporated in the PPP. However, two conditions need to be fulfilled. Firstly, the Internet Protocol [IP] infrastructure for the Project's geo spatial data needs to be operating, i.e. sending the data in the format required and secondly, the officers involved in the PPP need to have gone through training to use geo- spatial data to produce pertinent information in their PPP reports.

- Two elements of knowledge-management should be considered to strengthen sustainability of the proposed IP Infrastructure:

[54] Need to choose following regulations between MRA or CCDA

a) One has to do with the continuous use of a website [http://www.climateadaptationpng.org]. It is now acting as a climate change resource hub and a platform to showcase adaptation results to the global community.

b) The other element is the development of climate change curriculum materials for primary schools that incorporates key threats and adaptation measures from the five provinces. It has already benefitted a total of 23 schools, including 200 (girls and boys) students and 140 teachers and 97 school governors in five provinces. These climate change curriculum materials for primary schools incorporating key threats and adaptation measures are vital for the future generations.

Feature Four: Self Sustained Expansion of Community-led Mangrove Rehabilitation

- Project estimates indicate that in the North Coast of Madang Province, the Project has made important strides in awareness raising and training on climate change and mangrove reforestation. In 16 coastal communities, villagers have opted for mangrove planting as an adaptation strategy to coastal erosion and sea level rise after attending awareness raising exercises to mitigate climate change risks,. About 600 people were trained on mangrove conservation and coastal ecosystem management
- This intermediate outcome appears to be in a blossoming phase even though mangrove reforestation is currently at a convergence point.
- Mangrove rehabilitation can improve small-scale fisheries, which account for 90% of the people working in fishery operations worldwide, especially in PNG [FAO 2018]. As fish productivity is linked to the total area and status of mangroves, they play a vital role for food and income security for rural coastal communities in the country.
- From a rapid appraisal conducted by the TE mission, [Annex 10] the need for funds to implement mangrove rehabilitation has emerged as UNDP funds are used primarily in pilot operations.
- The key lesson to take away here is the need to allow ample time to understand how the village traditional hierarchy including cultural practices works that influence economic activities with family-units behaving as cogs in the wheel. This is critical because the measures suggested for adaptation to climate hazards require calibration to the village and the family-unit's organization and function. A village ecosystem does not occur in a vacuum, nor do the measures proposed to cope with climate hazards inevitably reduce the risks involved. A village ecosystem is influenced by a set of features within the context of physical, socio-cultural and institutional environments and is now impacted by climate variability.

Investment cost of mangrove rehabilitation

- A rapid case study was conducted with a villager from Numuru Village, Madang Province who rehabilitated mangroves with partial technical assistance from the Project [Annex 10]. The intention is to determine if the villagers themselves can initiate and lead locally appropriate climate change adaptation measures.
- The data showed [Table 10.1 in Annex 10] that the cost of rehabilitating one Hectare of mangrove is approximately USD 950 [PGK 2850], including the yearly cost of artisanal fishing. Only the fixed costs were considered for investment purposes as the operational cost consists exclusively of labour.
- Considering the GNP per capita of USD 2 723 [USD 8169] as a proxy indicator, the cost of investing in one hectare of mangrove for rehabilitation represents nearly 40% of the yearly family income. It is therefore logical to infer that the funds needed to invest in one Ha of mangrove rehabilitation cannot be raised from the villagers' own income. Thus, one must consider outside capital injections as villagers may not be able to absorb the necessary investment from their savings. There are several inferences that can be flagged for programming purposes.

  i) Adequate tenure arrangements over land where the investments will be laid out should be negotiated with traditional authorities before the investments are carried out, as nearly all the land in the country is under ancestral tenure. Those villagers who might consider investing in the rehabilitation of mangroves need assurance that they can reap the benefits in the long term. As it takes about 6-10 years for the mangrove to mature, the time lapse needed to benefit from such an investment is probably around one generation [33 years].

  ii) If such tenure arrangements can be negotiated with traditional authorities, and these arrangements are registered with the relevant national organizations, this legal arrangement itself could be used as collateral

with financing institutions. [55] This would be an important step towards financing the rehabilitation of mangroves by the villagers themselves, which would require the total policy and financial support of the national and provincial authorities including private sectors and non-governmental organisations

iii) The repayment schedule needs to take into consideration the biological context of the investment. As mentioned, it takes approximately 6-10 years for mangroves to reach full maturity and about the same time for the fish stocks to multiply to allow for an economically rewarding catch. Therefore, if villagers take out a loan, they will be unable to begin repaying the loan until the 7th or 8th year.

iv) Since mangrove rehabilitation will require long-term financing, understanding the economic structure of a village and the livelihood strategies used by menfolk and womenfolk to meet the needs of a family unit is essential, as previously discussed. Farming System Research [Annex 9] provides principles and reasoning for programming that leads to viable operations in mangrove reforestation.

- The key lesson must be to avoid underrating the inventiveness and problem-solving ability that a society needs to bring forth so that communities can make informed-decisions to adapt to climate change-driven hazards within an economically viable, socially acceptable and environmentally friendly framework.

7.1 Field Data Collection Procedures

As already indicated, climate science knowledge is imperfect, not only in relation to the environment but also to the ways of enhancing capabilities and knowledge of communities to make informed decisions and undertake concrete actions when adapting to climate variability. Adequate time and flexibility, therefore, plays a pivotal role in enabling all communities involved to learn-while-adapting.

In conformity with the TOR, the objective of the Terminal Evaluation [TE] is to [1] assess the achievement of project results, and [2] draw lessons that can both improve [the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming. In this context, the annexes presented intends to:

1- articulate a narrative to validate the procedures used in the field for the collection of evidence, with special reference to clarifying the differences from the planned procedures set out in the Inception Report [IR]; rapid surveys were used where possible to collect evidence.
2- understand the conditions in the pilot sites without the project so as to assess how the conditions have changed with the project.
3- sum-up the results obtained in the field to assess to what extent a tangible adaptation in skills has taken place, leading to the ability to cope with climate variability.

7.2 Organizational Framework

7.2.1 The Participatory Approach and Results-Based Management

The participatory approach is within the scope of TE as argued in the TE IR. The participatory approach is a collaborative evaluation process that builds on strengths and it values the contribution of everyone involved. Training, defined in this case as the imparting of learning to achieve program goals, is the lynchpin in the capacity building process. The voices of all stakeholders and beneficiaries are taken into consideration to capture the Project's intended and unintended results. In this manner, the approach incorporates all necessary elements until it has been totally validated by all stakeholders and beneficiaries, including the evaluators.

Experience has shown that the active participation of stakeholders is directly related to their understanding of the evaluation process. The participatory approach allows sharing the principles of the evaluation as it was done while collecting the information in the field. This procedure has proven useful where cross cultural communication was an essential task as participatory evaluation focuses on achievements and learning.

[55] The financial institutions in PNG have a different view of using customary land as collateral. The landownership arrangements vary in different areas in PNG thus concerns of security of such land tenure arrangements for financial institutions. Consider rephrasing to inform government of financing opportunities for community-based adaptation measures including mangroves. [UNDP comment]

Focus on Achievement

To assess achievements, the participatory approach applies the "results chain" and the "substantive focus" of evaluations within the framework of Results Based Management (RBM). "The results chain" identifies three levels of results. The set of actions of each level must be achieved satisfactorily to enable the next level to begin. If you undertake the right set of activities or actions, you should achieve the level of results or changes intended, as illustrated in Graph 1.

Although easy to define conceptually, in terms of results, it is critical to recognize on the ground the following differences:

Activities Are Not Results. Activities are ACTIONS … Completed Activities are OUTPUTS and Tangible and Measurable Changes in Behavior or Institutional Performance are OUTCOMES [Source Graph 1]

According to OECD, the evaluation's substantive focus is on the following generic themes.[56] Note that these questions have been expounded for this Project's specific context and performance issues and are reflected in the Evaluation Questions Matrix [Annex 6].

Relevance: The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor. In evaluating the relevance of a project, it is useful to consider the following questions: To what extent are the objectives of the project still valid? Are the activities and outputs of the project consistent with the overall goal and the attainment of its objectives? Are the activities and outputs of the project consistent with the intended impacts and effects?

Effectiveness: A measure of the extent to which an aid activity attains its objectives. In evaluating the effectiveness of a project, it is useful to consider the following questions: To what extent were the objectives achieved / are likely to be achieved? What were the major factors influencing the achievement or non-achievement of the objectives?

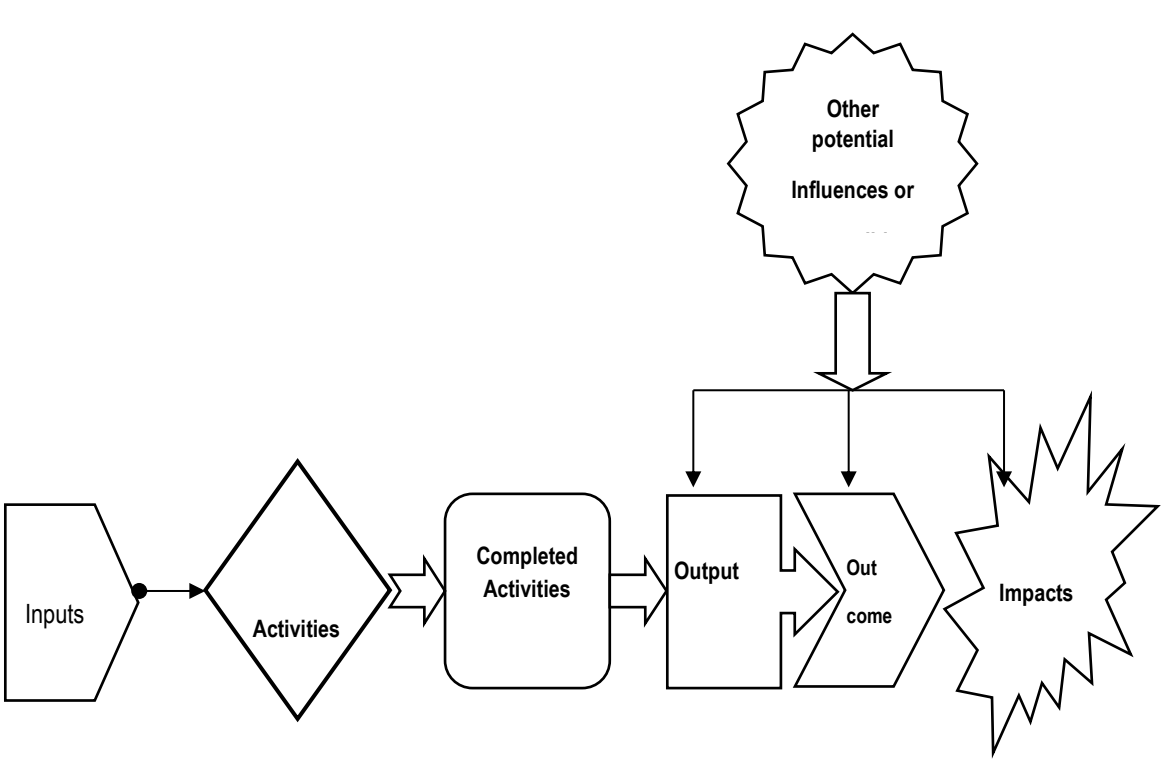
Efficiency: measures the outputs -- qualitative and quantitative -- in relation to the inputs. It is an economic term that signifies that the aid uses the least costly resources possible in order to achieve the desired results. This generally requires comparing alternative approaches to achieving the same outputs, to see whether the most efficient process has been adopted. When evaluating the efficiency of a project, it is useful to consider the following questions: Were activities cost-efficient? Were objectives achieved on time? Was the project implemented in the most efficient way compared to alternatives?

Impact: The positive and negative changes produced by a development intervention, either directly or indirectly, intended or unintended. This involves the main impacts and effects resulting from the activity on the local social, economic, environmental and other development indicators. The examination should be concerned with both intended and unintended results and must also include the positive and negative impact of external factors, such as changes in terms of trade and financial conditions. When evaluating the impact of a project, it is useful to consider the following questions: What has happened as a result of the project? What real difference has the activity made to the beneficiaries? How many people have been affected?

Sustainability: Is concerned with measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn. Projects need to be environmentally as well as financially sustainable. When evaluating the sustainability of a project, it is useful to consider the following questions: To what extent did the benefits of a project continue after donor funding ceased? What were the major factors which influenced the sustainability of the project?

---

[56] The DAC Principles for the Evaluation of Development Assistance, OECD (1991), Glossary of Terms Used in Evaluation, in 'Methods and Procedures in Aid Evaluation', OECD (1986), and the Glossary of Evaluation and Results Based Management (RBM) Terms, OECD (2000).



Graph 1: The Results-Chain within the framework of RBM [Source: own elaboration]

In addition to the above OECD generic principles, the following criteria is pertinent in this exercise.

- Sustainability - durability of positive project results after the termination of the technical cooperation; static sustainability - the continuous flow of benefits, by the completed project; dynamic sustainability - the use or adaptation of project results to a different context and/or other targets.
- Capacity Development - to what extent individuals and organizations (governmental and non-governmental) develop their abilities individually and collectively to perform functions, solve problems and set and achieve objectives.
- Audit - focuses primarily on compliance to existing regulations—rather than assessing the likely impact or sustainability which is the main concern of an evaluation.[57] If development results of a project have been affected by the management of administrative procedures, evaluators ordinarily report on such occurrence because they do not have the mandate or skills to deal with financial and administrative performance that should to conform legal and administrative norms.

Focus on Learning

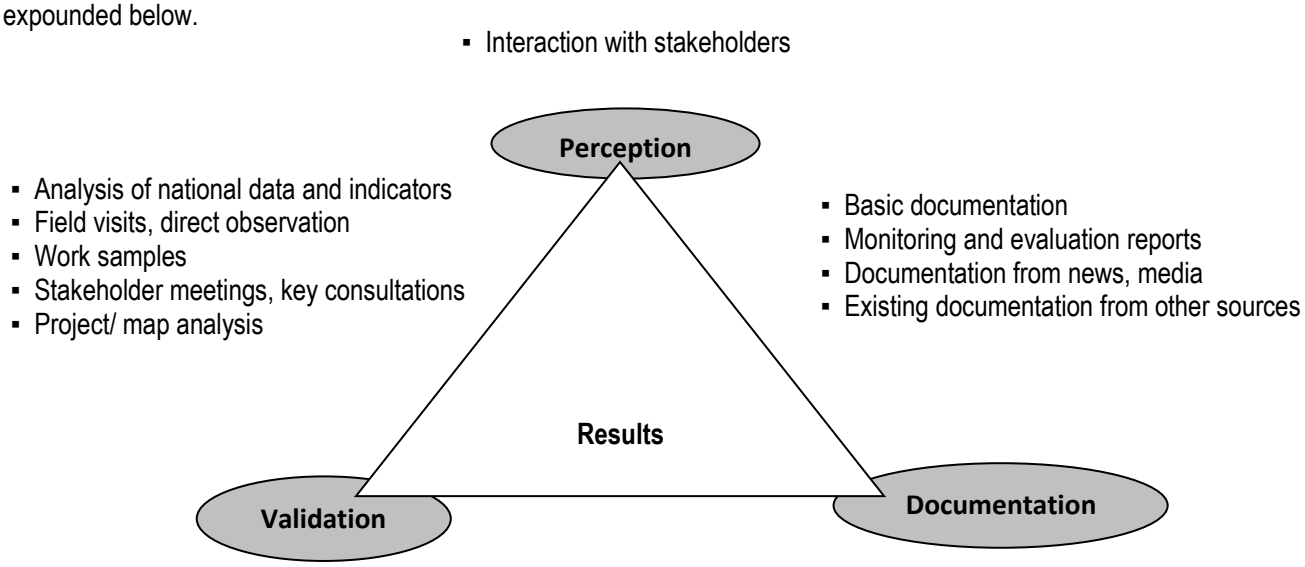
The systematic assessment of the relevance, performance and success or failure especially at the outcome level draws lessons learned from the evaluation. Often the beneficiaries, stakeholders, and the organizations most directly involved with the project conclude what worked and what did not. Learning can be used to move to action. The participatory evaluation is action oriented because it must be useful to the people and organizations that are doing the work.

In a participatory evaluation, the optimum conditions for learning take place when the evaluation and project teams jointly define the procedures, the choice to visit sites, and interaction with key stakeholders. This is often reflected in the Inception Report. Concretely, the project team prepares the data, and identifies the results achieved as well

[57] UNDP Results-oriented monitoring and evaluation. New York, 1997, page 10

as the successes and failures for review by the evaluation team. For accountability and transparency purposes, the project team is fully responsible to prepare the information needs for the evaluation team.

The division of labour for data collection and analysis follows the TOR 's structure. The Team Leader will closely consider the elements suggested and any modification will be reviewed jointly. It is essential that the Team Leader knows of the complete set of institutional arrangements i.e. policy initiatives, training procedures, and the like. In terms of the analysis of the evidence to back up the conclusions reached, the evidence is ordinarily collected from three sources of information: perception, validation and documentation. Then the evidence is triangulated as illustrated in Graph 2. The specific sets of data arrays used to triangulate the information needed in this TE is expounded below.



Graph 2: Concepts of Triangulation for the Analysis of Evidence [Source: Adapted from UNDP, Assessment of Development Results. Framework and Guidance. New York, 2009 p.9]

7.2.2 Specific Evaluation Processes

In conformity with the Inception Report, this TE assessment intends to measure, to the extent possible, the achievement of outcomes. Because outcomes happen as a result of all the work done by UNDP in partnership with development partners from state and non-state institutions, this is what is required to adapt to climate change-driven hazards.

Box 1 Outcome-Level Evaluation
Outcomes reflect the developmental momentum that has been gained by primary stakeholders in programme countries, as a consequence of UNDP's initiatives. Outcomes are what primary stakeholders do under their own steam, upon their own initiative, following UNDP's delivery of outputs – the services and products generated under a programme or project. Outcomes are not the sum of outputs delivered through UNDP programmes and projects; rather, they occur when outputs are used by primary stakeholders to bring about change. 'Knowledgeable training workshop participants' are not an outcome. 'UNDP advisory reports' are not an outcome. 'UNDP procurement of medication' is not an outcome. An outcome is when men and women use knowledge gained through UNDP training in their day-to-day work and bring about changes. An outcome is when UNDP advisory reports are used by government officials to develop new policies. An outcome is when counterparts use UNDP models and systems to develop transparent and accountable procurement systems of their own. UNDP Outcome-Level Evaluation: A Companion Guide, New York, 2011, page 3

The Final Project Review Report was prepared in 2017 [henceforth referred to as FPRR]. This report provides a "final review of the project performance over the implementation period, its contribution towards realizing national development goals over its life…and covers a summary of project results by output;[58] a performance review with respect to its contribution to achieving the UN Development Assistance Framework outcomes and programming principle; implementation strategy; and management effectiveness; project implementation, lessons learned, financial status and utilization of project resources [FPRR page 5]." Annex 12 contains a tabulation of the list of outputs within the objectives of the present TE.

The evaluative information available for this TE is at the level of outputs. It must be kept in mind that the TE's mandate is to draw lessons that can both improve [1] the sustainability of benefits from this project, and [2] aid in the overall enhancement of UNDP programming. Such information is drawn ordinarily from outcome-level data. It is important to note that this Project, for the factors that will be discussed throughout this TE, has presented its results achieved after seven years of implementation at the output-level. Ordinarily a terminal report prepared by an implementing agency after seven years of implementation the evaluative information would be at the outcome level.

During the grounding of the IR, and despite efforts by the CO to complete the data array on Project outcomes, it became evident that the data array was fragmentary and incomplete at the outcome-level. In consequence, the TE task was to assess project outputs to higher level effects which could be characterized [or hypothesized] as intermediate outcomes.[59] The following sub-tasks were conducted:

- To review in detail the intermediate and final outputs in terms of their actual or potential contribution to the expected outcomes and Project objectives.
- To examine changes that have taken place within outcomes of similar projects, whether they are environmental management, human security and recovery, governance or poverty reduction;
- To explain these changes with reference to specific contributing or impeding factors of particular relevance to the PNG context;
- To determine UNDPs contribution to these changes. UNDP may or may not have made a difference to the specific changes and in determining these changes; reference is made to changes that can be attributed to UNDP outcomes, to the relevance of these changes, to their sustainability and effectiveness;

The above tasks were compounded by the fact that the members of the Project management team had disbanded as the project was completed in December 2017. The discussion sessions were conducted via Skype with the former management team on the performance of project management, with the support of the Country Office, as they are now located in Africa and Asia-Pacific. The sessions were useful as they shed light on the administrative management of implementation.

In essence, it was possible [1] to triangulate the FPRR 's output data and field observations and then estimate the progress made towards outcomes; [2] to triangulate from international and regional information including development experience with local data as well as interviews with stakeholders, particularly the beneficiaries' lessons from their experience. In the consultant's opinion, from the results obtained it is possible to formulate lessons learned and an actionable agenda to go forward, with special reference on how to replicate and scale-up the good practices (specifically mangrove restoration practices).

---

[58] The TE mission's underlining

[59] This procedure of assessing outputs to a higher level effects which could be characterized [or hypothesized] as intermediate outcomes has been carried in cases of project implementation under considerable stress, like in Sudan just before it was divided into South Sudan and Sudan. Cf: The Republic of the Sudan/United Nations Development Programme. Country Programme Evaluation. Second Country Cooperation Framework [2002-2006] & the Bridging Programme for [2007-2008]. An Independent Evaluation. Mission Report. Ms. Afaf Abu-Hasabo, Mr. Abraham Matoc Dhal, Mr. Eduardo Quiroga, Team Leader. Karthoun, 2009

7.3 Specific Field Procedures for Data Collection

In line with the UNDP GEF guidelines for Terminal Evaluations, this annex intends to show the best mix of tools used to ensure reliable and valid answers to the evaluation questions within the context of the extremely limited resources assigned to the TE and the scarcity of evaluative data for reasons specific to the Project's own evolution. [60]

Concretely, the evaluation team was led by one international consultant and supported by the Country Office and representatives of the Climate Change and Development Authority, the national executing agency, accompanied the field visits and provided support when possible.

In conformity with the TOR, the Inception Report proposed an outcome-oriented methodology and set of procedures for collecting the evidence and instruments (e.g., crop budgets, Most Significant Change [MSC] technique, income-expenditures statements) from field visits to three pilot sites [three days per field site were proposed]. Thus:

> Day 1 was to be used to meet the implementing agencies and local authorities in the morning to brief them on the purpose of the evaluation so the information conveyed through the interviews was relevant and accurate. Subsequently, the enumerators are trained and the instruments tested.
> Day 2 was to focus on the administration of the instruments used for data collection by the enumerators, including focus-group discussions and informant-interviews conducted by the evaluator.
> Day 3 was to be used to consolidate the data collected to ensure coherence, reliability and validity. Any gaps in the data are addressed during the third day.

As the TE's organizational framework was participatory and consultative, every stakeholder had an opportunity to present their case, as the focus was on achievements and learning. It also allowed the assessment of potential and actual synergies, or lack thereof, in operation. Thus, the field data collection was focused primarily on reconstituting the framework of activity implementation geared to the outcome levels, making it possible to estimate if the results were achieved. This approach also allowed the identification of the causes that facilitated or precluded the realization of Project outcomes as well as the determination of whether the conditions had changed with the Project's implementation. As the time available in each visit was too brief, basic discussions were conducted on the counterfactual. A snap shot of the situation that prevail for individuals, organizations or groups were there no development intervention emerged. It was consistent with discussions describing the situation prior to the development intervention [subjective base line].

7.4 Limitations in the Field Data Collection and Mission Composition

When the consultant arrived in PNG, the number of sites field visits had increased from three to all five pilot provinces, without a corresponding increase in real time spent in the field. This was aggravated by the fact that instead of being organized to optimize data collection, the field visits had to fit airline schedules as all of the sites could only be reached by air. On top of all this, twice the airlines either cancelled or delayed flights occasioning further loss of time.

In line with assessing higher level of outputs, in every working session the TE focused on: [1] reconstituting the framework of activity implementation geared to the outcome levels, [2] estimate if the results were achieved, and [3] draw a glimpse of causes that facilitated or precluded the realization of project outcomes. All in all, the brief time assigned for each site weighed against inquiring further into outstanding issues.

[60] There is no substitute of using a minimum of three days in one site to do an assessment. The first day to plan jointly who to see and where to go. The second day to conduct the activities And the third day to reconstitute jointly the data collected. Even in conflict countries this approach has been followed. Otherwise the information lacks structure.

As indicated, the IR proposed conducting a rapid appraisal at each site, however no manpower was assigned to the TE to apply the different techniques proposed in the IR.[61] The exception was in Madang where a large number of beneficiaries showed up. The MSC was administered to more than 50 informants [cf Annex 8] and the information gathered provided insights about the current conditions to rehabilitate degraded mangrove areas. The crop- budget's economic framework was applied in the context of the Farming Systems Research approach [FSR] for a rapid assessment of the investment costs associated with mangrove reforestation and management [cf Annex 10].

It follows logically that it has been problematic to assess both [1] progress towards outcome achievement and the [2] sustainability of the results obtained. The IR proposed sketching an outcome model or a (visual) map of the causal logic of the results achieved that are being evaluated, with the participation of project management and key stakeholders. This could have shown how certain initiatives (activities, outputs) are perceived as contributing to bringing about a desired positive change [outcome]. This procedure would also have been useful to ascertain a reliable baseline based on the perception of older stakeholders. None of this was possible due to a lack of resources and time.

The TE team required additional technical capacity. A second consultant was needed with expertise in the relevant subject matter, including geomatics. An expert analysis to reviewed why geomatic outputs did not amalgamate with other outputs to turn into outcomes would have been productive. A third national consultant who knows the local context well should have been with the team to internalize important lessons learned that are not always amenable to written communication and inform the mission about governmental procedures and policies related to the Project context and the sector in general.

As climate science knowledge is evolving, every lesson learned is precious. Similarly, every opportunity lost has immeasurable costs. In this TE, issues concerning geomatics were reviewed straightforwardly without the necessary detail. In addition, the time available to explore issues was not adequate without mentioning the absence of skilled support, i.e. enumerators, research analysts, etc. Consequently, in the TE's opinion the Project's results could have been underreported due to the insufficient time and resources assigned to gather information on the Project's development issues in the field. Similarly, the monitoring efforts on development matters appeared insufficient.

Lastly it must be recorded that even though I took all of the international vaccines required, I was overcome by typhoid fever after two weeks of work in the field and missed the last field visits. At that point, however, the field data collected had begun accumulating into a recognizable pattern, meaning it made more sense to continue with the mission. In any event, the second mission member followed the procedures to guide CCDA collect the information. In retrospect, all lessons drawn hereunder would have been missed if the TE had been aborted at that point.

7.4.1 The Management of Implementation

During field visits, the TE came across irregularities in the procurement and delivery of outputs by partners in some of the sites visited. In nearly every meeting organized to conduct the TE activities, queries arose straightway tied to the application of UNDP procurement procedures. In addition, the TE has received a large number of management queries from national stakeholders. The bulk of the queries relate to the application of UNDP project management and financial disbursement procedures.

[61] "Clarify whether there were not enough participants from beneficiaries to use all applicable techniques. The CO assisted with facilitation and translation." [UNDP comment] As Evaluator I had to assume that there was going to be sufficient beneficiaries to interact. This is why I had tools prepared. In hindsight, the UNDP comment is correct. There were not enough participants from beneficiaries. This is discussed in the Main Report. The implications of this fact run far and wide.

The available evidence indicates that the implementation management has moderately hindered the project's development results. The missing element of the implementation management seemed to be the inconsistent adherence to standard management procedures within the framework of the UNDP and its national partner. How this situation arose is unclear.

The UNEG Handbook[62] states that the core work of UN agencies is normative work, that is, work that deals with international codes and standards; food safety, environmental protection, health standards, agriculture health including marine life, capacity development and others. The impact of this work can benefit the lives of millions of people around the world. However, it's work is long-term and indirect in nature, because the delivery of benefits require the participation of various partners. If partners perform as expected, then the benefits accrue on the beneficiaries—and the UN agency can take relative ownership.

This Project's purpose is to develop capacities on climate change adaptation. The provincial organizations, community leaders and other stakeholders through the Project activities have been learning new skills under different modules. If the enabling conditions are in place, they will be able to apply their knowledge and generate the expected results. To this end, seeds, trees, latrines, water tanks, etc., were distributed to test results. Is it possible that partners did not clarify to beneficiaries about the purpose behind the goods distributed? One could suppose that this may be the reason why some beneficiaries dispute the Project's distribution procedures.

This is a complex situation because one needs to review the contracts of each partner and the conditions surrounding the performance in the context of legal and administrative norms prevailing in PNG. Because evaluators deal exclusively with development results, in the TE's opinion this issue should be dealt by an auditor to be fair with everyone concerned. Accordingly, all the queries that TE has received will be placed in an annex [Annex 13]. In hindsight, this Project should have been audited before undertaking the TE.

7.5 Summary of Intermediate Outcomes: Key Features

7.5.1 Preliminary Metrics

At a minimum, the men and women interviewed are clearly aware that there are technological options available to cope with climate variability and global warming. All evidence points to the fact that there has been an initial awareness, raising uptake and making an early positive informed-decision to adapt to climate-change-hazards among Project beneficiaries, as has been shown from the results of analyzing data collected from interactions with beneficiaries in the Madang provinces and other areas [cf Annex 8]

Moreover, the organizations that the TE mission interacted with [cf Annex 4] are clearly aware that there are technological options available to adapt to climate change-driven hazards. This trend is consistent with the historical pattern of the country's efforts in experimenting and making informed decisions, as exemplified in the interactions of the TE mission with decision-makers and policy analysts.

To manage climate change risks and facilitate resilience to climate change by both the administrative levels and the vulnerable communities, the Government of Papua New Guinea (GoPNG) envisages leading the planning, coordination and on-the-ground implementation of measures [Prodoc p10]. To this end, it was anticipated that all levels of society participate in a paradigm shift of the development processes in order to transform reactive and ad hoc responses into anticipatory and planned interventions to manage the uncertainties of climate change. This entails resources to support the GoPNG to put pro-active systems and concrete measures in place that can provide sustainable benefits to vulnerable communities and foment critical sectors with respect to adapting to climate change.

[62] UNEG Handbook for Conducting Evaluations of Normative Work in the UN System. 2013, pp 5-7

The crux of the project is capacity development wherein the process by which individuals, groups, institutions and organizations improve their ability to perform functions, identify and solve problems efficiently, and understand and deal with their developmental needs in a broader context and in a sustainable manner.[63] The Project is knowledge-based and purports to build institutions at the national and sub national levels together with the communities in the targeted provinces, within the framework of climate change adaptation and disaster risk management plans. To this end, the upgrading of both general and specific skills, procedural improvement, and organizational strengthening is critical.[64] This is because skill upgrading enables connecting climate change adaptation and disaster risk reduction to provide a framework for responding to climate change risks. This process focuses on expanding facilities for the knowledge-based reduction of hazards and disaster risks. Ultimately, the reduction of climate change- hazards and disaster risks ensures economic development results with some degree of sustainability –including social factors in the context of CCA

7.5.2 Project Concept and Design

According to approved Project document [pp 3-19]:

- the Project's targeted beneficiaries include: 9 coastal communities and 8 riverine communities in the five provinces of Morobe, Madang, New Ireland, East Sepik and Northern;
- the Project implementation was led by the Climate Change and Development Authority in collaboration with the National Weather Services, Conservation and Environmental Protection Authority; National Disaster Center and Provincial Administrations of Morobe, Northern, East Sepik, Madang, and New Ireland.
- Project objectives were to enhance the adaptive capacity of communities to make informed decisions about and adapt to climate change driven hazards affecting both coastal and riverine communities in the North Coast and Islands Region of Papua New Guinea. The Project's focus was on building resilience towards occurrences of coastal and inland flooding events.

The Project had four expected outcomes:

- Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and 3 cities of the 11 provinces of the North Coast and Islands Region;
- Reduced exposure and increased adaptive capacity of 8 riverine communities of the 4 provinces (East Sepik, Oro, Morobe and Madang Provinces);
- Strengthened institutional capacity at the national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices; and,
- Strengthened awareness, education and advocacy to promote ownership of adaptation and climate change-related risk reduction processes at the national and sub-national levels

Operationally, the Project intended to strengthen the ability of coastal and riverine communities to make risk-informed decisions and to undertake concrete actions to adapt to climate change- driven hazards affecting their specific locations. This was to be achieved through:

- reduced exposure and increased adaptive capacity of coastal and riverine communities to flood-related risks and hazards;
- strengthened institutional capacity at the national and sub-national levels to integrate climate change related risks into sectoral policies and management practices;
- strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at the national and sub-national levels [FPRR page 4].

---

[63] UNDP Capacity Development Group, New York, 2005

[64] Elliot Berg, Rethinking technical cooperation, New York, 1993

7.5.3 The Project's Development Strategy[65]

As partially discussed, the overall intent of this Project is to induce a paradigm shift of the development processes in order to transform reactive and ad hoc responses into anticipatory and planned interventions to manage the uncertainties of climate change. To this end, the design of outcomes reflects ambiguity because there is uncertainty as to what to do once outcomes are attained. Further, the anticipated intention of this paradigm shift is undefined. A sketch of the new paradigm would have been helpful for the present exercise. This TE exercise needs to focus on the logical options that are economically viable, socially acceptable and environmentally sustainable—in the context of governmental agencies and communities making informed-decisions to adapt to climate change-driven hazards.

It must be understood that this search of logical options is associated with both a possible overestimation of benefits and a likely underestimation of costs, due to inexperience in the design of projects dealing with climate change adaptation. Concretely, there is information about the technological transfer of projects tied to infrastructure and industry. The techniques make it clear that a factory can be dropped anywhere with minor issues in management, whereas projects involved with agriculture, natural resources, environment and climate change are deeply enmeshed with nature and laden with technological uncertainty. For instance, even basic statistical information on climatic elements is scarce almost anywhere in the developing world.

Development experience indicates that despite the technological uncertainty, overestimating benefits is considered to be a useful development mechanism when difficult initial decisions are needed to be made, due either to the slowness of institutional change and even when fiscal sacrifices are required. Hirschman[66] suggests that societies often reflect man's inadequate acquaintance with his ability to solve problems.

Exaggeration of prospective benefits is at least as common as underestimating costs. Historical evidence on entrepreneurship in the United States in the early 20th century indicates that the cost of development efforts undertaken in transport and in opening up new resources was underestimated either "by miscalculation or sheer ignorance"[67] If the efforts had been accurately estimated, the investments would not have been made.

The takeaway lesson must be to avoid underrating the inventiveness and problem-solving ability that a society needs to bring forth so that communities can make informed-decisions to adapt to climate change-driven hazards within an economically viable, socially acceptable and environmentally friendly framework.

7.5.4 Output-Performance Assessment: Key Features

As mentioned, the organizations that the TE mission interacted with [cf Annex 4] are clearly aware that there are technological options available to adapt to climate change-driven hazards. This trend is consistent with the historical pattern of the country's efforts with experimenting and beginning to make informed decisions, as exemplified in the interactions TE mission with policy and decision-makers. Moreover, the men and women interviewed have shown awareness and have also begun making informed-decisions to adapt to climate-change hazards, for example by getting involved in the rehabilitation of mangroves in Madang province [cf Annex 8]

---

[65] "I am trying to understand the gist of the project development strategy in relation to the project results as what's coming out in this section is costs and technology for climate change adaptation. What aspects of project should have been thought through for such as project. Has the project not considered something important and/or paid little attention to it."[UNDP comment] As argued in Main Report, the project concept was broad and abstract. It lacked synergy among its proposed components. The idea of "Paradigm shift" may have been misused. It was never defined with clarity where the Project was going and what was the pathway. The management structure proposed was never implemented. In the end, there were two development themes: 1- mangrove development and conservation and 2- regional economic planning integrated to DRM/DRR. Both themes are tied to natural resources and require structural reforms and new policies. They should be dealt with government agencies. It is the government agencies that need the training on-the-job. The NGO partners can only think one semester at the time.

[66] Hirschman, A. Development projects observed. The Brooking Institution, Washington, DC 1967 page 31

[67] Sawyer, E. John "Entrepreneurial error and economic growth" In Explorations in entrepreneurial history. Vol 4 [May 1952] pp 199-200 Cited in Hirschman, A. Development project observed, page 16

The tabulation of the available output- performance data [Annex 12] shows the emergence of four sets of intermediate outcomes. Put differently, one can hypothesize the emergence of four intermediate outcomes. The outputs within each set have distinct possibilities of amalgamation if synergy is induced. It is productive to keep in mind that the purpose of outputs are to morph into the expected outcomes, that is, instituting tangible and measurable change in behaviour among the population and change in institutional performance among the organizations involved at the national and semi-national levels, including communities inhabited by men and women. This is the overarching purpose of designing projects under any development framework.

Although there are methodological directives to enhance a project's impact, it is possible that there are no similar directives to enable outputs to morph into an expected outcome.[68] Synergy may be one procedure to enable the amalgamation of outputs into outcomes. This is critical —otherwise the output becomes a "white elephant" that would be a great waste of resources at this critical juncture when, the country 's economy, environment and people are becoming more vulnerable and are at risk of not meeting basic human development needs [Prodoc page 1].

Synergy in the economic context is the operation whereby the overall return on a firm's resources is greater than the sum of its parts (the so-called '2 + 2 = 5 or more effect'). In project management, synergy often results from the exploitation of complementary activities or from the carry-over of management capabilities, synchronizing individual, group or organizational activities in a way that achieves a better result than any of the activities by themselves. For example, in the case of a production- project, one output may have a production organization, while the other excels in marketing; joining the two can make the combined operation a more effective project.

In this Project, the four sets of intermediate outcomes are knowledge-based purporting to building institutions at the national and sub national levels together with the communities in the targeted provinces, within the framework of the reduction of hazards and disaster risks. As will be discussed next, this process focuses on expanding facilities for the reduction of hazards and disaster risks. Ultimately, the reduction of climate change- hazards and disaster risks is to ensure the results of economic development, including current physical assets that are the country's endowment, including preserving the biological and cultural diversity.

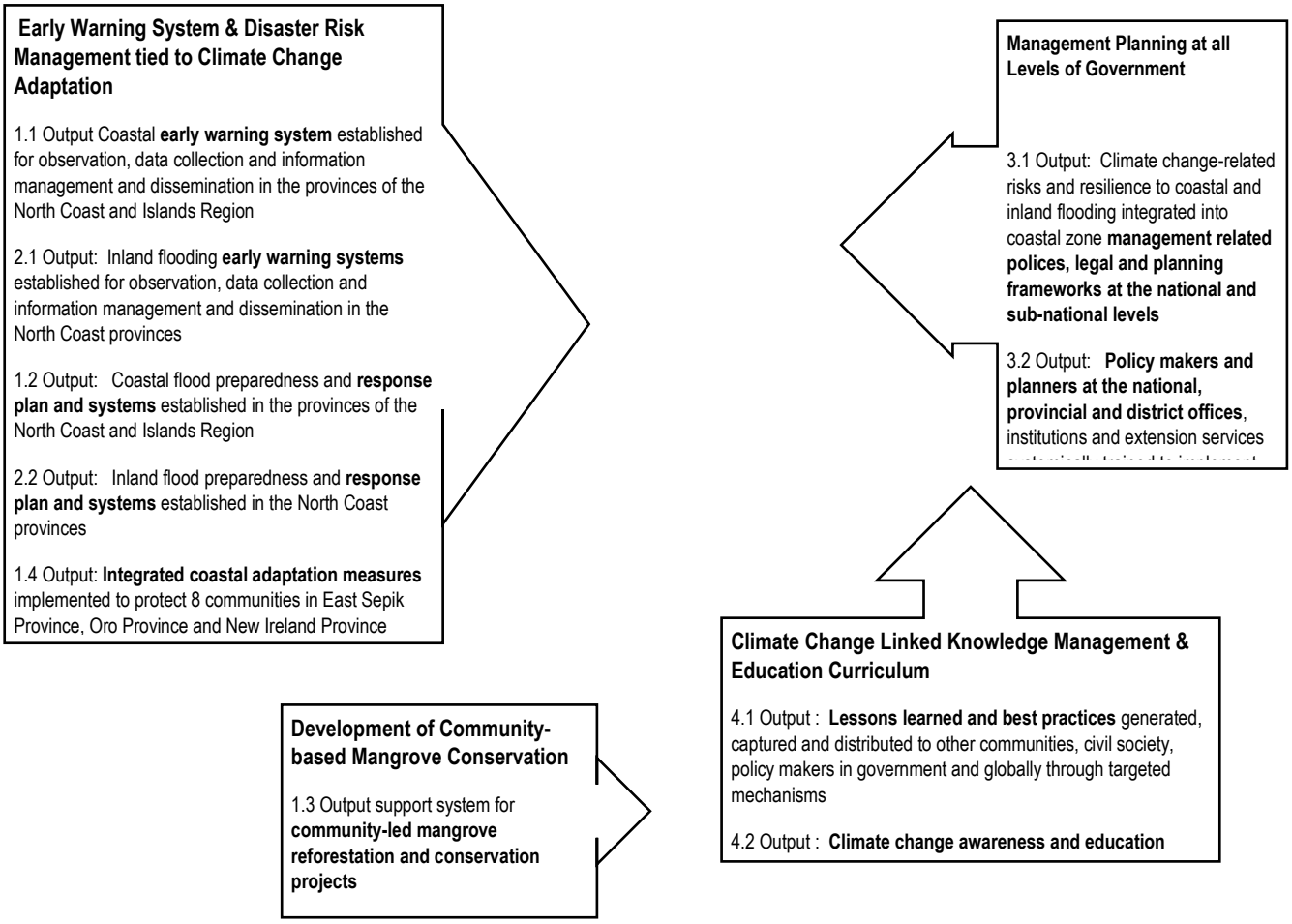
7.5.4.1 Feature One: Data Rich / Information Poor?

Graph 3 illustrates the output composition of these four sets of intermediate outcomes. Each set is composed of outputs that logically and functionally complement each other. For instance, the set of "Early Warning Systems and Disaster Risk Management" is tied to Climate Change Adaptation and has the largest number of outputs [6]. By contrast, the set of "Development of Community-based Mangrove Conservation" contains only one output.

At this junction, the point is to analyze the context, to move forward from the situation of using outputs as silos. This began with the review of the following four intermediate outcomes or hypothetical outcomes:

1- First Intermediate Outcome: Early Warning Systems and Disaster Risk Management tied to Climate Change Adaptation [containing six outputs]
2- Second Intermediate Outcome: Management Planning at all levels of Government [containing two outputs]
3- Third Intermediate Outcome: Climate Change Linked to Knowledge Management and Education Curriculum [two outputs]
4- Fourth Intermediate Outcome: Development of Community-based Mangrove Conservation. Output support system for community-led mangrove reforestation and conservation projects [1 output]

[68] The ROtI Handbook: Towards Enhancing the Impacts of Environmental Projects. Methodological Paper # 2, The GEF Evaluation Office, Washington, DC 2009



Graph 3: EMERGING INTERMEDIATE OUTCOMES [Mission elaboration]

The unifying observation is that these four intermediate outcomes contain all of the Project outputs and have produced all of the reports and studies listed in Annex 5. The data that has been produced is rich. The evaluation's challenge is to ascertain if this data is being processed by the different stakeholders and beneficiaries in such a manner that information is generated that enables the amalgamation of outputs so they become an outcome with the developmental momentum for climate change adaptation. For instance, there is one key study on climate hazards, exposure and vulnerability and a Composite Risk Atlas and Maps/Indexes for five pilot provinces [East Sepik, Madang, Morobe and Northern and New Ireland]. The study contained comprehensive hazard profiles and maps in geospatial format which could be integrated into the National Risk Information System. There are other reports related to Early Warning Systems and Disaster Risk Reduction that are linked to climate change-hazards.

Box 2. Sample of Intermediate Outcome or Hypothetical Outcome

Early Warning Systems and Disaster Risk Management Integrated to Climate Change Adaptation
1.1 Output Coastal early warning system established for observation, data collection and information management and dissemination in the provinces of the North Coast and Islands Region
2.1 Output: Inland flooding early warning systems established for observation, data collection and information management and dissemination in the North Coast provinces
1.2 Output: Coastal flood preparedness and response plan and systems established in the provinces of the North Coast and Islands Region
2.2 Output: Inland flood preparedness and response plan and systems established in the North Coast provinces
1.4 Output: Integrated coastal adaptation measures implemented to protect 8 communities in East Sepik Province, Oro Province and New Ireland Province

2.3 Output. Integrated riverbank protection measures implementation to protect communities in East Sepik Province, Oro Province and Morobe and Madang Provinces Source: FRRP

Another characteristic is that most of these works are in geospatial format. Geoscience or geomatics is the science of map technology (GPS, satellite imagery, GIS, and Google Maps). Geospatial engineers are responsible for using geographic data that supports technical operations for Disaster Relief and Natural Resource Development. They collect, analyze and distribute geospatial information to represent the terrain and its possible effects. Ordinarily, GIS Technicians are responsible for digitizing, inputting, updating and ensuring the integrity of the data in the system, like the DRR/DRM Atlas. Essentially, a GIS Technician is a database administrator who updates the data but does not use it. They have administrator's capabilities and have day-to-day responsibilities such as updating records presented by stakeholders and decision-makers. They may extract the data, but usually do so for others instead of using it for themselves. Typical data they would handle includes qualitative and quantitative data such as aerial photographs, environmental readings (such as pollen, precipitation, water pollution) climate science, environmental conservation, zoology, demographic analysis, and regional planning.[69]

According to discussions the TE mission had with several members of the community of end-users, this valuable and precious documentation does not have a "home" where it is maintained and updated regularly. The FPRR [page 25] indicates that the contract with the vendors that produced the reports using digital information and geospatial format, did not include a clause requiring training for the maintenance and update of the data. The contract with the vendor for the installation and maintenance of the automatic weather station includes capacity training. It concludes by stating that the government can update the digital information from the vulnerability assessment using their own resources. It is absolutely essential for the national government to take ownership of these knowledge products. To enable these three sets of outputs to generate information from the data available that is adequate for the needs of the community of end-users, requires additional effort. The specific requirements from the community of end-users can be varied in terms of time and technical requirements. There might be need of a common platform, with data being updated/curated by each separate department or province [not a clearinghouse, the data would stay with and be maintained by the responsible province or department], connected by modern ICT infrastructure for sharing the required layers of data. This does not mean all data would be shared to start with - but at least the most important would be. The crux of the matter is to induce synergy among the data producers and the community of end-users.

7.5.4.2 Feature Two: Data Rich AND Information Rich: Potential Synergy?

The functional requirement of ICT infrastructure for sharing the required layers of data became evident as a result of reviewing the output performance data. This issue was not contemplated in the TOR as it arose from the analysis posterior to the TOR issuance. Unsurprisingly, there were no interaction with PNG's government agencies and policies tied to ICT infrastructure. The information available indicates that PNG has a Geological Database at the Mineral Resources Authority. Recently, one Geological Database Specialist indicated to the Coordinating Committee for Geoscience Programmes for East and South-East Asia that the current PNG Geo Information Sharing Infrastructure advocates integrating Geoscience into Geoscience for Mining, Energy and Humanity. The latter is relevant to this exercise

> "GEOSCIENCE FOR HUMANITY A silent task, but very important in the nation's development, is our contributions to meet demand brought about by the growth in population. This focus area also addresses other cross-cutting issues such as poverty alleviation and health. Our Projects under this Focus Area include: Water Supply and Sanitation Urban Geology and infrastructure development Industrial Minerals

[69] Extracted on June 20, 2018, from https://www.environmentalscience.org/career/gis-technician

Fig.1.5. Chart showing Geology Survey Division Primary Focus Areas and data work flow Current status of Spatial Data Information System in MRA Geology Survey Division (GSD)"
https://www.slideshare.net/FionaKaumu/papua-new-guinea-geoinformation-sharing-infrastructure

Since the Mineral Resources Authority advocates for a Human Geoscience, the first step for the Project's intermediate outcomes would be to touch base with the Authority's IT infrastructure's management. As in any other processes involving technology adaptation, there is the need to wield the appropriate tools and coordinate efforts. If there is a single crucial thread, it is the importance of coordination within the framework of an IT infrastructure. Coordination allows the accomplishment of tasks that individuals working alone cannot achieve. People can build on one another's strengths and make up for one another's weaknesses. Coordination, in turn, depends on communication; the exchange of information that allows people to work together: in short, synergy begins taking place.

Experience has shown that if tangible results are expected on the ground it is critical to involve the potential community of end- users very early in the design stage, through self-sustaining institutions. Due to a lack of time, the TE did not have the opportunity to assess what governmental agencies or civil society organizations could be considered as a potential home- organization. It is forward-looking institutions that drive the use of new technologies, such as geomatics. Geomatics technology is neutral; [70] and on its own it has no impact on the sustainability of its use; it is not an automatically adopted tool. Institutional reform/innovations are needed to ensure that the benefits of a new technology reach the target group. Concretely, institutional infrastructure is the key factor in successful technology transfers; this is true the world over.

A dictum claims that only rich countries have good maps. The reality is that a country becomes rich because of good maps. The process of making good maps is now within reach, and Geomatics is the science of map technology (GPS, satellite imagery, GIS, and Google Maps). Geospatial engineers can use geographic information data that supports technical operations for disaster relief and sustainable natural resource management and development. They collect, analyze and distribute geospatial information to represent the terrain and its possible effects. In addition, PNG has an IT infrastructure in the Geological Database at the Mineral Resources Authority that advocates for a Geoscience for humanity besides energy and minerals.

Reportedly, in the Indian state of Kerala, after learning to coordinate with geospatial information through mobile phones, the artisanal fishing business has been transformed. Fishermen no longer have to guess which seaside markets need their catch, as they can use their mobile phones to tell them which markets have a gap between supply and demand. Fishermen sell more fish and fish eaters have more choice.[71]

7.5.4.3 Feature Three: Levering up the Provincial Planning Committees with Geospatial Information towards Climate Change Adaptation

Fomenting the development of disaster risk management [DRM] leading to CCA to remedy the adverse effects of climate change is an essential condition in protecting the national assets and the level of physical infrastructure achieved so that PNG can continue with its development objectives to achieve its long term goals.

The Hyogo Framework for Action [2005] is an important instrument for implementing disaster risk reduction [DRR], as it intends to build the resilience of nations and communities to disasters. The possible impact of public policies surrounding the disaster risk management has not been documented. This creates a misperception as tracking down the compliance of policies that have not been clearly established or attempting to determine the impact they seek to address is not straightforward. There are mechanisms that can reduce these gaps. Concretely, it is now understood that disaster risk management [DRM] is essentially a problem related to socio-economic development

[70] Dr. Robert A. "Bob" Ryerson and Dr. Eduardo Quiroga. Taking Remote Sensing from Development Projects to Operational Use: Some Common Attributes of Successful Projects. Invited Paper: Geo Asia Pacific Conference, Bangkok, Thailand. October 2000

[71] Viktor Mayer-Schönberger and Thomas Ramge Reinventing Capitalism In The Age Of Big Data. Review by David Leonhardt, NYT June 7, 2018

and under the current conditions needs to be incorporated in climate change adaptation processes.

The planning process that incorporates DRM includes the verification of the existence of explicit regulations in the public administration for disaster risk management, the existence of a series of legal, institutional and budgetary conditions. These are fundamental for adequate disaster risk management including economic decentralization, land use planning, public investment, monitoring and others that are site-specific. In a sense, the regulatory and institutional framework that upholds the processes of DRM can be considered a development strategy within the context of the planning process. Only that which can be understood and to some extent measured can then be planned.[72]

The above principles are generic procedures currently applied in other developing countries facing similar predicaments as the PNG in terms of the increased climate change-hazards in intensity and frequency. The set of outputs under "Management planning at all government levels" are associated with the planning process in the five pilot Provinces. The outputs have the potential to incorporate DRM in the key economic sectors of the five provinces. The data available within the DRR/DRM Atlas and the EWS hydrological and climate services are critical to enable provincial planning to incorporate DRR data to inform sectoral economic policy about potential remedies to disaster risk, among others.

The TE mission findings on the conditions of the provincial planning process in the provinces visited show a level of incipient progress. This indicates the need for strengthening and consolidating the provincial planning process [PPP] in order to have effective disaster risk management in PNG.

Although progress has been made in certain provinces [FPRR, page 24], it is productive to identify the possible source of the problem. Not a single draft of the provincial planning process [PPP] was made available for the mission's examination. Neither the manual for the planning process prepared by the vendor was made available. In one office there was a copy, but it could not be taken because it was the only copy available. These factors indicate a defective training process.

Indeed, officers allowed the vendor to conduct the training without coordinating with the provincial administrations in terms of the training modules and the timeframe.[73] It was underlined that the content of the subject matter was theoretical and somewhat useful. The number of days [5] used to impart the training was considered too short and did not provide time for discussions and review. Perhaps the most detrimental aspect was the uncoordinated and non-didactical approach used so the provincial teams could be guided to draft the planning process. The vendor provided a standard format and the officers who received the training were supposed to simply incorporate in the format generic data. The officers did not have the opportunity to discuss specific problems with the vendor. In short, the conditions were inadequate to draft a plan because the officers returned to their substantive function within their respective posts in the provincial and district administrations. These were the reasons why the drafting of the PPP was incomplete.

In the real world, a planning process must reflect the specific conditions of a given context. This takes a coordinated effort between the trainer, trainee, provincial administration and the UNDP/CCDA PMU. The trial-error method is costly in terms of time. Often the theoretical training must be accompanied by practicums specifically related to the eventual task for which the training is conducted. In this manner, it is possible to advance the theoretical learning of planning theory and associated techniques, and actually conduct practical exercises on the actual themes, problems or issues of the eventual planning job. This approach brings about tangible results, but it

---

[72] Inter-American Development Bank. Status of Incorporation of Disaster Risk Management in National Public Investment Systems. Barbados and Trinidad and Tobago. Environment, Rural Development and Disaster Risk Management Division. TECHNICAL NOTE No. IDB-TN-527. Washington DC 2014. Banco Interamericano de Desarrollo. Integración de la Gestión de Riesgo de Desastres y la Adaptación al Cambio Climático en la Inversión Pública. Centroamérica. División de Medio Ambiente, Desarrollo Rural y Gestión del Riesgo de Desastres. NOTA TÉCNICA. # IDB-TN-509. Washington, DC 2013

[73] "Is it the ministries or CCDA and provinces?" [UNDP comment] The international consultant has limited insights on the choice. This is why a national consultant is essential as he/she would have the understanding and the insight about the best organizational framework.

What about climate change adaptation?

requires close coordination and flexibility between the trainees, the trainer and the ministry. However, pre-testing the content of the training modules in terms of theoretical underpinning and the practical elements of planning is essential.

Once the planning process is understood, the geo spatial data available within the and the EWS hydrological and climate services can be incorporated in the PPP.[74] However, two conditions need to be fulfilled.

- First, the IP infrastructure for the Project's geo spatial data needs to be operating, i.e. sending the data in the format required.
- Second, the officers involved in the PPP need to have gone through training to use geo- spatial data to produce pertinent information in their PPP reports.

Attached to the proposed IP Infrastructure, two elements of knowledge-management should be considered.

- One has to do with the continuous use of a website [http://www.climateadaptationpng.org]. It is now acting as a climate change resource hub and a platform to showcase adaptation results to the global community.
- The other element is the development of climate change curriculum materials for primary schools incorporating key threats and adaptation measures from the five provinces. It has already benefitted a total of 23 schools, including 200 (girls and boys) students and 140 teachers and 97 school governors in five provinces. Developing climate change curriculum materials for primary schools incorporating key threats and adaptation measures is vital for the future generations.

7.5.4.3. Feature Four: Self Sustained Expansion of Community-led Mangrove Rehabilitation

This intermediate outcome [or hypothetical outcome] is composed of only one output, which appears to be in a blossoming phase. Early results in Madang Province indicate that communities have ostensibly become aware that mangrove rehabilitation is one sound strategy to cope with the threats of climate variability. Through the use of MSC techniques [cf Annex 8], community members pointed out that this is because mangrove rehabilitation brings about the possibility of controlling salt water intrusion onto their lands, especially as it relates to the destruction of their food gardens. Mangroves can function as wind breakers and flood control for riverine communities. Above all, mangrove rehabilitation can contribute to enhance the current livelihood opportunities of communities.

In fact, the project estimates indicate[75] that in the North Coast of Madang Province, the Project has made important strides in awareness raising and training on mangrove reforestation. In 16 coastal communities, , villagers have opted for mangrove planting as an adaptation strategy to coastal erosion and sea level rise after attending the awareness activities on climate change risks. There are about 600 people trained on mangrove conservation and coastal ecosystem management.

Concretely, mangrove reforestation is currently at convergence point. Mangrove rehabilitation can improve small-scale fisheries in the area, which account for 90 % of the people working in fishery operations worldwide, especially in the PNG [FAO 2018]. As fish productivity is linked to the total area and status of mangroves, they play a vital role for food and income security for rural coastal communities. Mangrove reforestation has the potential to change the lives of the communities for the better [FAO 2018]. Discussions with targeted villagers in different provinces

[74] "What about climate change adaptation?" [UNDP comment] The planning process integrates all the relevant information required so that the development plan is resilient from the standpoint of the ecosystem involved, economic and social considerations. As argued in the Main Report, in reality, the "DDR/DRM integrated regional economic plan" is a strategy of economic development

[75] WWF-Pacific PNG Country Programme. Phase 2 Project Completion Report. 9 Jan 2018 page 2

indicate that their current level of living standard has not improved with the Project, with some exceptions. The reasons that stall the developmental potential are discussed below. [76]

To this end, the TE has proposed tools on how to better understand the reasons why family-units, in particular women, participate in project initiatives. One tool is the Farming Systems Research [FSR] and how it is used and under what circumstances is expounded in Annex 9. Concretely, from a rapid appraisal conducted by the TE mission, using the FSR principles, [Annex 10] the need for funds to implement mangrove rehabilitation has emerged as UNDP funds are used primarily in pilot operations. Discussions with villagers indicate an acute need for funds, as the opportunities currently available from non-institutional or institutional credit sources are limited. One villager said "I am now aware of the need to rehabilitate mangroves to cope with climate change but I don't have spades, wheelbarrows, nails, hammers, bush knives, and all that is needed to plant mangroves."

The lesson to take away is the need to gain an in-depth understanding of how the village economy works, with family-units behaving as cogs in the wheel. This is because the measures suggested for adaptation to address climate hazards require calibration to the village and the family-unit's organization and function. A village ecosystem does not occur in a vacuum, nor do the measures proposed to cope with climate hazards inevitably reduce the risks involved

Annex 10 outlines a preliminary schedule of investment costs in mangrove rehabilitation supported by preliminary quantification of benefits [ecosystem services], mainly related to fisheries. A village ecosystem is influenced by a set of features within the context of physical, socio-cultural and institutional environments and is now impacted by climate variability. The features of each set are location-specific and require on-site verification.

The villagers' perceptions about the intervention in terms of improving food security through an enhanced adaptive capacity to respond to the risks posed by the effects of climate change were gathered using the Most Significant Change Technique [MSC]. The MSC technique is a form of participatory monitoring where the response to the questions provides insights on outcomes which is useful when assessing the performance of the project as a whole. This was clearly highlighted in the responses elicited by the MSC technique. The MSC technique is outlined in Annex 8. The following composite narrative integrates field observations with interviews held with villagers and provincial officials that accompanied the field visits.

The one unifying observation is that the bulk of the villagers [men and women] interviewed are clearly aware of the threat of climate variability and the devastating aftermath it can have on their daily lives and livelihood means. Further, the interviews, held primarily with villagers involved with the rehabilitation of mangroves, revealed that they have become aware that mangrove rehabilitation is one sound strategy to cope with the threats of climate variability. It was pointed out that this is because mangrove rehabilitation brings about the possibility of controlling salt water intrusion onto their lands, especially as it relates to the destruction of their food gardens. Mangroves can function as wind breakers and flood control for riverine communities.

Above all, mangrove rehabilitation can contribute to enhance the current livelihood opportunities of communities, such as they are. As fish productivity is linked to the total area and status of mangroves, they play a vital role for food and income security for rural coastal communities. As one villager succinctly put it "with mangrove rehabilitation we can see the fish, the crabs and the birds multiply again. It is good-air. [The ecosystem is functioning again]. Also, the regrowth of mangroves provide material to build and repair our homes, collect wild honey, and sago palm (Metroxylon sagu) can grow again."

Sago palms, which grow in proximity to mangroves, are a Non- Forest Product of considerable nutritional value. The literature indicates [extracted on 22-05-18 from ttp://wildernessarena.com/food-water-shelter] that two

[76] "Formal evaluation processes wherein discussions were held with communities thus delete this." [UNDP comment] The communities' level of living is a key reference in rural development. If it is not improving, it is going downwards. It is never stationary

kilograms of sago have the nutritional value equivalent to 1.5 kilograms of rice. The upper part of the trunk's core does not yield sago, but it can be roasted in lumps over a fire. Young sago nuts and the growing palm-shoots are also edible.

Villagers who were interviewed underlined that sago constitutes the core of their daily diet. It is complemented by protein from fish or small livestock [primarily hogs and chicken] and whatever seasonal fruits are available, i.e. bananas, papaya, and others. Climate hazards compromise this food system, which is based on harvesting the natural resources available locally. In particular, when women discuss this matter they show distress as they are responsible for the maintenance of the young and the old family members. A nutrition strategy could be considered as another measure to encourage villages to adapt to the hazards of climate variability, as will be discussed below.

During discussions on livelihoods at Wom Village in Wewak, one villager indicated that they grow three varieties of sweet potato (Ipomoea batatas (L.) Lam.) While it is well known that there are two varieties, one that matures in 6 months and another in 3 months, in fact, the literature identifies a third variety that matures within a month.[77] This speaks well of the villagers' capacity to diversify their livelihoods.

Although another study[78] found that in a healthy mangrove it is possible to earn PNGK 350 monthly from fishing and non-timber forest products [NTFP], it is critical to estimate the basic economic parameters tied to investments in mangrove rehabilitation.

Investment cost of mangrove rehabilitation

Within the framework of the FSR methodology [Annex 9], a rapid case study was conducted in Madang Province were a villager from Numuru who rehabilitated mangroves in partial collaboration with technical assistance from the Project [Annex 10]. By all accounts this was a successful effort, not only because it initiated the reforestation of mangrove in his village but also due to the fact that on his own initiative he incorporated added value in the rehabilitation effort. Specifically, besides the fact that he has the largest catch of fish by virtue of rehabilitating mangroves, he has built a visitor's hut nearby, which is an early expression of eco-tourism. As he did not volunteer to share the actual return on his value-added efforts, the TE mission did not request this information.

The data shows [Table 10.1 in Annex 10] that the cost of rehabilitating one hectare of mangrove is approximately USD 950 [PNGK 2850], including the yearly cost of artisanal fishing. Only the fixed costs were considered for investment purposes as the operational cost consists exclusively of labor. The quantity of labor required to rehabilitate one ha of mangrove goes beyond what one family- unit can supply. It is estimated that 395-man days are needed for the total operation. If the arrangement of labor reciprocity is used, then the cost of labor is PNGK 7900 [USD 2633], where the cost of feeding each worker is PNGK 20 [USD 7]. Using the minimum wage rate of PNGK 36 [USD 12], the cost of labor increases to PNGK 14 220 [USD 4740]. Only the fixed costs will be considered in the present analysis because its financing requires the participation of subnational and national authorities.

Considering the GNP per capita of USD 2 723 [PNGK 8169] as a proxy indicator[79], the cost of investing in one hectare of mangrove for rehabilitation represents nearly 40% of the yearly family income. It is therefore logical to infer that the funds needed to invest in one Ha of mangrove rehabilitation cannot be raised from the villagers' own income. Actual rural incomes are ordinarily lower than statistical estimates because many costs are embedded in customs of labor reciprocity. Thus, one must consider outside capital injections as villagers may not be able to absorb the necessary investment from their savings. There are several inferences that can be flagged for programming purposes.

---

[77] Pablo Muñoz-Rodríguez, et al. Reconciling Conflicting Phylogenies in the Origin of Sweet Potato and Dispersal to Polynesia. Current Biology. Volume 28, Issue 8, p1246–1256. 2018]

[78] SPFEC Mangrove Ecosystem Survey Report. A consolidated consultancy report. Executive Summary. 2015

[79] UNDP. Human Development Report. Table 10 National Income and Composition of Resources. New York, 2016

First, adequate tenure arrangements over land where the investments will be laid out should be negotiated with traditional authorities before the investments are carried out, as nearly all the land in the country is under ancestral tenure. In reality, there is no available land outside ancestral tenure arrangements. This is a critical feature that was reflected during discussions with villagers in the context of food gardens. Villagers made it very clear that other than the land-area where their current food gardens are situated, there was no additional land anywhere, because the land of the surrounding villages has already been prescribed by the ancestral land regime.

Those villagers who might consider investing in the rehabilitation of mangroves need assurance that they can reap the benefits in the long term. As it takes about 6-10 years for the mangrove to mature, the time lapse needed to benefit from such an investment is probably around one generation [33 years]. This time lapse can allow the play of economic incentives so villagers can embark in mangrove reforestation operations themselves, to enhance their family income and overall wellbeing. In this manner, the villagers themselves become the solution to the hazards of climate change adaptation. There are, however, critical conditions to consider.

Second, if such tenure arrangements can be negotiated with traditional authorities, and these arrangements are registered with the relevant national organizations, this legal arrangement itself could be used as collateral with financing institutions. This would be an important step towards financing the rehabilitation of mangroves by the villagers themselves, which would require the total policy support of the national and provincial authorities, as well as the national financial system.

Third, the modalities of financing are just as important as the collateral. The repayment schedule needs to take into consideration the biological context of the investment. As mentioned, it takes approximately 6-10 years for mangroves to reach full maturity and about the same time for the fish stocks to multiply to allow for an economically rewarding catch. Therefore, if villagers take out a loan, they will be unable to begin repaying the loan until the 7th or 8th year. There are several financial facilities that can be used when this situation arises.

Fourth, since mangrove rehabilitation will require long-term financing, understanding the economic structure of a village and the livelihood strategies used by menand women to meet the needs of a family unit is essential, as previously discussed. Measuring the cost and benefits associated with the livelihood operations of villagers from the reef through to the food gardens, including NTFP, are decisive operations to ascertain the economic viability of mangrove reforestation. National statistics do not measure the operations involved in harvesting natural resources by different segments of the population. What is required is a research approach that starts from the fact that the input of the villager, who is the final consumer of the benefits from climate change adaptation, is critical.

Farming System Research [FSR] can provide principles and reasoning to conduct programming leading to viable operations in mangrove reforestation. To this end, the FSR advances the principle of selecting the participation of representative villagers from the intervention area, in particular women, involved in livelihood activities. This is decisive in ensuring that the development arrangements are responsive to the villagers' priorities and objectives. Annex 9 outlines the approach and procedures to apply FSR in the context of mangrove reforestation. It must be remembered that UNDP/Bangladesh, in coordination with FAO /Bangladesh and the application of FSR, were able to support the agricultural sector to overcome technical/social constraints so that maize was accepted as another crop among farmers. The acceptance of maize had considerable positive repercussions among landless farmers and rural women to improve their income and diets.[80]

ANNEX 8: APPLICATION OF THE MOST SIGNIFICANT CHANGE TECHNIQUE TO ASSESS VILLAGERS RESPONSE TO MANGROVE REHABILITATION

[80] Bangladesh Agricultural Research Institute. On-Farm Research Division. Farming systems research and development site Goyeshpur. Agricultural Research Station, Pailanpur, Pubna September 1998]

Concept

The most significant change (MSC) technique is a form of participatory monitoring and evaluation.[81] It is participatory because many project stakeholders are involved both in deciding the sorts of change to be recorded and in analysing the data. It is a form of monitoring because it occurs throughout the project cycle and provides information to help stakeholders manage the program. It contributes to evaluation because it provides data on impact and outcomes that can be used to help assess the performance of the program as a whole.

In essence, the process involves collection of significant change stories emanating from the community level. Following the process one could designate stakeholders to "search" for project results or tangible changes. Once changes have been identified and captured, various stakeholders would sit down together, read the stories aloud, and will have in-depth discussions about the relevance of these reported changes

Reporting format

The following characteristics are essential in a format for documenting stories. The format should be user-friendly and must ensure that important details are not omitted.

The essence of the technique is to ask a couple of simple open-ended questions as shown below. There is no need of a structured questionnaire. The more specific and detailed the MSC account is, the more credible it will be, partly because it will be easier to verify. However, even if the stories are vague or incomplete, the process can improve through feedback.

Monitoring-without-indicators

MSC does not make use of pre-defined indicators, especially ones that have to be counted and measured.

The significant change (SC) 'story' approach

The answers to the central question about change are often in the form of stories of who did what, when and why - and the reasons why the event was important (Dart 2005).

- The first step in MSC generally involves introducing a range of stakeholders to MSC and fostering interest and commitment to participate. The next step is to identify the domains of change to be monitored. This involves selected stakeholders identifying broad domains— for example, 'changes in people's lives'—that are not precisely defined like performance indicators, but are deliberately left loose, to be defined by the actual users. The third step is to decide how frequently to monitor changes taking place in these domains.

SC stories are collected from those most directly involved, such as participants and field staff. The stories are collected by asking a simple question such as: 'During the last month, in your opinion, what was the most significant change that took place for participants in the program?' It is initially up to respondents to allocate their stories to a domain category. In addition to this, respondents are encouraged to report why they consider a particular change to be the most significant one than the others.

The stories are then analysed and filtered up through the levels of stakeholders typically found within an organisation or program.

Climate Change Adaptation Fund Project and MSC

[81] Rick Davis and Jess Dart. The Most Significant Change Technique A Guide to Its Use CARE International UK 2005

The villagers' perceptions about the intervention in terms of improving food security through enhanced adaptive capacity to respond to the risks posed by the effects of climate change and others were gathered using the technique the Most Significant Change Technique [MSC]. The MSC technique, is a form of participatory monitoring because the response to the questions provides insights on outcomes which is useful to assess the performance of the project as a whole. As shown below this task was performed by asking three questions to different stakeholders in Madang Province. The frequency of responses were tabulated and placed in parenthesis. Subsequently, the responses were tabulated by frequency as shown in Charts 8.1, 8.2, 8.3

Most Significant Change Stories

Question. Tell me how you (the storyteller) first became involved with the Climate Change Project, and what your current involvement is.
3.1 Became involved because of outreach conducted by WWF and Ward Councillors (25)
3.2 Became Involved as a representative of the women`s committee (7)
3.3 Became Involved as a community facilitator (24)
3.4 Became Involved because of the impending sea erosion in the community (3)
3.5 Personal Interest (8)

Question. From your point of view, describe the most significant change that has resulted from your involvement with Climate Change Project

[Last six months before the survey]
4.2 We can now see marine life (crab, kina shell), fish and birds multiplying. (15).
4.3 Currently involved with mangrove`s nursery, replanting to avoid floods, sea erosion and high tides. (21)
4.4 The project instills in the community (male and female) the motivation to plant mangroves (and other species) and avoid deforestation. (17)
4.5 We now realize we need more Funds to support mangroves nurseries, planting and sea walls. (F8)

Question. Why is this significant to you?

5.1 Mangroves can make less severe the effects of sea level rise for my generation. (23)
5.2 Mangroves will benefit mainly our children (next generation) (2 7)
5.3. Mangroves provide windbreakers, building materials for homes, firewood and good air (F10)
5.4 Mangroves provide food security and cash income. (14)
5.5 Help reduce greenhouse effects and protects against coastal erosion and strong winds (25)

Chart 8.1

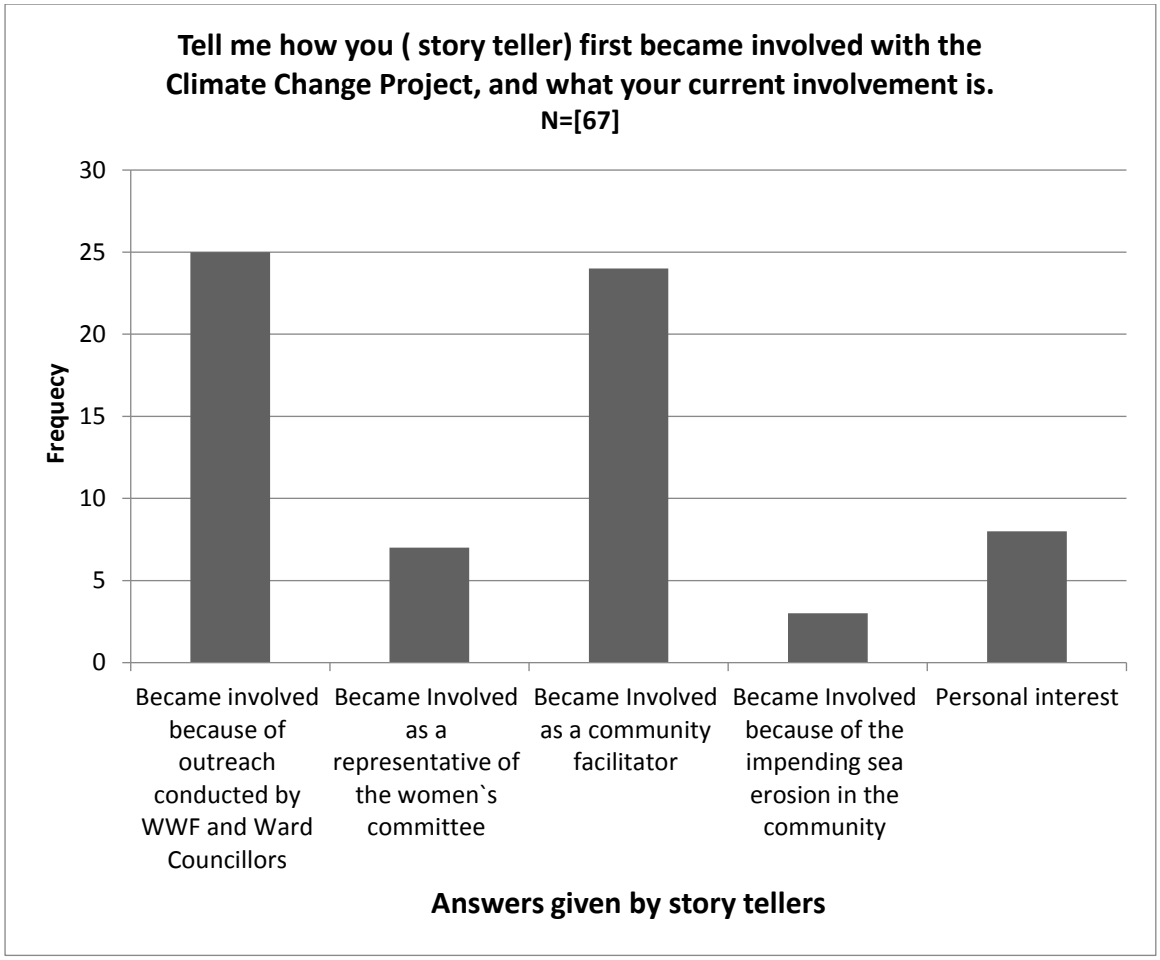

Tell me how you (story teller) first became involved with the Climate Change Project, and what your current involvement is.
N=[67]
Frequecy
30
25
20
15
10
5
0
Became involved because of outreach conducted by WWF and Ward Councillors
Became Involved as a representative of the women`s committee
Became Involved as a community facilitator
Became Involved because of the impending sea erosion in the community
Personal interest
Answers given by story tellers

Chart 8.2

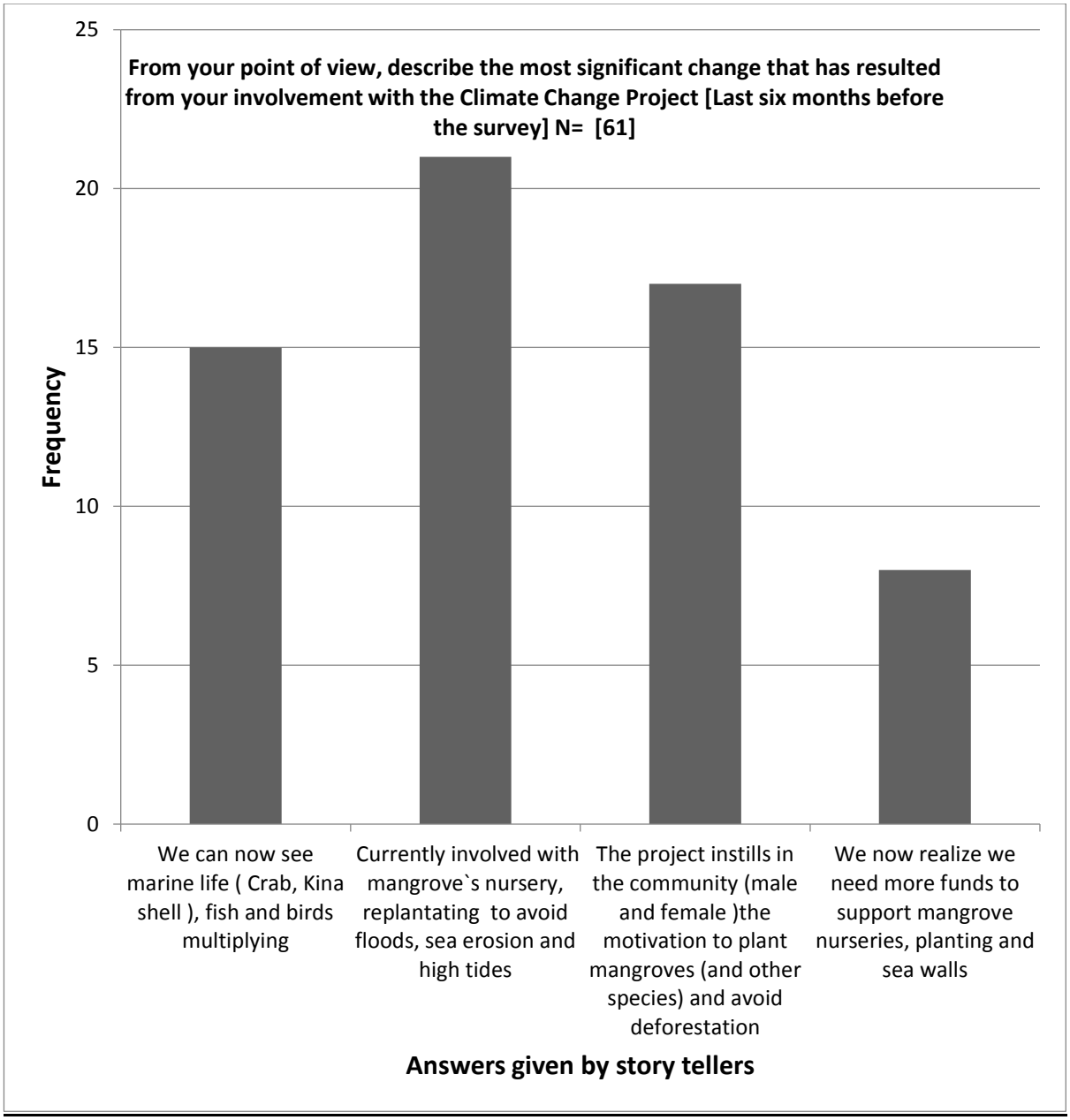
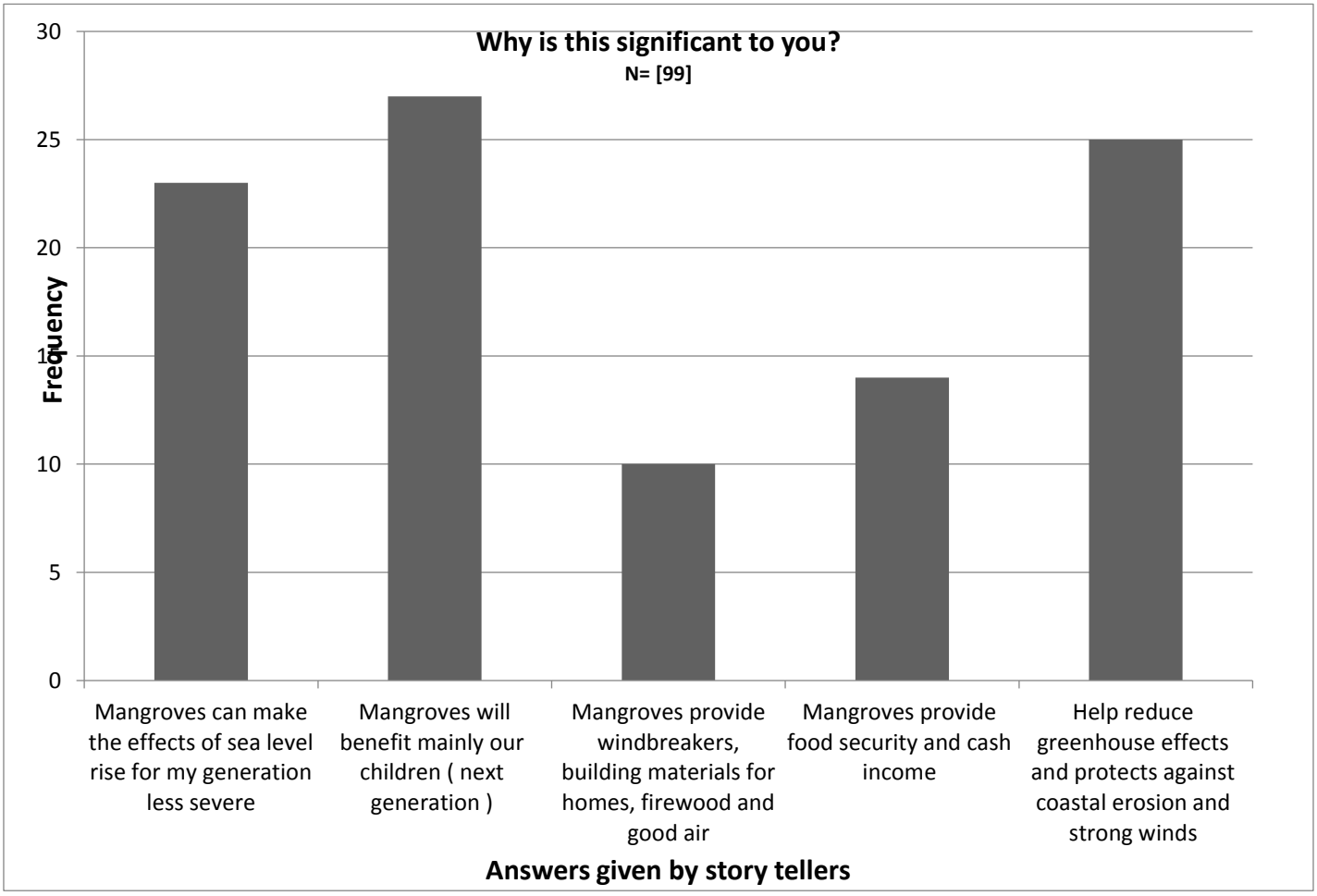

From your point of view, describe the most significant change that has resulted from your involvement with the Climate Change Project [Last six months before the survey] N= [61]
Frequency
25
20
15
10
5
0
We can now see marine life (Crab, Kina shell), fish and birds multiplying
Currently involved with mangrove`s nursery, replantating to avoid floods, sea erosion and high tides
The project instills in the community (male and female)the motivation to plant mangroves (and other species) and avoid deforestation
We now realize we need more funds to support mangrove nurseries, planting and sea walls
Answers given by story tellers

Chart 8.3



ANNEX 9: ADAPTING FARMING SYSTEMS RESEARCH TO CLIMATE CHANGE ADAPTATION

The FSR approach helps to understand better the reasons why family-units, in particular women, participate in project initiatives. This is indispensable to ensure that the proposed changes are:
[1] responsive to the priorities and objectives of those family-units under environmental and economic stress; and
[2] reflect the reality that family-units in these provinces of PNG are the product of a complex and dynamic interaction of risk-prone and resource-poor factors; and more importantly,
[3] the application of FSR's field procedures used to conduct rapid surveys can lead to an understanding of the economics of whole-livelihood-systems within a village social structure such that the whole-livelihood-system can be improved where possible.

Approach

FSR uses the fact that the input of the family- unit is critical, because they are the final consumer of the benefits from climate change adaptation. Operationally, the FSR approach has the following features:

1- FSR gives men and women in a village a voice that allows them to actively participate in the process of designing and implementing climate-proofed livelihood measures; because villagers stand to gain or lose most from the adaptation process, they have the right to be involved in the process from the start.

2- FSR's development goals are to improve productivity and profitability of the family-unit's livelihood operations so as to ensure sustainability, and ultimately guarantee an equitable distribution of benefits among family- units within a community.

3- Since risk-prone and resource-poor conditions characterize the country, the biophysical and socioeconomic features enmeshed in the villagers' livelihoods must be reviewed jointly and clearly understood.

4- An FSR team is multidisciplinary because of the complex nature of livelihood systems, which require interdisciplinary analysis; changes in one area necessarily bring about modifications in other areas of the production system. Sociological factors can play decisive roles in the adoption of certain techniques or products proposed.

5- The thrust of the FSR approach is to focus on the project area's prevailing development conditions in the context of the family-unit's whole- livelihood- system. Concretely, the multiple activities enmeshed in the livelihood system of a family- unit can span from artisanal fisheries to staple crops in food gardens including trees, small-livestock, and a collection of NTFP products from mangroves and the bush.

6- There are additional features that render this livelihood system more complex.

- The dominating factor is that there is no additional land for expansion due to historically-determined factors such as ancestral land tenure arrangements. This dominating historical is tied to land tenure and use, and is as critical as the physical resource limitations.

7- Given this diversity of ways to deal with all the production activities, there are no universal principles to investigate the factors influencing the production system. Experience is essential, for example, when family units consume most of the crops raised on the food garden the crop mix chosen will be influenced by the customary diet. If the family-unit crops are grown for sale, the choice of crop mix will be influenced by the accessibility of markets for different crops and by their relative market prices. Therefore, to investigate the factors influencing the production system of family-unit's whole livelihood system the following principles can be useful.

7.1 The livelihood-mix of a family unit is influenced by each family-unit's capabilities, resources, and needs. As expected, there is evidence indicating that productivity is tied to local institutional capacity. It follows therefore that the productivity of any resources of the family-unit are tied to local resource management, i.e. healthy mangroves can provide for good fishery production levels, the crop rotation within a food garden can produce high yields, etc. It is clear, then, that to enhance a family-unit's training they need to become better problem- solvers and better managers. This can help to raise the family-unit's level of efficiency in the use of the resources at their disposal.

7.2 Within the context of livelihood systems, conflicting issues are becoming increasingly challenging as rapid rural population growth outstrips cultivable land, aggravated by ancestral land factors. These issues relate to both men and women that make up a family-unit, as well as other folks of different walks of life that make up the community.

7.3 A common thread in these livelihood issues is gender, as it is customary that women do not have access to the food garden and are involved in non-garden activities.[82] Unsurprisingly, experience suggests that gender differences can influence the adoption of technology, food production and the welfare of the rural communities.

[82] "Gender division varies exist among communities and regions in terms of the position of women and their levels of financial autonomy, social status and control over the use of productive assets. In all rural communities, where the project sites are located, gender roles are well defined. women are almost exclusively responsible for managing the household affairs in terms of food preparation, fuel and water collection, rearing and caring for children, while also highly involved in food production in the 'gardens' and in few cases, fishing in coastal areas. Men tend to be responsible for hunting, clearing of land for new gardens, fishing by boat and the main construction work on a new house has traditionally been the work of men. Employment in the oil palm industry, and other formal employment outside the community is also usually limited to men.
In general, community leadership is led by men, though sometimes his wife can be given the responsibility to organise and lead women in a community. Many women are organized in social groupings but their participation is limited in church" [UNDP comments]

7.4 FSR can respond to this challenge by adopting participatory methods and developing institutional models to enable women to take more responsibility for location-specific production activities as well as greater access to the benefits derived therefrom.

8- The proposed improvements are tested and jointly evaluated on site with the direct participation of men and women, particularly those related to technology, support services and management, so the family unit can obtain the best economic return.

8.1 To this end, an essential step, if necessary, is to negotiate adjustments in policy/support services that can facilitate the adoption of these improvements with the respective authorities at the local, provincial or central level.

9- Those improvements found effective to cope with climate change, and that are also a source of additional streams of income for the family-unit, can be considered for dissemination via the extension services with the participation of relevant actors: credit agents, researchers, policy-makers, etc. After dissemination it will be essential to continue monitoring and tracking the adoption rate of the proposed improvements to facilitate greater adoption and/or more favourable impact.

In summary, the FSR approach comprises:

The participation of the project area's representative family- units, in particular those of women and others, especially marginalised folks. This is indispensable to ensure that the proposed changes are:
Responsive to the priorities and objectives of those family-units under environmental and economic stress; and reflective of the reality that family-units in these provinces are the product of a complex and dynamic interaction of risk-prone and resource-poor factors within and outside the family-units and villages.

-
- Monitoring rates of adoption and the impact of changes resulting from the dissemination activities will be necessary in order to adjust or facilitate greater adoption and/or more favorable impacts. How to operationalize this approach within the framework of FSR methods follows.

10- FSR Field Procedures

This section operationalizes the FSR approach through the application of field procedures used to conduct rapid surveys. This approach leads to an understanding of the economics of whole-livelihood-systems within a village social structure such that the whole-livelihood-system can be improved where possible. A rapid survey comprises the following features.

11- Basic Features

Development experience indicates that FSR has a strong diagnostic component and the results are always empirically grounded and location-specific. This is why FSR has little theoretical or mathematical context in the generation of intended results. The features of the FSR diagnostic components is discussed followed by the survey design structure and subsequently the design, testing and dissemination phases are discussed. As noted, the drive of the FSR approach is to focus on the project area's prevailing development conditions in the context of the family-unit's whole- livelihood- system. In a typical situation, the multiple activities enmeshing in the livelihood system of a family- unit can span artisanal fisheries to staple crops in food gardens including trees, small-livestock, and the collection of NTFP products from mangroves and the bush.

12- Structure of the survey design

12.1 The target population

The identification of a target population in a project area narrows the number of potential beneficiaries. This is essential because the recommendation domains should address the beneficiary's needs, particularly their priority

problems and constraints. Ultimately, these recommendations are expected to improve the productivity of their resources within a sustainable framework. To this end, the effects of the national policies and administrative arrangements on the target population, such as credit policies, extension procedures, prevailing technological policies, the operation of input and output markets, labor legislation and other national governance issues, needs analysis and understanding. Assessing these conditions can improve the cost of service and supplies going from consumption centres to villages.

12.2 Whole-Livelihood-Systems

The analysis of the family-unit's whole- livelihood- system is paramount. There are no universal principles to investigate the factors influencing the production system. Experience is essential; for example, when family- units consume most of the crops raised in their food garden, the crop mix chosen will be influenced by the customary diet. If the family-unit's crops are grown for sale, however, the choice of crop mix will be influenced by the accessibility of markets for the different crops and by their relative market prices. Therefore, to investigate the factors influencing the production system of a family-unit's whole- livelihood- system, the following principles and reasoning can be useful.

As mentioned, the livelihood-system mix of a family unit is influenced by the particular family-unit's capability, resources, and needs. As can be expected, there is evidence indicating that resource productivity is tied to local institutional capacity. For instance, the productivity of any resources used by the family-unit is tied to local resource management, i.e. healthy mangroves can provide food for good fishery production levels and a crop mix of maize and beans within a food garden can yield good returns. It follows that if the family-unit receives the necessary training they can become better problem- solvers and managers. This process can enable an increase in the family-unit's level of efficiency in the use resources at their disposal.

13- Enhancing Whole-Livelihood -Systems

If the purpose is to introduce improvements into livelihood-systems, it is essential that it is clear what family-units are doing for livelihood-systems and why they do it in a particular way. Through a diagnostic exercise, it might then be possible to identify areas within the livelihood-systems where improvements can be made. Activities in this stage are oriented towards:

(1) understanding how the livelihood- systems are operating in a given target area, and based on this information,
(2) identify problem areas, or areas of under-utilized potential that could benefit from change.

For example, in a project area, some of the problems can be related to:
(1) crop and livestock integration in food gardens,
(2) the relative benefits of crop rotations with respect to using organic inputs, and
(3) enhancing collaboration among extension/credit services and family-units, with the goal of providing better credit/extension information to family-units can raise their productivity and income.

At the outset, one way to ensure a preliminary understanding of the family-units' challenges in terms of their livelihood-system is to conduct an informal and rapid exploratory diagnosis, sometimes known as a rapid appraisal. The objective is to gain maximum knowledge of the target area while using minimum amounts of time and resources. The specific objectives are to:
(1) obtain a qualitative understanding of the biophysical, socioeconomic and cultural determinants of the existing livelihood -systems and
(2) ascertain the constraints, flexibility and potential opportunities of the family's livelihood-system.

The insights into a family-unit's values, opinions, as well as any biophysical, cultural and economic factors allow the framing of a preliminary problem identification. Subsequently, it is possible to consider conducting a formal survey, which can use statistical tools to validate insights obtained from the exploratory diagnosis.

The survey can focus on a detailed analysis of the production system(s) to be modified. This could include:
(1) conducting an inventory of land use, tenure structures and other institutional factors, and

(2) an analysis of the current whole-livelihood-system's production subsystem with particular reference to that portion supported by family-units and other folks associated with the project objectives; and
(3) the participation of women, men in the production subsystem described above.

In this context, it is possible to review the climate change hazards impacting both the whole-livelihood-system and the production subsystem. These results can be used as baseline data for monitoring and evaluation studies as well as for preliminary definitions of recommendation domains.

The following set of open-ended questions are guidelines, essential to the design and implementation of initiatives to enhance the whole-livelihood-system.

- Who does what? When? Where? Why? (the activities analysis questions)
- Who has access and control of the resources for production?
- Who has access and control of the benefits of production?
- Who is included in the process of whole-livelihood-systems assessment and who might be excluded?

14- Procedures to Conduct a Survey

An FSR survey operation commences with the selection of the survey team, the target site and cooperating family-units.

14.1 The Survey Team

The team is selected in close coordination with national and project authorities. Special attention is necessary to achieve effective teamwork, which is central to project success. Experience shows that the following elements should cement effective teamwork.

First, A FSR team should be multidisciplinary because of the complex nature of livelihood systems, which require interdisciplinary analysis; changes in one area necessarily bring about modifications in other areas of the production system. Sociological factors can play decisive roles in the adoption of certain techniques or products proposed.

Second, the team should be managed in a decentralized manner wherein sub-project teams containing complementary disciplines focus on aspects of a task or problem in a fairly free and flexible fashion. Concerning gender issues, women must be integrated into the team as professionals and should conduct whole-livelihood research. Management in this context is usually facilitation, encouragement and mediation rather than direction.

Third, in terms of the team's organizational structure, the team's working conditions must correspond to the real-world conditions. The objectives and targets should be realistically set and the team's organizational model should be tailored to seize emerging constraints and opportunities. The success of an assessment is more likely when all objectives are known, understood, realistic and agreed upon. In this context the participatory elaboration of the survey research within one technique like the Logical Framework Approach (LFA) has proven useful.

14.2 Selection of Target Areas

The target areas are selected within the project area with the goal of learning how best to meet the needs of the family-units who live there and to take advantage of the resource potential with respect to the availability of anticipated project inputs.

The following specific research themes are pertinent:
- representativeness of the environmental conditions;
- prevailing socio- economic conditions; and
- livelihood- systems practiced.

The accessibility and cooperation of men and women involved in livelihood operations, as well as local leadership support, is essential when information concerning livelihood processes is being gathered. If a selection of villages is required, in order to enhance the efficiency in the use of resources, the clustering of research activities in a limited number of villages can be considered. Representativeness and logistical considerations are also key factors.

14.3 Selection of Cooperating Family-Units

The most critical activity by far is to secure the support and approval of the village chiefs and/or community leaders. This normally reduces all folks' suspicions and encourages them to cooperate with the team. Every effort has to be made to avoid disrupting the villages' political economy, and to gain local leadership support.
The selection of cooperating family-units should be conducted in consultation with the team, project and local authorities, chiefs, elders and other pertinent institutions. Several criteria can be applied in the selection of cooperating family-units, co-operators for short.

- The key criteria is representativeness of the typology of family-units, the Project intends to work with in terms of the ecology, production systems, and social structure.
- The interest, willingness, and ability of the family-units to cooperate are also essential criteria for selection as well as logistical considerations for interviewing the co-operators.
- Co-operators can be selected at the beginning of every season and at the start of any new initiative. Whether these co-operators are part of a repeat core of collaborators is a question that can be resolved by the team based on the needs of the survey work-plan.

For the purposes of classifying the co-operators in the target areas, they can be tentatively grouped into homogeneous groups. The grouping criteria uses the notion of a group of family-units that practice the same livelihood- system, face the same constraints, and have the same potential solution(s) to the problem.
In terms of managing expectations about the project, it is essential to ensure high levels of satisfaction from cooperating family-units, in particular resource-poor families. The project can be promoted by establishing realistic expectations about how the project will serve them, as well as by developing congenial relations with them and, above all, generating effective results.

15- Expected Results

The ultimate purpose of the FSR is to produce new options that will be used by the villagers to increase their productivity and incomes. Therefore, those potential improvements that do in fact address the identified constraints, should increase food garden production, and/or improve the output per unit of the most limiting input.

These improvements normally fall under 3 categories:
(1) techniques to increase production in good gardens ,
(2) modifications in management of the whole or part of the livelihood-system, and
(3) modifications or adjustments in support systems and/or policies to villagers..

To proceed with the testing and to choose the best(s) solution(s) for testing is an interdisciplinary decision made by the team members in cooperation with the family-units. The notion is to test on-site in the food gardens to determine the fit of potential improvement into the whole-livelihood- system. To what extent these improvements are accepted by family-units and what modifications are needed to make them acceptable are issues to be evaluated by the FSR team and cooperating family-units.

To ensure acceptability, testing is conducted with cooperating family-units , who act as representatives of the recommendation domains whose needs are being addressed. The positive results of preliminary evaluations can provide justification for the FSR team to continue with further action.

Eventually, the tested techniques or proposed management procedures can be disseminated through the extension service to other households in the same recommendation domains. A proactive attitude is useful in ensuring that the appropriate policy/support system is in place to facilitate and accelerate the development process

in the villages, particularly if favourable test results for the proposed changes in policy/support systems come from food-garden level information.

In this policy context, it is important to analyse the results from tests so the test results do not create two types of inequalities: (1) helping some family-units — or even certain individuals within those households — at the expense of others; or (2) reducing the quantity and quality of land that can be productively used by future generations.

16- Dissemination of Results

Extension staff obviously play a decisive role in this phase, as the involvement of FSR teams decrease in proportion. Nonetheless, the team can play a supportive role by continuing to establish good interactive linkages with all of the actors involved in the development process, particularly those belonging to extension/development agencies.

Specifically, one area of productive interaction is monitoring and evaluation activities. By monitoring and evaluating the rate of adoption of the changes that had been proposed, implemented and tested earlier, it is possible to choose the direction for further activity to increase the dissemination rate.

Adoption studies show an important and unexploited dimension. Assessment of reasons for non-adoption and/or adoption can provides a productive approach to feedback information for policy decision makers and researchers. For example, in virtue of the survey's findings, the marketing of inputs and outputs or credit facilities may use alternative policies that will improve the adoption of these facilities by the family-units. These kinds of studies are the best measure of impacts of the development process. Because of their on-site location and pivotal linkages with other actors, FSR teams are in the best position to take a leadership role in these studies.

ANNEX 10: MANGROVE REHABILITATION: PRELIMINARY INVESTMENT SCHEDULE AND ESTIMATED BENEFITS

1. Estimating the Cost Structure of Mangrove Rehabilitation

Table 10.1. Estimated Cost of Mangrove Rehabilitation: 1 Hectare
[in PGK of 2018 – Ex rate: USD 1 = PGK 300][83]
Site: Madang Province [Numuru village] – Mission estimates collected on site

Item	Unit cost	Number	Cost
Fixed Cost			
Setting up nursery [20m x 20m]			
Equipment and tools			
Shade cloth	300	1 roll	300
Wheel barrow	400	2	800
Spades	50	4	200
Bush knives	50	2	100
Axes	70	2	140
Files	20	2	40
Hammer	30	2	60
Nails	30	11kg	330

83 Exchange rate estimates are indicative figures for the purpose of economic analysis. There is no intention to carry out financial analysis

Tie wire	80	1 roll	80
Material			
Seedlings [2000 / ha]	12	20 bags @100seedlings	240
Fishing gear			
Canoe	200	1	200
Net	100	2	200
Fishing line	30	3 rolls	90
Hooks	20	3 boxes	60
Total fixed cost			2840
Operating Cost: Family Labour			
Erecting shade	36	5-person days	180
Laying out seedlings under shed	36	10-person days	360
Daily watering over 4 months	36	30-person days	1080
Transplanting 200 days	36	200-person days	7200
Opportunity cost of catching fish	36	150-person days	5400
Total operating cost using wage rate [family labor]			14 220
Total operating cost using traditional arrangements [family labor]	20 @day	395 days	7900

Source: TE Mission estimates collected on site 01/05/2018

Table 10.1, estimates the cost of rehabilitating one hectare of mangrove as approximately USD 950, including the yearly cost of artisanal fishing. Only the fixed cost was considered for investment purposes as the operational cost consists exclusively of labor. The quantity of labor required to rehabilitate one ha of mangrove goes beyond what one family- unit can supply. It is estimated that 395 person /days are needed for the total operation. If the arrangement of labor reciprocity is used, then the cost of labor is PNGK 7900 where the cost of feeding each person is PNGK 20. Using the minimum wage rate of PNGK 36 the cost of labor increases to PNGK 14220. Only the fixed costs will be considered in the present analysis because it requires the participation of regional and national authorities.

Considering the GNP per capita of USD 2723 as proxy indicator [UNDP 2016] the cost of investing in one hectare of mangrove for rehabilitation, represents nearly 40% of the yearly family gross income. It is logical to infer that the funds to invest on one Ha of mangrove rehabilitation cannot be raised from the villagers' own income. Actual rural incomes are ordinarily lower than statistical estimates because many costs are embedded in customs of labour reciprocity. Thus, one must consider outside capital injection as villagers may not be able to absorb the necessary investment from their savings. There are several inferences that can be flagged for programming purposes.

First, adequate tenure arrangements over land where the investments will be laid out should be negotiated with traditional authorities before the investments are carried out —as nearly all the land in the country is under ancestral tenure. In reality, there is no available land outside ancestral tenure arrangements. This is a critical feature that was reflected during discussions with villagers in the context of food gardens. Villagers made it very clear that besides the land-area where their current food gardens are situated, there was no additional land anywhere. Because the land of the surrounding villages has already being prescribed by the ancestral land regime.

Those villagers who might consider investing in the rehabilitation of mangrove need the assurance that they can reap the benefits in the long term. As it takes about 6-10 years for the mangrove to mature, the time lapse needed to benefit from such an investment is probably around one generation [33 years]. This time lapse can allow the play of economic incentives, so villagers can embark themselves in mangrove reforestation operations

as going venture to enhance their family income and overall wellbeing. In this manner, the villagers themselves become the solution to the hazards of climate change adaptation. There are, however, critical features to consider.

Second, if such tenure arrangements can be negotiated with traditional authorities, and this arrangement is registered with national relevant organizations, this legal arrangement itself could be used as collateral with financing institutions. This would be an important step towards financing the rehabilitation of mangroves by the villagers themselves that would require the total support of the national and provincial authorities, especially the national financial system.

Third, the modalities of financing are just as important as the collateral. The repayment schedule needs to consider the biological context of the investment. As mentioned, it takes approximately 6-10 years for mangroves to reach full maturity and about the same time for the fish stocks to multiply to allow economically rewarding catch. Therefore, if villagers take up a loan, they will be unable to begin repaying the loan until the 7th year. There are several financial facilities that can be used, when this situation arises.

Fourth, since the mangrove rehabilitation will require long-term financing—understanding the economic structure of a village and the livelihood strategies used by men and women to meet the needs of a family unit is essential, as discussed early. Measuring the cost and benefits associated with the livelihood operations of villagers from the reef through the food gardens including NTFP are decisive operations to ascertain the economic viability of mangrove reforestation. National statistics do not measure the operations involved in harvesting natural resources by different segments of the population. What is required is a research approach that starts from the fact that the input of the villager, who is the final consumer of the benefits from climate change adaptation is critical.

The Farming System Research [FSR] can provide principles and reasoning to conduct programming leading to viable operations in mangrove reforestation. To this end, the FSR advances the principle of selecting the participation of representative villagers from the intervention area, in particular women, in livelihood activities. This is decisive to ensure that the development arrangements are responsive to the villagers' priorities and objectives. Annex 9 outlines the approach and procedures to apply FSR in the context of mangrove reforestation.

2. Estimating Benefits from Mangrove Rehabilitation

As in any other investment on natural resources, benefits are difficult to quantify monetarily and even numerically. To move forward, direct economic benefit have been estimating in Table 10.2. These benefits reflect the rehabilitation of the ecosystem service ensuing mangrove rehabilitation. Food for fish becomes more abundant gradually. According to the observations of the fisherman of the Numuru village who carried out rehabilitation of mangrove, the fisheries catch can double in approximately six years. The figures for daily catch and number of fishing days/year come from his experience. All prices correspond to 2018 and are considered as indicative for the present economic analysis.

Table 10.2 Direct Economic Benefits: Ecosystem Services on site: Fisheries

[Estimate from fishermen in Numuru village, Madang Province. Mission estimates collected on site]

Year	Daily catch [kg/day]	Number of days	Total [kg]	Yearly Estimated Value on-site [PNK30/kg]
0	2.0	250	500	15000
1	2.0	250	500	25 000
2	2.0	250	500	15 000
3	2.5	250	625	18 750
4	3.0	250	750	22 500
5	3.5	250	875	26 250
6	4.0	250	1000	30 000
7-10	4.0	250	1000	30 000

Source: TE Mission estimates collected on site 01/05/2018

When the catch doubles in year 6 and onwards, the gross annual benefit stream is important, approximately USD10 000/year. However, their additional benefits on-site that have not been quantified for lack of information and time on-site. They are substantial benefits for the global environment and for people living in and around mangroves.

2.1 Global benefits that mangroves can provide to Project beneficiaries

2.1.1 Protecting food gardens from salt water intrusion and buffeting the effects of tropical storms

Mangrove forests are vital for protecting gardens from salt water intrusion and buffeting the effects of tropical storms. The responses to the MSC [Annex 8] instrument indicate that villagers interviewed have reflected acute concerns on their vulnerability to salt water intrusions into their gardens and tropical storms and are aware that mangroves provide one immediate solution.

2.1.2 Mangroves have the ability to 'grow up' as sea levels rise

Research shows that mangroves have the ability to 'grow up' as sea levels rise, by trapping sediments and raising their root beds. By reducing wave height by 13–66 % per 100 m and storm surge water depth by 5–50 cm per km, mangroves can significantly reduce the impacts of flooding in coastal areas [FAO 2018].

- One case study demonstrates storm protection benefits measured in economic terms following a cyclone in India. In villages protected by an embankment without mangroves, the economic losses were over four times greater than in those with mangroves as their sole form of protection [Info sheet 2018]

2.1.3 Mangrove's carbon storage capacity is 3 to 5 times higher than the one of terrestrial forests.

- Mangroves may have the highest net productivity of carbon of any natural ecosystem, that is, about a 100 kg/ha/day [FAO 2018]. Approximately one third of this may be exported in the form of organic compounds to mudflats. One hectare of mangrove yields approximately one ton of organic matter per ha / year. This organic material is highly appreciated by villagers to improve the germinating capacity of their gardens' soils, as was indicated in the villages of Mengar and Moem in East Sepik Province.

2.1.4. Mangroves offer crucial opportunities for villagers in terms of livelihood opportunities

The collection of reeds for roof thatching and baskets and harvest wild honey are an important contribution to the livelihoods of villagers. More importantly there are biodiversity products [NTFP] currently used by the communities in their livelihood operations.

- Sago [motroxyllon sagu] provides important input to the food system of the Wom villagers in East Sepik, Madang and elsewhere. Sago palms grows in association with to mangroves, are is a Non-Timber Forest Product of considerable nutritional value. The literature indicates [extracted on 22-05-18 from ttp://wildernessarena.com/food-water-shelter] that two kilograms of sago has the nutritional value equivalent to 1.5 kilograms of rice. The upper part of the trunk's core does not yield sago, but it can be roasted in lumps over a fire. Young sago nuts and the growing palm-shoots are also edible.
- Villagers who were interviewed have underlined that sago constitutes the core of their daily diet. It is complemented by protein from fish or small livestock [primarily hogs and chicken] and whatever seasonal fruits are available, i.e. bananas, papaya, and others. Climate hazards compromise this food system, which is based on harvesting the natural resources available locally. In particular, when women discuss this matter they show distress as they are responsible for the maintenance of the young and the old. A nutrition strategy could be considered as another measure to encourage e villages to adapting to the hazards of climate variability.
- In the village of Wom during discussions on livelihoods, one villager indicated that they grow three varieties of sweet potato. (Ipomoea batatas (L.) Lam.) While it is well known that there are two varieties; one that matures in 6 months and another in 3 months, in fact, the literature identifies a third variety that matures within a month.

This speaks well of the villagers' capacity for diversifying their livelihoods [Pablo Muñoz-Rodríguez, et al. 2018]

- These items should be analysed in the context of biodiversity prospection and properly recorded as traditional knowledge and registered in the context of the Nagoya Agreement. Concretely, the key point is to collaborate with indigenous and local communities in research related to food systems and ecological health. Enhancing the quality of life of indigenous and local communities by advancing understanding of both natural and human-generated environmental impacts on food systems is vital to cope with climate hazards in PNG's communities.
- There must be several organizations around the world working on indigenous food systems. The consultant without making a special search for lack of resources is acquainted with one organization. The Centre for Indigenous Peoples' Nutrition and Environment (CINE) is a multi-disciplinary research and education centre created located within the Faculty of Agricultural and Environmental Sciences on McGill University's Macdonald Campus in Ste-Anne-de-Bellevue, Quebec. CINE website: www.mcgill.ca/cine

2.1.5 Summary of Benefits

Global fishery

Mangrove forests are critical because a large share of global fishery depends directly or through food chains on mangroves – some scientific estimates amount up to 80 %.

Small scale fishery

- Small-scale fisheries accounts for 90 % of the people working in fisheries worldwide and is common in the Asia Pacific region especially in PNG. As fish productivity is linked to the total area and status of mangroves, they play a vital role for food and income security for rural coastal and island communities in PNG.
- Based on mangrove restoration in the Madang province, the TE Mission estimates indicate it is possible to increase the catch of fishery from the current 720 kg/ha/year to approximately 1 440kg/ha/year after the 6th year of restoration.
- Regionally, [FAO 2018] estimates that in one hundred [100] hectare section of mangrove it is possible to produce four tons of shrimp a year; this is equivalent to 40 kg/ha/year [FAO 2018]

Although unmeasured, the benefits from mangrove rehabilitation are substantial for the folks who live nearby mangroves and in addition to those who invest in rehabilitation. Annex 10 provides a list of the necessary conditions that need to be fulfilled so that investors gain from their efforts—otherwise, there is no incentive for additional efforts to rehabilitate mangroves.

The following unquantified benefits require a thorough analysis, as they are decisive in the process of climate change adaptation in terms of the population on the on the ground. They also provide unquantified but significant global benefits.

- Protecting gardens from salt water intrusion and buffeting the effects of tropical storms
- Mangroves have the ability to 'grow up' as sea levels rise
- Mangrove's carbon storage capacity is 3 to 5 times higher than the one of terrestrial forests [FAO 2018].
- Mangroves offer crucial opportunities for villagers in terms of livelihood opportunities

References

IUCN/WWF [no date] Mangroves – A Life-Saving Coastal Ecosystem Scaling up protection and restoration for achieving the SDGs Info sheet. Federal Ministry of Economic Cooperation and Development /IUCN/WWF [no date]
FAO [2018] Biodiversity a-z Mangrove. Extracted from: fao.org on 2018/05/02
Info sheet. Facts and Details. [2018] Mangroves And The Plants And Animals That Live There. Extracted on 2018/05/02. http://factsanddetails.com/world/cat53/sub335/item2182.html
Pablo Muñoz-Rodríguez, et al. [2018] Reconciling Conflicting Phylogenies in the Origin of Sweet Potato and Dispersal to Polynesia. Current Biology. Volume 28, Issue 8, p1246–1256. 2018
UNDP [2016] Human Development Report. Table 10 National Income and Composition of Resources. New York

Food-Water-Shelter. Extracted on 22-05-18 from www.ttp://wildernessarena.com/food-water-shelter

ANNEX 11: A PRIORI[84] OUTPUT DELIVERY: ISSUES AND PROBLEMS

1- Concept and Scope

One unifying observation from the implementation process, especially in the second half of the Project, is that outputs were delivered a priori; put differently, the logic applied to the delivery did not seem to reference to an economic development principle or an approach that ensured sustainable and equitable results. In particular, it did not take into account the critical fact that projects are designed to bring about the potential ability of individuals and organizations to be more productive as a result of a combination of efforts. Concretely, as discussed in Annex 7, synergy can result from the exploitation of complementary activities, that is, synchronizing individual, group or organizational activities in a way that achieves better results than any other activities by themselves. If there is no synergy among activities, the silo mindset ("you do your work, and I'll do mine") can prevent stakeholders from jointly designing and implementing an appropriate technology solution to move forward toward climate change adaptation.[85]

All societies have groups and functions that operate in silos for reasons of their own. Silos can harness knowledge-based skills and can be vital to productivity, or they can be geographic and culture-based. But when a paradigm shift [Prodoc page 11] is intended, as is the case in this Project, organizational transformation is needed. This means that every region of PNG must work together—even though they are unaccustomed to doing so. It is undeniable that in a country where 840 languages are spoken, even with the presence of Pidgin, many people will be unable to communicate with one another, because they are culturally different or inherently mistrustful and territorial. Logically a host of unintended consequences can happen, which can complicate change efforts, or delay or even derail delivery of benefits from projects. The pivotal feature is to track the evidence and determine what works and what does not in terms of the expected outcomes stipulated in the results framework.

To illustrate the a priori delivery of outputs, one typical output from the FPRR [page 13-14] has been selected. Output 2.3 is examined and its narrative is in Box 1. [2.3 Integrated riverbank protection measures implemented to protect communities in East Sepik Province, Northern Province and Morobe and Madang Provinces].

Output 2.3 intends to build " resilience and capacity of 10 riverine vulnerable communities in Morobe (4 communities) and Madang (6 communities) exposed to climate change related to inland flooding and other natural hazards..." There were 1507 direct beneficiaries [793-male and 714-female] that participated from the communities.

The direct beneficiaries benefited from the following actions supported by the project:

- river bank and flooding area protection actions were implemented;
- bamboo planting;
- climate resilient crops; and
- contingency water supply.

The FRPP reports that these implemented actions [" measures adopted"] were informed by community based climate hazards, vulnerabilities and risk mapping that facilitated the development of appropriate planning." [pp 13-14]. In addition:

· "A total of 248 (23 males and 225 females) participants attended the training sessions in their respective communities on food preservation techniques, food processing and preservation"

[84] Requiring no evidence for its validation or support [www.thefreedictionnary.com]

[85] Augusto Giacoman & Frank Ribeiro. Seven strategies for breaking down silos. Extracted on 30 July 2018 from www.strategyand.pwc.com

- "Women in the target sites [learned] the basics of how they can use tubers, such as cassava, sweet potato, banana, sago and taro to produce muffins, pops and chips."
- "Drought resistant crops were purchased and provided to ward disaster management committees to distribute in their communities.
  - ✓ A total of fifty (50) African Yams tubers were distributed to the target communities, with each community receiving five tubers. The ward disaster management committee identified key farmers in their communities and gave them tubers to plant in nurseries to multiply them and distribute them to the community members once they are ready."

2- Analysis of an A Priori Output Delivery

2.1-Method

The FRPP did not quantify [1] the delivery of outputs in terms of cost / benefit criteria; or [2] any other framework of situational features shared by members of social segments so as to identify the potential incidence of the delivery of outputs on the ability of the population to recover from the economic stress arising from climate change shocks [resilience]. This lack of a procedure to aggregate outputs into tangible measurable outcomes is a pivotal issue.

The absence of procedure makes it difficult to ascertain whether outputs are blending into tangible outcomes. It is important to underline that the application of a framework to amalgamate outputs so they are combined into a tangible and measurable outcome is a procedure that is normally defined in the Prodoc. In fact, this procedure does not appear in the Prodoc. For example, the TOR's Annex A contains the project's logical framework. Each outcome in the table contains respective columns for: indicator, baseline, target at the end of the project, sources of verification and assumptions. There is no column with information to indicate if the targets at the end of the project were achieved. Logically, the absence of information on what was achieved in terms of outcomes makes it difficult to apply the indicators to measure any progress. To sum up these matters of evaluability, if there is no information on outcome progress, the next assessable information that is available is the delivery of outputs as reflected in the FRPP.[86]

Further, the 2.3 Output narrative indicates that the development planning was grounded on community- based climate hazards, vulnerabilities and risks mapping, however there is no reference to a specific study where it would be possible to review the parameters considered in terms of vulnerabilities and other risks that were mapped. This missing information is pivotal to validate the information produced and its application. Although the villages were supposedly selected because of their geographical position for riverbank protection, the selection criteria of the beneficiaries has not been identified. It is not clear either if these communities were among the 33 climate-risk hotspot communities identified by the Project.

As there is no apparent economic logic being applied, with the intention to induce synergy among beneficiaries and non- beneficiaries, the question is what logic or criteria has been applied? Observation and informal discussions with stakeholders provided a glimpse of a possible criteria, which allowed for the a priori delivery of outputs as the way to help populations cope with the economic and social stress arising from climate change hazards. Evidently, the delivery was conducted in what can be termed as good faith; and those who benefitted from the distribution of resources most likely made good use of them.

Indeed, globally, the evidence shows [87] that poor people and poor countries are exposed and vulnerable to all types of climate-related shocks. Natural disasters that destroy assets and livelihoods; waterborne diseases and pests that become more prevalent during heat waves, floods, or droughts; crop failure from reduced rainfall; and

---

[86] UNEG Norms for Evaluation in the UN System, 2005, pp 6-9

[87] Hallegatte, Stephane, Mook Bangalore, Laura Bonzanigo, Marianne Fay, Tamaro Kane, Ulf Narloch, Julie Rozenberg, David Treguer, and Adrien Vogt-Schilb. . Shock Waves: Managing the Impacts of Climate Change on Poverty. Climate Change and Development Series. Washington, DC: World Bank. 2016 Overview [pp1-29]

spikes in food prices that follow extreme weather events. Climate- related shocks can also drag into poverty those who are not poor but remain vulnerable. Such events can erase decades of hard work and asset accumulation and leave people with irreversible health consequences. If we follow the trail of a priori outputs delivered, it may be possible to find a thread to ascertain if this approach is enhancing vulnerable communities' resilience to climate change, as intended by the Project.

2.2 Equity Issues

2.2.1-The outright distribution of outputs to approximately 20% of the population raises an arguable issue. It is likely that among the remaining 80% of the population there are equally deserving beneficiaries. This is conclusion is intuitive and can lead to conflict among the members of villages.

2.2.2-The plan to purchase 50 tubers of African yam [a drought resistant crop] and then distribute five tubers per community so they can be planted in nurseries and multiplied for re- distribution is sensible. The plan can be considered a garden- to- garden extension. However, in the context of the UNDP as a donor working with local partners, unintended issues can arise from the following circumstances.

- Were the 50 tubers health certified? Although there is no intention of spreading plant or soil infestation under UNDP/AF financing, precautions are in order.
- Given the 840 languages spoken in the country, which likely translates into approximately the similar number of societies or peoples, is this garden-to-garden extension approach replicable? This is a critical issue because an AF financed project intends to reach conclusions applicable beyond one ward, region or province.
- More importantly, did the organization/persons that distributed the African yams have the means to follow up on the distribution of yams among the adopters. Did the families achieved the expected yields? Were there crop infestations because of increased precipitation, etc. It is known that for sustainability purposes the introduction of new crops or techniques need to be conducted by an organization established in the community and the country—with the capabilities of following up on the uptake and take corrective action—and ultimately continue disseminating the new crop. These vital issues remain unanswered. They are fundamental for sustainability purposes.

To sum up: the project has not gathered evidence to ascertain to what extent the a priori delivery of outputs meets the needs of the communities globally. One stakeholder [Annex 13] perceived that the climate-risk and climate-shocks have worsened the poverty conditions in PNG. This is compounded by the fact that climate change impacts are unevenly distributed. Consequently amplifying economic inequality must be avoided.

Intuitively, the a priori delivery of outputs among community members or among communities, introduces unintended inequality as those who did not receive the outputs are as equally deserving as those that did receive the outputs. As issues cascade and escalate, populations may react harmfully in order to survive, thus precautionary approaches must be prioritized through the lens of equity and justice. Last but not least, the approach is unsustainable as the community and individuals' needs can be almost unlimited.

2.3 Alternative Approaches for Sustainable Output Delivery

In a recent intervention in Ethiopia and Kenya, the World Food Programme[88] [WFP] demonstrated that supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives contributed to sustainable increases in household and community-level food security, supporting long-term resilience-building in traditionally food-deficit areas. The most important result is long term resilience, and the communities and members of the communities do not become dependent on donors.

[88] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011

The World Food Programme [89] has proven comparative advantage in the area of disaster risk reduction and management in the context of food security and resilience. NGOs involved in humanitarian work have begun following the WFP approach. For example, World Vision [90] has conducted successful projects of food for work/assets in six countries where food assistance contributed to creating livelihood assets or a productive environment for farmers, individual households and communities. The key issues was to ensure that food assistance contributes to creating the assets in the community and an environment necessary for long-term food security. In a way this is equivalent to teaching someone how to fish instead of sharing one fish for one meal.

The object lessons here is to select partners with proven comparative advantage to intervene directly in the communities in the context of DRD/DRR without introducing unintended inequity issues. The overarching purpose is to promote long-term resilience among the communities while avoiding introducing unintended inequity in the short term in the distribution of resources to those who need them the most. In this light, the MTE recommended strengthening community disaster management capacity in the identified 33 climate-risk hotspot communities. It seems that if these 33 communities had been validated jointly by stakeholders as being climate-risky, the resulting selection would have avoided inequity issues.

Box 1 A Priori Output Delivery

2.2 Integrated riverbank protection measures implemented to protect communities in East Sepik Province, Oro Province and Morobe and Madang Provinces [Source FPRR page 13-14].

2.3

Under this output the project built up the resilience and capacity of 10 riverine vulnerable communities in Morobe (4 communities) and Madang (6 communities) exposed to climate change related inland flooding and other natural hazards. This was realized through effective climate-change driven disaster preparedness & response measures in partnership with NGOs to promote good practice. As a result, communities adopted river bank protection measures by planting bamboo to prevent erosion. A total of 1507 (793-male and 714-female) individuals directly benefited from activities supported by the project under this output. As a result, river bank and flooding area protection measures such as bamboo planting and climate resilient crops and contingency water supply were adopted. The measures adopted were informed by community based climate hazards, vulnerabilities and risks mapping that facilitated development of appropriate planning. The consultation process involved women and other vulnerable sections of the communities to ensure that their views are incorporated into the planning and decision-making process. To enable communities, adopt food preservation techniques, food processing and preservation training was conducted. A total of 248 (23 males and 225 females) participants attended the training sessions in their respective communities. The training targeted women in the target sites to learn the basics of how they can use tubers, such as cassava, sweet potato, banana, sago and taro to produce muffins, pops and chips. In addition, drought resistant crops were purchased and provided to ward disaster management committees to distribute in their communities. A total of fifty (50) African Yams tubers were distributed to the targets communities, with each community receiving five tubers. Ward disaster management committee identified key farmers in their community and gave them tubers to plant in nurseries to multiply them and distribute further to the community members once they are ready.

ANNEX 12: SUMMARY OF PROJECT RESULTS BY OUTPUT AND ACCOUNTABILITY ISSUES

Purpose

[89] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011. WFP. Policy on Disaster Risk Reduction and Management. Building Food Security and Resilience. Policy Issues. Agenda item 4. Rome, 14–17 November 2011. WFP. Policy on Building Resilience for Food Security and Nutrition. Policy Issues. Agenda item 5. Rome, 25–28 May 2015.Extracted on 10 July 2018 from www.wfp.org

[90] World Vision International Leveraging Food Assistance For A Hunger-Free World. Published by Food Programming and Management Group (FPMG) on behalf of World Vision International. 2014 This Research and publication was made possible with the generous support of World Vision Korea. Publication designed by Everyday Practice. For further information on this report, please contact: yejin_oh@wvi.org or sheri_arnott@worldvision.ca

1. To tabulate the information contained in the Final Project Review Report [2017] with minimum alterations for the sake of brevity for the purposes below enumerated.
2. To ascertain, retrospectively, possible procedures that could be used to amalgamate the outputs into outcomes so that results framework could be established to gauge the relative achievement of outcomes.
3. Review accountability issues associated with aggregating outputs into outcomes

12.1 Tabulation of Project Outputs from the Final Project Review Report [2017].

OUTCOME 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and 3 cities of the 11 provinces of the North Coast and Islands Region
Output 1.1: Coastal early warning system established for observation, data collection and information management and dissemination in the provinces of the North Coast and Islands Region
Activities undertaken An assessment of early warning systems for inland and coastal flooding in Papua New Guinea: 1- Comprehensive multi-hazard profiling of each province; 2- climate risk, vulnerability and needs assessment for each of the five provinces and 3- community level climate hazard and risk assessment was conducted in 30 communities of the five provinces.
Results: Outputs Completed Through these assessments, climate risks, exposure and vulnerability to principal climate hazards affecting five pilot provinces (East Sepik, Madang, Morobe, Northern, and New Ireland) were identified and used to prepare composite risk Atlas and maps and indices for the hazards at the district level. The vulnerability and hazard assessments provide exposure data for the three provincial capitals of Lae, Madang and Wewak. The exposure data/maps have been shared with provinces and coastal adaptation measures identified through a consultative process as part of developing provincial adaptation plans. The community level climate hazard and risk assessment conducted in 30 communities of the five provinces documented community perspectives on climate change; types of climate and weather-related issues that are affecting the communities, impact of climate hazards on local economic systems, ecology and livelihoods of the communities and document community coping/adaptation mechanisms. These climate risk, vulnerability and hazard profiles have provided evidence based for development and implementation of climate and disaster risk reduction measures in the provinces and informed preparation of climate change adaptation and disaster risk management plans. The early warning system assessment informed the design and establishment of the pilot Bumbu river early warning system and installation of automatic weather stations and rain gages in strategic locations.
Output 1.2: Coastal flood preparedness and response plan and systems established in the provinces of the North Coast and Islands Region
Activities undertaken 1- disaster risk management/climate-change awareness and training at a provincial level; 2- formation of Community Disaster Management Committees, 3- First aid/search and simulation exercises, 4-development of community disaster response plans; 5- Assessment of the sustainability of coastal and estuarine ecosystems with specific relation to mangrove rehabilitation and replanting schemes; 6- support, monitor and report on mangrove rehabilitation and replanting; 7- study and review of indigenous early warning systems/mechanisms with the aim of strengthening existing indigenous early warning systems and linking them to different levels of governing bodies at the province.

Results: Outputs Completed
Based on the early warning system assessments, vulnerability assessment and multi-hazard profiles, comprehensive disaster preparedness and response plans have been reviewed and or developed in the 5 provinces. The plans articulate the hazard risks in the provinces, institutional framework for disaster risk management, roles and responsibilities of key stakeholders.

Training
A total of 2,155 (1113 Male & 1042 female) benefited from training and capacity building activities towards climate change response in the four communities of New Ireland Province.

As part of capacity building, provincial staff (4-men) were supported to participate in a 3-week training in Thailand on disaster risk management. This has enabled them to facilitate preparation of disaster risk management at ward level that inform development of provincial plans..

Disaster management committees were established at ward level in lower local level governments of Tikana and Lovongai in Kavieng District. Sumuna in Djaul Island Ward 17, Tikana and Taskul Governement station in Ward
1, Patiagaga in ward 2 and Konomatalik in Ward 3 of Lovongai lowe local government in New Hanover Island

Refresher training was conducted for 861 people for six Ward Disaster Management Committee in community-based disaster response management, climate change adaptation, and emergency response; and 32 community members as first responders.

Organization and community - mobilization

The project established basic DRM and CCA management structures at the grass-roots level and enabled a basic understanding of hazards, risk, and suitable adaptation measures amongst the target communities.

By working in schools, the beneficiaries were also children, who have shown a keen interest in DRM and CCA. The project provided capacity development of the local ward disaster management committee through structured training, as well as coaching on-site during the facilitation of awareness sessions. These committees will remain after the project ceases and continue to work on building up adaptation measures within their communities. Through the project they have established close links with the local authorities and will therefore be able to access further support in the future and keep actively Ramu River Community Resilience Project engaged in DRM and CCA activities, for instance by assisting the district in carrying out needs assessments.

The project clearly contributed to human capacity with the provincial, district and lower local government administrations.

Pending Issues
By enhancing capacity of provincial and local governments in DRM and CCA, the project has enabled them to continue similar work with other communities, as well as providing follow-up support to the target communities. While this will be depending also on the availability of operational budget for DRM and CCA activities,

The Usino-Bundi District Administration was part of the ward disaster management plan updating process conducted in September 2015 and they stressed how much this process had assisted them with their work. The willingness of the District Administration to support future DRM and CCA programming was clearly articulated and demonstrated by the consistent attendance of the Usino-Bundi District Community Development Officer and the Deputy District Administrator.

The Deputy Administrator stated that he was prepared to extend continued support to the target communities, guided by World Vision, and also confirmed that the district was planning to develop another Ward DRMPs as well, so that all of them could be consolidated in lower local government and district disaster risk management plans.
He further pointed out that a budget allocation will be made in the annual plans for the district. The District's commitment was further expressed through the co-funding of PGK 50,000 provided for the construction of a gravity-fed water system to complement the project achievements and ensure a sustainable and safe water supply in the target area.

Output 1.3: Support system for community-led mangrove reforestation and conservation projects

Activities undertaken

1- Participatory climate change impact vulnerability mapping; 2- conducted community climate change education awareness in 25 coastal communities along North Coast; 3- trained local communities in the methods and actions for the conservation and restoration of mangrove habitats and supported restoration projects at participating communities; 4- raised awareness and understanding of the ecosystem service value of mangrove habitats including their role as a coastal barrier to limit coastal flooding from climate change impacts; 5- facilitated establishment of mangrove nurseries and field demonstration trials for mangrove nursery, species identification, collection and propagation for individual or clustered communities, including schools; 6-investigation and research on potential alternatives to mangroves in areas of NG north coast which are unsuitable for mangrove planting; 7- developed community and provincial mangrove management plans to ensure the long-term conservation of mangroves.

Training

A total of 4,265 people in [25] twenty-five coastal communities in Madang (15) and New Ireland (10) Provinces benefited from mangrove conservation and plantation initiatives.

The communities in which nurseries have been established and mangrove restoration undertaken include: Tugalop, Limanak, Nonovaul, Enang, Metetui, Angat, Enuk, Pati,Salapiu of New Ireland; Kave (Rempi), Lusik (Kubugam, Sarang 2, Tokain 2, Sikor (Ulingan Bay), Rurunat, Mereman-Sapra, Numuru, Yambayabar, Wanam,Sisimagun (Nubia), Awar, Borori Burag (Karkar Is.),Kavailo Bay (Karkar Is.).

Equipment and Material

Thirty (30) community nurseries were established with capacity of 61,400 seedlings.
Planting of these mangrove seedlings will result in protection of 263.1 hectares and 131.6km of the coastline.

These mangrove restoration measures were based on a coastal ecosystem survey and Geographical Information System mapping undertaken in collaboration with WWF which identified 75.9km degraded coastlines (4660ha), 2088ha mangrove habitat distribution in Madang North Coast region.

The project recruited 25 community facilitators and trained forty (40) people (36-men and 4-women) in mangrove nursery establishment & climate change in Madang.

Results: Completed Outputs

Community mangrove management plans have been developed in 15 communities identified for piloting. These plans provide basis for resource allocation by local governments to sustain the mangrove conservation efforts
at the community level.

Because of these interventions, there has been improved general health of the ecosystem and contributed positively to addressing food security issues, and enhancing livelihood of the local communities whilst addressing climate change impacts. It is important to note that mangrove restoration program will take time to monitor and maintain, and there is need for continuous support to local communities during transplanting.

Pending Issues

During implementation, we have also learnt that strong community leadership is needed to ensure effective community participation in the mangrove planting activities.

Some communities have been undertaking mangrove nursery and planting activities as part of their local initiatives to manage coastal ecosystem and sea. The project intervention has further strengthened them and they will continue to do mangrove nurseries and replanting in degraded coastlines.

At the community level, the local level government including ward level and village development committee members have been supportive in seeing this project through. They have been behind community organization, mobilization and have committed future support through the district strategic investment plan funds to roll down at their level. Sustainability is assured but this would take time to be structured into the government system.

Notwithstanding, the project encountered challenges related to irregular and unreliable communication with provincial climate change officers which made planning field visits for some provinces more difficult than anticipated and caused some delays. Consequently, some community leaders and head teachers from participating villages and schools did not attend the repatriation meetings.

ELNINO effect in 2015 affected much of the mangrove seedlings. There was severe pest and disease (Insect & Fungus) attack on mangrove seedlings in some nurseries resulting in average seedling mortality for all necessaries at 18.5%. On-site demonstrations were made on making homemade insecticide were established and implemented. Remote and distant location of the projects sites consume time spent in terms of accessing these communities and even affecting communication with communities.

Output 1.4: Integrated coastal adaptation measures implemented to protect 8 communities in East Sepik Province, Oro Province and New Ireland Province

Strengthening resilience of the eight coastal communities against climate risks through community- based climate change adaptation: eight communities of Big Muschu (Muschu Is.), Brauniek (Kairiru Is.), Ingo-Krupia (Boikin), Kambilal (Wallis Is.), Mandi (Turubu), Mengar (Wewak Local), Moem (Wewak Local) and Wom (Wewak Local) were supported to develop and adopt climate change adaptation and disaster risk reduction measures.

Criteria of Selection

These communities were identified based on a Vulnerability Needs Assessments (VNA) into the coastal people of Wewak District in the East Sepik Province during the El Nino and drought period conducted in 2015. The VNA established that these communities do not have early warning systems in place and the houses are unstable and vulnerable to flash floods and strong winds. Most also do not have a safe and sustainable drinking water supply. In addition, most do not have proper coastal erosion mitigation measures in place.

Given this low level of resilience and exposure to climate change hazards a Community-Based Climate Change Adaption and Disaster Risk Reduction initiative was implemented in collaboration with World Vision PNG. Through a community based approach climate hazards, vulnerabilities and risks were mapped to develop appropriate mitigation planning. The consultation process involved women and other vulnerable sections of the communities to ensure that their views are incorporated into the planning and decision-making process. Food security training on seed multiplication and setting up a family garden at the community level was conducted. Adaptation training and preparation of plans has been completed in 3 communities in New Ireland Province and 6 communities of East Sepik provinces.

Beneficiaries

A total of 2796 (1,123-males and 1673 females) people participated and benefited from awareness and implementation of community-based coastal erosion protection measures as wells as adoption of infrastructure and livelihood assets protection measures.

Results: Intermediate Outputs

Eight (8) disaster management committees were established for Mandi (3 members), Wom (4 members), Moem (3 members), Ingo- Krupier (3 members), Big Muschu (5 members), Mengar (5 members, Kabilal (5 members) and Brauniek (4 members).

These DMCs were facilitated to develop disaster risk management plans for their communities.

Facilitated the propagation of drought tolerant crops to ensure communities are food secure.

Disaster risk reduction measures adopted include; relocation of households at risk, opening up drainage channels; and construction of stone and sand banks especially in the island communities of Wallis, Mushu and Kairiru.

Green belt zones were created by replanting mangroves and other salt tolerant tree species to prevent coastline erosion. Provision of poly bags for the nurseries and replanting of mangroves and other coastal plants that act as buffers, reducing erosion and maintaining water quality.

To address water, sanitation and hygiene in the coastal communities, a total of eighteen (18) 9000 litre rain water catchment tanks were distributed to the eight communities as livelihood assets.

To address effects of drought on food security, the project established demonstration sites for drought resistant crop varieties such as African yams, sweet potatoes and lowland bananas in collaboration with the National Agriculture Institute in Lae, Morobe Province.

OUTCOME 2: Reduced exposure and increased adaptive capacity of 8 riverine communities of the 4 provinces (East Sepik, Oro, Morobe and Madang Provinces)

Output 2.1: Inland flooding early warning systems established for observation, data collection and information management and dissemination in the North Coast provinces

Activities undertaken

1-piloting flooding EWS for Bumbu river catchment in Morobe including procurement and installation of Automatic Weather Station, 2- 5 automatic rain gauges (5), water level gauges (3) and integrated data management system at the National Weather Services in Port Moresby; 3- Ramu river EWS early warning system including development of community adaptation measures through land-use planning within the Ramu River area; 4- raise awareness and train communities of upper and middle Ramu river about importance of stream gauges and several rainfall gauges to reduce on vandalism and improve operation and maintenance;
5]conducting community-based disaster risk management awareness and training with selected communities within the Upper and Middle Ramu River region; 6- developing child-centered climate change awareness and education program with schools within the Upper and Middle Ramu River region, 7- automatic weather stations have been procured and installed in each of the provinces of Lae, New Ireland, Boungaivillea, Madang and East Sepik by the end of March 2018.
Deliberate effort was made to ensure that siting of the equipment was on either public land or individuals who would guarantee their protection from Vandalism. Formal agreements to provide security of the sites are yet to be finalized. All the equipment procured and installed under the project meet World Meteorological Organisation standards. Each weather station is expected to cover 2 communities in each province.

Training

4 staff of the National Weather Service and the Conservation and Environment Protection Authority were provided with hands-on training in M&O.

South-South learning exchange about EWS to Australia which provided basis for development of a proof of concept that has guided establishment of the Bumbu river early warning system. Installation utilised leadership of the provincial disaster coordinators in mobilising community engagement and ensuring ownership of the equipment.

Strengthening of the capacity of the National Weather Services to forecast, predict and disseminate climate early warning information. PNG can now receive real time early warning to inform decision on adaptation measures.

Beneficiaries

A total of 26,6912 (11,232 females and 15459 males) people directly benefited from the project activities under this output through the different initiatives.

Pending Issues

Planned 20 voluntary weather stations were not procured due to increased cost of Bumbu river flooding pilot EWS [early warning system] that went above what was earlier budgeted for in the project.

Government prioritized investment into development of the Bumbu river flooding EWS pilot to inform documenting lessons for scale up in other inland river systems.

Design and development of the flood pilot Early Warning System was informed by assessment early systems for inland and coastal flooding completed in 2014.

Output 2.2: Inland flood preparedness and response plan and systems established in the North Coast provinces

Activities undertaken

1- Strengthening community DRM [disaster risk management] capacity to prepare for and respond to inland flooding in vulnerable communities in Upper Ramu :

Training

Refresher training for 6 wad disaster management committees in community-based disaster response management, climate change adaptation, and emergency response planning;

updated 5 ward disaster management plans and

3 lower local government disaster management (Usino, Bundi & Gama) plans in Usino-Bundi District with sections on emergency response and climate change adaptation;

First Aid Training and First Aid Kits to 32 community members;

Conducted DRM & CCA and inland flooding awareness sessions in 10 communities (Waput, Asas, Koroba, Abegal, Boko, Waramea, Biamodo, Kalafulim, Moimara and Usiema) and four schools, namely Waput Adventist Primary School, Koroba Primary School, Dumpu Primary School, and Karani Community School.

The project established basic DRM [disaster risk management] and CCA [climate change adaptation] management structures at the grassroots and enabled a basic understanding of hazards, risk, and suitable adaptation measures amongst the target communities.

By working in schools as well as communities, the beneficiaries were not only the adult population, but also children, who have shown a keen interest in the topic and significant knowledge increase.

Through a child-centred approach to introducing DRR/CCA awareness and initiatives, the project introduced climate change adaptation and disaster risk management to climate change-induced floods in the Ramu river basin.

Training was provided to children, youth, women, teachers, the disabled and community members; improved food seed management and climate change adaptation techniques and skills transfer.

Beneficiaries

A total of 3045 (1575 males and 1459 females) people directly benefited from the inland flood preparedness and response measures undertaken by the project.

Output 2.3: Integrated riverbank protection measures implemented to protect communities in East Sepik Province, Oro Province and Morobe and Madang Provinces

Conducted [built] resilience and capacity building

10 riverine vulnerable communities in Morobe (4 communities) and Madang (6 communities) exposed to climate change related inland flooding and other natural hazards. This was realized through effective climate-change driven disaster preparedness and response measures in partnership NGOs in promotion of good practice.

As a result, communities adopted river bank protection measures by planting bamboo to prevent erosion.

Beneficiaries

A total of 1507 (793-male and 714-female) directly benefited from activities supported by the project under this output.

As a result, river bank and flooding area protection measures such as bamboo planting and climate resilient crops and contingency water supply were adopted. The measures adopted were informed by a community- based climate hazards, vulnerabilities and risks mapping that facilitated development of appropriate planning.

Intermediate Outputs

A consultation process involved women and other vulnerable sections of the communities to ensure that their views are incorporated into the planning and decision-making process.
The training targeted women to learn value-added processes for tubers, i.e. cassava, sweet potato, banana, sago and taro to produce muffins, pops and chips;

Drought resistant crops were purchased and provided to ward disaster management committees to distribute in their communities. A total of fifty (50) African Yams tubers were distributed to the 10 targets communities [each community receiving five tubers]. Ward disaster management committee identified key farmers in their community and gave them tubers to plant in nurseries to multiply them and distribute further to the community members once they are ready.

This value addition increases shelf life of products and serve as contingency food supply during floods and droughts and increase market price at local markets. This will enable families to generate additional income and diversify coping strategies in the event of an emergency or disaster.

Training
A total of 248 (23 males and 225 females) participants attended the trainings in their respective communities.

OUTCOME 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices

Output 3.1: Climate change-related risks and resilience to coastal and inland flooding integrated into coastal zone management related polices, legal and planning frameworks at the national and sub-national levels

Results: Intermediate Outputs

Using the inputs from the climate hazards, vulnerabilities and risks assessment geared to foment the development of integrated CCA and DRM policies and plans (with budgets) for selected sectors in each of the provinces in collaboration with Asian Disaster Preparedness Center.

Mangrove management plans have also been completed for New Ireland Province.

Institutional strengthening for mainstreaming CCA &DRM inaugurating provincial climate change committees have been established comprising of provincial level government agencies, and NGOs to carryout climate change adaptation related plans, policies, projects and programmes.

Enabling the establishment of climate change committees in the 5 provinces, Climate Change and Development Authority has been able to build on these efforts to scale up in Eastern Highlands and Engar provinces.

To facilitate climate change adaptation & mainstreaming, climate change committees have been established in the 5 provinces. [Duplication?]

Training Materials

Development of mangrove restoration handbook and mainstreaming handbook.

Development and mainstreaming manual prepared to facilitate focal points in training of communities in CCA andDRM planning

Computers and furniture for climate change focal points to enable them coordinate provincial level initiatives.

Training

A total of 146 (119 men and 27 women) people benefited from adaptation planning workshops.

Climate change assistants recruited and trained during the project are expected to be integrated in the provincial administration as part of institutional strengthening.

Output 3.2: Policy makers and planners at the national, provincial and district offices, institutions and extension services systemically trained to implement climate-sensitive policies and plans

Training

As part of mainstreaming climate change adaptation and disaster risk management in development planning, more than 150 people were trained at the National and provincial levels.

Pending Issues

Climate Change Adaptation has been mainstreamed in development plans of key sectors in each of the provinces. This has been achieved through the awareness of key departments and policy makers about the importance of mainstreaming climate change adaptation into development planning; enhancing the understanding of department heads and policy makers in the pilot provinces about the practical realities of mainstreaming climate change adaptation into development planning and budgeting; and developing climate change adaptation plans for key sectors in the pilot provinces.

The Mainstreaming of climate change adaptation was informed by a detailed analysis of the climate hazards, vulnerabilities and risks undertaken by the five pilot provinces.

Through the training, understanding of provincial and local government was built improved on with regards to climate change science, its causes, effects, modelling and implications for the provinces.

The training enhanced the capacity of provincial and local governments to integrate climate change adaptation into provincial and local development planning processes, identify and select entry points for climate change adaptation, and identify possible adaptation measures to be pursued, as well as proactive planning options.

Utilising lessons learned from the pilot, Climate Change and Development Authority has been able to scale up the establishment of climate change committees in the Eastern Highland and Enga provinces using government resources.

OUTCOME 4. Strengthened awareness, education and advocacy to promote ownership of adaptation and climate change-related risk reduction processes at the national and sub-national levels.

Output 4.1: Lessons learned and best practices generated, captured and distributed to other communities, civil society, policy makers in government and globally through targeted mechanisms

Activities undertaken

1- supported documentation of community experiences through digital stories and photo essays; and 2- development of an adaptation website for PNG to act as a hub and key repository for information on climate change impacts and adaptation measures.

Completed Output

An important achievement of the project has been the development of the website http://www.climateadaptationpng.org, which is now live. The website is based on the WordPress Content Management System (CMS) which allows for the inclusion of rich and dynamic features. Both the hosting and domain name services have been paid for for a 12-month period and will have to be renewed via their respective accounts on May 4, 2018 by CCDA, who will be responsible after the first-year subscription is over.

The website acts as a climate change resource hub for the people to access and all materials are freely available for download. The website has provided a platform to showcase adaptation result to the global community, including during the UNFCC COP23..

Examples of stories and photo essays uploaded to the website on our PNG series include:
https://undp-adaptation.exposure.co/realizing-potential;https://undpadaptation.
exposure.co/92375b11928cf6cdda9eb47934c7a716 to reach global stakeholders.

The materials can be accessed by visiting the following website link: http://www.climateadaptationpng.org/mediamaterial/. In addition, community stories on food security issues, water-borne diseases, natural disasters, and economic consequences of drought were recorded and these stories have been edited into digital stories, incorporated in an online, interactive Story Map (https://scgismaps.maps.arcgis.com/apps/MapTour/): (http://www.climateadaptationpng.org/digitalstories/), searchable by province. The digital stories are short, multi-media pieces that combine a narrated script, images (still), text, and a musical soundtrack and can accessed through http://www.climateadaptationpng.org/education-curriculum/.

Twenty-seven (27) stories were used for an innovative and interactive online Story Map (https://scgismaps.maps.arcgis.com/apps/MapTour/) to showcase community experiences with climate change from the ground. The stories selected showcase climate impacts being felt by local people and actions they are taking to build resilience in the five provinces across Papua New Guinea.

At the national level, Digital and photo stories have been produced on climate change adaptation and different media have been used to disseminate these stories, including using a national stakeholder dialogue.

Output 4.2: Climate change awareness and education programmes carried out to build next generations' resilience to climate change

Under this output, the project raised awareness for implementation of on the ground actions among vulnerable communities and decision makers in five provinces related to the threats posed by climate change and the means to strengthen resilience and adaptive capacity to climate change.

Completed Outputs

Awareness raising activities were conducted in 60 communities through NGO partners.

Education activities undertaken include: i) Evaluation of applicability and relevance of existing materials on climate change based on the feedback received from provincial visits;
ii) Develop climate change curriculum materials for primary schools incorporating key threats and adaptation measures from the five provinces;
iii) development, printing and dissemination of posters on improved agriculture practices, mangrove conservation, drought and flood preparedness.
More than 2000 copies of these posters and factsheets were printed and distributed to schools , project communities, provincial climate change offices and the provincial education office. A total of 23 schools, including 200 (girls and boys) student, 140 teachers and 97 school governors across five provinces, benefited from the process of developing climate change curriculum supplementary materials. The course books have been printed and disseminated to all the primary schools of the five provinces. In addition, awareness has been raised among vulnerable communities as a key component of the community, In addition to mainstreaming climate change and adaptation in school curricula and university academic programmes and by equipping teachers with the required knowledge and materials, a curriculum for primary schools has been developed following intensive consultations with schools.

The materials can be accessed online through http://www.climateadaptationpng.org/education-curriculum/
Five (5) short videos were produced in local languages and included as part of the activity under the topic "Impacts of climate change" in the supplementary teaching material titled "Introduction to Climate Change: Supporting Existing Education Curricula in Papua New Guinea schools". A supplementary resource for teachers (Kuange et al. 2017) was also produced under this project.

Pending Issues

Inadequate internet connections disrupted or delayed the design and content upload of the website. Providing editions and comments on the website, awareness materials, and curriculum material via email was a challenge between WCS, UNDP and CCDA. Emails don't seem to capture the intended messages or are misinterpreted. We found that face to face meetings are better to ensure there is no misunderstanding in context.

Video production took more time than expected and this delayed uploading to the website. The demand for more awareness and supplementary curriculum materials unfortunately could not be met because of budget constraints. For instance, the Morobe Provincial Education Office wanted the project to produce more supplementary curriculum material for all schools in the province.

12. 2 -To ascertain, retrospectively, the possible procedures that could be used to amalgamate the outputs into outcomes so that results framework could be establish

As partially discussed in Annex 11, the FRPP lacks a procedure to enable blending of outputs into tangible outcomes. This is because the FRPP did not quantify [1] the delivery of outputs in terms of cost / benefit criteria; or [2] any other framework of situational features shared by members of social segments so as to identify the potential incidence of the delivery of outputs tied to the population's ability to recover from the economic stress arising from climate change shocks [resilience]. Ordinarily a framework to amalgamate outputs so they are combined into a tangible and measurable outcome is a procedure that is defined in the Prodoc. This procedure is not available in the Prodoc. Thus, from the standpoint of evaluability, if there is no information on outcome progress, the next assessable information that is available is the delivery of outputs as reflected in the FRPP.[91]

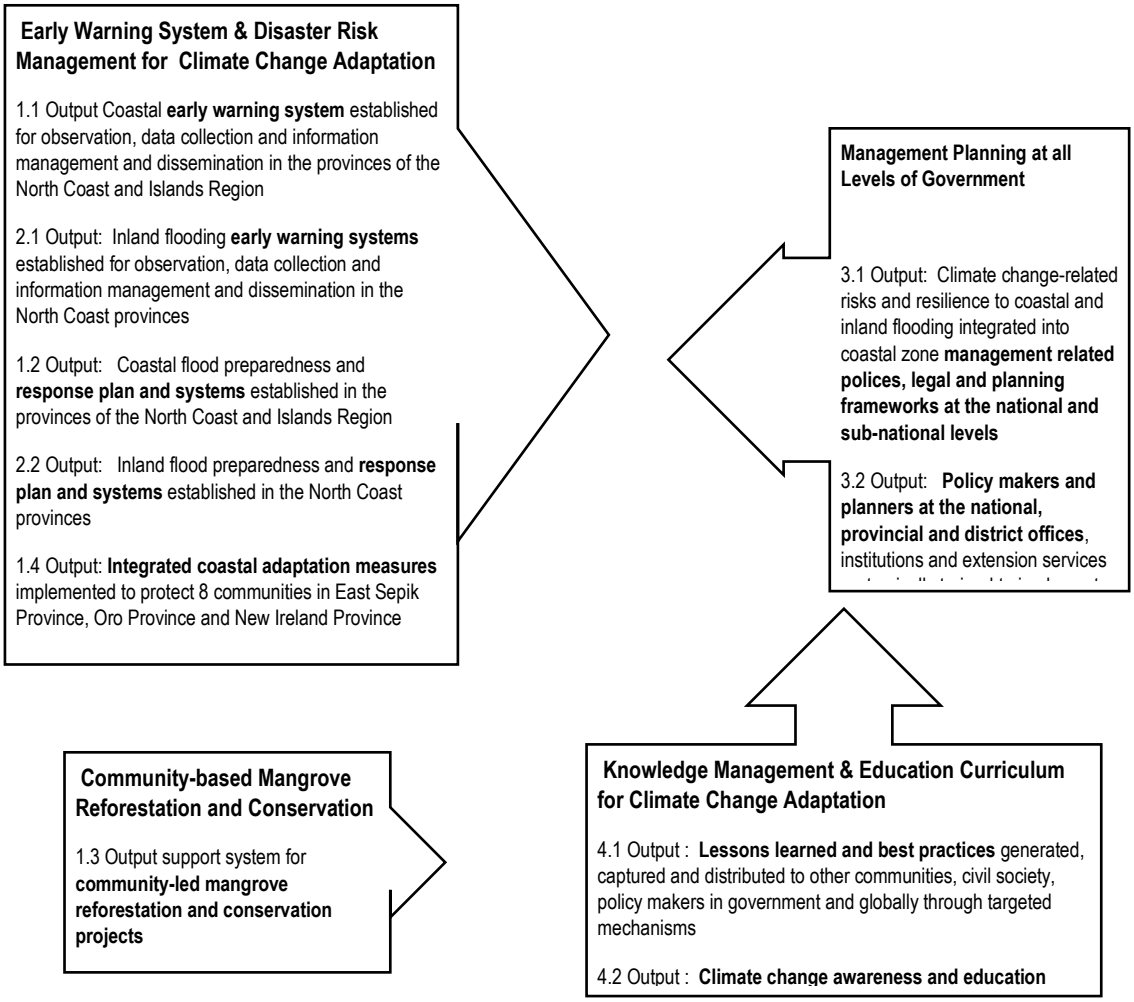
[91] UNEG Norms for Evaluation in the UN System, 2005, pp 6-9

The country, especially people living in coastal areas, are enduring daily the shocks of climate change. With the purpose of moving forward, the tabulation of the available output- performance data [section 12.1] shows the emergence of four sets of intermediate outcomes. The outputs within each set have distinct possibilities of amalgamation if synergy is induced. It is productive to keep in mind that the purpose of outputs are to morph into the expected outcomes, that is, instituting tangible and measurable change in behaviour among the population. Another purpose is a change in institutional performance among the organizations involved at the national and semi-national levels, including communities inhabited by all men and women. This is the overarching purpose of designing projects under any development framework.

The four sets of intermediate outcomes are knowledge-based and purport to build institutions at the national and sub national levels together with the communities in the targeted provinces, within the framework of the reduction of hazards and disaster risks. This process focuses on expanding facilities for the reduction of hazards and disaster risks. Ultimately, the reduction of climate change- hazards and disaster risks is to ensure the results of economic development, including current physical assets that are the country's endowment, including preserving the biological and cultural diversity.

Graph 1 illustrates the output composition of these four sets of intermediate outcomes. Each set is composed of outputs that logically and functionally complement each other. Thus, the set of "Early Warning Systems and Disaster Risk Management" is tied to Climate Change Adaptation and has the largest number of outputs [6]. By contrast, the set of "Development of Community-based Mangrove Conservation" contains only one output. At this junction, the point is to analyze the context, so we can move forward from using outputs as silos. We can begin reviewing the following four intermediate outcomes or hypothetical outcomes :

1-First Intermediate Outcome: Early Warning Systems and Disaster Risk Management for Climate Change Adaptation [containing six outputs]
2-Second Intermediate Outcome: Community-based Mangrove Reforestation and Conservation. [1 output]
3-Third Intermediate Outcome: Planning at all levels of Government [containing two outputs]
4-Fourth Intermediate Outcome: Knowledge Management and Education Curriculum for Climate Change Adaptation [two outputs]



Graph 1: Output Composition of Emerging Intermediate Outcomes [Mission estimates-Annex 7]

The unifying observation is that these four intermediate outcomes contain all of the project outputs and have produced all of the reports and studies listed in Annex 5. The data that has been produced is rich. The evaluation's challenge is to ascertain if this data is being processed by the different stakeholders and beneficiaries in such a manner that information is generated that enables the amalgamation of outputs so they become an outcome with the developmental momentum for climate change adaptation. For instance, there is one key study on climate hazards, exposure and vulnerability and a Composite Risk Atlas and Maps/Indexes for five pilot provinces [East Sepik, Madang, Morobe and Northern and New Ireland]. The study contained comprehensive hazard profiles and maps in geospatial format which could be integrated into the National Risk Information System. There are other reports related to Early Warning Systems and Disaster Risk Reduction that are linked to climate change-hazards.

Another characteristic is that most of these works are in geospatial format. Geoscience or geomatics is the science of map technology (GPS, satellite imagery, GIS, and Google Maps). Geospatial engineers are responsible for using geographic data that supports technical operations for Disaster Relief and Natural Resource Development. They collect, analyze and distribute geospatial information to represent the terrain and its possible effects. Ordinarily, GIS Technicians are responsible for digitizing, inputting, updating and ensuring the integrity of the data in the system, like the DRR/DRM Atlas. Essentially, a GIS Technician is a database administrator who updates the

data but does not use it. They have administrator's capabilities and have day-to-day responsibilities such as updating records presented by stakeholders and decision-makers. They may extract the data, but usually do so for others instead of using it for themselves. Typical data they would handle includes qualitative and quantitative data such as aerial photographs, environmental readings (such as pollen, precipitation, water pollution) climate science, environmental conservation, zoology, demographic analysis, and regional planning.[92]

According to discussions of the Evaluator with several members of the community of end-users, this valuable and precious documentation does not have a "home" where it is maintained and updated regularly. The FPRR [page 25] indicates that the contract with the vendors that produced the reports using digital information and geospatial format, did not include a clause requiring training for the maintenance and update of the data. The contract with the vendor for the installation and maintenance of the automatic weather station includes capacity training. It concludes by stating that the government can update the digital information from the vulnerability assessment using their own resources. It is absolutely essential for the national government to take ownership of these knowledge products. To enable these three sets of outputs to generate information from the data available that is adequate for the needs of the community of end-users, requires additional effort. The specific requirements from the community of end-users can be varied in terms of time and technical requirements. There might be need of a common platform, with data being updated/curated by each separate department or province [not a clearinghouse, the data would stay with and be maintained by the responsible province or department], connected by modern ICT infrastructure for sharing the required layers of data. This does not mean all data would be shared to start with - but at least the most important would be. The crux of the matter is to induce synergy among the data producers and the community of end-users.

12.3-Review of accountability issues associated with aggregating outputs into outcomes

The submission of the results framework showing the achievement of outcomes is the opportunity for project management authorities to demonstrate that they have met with their obligations. In this connection, this a measure of accountability demonstrating that project management authorities have met their obligations with respect to (i) conducting work programme in accordance with agreed rules and standards and (ii) of reporting fairly and accurately on performance results in terms of mandated roles and/or plans.[93]

As shown in the TOR's Annex A project management authorities have not submitted the results framework showing the achievement of outcomes by the end of the project. This Terminal Evaluation in the absence of the final results framework is unable to assess to what extent the expected outcomes have been achieved. Accountability considerations do not allow Evaluator to sketch a proxy- Terminal Results Framework. By contrast, as discussed above, based on the output- performance data tabulated [section 12.1] from the Final Project Review Report [2017] , it was possible to triangulate intermediate outcomes from outputs that were listed in the contextual information of field observations and focused interviews with beneficiaries and stakeholders [Annex 7].

Thus, the summary results of triangulating intermediate outcomes from outputs that were listed in the contextual information of field observations and focused interviews with beneficiaries and stakeholders [Annex 7] are shown in Annex 15 as estimated progress in outcome achievement derived from mission estimates from composite annexes 11,12 and 14.

It is vital to move forward. The daily reality of PNG is that climate change impacts are already irreversibly changing life for folks of all walks of life -- especially those living in the coastal areas. The capacity to track results is now imperative in PNG because the survival of society is at stake [Annex 14].

[92] Extracted on June 20, 2018, from https://www.environmentalscience.org/career/gis-technician

[93] Executive Board of the United Nations Development Programme and of the United Nations Population Fund. The UNDP accountability system Accountability framework and oversight policy. New York, 2008

ANNEX 13: PROCUREMENT, ACCOUNTABILITY & TRANSPARENCY ISSUES

These three files were shared with the TE. They were sent by stakeholders. They illustrate the issues surrounding procurement, accountability and transparency issues. In the main text accountability and transparency issues have been discussed. It is not the function of the TE to adjudicates on these matters as they are outside the scope of development--- however they impinge on development and have had a deleterious, unmeasured, effect on development results.

File 1: Vulnerability versus Accessibility, Implications on Transparency

File 2: Procurement & Equity Issues : Implications on Transparency and Accountability

File 3: Stakeholder Perception on Management Performance: Implications on Transparency and Accountability

File 1: Vulnerability versus Accessibility, Implications on Transparency: Author: Project Stakeholder

Project: Enhancing Adaptive Capacity of Communities to Climate Change-related Floods in the North Coast and Islands Region of Papua New Guinea.

Introduction

The Anteagroup and partners conducted a vulnerability assessment for the Adaptation Fund supported project titled: Enhancing Adaptive Capacity of Communities to Climate Change-related Floods in the North Coast and Islands Region of Papua New Guinea. The report produced in 2017 anticipated that by 2030, sea-level will rise by 4-15 cm, significantly increasing storm surges and elevating the risk of coastal flooding (Anteagroup 2017, p. 56). Temperature rise and rainfall are also projected to intensify in the near future.

The vulnerability assessment was conducted towards the end of the AF project cycle in 2017. This raises concerns for more science based and inductive reasoning at project initiation to support evidence based investment of climate change adaptation resources. The report identified hotspots particularly in Namatanai that are not within the AF target communities. Essentially, adaptation assessments should be the premise for project development. Future project development need to be backed by available data to ensure rational distributional of resources amongst the most vulnerable communities but also encapsulate social and economic aspects that are critical to the wellbeing of target communities.

Vulnerability

Datasets for sea-level rise was not obtained in New Ireland Province, however, data collected for coastal flood and cyclone are complementary. Figure 2 provided by Anteagroup shows very high risk hotspots for coastal flooding and cyclone in both Kavieng and Namatainai Districts. Notably, Matalai rural, Namatanai rural and Nimamar rural are highly exposed to cyclones and coastal erosion. Relatively, the combination of social, physical and economic vulnerability shown in figure 1 indicates very high risks for Namatanai District (Anteagroup p. 55). It is essential that ethical principles of equity and justice must be applied in future site selection based on the level of vulnerability of communities. Vulnerability assessment must be stressed as the forerunner for decision making at the inception phase.

In addition, an ex ante[94] type of cost-benefit analysis is vital for project-specific decision making at the onset (Pearson 2014, p. 3). Climate change mostly deals with forecasting and projecting future scenarios as there are uncertainties involved. It is thus, essential to critically analyze future scenarios integrating social and environmental aspects for optimal resource use and opportunities that can be derived to marginally offset vulnerability. For example, one of the target communities visited, Pati Island, community members expressed multiple benefits as a result of mangrove reforestation that were not captured by the AF project. Additional benefits included improvement in fish growth and increase in crab stock which in turn generated and improved income. Although, distance to reach some of these hotspots may seem difficult, the primary objective is to raise the level of resilience of most vulnerable people through financial security and social wellbeing.

Table 32. Distribution of vulnerability classes for extreme weather (cyclones) in New Ireland Province (combined social, economic and physical)

	HAZARD : CYCLONE						
	COMPOSITE VULNERABILITY %						
District	1	2	3	4	5		(3+4+5)
Kavieng District	16.0	22.1	19.3	7.7	7.3	27.5	34.3
Namatanai District	2.0	11.5	10.0	6.5	16.9	53.1	33.4

Figure 1: Distribution of vulnerability classes for extreme whether (cyclones) in New Ireland Province (Source: Anteagroup, Belgium, 2018)

Hazard: Coastal Flooding

Kavieng District

LLG	High (4)	Very High (5)
Murat Rural	4	1.2
Lovangai Rural	4.6	8.2
Tikana Rural	6.5	9.1
Kavieng Urban	2.9	96.7
	18	115.2
	4.5	28.8

Namatanai District

LLG	High (4)	Very High (5)
Konoagil rural	0.4	0.8
Matalai rural	3.1	2
Namatanai rural	4.9	5.9
Sentral Niu Ailan rural	4.5	3.3
Tanir rural	5.1	0.3
Nimamar rural	4	25.6

Hazard: Cyclone

Kavieng District

LLG	High (4)	Very High (5)
Murat Rural	5.3	1
Lovangai Rural	8.5	7.2
Tikana Rural	7.9	7.6
Kavieng Urban	0	100

LLG	High (4)	Very High (5)
Konoagil rural	0.9	3.7
Matalai rural	2.4	55.8
Namatanai rural	2	74.2
Sentral Niu Ailan rural	6.1	4.6
Tanir rural	84	13.7
Nimamar rural	52.8	38.2

Hazard: Multi Hazard (current)

Kavieng District

LLG	High (4)	Very High (5)
Murat Rural	0	0
Lovangai Rural	1	0
Tikana Rural	0	0
Kavieng Urban	13	4

LLG	High (4)	Very High (5)
Konoagil rural	2.6	0.3
Matalai rural	0	0
Namatanai rural	0.1	0.2
Sentral Niu Ailan rural	1.2	0.3
Tanir rural	0	1.6
Nimamar rural	0.4	0

Figure 2: Hot spots based on high to very high-risk settlements (Source: Anteagroup, Belgium, 2018)

Access

Lack of access to information

Information is vital for hotspot (high to very high risk areas) communities. Climate change awareness needs to be communicated though such projects and institutions that have existing knowledge. Lack of access to vital information through such project by hotspot communities may have detrimental social and economic implications in future given the current global cumulative emissions levels (Peters et al., p. 118). The continued increase in

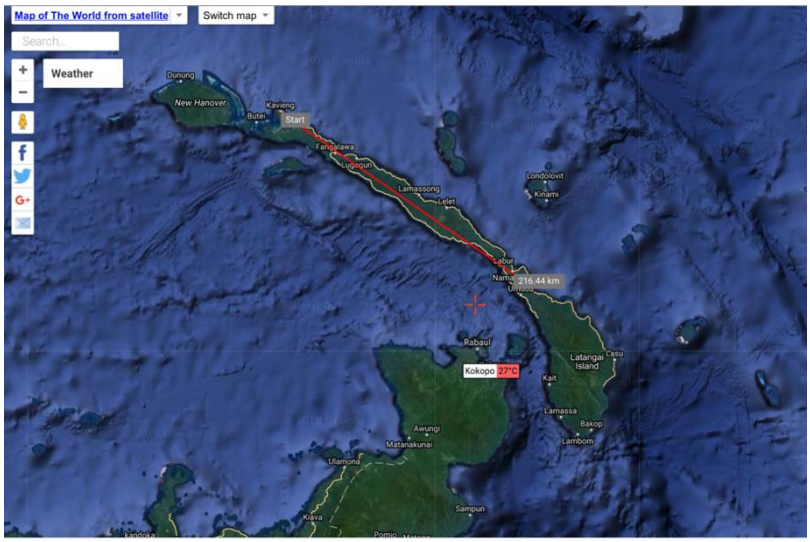
[94] Based on what it is expected to happen [added by Consultant]

concentrations of fossil fuels translate to increasing trajectories of temperature and rainfall variability that also drives cyclones and coastal flooding also affecting New Ireland Province. Because hotspot communities cannot access this information in a timely manner, further deterioration of human wellbeing and economic loss are expected (Stern 2016, p. 408). Curtailing of climate change information has to be addressed.

Lack of easy access to hotspot zones

One of the assumptions is that implementation of the AF project in the hotspot communities is constrained by lack of easy access. The Namatanai airstrip that served the District had ceased operation since 2007. Access to the District is by road from Kavieng along the Buluminski highway approximately 216km which takes about four and a half hours drive. However, such projects must tackle coupling considerations which are; (i) to manage climate change impacts and (ii) overcome poverty. Despite distance, the goal is to build the adaptive capacity in hotspot communities. While such projects as the AF may deliver basic measures for climate change adaptation, adaptation options can be provided for sustainability and/or replication by communities themselves in the future.

Figure 3. Distance from Kavieng Town to Namatanai town



Implications on equity

1. Social exclusion

Climate change impacts are unevenly distributed and communities at risk need to know their level of vulnerability to cope with related challenges even through awareness conducted through the project. The over and above cost of climate change intertwine with developmental deficiencies reflected through induces that include; child and maternal health, low literacy levels, scarce arable and population growth (Anteagroup 2017, p.25). As issues cascade and escalate, populations may react in negative ways in pursuit to satisfy themselves thus, precautionary approaches must be prioritised through the lens of equity and justice. It is also crucial that future projects attract normative social behaviour through implementation of measures that meet urgent and immediate needs but also bring added value. People tend to work more cooperatively when adaptation interventions are perceived important to address immediate needs and where traditional knowledge is integrated.

2. Economic Loss

Cost-benefit assessment of coastal ecosystems adaptation is required for rural communities that mostly depend on fisheries for their livelihoods. As explained by the Pati communities in Kavieng District, mangrove planting and reforestation plays a key role 'to dissipate wave energy and shoreline protection', but there are marginal benefits to fishery accumulation that need to be integrated into adaptation projects (IUCN, p.2). A cost-benefit analysis for efficient allocation of resources is critical for such projects.

References:

Anteagroup 2017, Climate risk, vulnerability and risk assessment in the New Ireland Province in Papua New Guinea: Province and District Profile, Belgium.
Greenberg, G & Weimer, V 2014, Cost-Benefit analysis, concepts and practice, Pearson Education Limited, 4th edn, United States of America.
IUCN, n.d, 'Coastal ecosystem-based adaptation', Briefing Paper, pp. 1-4.

Peters, GP, Andrew, RM, Canadell, GJ, Fuss, S, Jackson, RB, Korsbakken, IJ, Le Quéré', C & Nakicenovic, N 2017, Nature Climate Change, vol 7, pp. 118-123.
Stern, N 2016, 'Current climate models are grossly misleading', Nature, vol. 503, pp. 407-409.

File 2: Procurement & Equity Issues : Implications on Transparency and Accountability

To: TE mission

Files available in pdf
Speedy Kiwi Signs.jpg (50 KB)
July Month End Report & Ti...pdf (1.4 MB)
Bill Board Construction July 2...pdf (1.8 MB)
ACTIVITY PLAN 2017 & ESTIM...pdf (131 KB)
Air Fares Quote July 2017.pdf (199 KB)
Active Signs Quote.pdf (216 KB)
Graffitti Signs Quote.pdf (461 KB)
Tiger Signage Quote.pdf (92 KB)
SQHEIDE Multi Service EOI.pdf (1.8 MB)
Northern Gate Builder EOI.pdf (1.5 MB)
KRN EOI.pdf (2.3 MB)
IWU Contractor EOI.pdf (3.8 MB)
DD Civil Works Profile.pdf (4.7 MB)
DD Civil Building & Mechan...pdf (1.1 MB)
01081700.PDF (308 KB)
DD Civil Building & Mechan...pdf (1.1 MB)
DD Civil Works Profile.pdf (4.7 MB)
Office of Climate Change-ORO-A...pdf (757 KB)
Office of Climate Change-POPON...pdf (819 KB)

Dear Eduardo,

I trust this email finds you safely returned to Canada and in good health after illness in PNG.

With regard to the case studies you requested from each of us, I am forwarding you a series of 8 emails that highlight some issues that were faced with procuring awareness billboards for Northern (Oro) Province. The general timeline is below:

Timeline

2015: All Provinces agree at the Project Steering Committee Meeting (PSCM) that they would like to produce billboards to raise awareness on the effects of climate change in their Provinces.

July 2016: Oro Provincial Climate Change Committee (PCCC) meet. One agenda is the development and setting up of awareness billboards.

Sept 2016: Oro submits billboard design draft CCDA for comment.

Feb 2017: PSCM discusses billboards as an agenda ite,, all provinces provide their updates

April 2017: Oro workplan for 2017 submitted with billboard erection planned for Q3/2017

May 2017: Agenda for June PCCC meeting submitted to CCDA. Billboard locations to be be discussed in June meeting.

July 2017: Billboard quotations submitted for approval and payment

Sept 2017: Oro further follow-up on billboards.

Nov 2017: Follow-Up on billboards from Oro Province. Number of Billboards for Oro reduced from 5 to 3.

Dec 2017: Number of Billboards for Oro reduced from 3 to 2.

Final Status: Billboards not delivered for Oro.

Please see below for details,

File 3 Stakeholder Perception on Management Performance: Implications on Transparency and Accountability

Confidential

In my view, the Project Management Unit (PMU)/UNDP could have done better for the amount of grant received.

1. At the onset, communities in the pilot sites were insufficiently engaged and field visits to these communities lacked. The inception report reflects that the stakeholders involved for hazard profiling and data collection did not capture the views of affected communities. Perhaps the key question is, if the AF project was to enhance the capacity of communities, then why was field data collection from primary beneficiaries omitted?

2. The level of leadership and technical support by the PMU/UNDP was inadequate to lead project implementation throughout the cycle. The PMU are perceived experts to drive implementation and ensure activities are well coordinated. The absence of the desired level of leadership and guidance also reflects prolonged delay and inadequate accomplishment of outcomes.

3. A fully fledged PMU was not in place until later. This also had consequences, delaying implementation of activities and disbursement of funds.

4. Constant monitoring of project activities was inadequately done. There are tools (in Atlas) available for use by the PMU/UNDP. The tracking system should have been used more effectively to monitor progress on a regular basis and identify opportunities or risks/threats both expected and unexpected and devise practical solutions. In addition, periodical field visits should have been mandatory for empirical evidence of project implementation.

Communities indicated that mangrove nurseries were not necessary and community members resorted to direct planting which was more effective. It would be worthwhile to understand how much funds were budgeted and disbursed for mangrove planting. This are my views which I opt to share in confidence.

ANNEX 14: PROJECT MANAGEMENT PERFORMANCE IN LESS-THAN-IDEAL CONDITIONS

1- Prolegomenon

The October 2018 IPCC report [95] is a despairing warning about the impact of climate change. One scientist starkly noted "the small islands [in the Pacific] will be the first but nobody can escape; it is quite clear." [96] We have reached the end of the rope. One hopeful note has emerged, however. The overall findings suggest that "we've already got all the technology we need; we don't need to re-invent the wheel to cope with climate change hazards." As is discussed below, the application of straightforward techniques requires a modicum of enhanced skills supported by well-coordinated organization.

The techniques outlined in the Prodoc have the potential to solve the environmental problems linked to climate change adaptation in PNG. One case in point is the potential to rehabilitate mangroves, as demonstrated by encouraging test results. The preliminary investment figures per hectare are promising. In addition, growing mangroves is socially acceptable, economically viable and excellent for the environment.

To move forward we need to draw lessons from the TE draft-report, despite the difficulty in finding the appropriate language needed to capture the problem and communicate it properly. [97] Specifically :

- It is essential to understand that capacity development assessment seeks to ascertain the nature of the skills, capacities and social mechanisms needed to apply the proposed techniques and achieve the expected outcomes. However, the assessment does not intend to assign fault or liability to any of the actors involved in the design and implementation of the project. This principle is fundamental because lessons drawn from both successful and less than successful projects are critical to moving forward
- For example, the Project gathered coastline data from five provinces. Subsequently, the data needed to be used alongside simple techniques to generate information leading to enhanced opportunities for resilient climate adaptation. As, for many reasons, outputs did not amalgamate into outcomes, there was a shortfall in outcome realization---including the early results in mangrove rehabilitation. Although this shortfall is significant because the overall purpose of GEF – AF financing of projects is to accomplish tangible outcomes, the lessons learned from the shortfall are essential for the forthcoming operations.

Although it is intuitively clear, we seem to forget that the process used to create a product or service that is efficient often involves a lot of inefficiency; inefficiency in its different manifestations is a normal process of learning while doing. [98]

These inefficiencies act as a source of learning for moving forward. Specifically, current technology has many efficient algorithms from which society in general and organizations in particular benefit. For example, GPS is great for getting from one point to another. But if understanding the context of an ecosystem and the surrounding sub systems is required, GPS is less helpful. "A GPS isn't going to tell you where the bad ice is, says an Inuit man, the only way to find out is to go and find it where it is."[99]

Likewise, geo spatial data can provide a considerable amount of data on many development topics, including national resource planning and management and disaster risk reduction, however if the specific techniques and software used to process the data is not mastered, a downward spiral can follow. It is important to avoid the illusion that algorithms function on their own without upgrading human skills and organization. Technical and management skills can be learned either at academic centers or through specific training efforts. The results are often mixed but can be delivered through the use of sound planning and organization. In the end, it is organization that is the decisive factor as well as the most fortuitous. There are planning techniques that can provide support to organizational arrangements, like Gantt charts, the Critical Path Method and the Logical Framework. Ultimately,

---

[95] IPCC Summary for Policymakers formally approved at the First Joint Session of Working Groups I, II and III of the IPCC and accepted by the 48th Session of the IPCC, Incheon, Republic of Korea, 6 October 2018.
[96] BBC Five things we have learned from the IPCC report. By Matt McGrath, Environment correspondent, Incheon, South Korea. Extracted on 09 October, 2018, from www.bbc.com
[97] NYT. Searching for Language to Capture How Climate Change Has Altered Our World. By David Biello, RISING Dispatches from the New American Shore. Milkweed Editions. Reviewed by Elizabeth Rush , extracted on Aug. 17, 2018 from www.nyt.com
[98] NYT The Efficiency Paradox. What Big Data Can't Do by Edward Tenner. Alfred A. Knopf. Extracted on June 4 2018 from www.nyt.com
[99] Globe and Mail. At the edge of Canada, climate change brings "ecological grief" to Labrador Inuit. Montreal, 23 Oct 2018

coordination is the critical step in reaching sound organization. One author states " if there is a single crucial thread that has persisted through human history, it is the importance of coordination."[100] Coordination allows communities to accomplish tasks that individuals working alone cannot. People can build on one another's strengths and make up for one another's weaknesses. Coordination made possible the library of Alexandria, the Great Wall of China, the Suez Canal and the moon landing. Coordination, in turn, depends on communication — the exchange of information and motivation that allows people to work together.

Having the capacity to track results and to use that knowledge to learn what does and what does not work – or how to make things work better – is critical for improving development processes and outcomes anywhere in the world. M&E is a powerful tool that can be used for these purposes.[101] M&E is intrinsically challenging and requires a level of technical capacity often scarce in developing countries. The challenge is greater where less-than-optimal conditions prevail, in particular, when societies lack the capacity to gather and manage statistical information. This challenge is compounded when the need arises to connect separate government agencies through information and communication technology [ICT] infrastructures to share the required layers of data, i.e. geo spatial data.

The Project under review illustrates these exceedingly challenging conditions arising from the fact that PNG is on the frontline when it comes to climate change impacts, even though it is an insignificant contributor to climate change. With rising sea levels and increasingly extreme weather events, the daily reality in the country is that environmental impacts are already irreversibly changing life in this island state. The capacity to track results is now imperative in PNG because the survival of society is now at stake.

The present case analysis intends to highlight what are the nature of the technical and management skills needed to cope with the hazards of climate change adaptation—based on results from the Project. It should be reiterated that this assessment was conducted within the limited-scope of a Final Evaluation. This evaluation is based on an evidence-gathering investigation into the Project's performance through the gaining of a greater awareness of the problems leading to the limited success of a project from the development standpoint. It is not the function of this assessment to assign fault or liability to any of the actors involved in the design and implementation of the Project.

2- Specific Objectives of the Case Study

- To summarize a factum on project management performance in less-than-ideal conditions so that it can provide a framework for a teachable moment.
- Subsequently, set out object lessons of what went wrong based on the drivers arising from the factum.
- The lessons learned from the performance of project management are intended to contribute to the overall enhancement of UNDP programming.

3- Factum

The available evidence points to the fact that the project management pattern that emerged during implementation was inconsistent with the Project's development objectives. Wittingly or unwittingly, from the start the Project management's implementation was asymmetric, as has been documented by the Mid Term Evaluation [page 31] and reiterated by the present Terminal Evaluation.

- Concretely, the Prodoc [pp 60-63] outlined management arrangements with clear roles and responsibilities consistent with the administrative framework and procedures of the UNDP and the Government of PNG. The evidence indicates that core elements were not adhered to during implementation for undetermined reasons.
- The Project was implemented simultaneously in five provinces [PCCCs]. The provinces were each assigned substantive implementation responsibilities. As they were short on implementation capacity, the delivery was

[100] NYT Data and Capitalism, What Data Has Done to Capitalism, by David Leonhardt. Reinventing Capitalism In The Age Of Big Data, By Viktor Mayer-Schönberger and Thomas Ramge. Basic Books. Extracted on June 8 2018 from www.nyt.com

[101] Tracking Results in Agriculture and Rural Development in Less-Than-Ideal Conditions: A Sourcebook of Indicators for Monitoring and Evaluation. 2008 Extracted from on 10/10/15 from www.fao.org

sporadic. This was compounded by the fact that the PMU did not have a budget to facilitate the execution of works in any of the five provinces.

The Project's core work was capacity building, as it was knowledge-based and purported to build institutions. It was labor-intensive work as capacity building is a process by which individuals, institutions and organizations can improve their ability to perform functions, and identify and solve problems so they can deal with their developmental needs in the broad context of climate change adaptation. This work cannot be done remotely, as testified by the UNDP's capacity building efforts in countries under economic reconstruction. [102] [Liberia, Iraq, Afghanistan, Sudan and others]. It is evident that remote activity implementation in capacity building is ineffective.

It appears that the project management unit could not manage remote and simultaneous activity implementation in five distinct geographically dispersed areas with difficult access, and without a budget to enable activity implementation by PMU.

- Project management, in addition, needed to command the technical skills to provide knowledge-based leadership. The upgrading of specific skills, procedural improvements, and organizational strengthening is essential to enable the integration of disaster risk management data within a regional economic framework corresponding to the five provinces. This would have provided an actionable framework for responding to climate change-induced hazards. The reduction of climate change- hazards and disaster risks ultimately ensures economic development results with a certain degree of sustainability.
- In the absence of articulation between the outcomes, there was no sequencing of activities to facilitate coordination efforts or synergy. Project management was unable to lead this transfer of know-how by inducing coordination with other activities. This absence of synergy permeated throughout the Project's implementation, as the design of the outcomes was indeterminate, reflecting imprecision and vagueness as to what to do if outcomes were attained or if unforeseen problems arose.

Under these circumstances, as implementation progressed, vendors commenced delivering their products without coordination with other activities, as this was not their role. In the final phase of the Project, vendors' delivery of outputs became sub-standard as revealed by field data collected by the Evaluator. Above and beyond, the evidence disclosed that the abundant data collected and delivered by vendors has not being processed by the different stakeholders due to a lack of training in the skills needed to process the data. Therefore, it has not been possible to generate information that could enable the amalgamation of outputs used to create an outcome with the developmental momentum for climate change adaptation.

- The five [5] province's regional planning processes showed incipient progress, as relevant officers lacked the skills to integrate DRM/DRR data into the provincial planning process of key economic sectors in order to generate provincial plans to cope with coastal/inland flooding. Thus the costly geo spatial data generated and delivered by the different vendors is currently being under-utilized.

4- Establishing Object Lessons of What Went Wrong

As the Project-design intended to shift national parameters to cope with climate change hazards and risks, the key challenge of the management design was to be flexible and results-oriented. To understand and draw lessons

---

[102] UNDP/Afghanistan. Country Programme Review. Mission Report. E.R. Quiroga, team leader, A. Mojaddidi, consultant. Kabul, February 2005
UNDP/ Iraq. Outcome Evaluation of UNDP Governance, Crisis Prevention and Recovery, and Poverty Reduction Initiatives in Iraq. Mission Report. Dr. Jim Freedman, Team Leader, Dr. Eduardo Quiroga, Dr. Amal Shlash, Dr. John Weeks. Amman, June 2009
UNDP/ Republic of Liberia. Results Focus Transitional Framework. Implementation and Monitoring Committee. Readiness Assessment Report. Eduardo Quiroga, Ph.D. June 2005
UNDP/The Republic of the Sudan. Country Programme Evaluation. Second Country Cooperation Framework [2002-2006] and the Bridging Programme for [2007-2008] An Independent Evaluation. Mission Report. Mission Members : Ms. Afaf Abu-Hasabo, Mr. Abraham Matoc Dhal, Mr. Eduardo Quiroga, Team Leader. June, 2009

from the PMU's challenges and their response,[103] concepts from the iterative and incremental development of software-engineering have been borrowed here to help gain insight.[104]

The brass tacks was that the management approach proposed a common response to a complex problem. A set of standard techniques were intended to apply to geo spatial data [and other types] so as to generate plans and policies to cope with the hazards of climate change. To this end, vendors collected and delivered geo spatial and other data at a considerable expense, without coordination with other relevant activities nor with user-stakeholders. As the Project design had not anticipated all the training requirements needed to use and upkeep the geo spatial and other data, the data has not been used by user-stakeholders and is currently "homeless" without linkages to the national framework.

The pivotal point was inadequate coordination. This was exacerbated by aiming to conduct simultaneous implementation in five provinces, in geographically dispersed areas. In the end, the approach was unintentionally ineffective and the results were counterproductive . The counterproductive effects can be ascertained by the management risks discussed.

4.1-Organizational

The techniques proposed for use were not cutting-edge technologies that are still untested and/or unstable. As noted, the crux of the matter was inadequate coordination when using these techniques in the context of applying them to geo spatial data, and other kinds of data, that seemed to have led to the under-performance and delayed delivery of expected results.

At the end of the project-life, the planning units of the five provinces did not master the techniques and procedures needed to outline the planning process of a regional economy. This was due to lack of coordination with the provincial planning units, compounded by faulty training delivery. Thus it was not possible to integrate the geo spatial data, which has already been delivered by the vendors. In this case the cart came before the horse, due to flawed sequencing.

The organizational structure was characterized by isolated or semi-isolated teams situated in five provinces that were difficult access. The teams lacked communication on technical matters with PMU, which was situated in the capital. There also was no budget anticipated, so PMU's technical staff could facilitate the coordination of activities on site with the five teams. This was exacerbated by the fact that it was assumed that the provincial authorities [without specification] were expected to supervise the implementation of works.

It was almost inevitable that under these conditions the Project became dependent on product supply from vendors. As contractual arrangements did not include training procedures for the grounding of the data and its maintenance [i.e. geo spatial data], the Project ended up losing control of the vendors.

4.2-Project Management Unit

The evidence indicates that management focused on using available resources without coordinating the sequencing of activities in the five provinces to achieve results on the ground. Consequently, during the first half of the project the funds disbursement was sluggish. During the second half, management made considerable efforts and were able to disburse more funds so as to increase performance despite the limited coordination. The results were counterproductive.

Evidence indicates that vendors got more funds without commensurate delivery of results on the ground. The lion's share of the Project resources went to vendors. And undetermined number of outputs were delivered to

[103] Source: Extracted on 2018-08-15 from http://www.base36.com/2012/12/agile-waterfall-methodologies-a-side-by-side-comparison

[104] Craig Larman & Victor R.Basili. Iterative and Incremental Development :A Brief History. Computer. Published by the IEEE Computer Society. June 2003

beneficiaries. on the ground [for whom the Project was intended] received free-goods through a scheme characterized by unintended inequities.

Although vendors delivered the geo spatial data on time, the planning units from each of the five provinces did not receive the adequate training needed to utilize the geo spatial data and generate the expected results. The anticipated plans and policies to cope with climate change hazards for communities situated in riverine and costal areas are simply not ready.

5- Lessons Learned to Contribute to the Overall Enhancement of UNDP Programming.

Although the absence of coordination, particularly sequencing, provides a mechanical explanation of the management shortfalls, the formal cause is a project-design incongruous to the objective needs on the ground. Specifically, the design anticipated an assemblage of four expected and scarcely related outcomes. There were no conceptual linkages or a recognizable structure, as the final objectives were indeterminate. The design did not specify a viewpoint of what to do if outcomes were achieved or if problems were encountered that created delays.

One consequence was that the programming could not use the adequate tools because there was no clarity around the problem being tackled . Concretely, the intended interaction between the five provinces, which are widely separated by geography and yet are part of one system, proved non viable. Almost everything seemed to indicate that management was using methods and procedures without understanding why. For instance, the distribution of free-goods at the end of the project brought about unintended inequality among primary beneficiaries because the process was unsustainable.

Lastly, from a methodological standpoint, the proper principles and tools needed to conduct the activities were not explained. There seemed to be an attempt to find a universal solution, without understanding the problem being tackled. In essence, it seems that the flawed project-design was a key driver that conditioned the under-performance and delayed delivery of expected results.

To advance the understanding of this predicament, project-design is reviewed both conceptually and operationally, using two approaches. They are the waterfall and the evolutionary approaches. Although these approaches vary both conceptually and operationally, they can be complementary. It all depends on the project context, that is, the conditions on the ground. The similarities and differences reflect their comparative advantage in terms of the project context.

5.1- The Waterfall Project Design

The waterfall project is a sequential design process. Put simply, as each step of the project cycle (conception, initiation, analysis, design, implementation, and operation) is completed, the implementing agency moves on to the next step.

The sequential process means that once a step has been completed, the implementing agency cannot go back to a previous step without cancelling the whole project and starting from the beginning. With the exception of mid-term evaluations, ordinarily conducted near the end of the project, there is no room to redress errors. So a project outcome's detailed planning must be set at the beginning and then followed carefully, in a waterfall pattern. This is the preferred format of most donors, as well as the UNDP. The approach has advantages and disadvantages that reflect its relative comparative advantage.

5.1.1- Advantages of the Waterfall Approach

- The waterfall approach comes with a standard model. The donor and client know what to expect, and both have an idea of the size, cost, and timeline for the project. Most features are reviewed to have an idea of what the project will accomplish at the end.

- The waterfall approach stresses meticulous record keeping. Having such records can allow to improve upon the existing program but in another project cycle. In the case of employee turnover, for instance, the waterfall approaches' strong documentation could diminish the negative impact on the project cost framework.
- With the exception of the mid-term evaluation, there is no procedure for improving outcomes within one and the same project cycle, as discussed below.

5.1.2-Disadvantages of the Waterfall Approach

- Once a step has been completed, implementing agencies cannot go back to a previous stage and make changes---unless it is in the context of a mid-term evaluation that happens only once during the project-life. It is difficult to apply techniques based on the participatory approach because the system architecture is already in place under the Prodoc framework.
- The waterfall approach relies on initial prerequisites. If these prerequisites are imperfect in any manner, the project is weakened in its capacity to deliver expected results. These problems are often related to system architecture that was not evident in earlier prototypes. This is amplified when additional practical requirements are needed for project implementation.
- If an error in a prerequisite requirement is found, and change needs to be made, the project can ordinarily incorporate modifications only during the mid term review. There is no way to re-start the project from the beginning with an improved design .
- The outcome [s] is only tested at the end. If flaws are unwittingly implemented early, but discovered late, their implementation may have affected how outputs and outcomes are generated—almost irreversibly. Often the temptation to delay testing is high, as these delays allow the short-term win of staying on-schedule.
- The project cannot take into account a client's evolving needs through "learning while doing" techniques. If the client realizes that they need more than what they initially thought, and demand change, the project will be delayed and impact the budget.
- Although the standard procedures of the waterfall model appear to easily diffuse outputs, it is weak in concentrating efforts to induce impact. This is also known as the trickle-down approach. If enough water runs down, somebody will catch it. The trickle- down approach can unwittingly introduce or consolidate inequities among beneficiaries.

5.1.3- When to Use the Waterfall Approach?

- With the exception of integrating civil works with water resources [hydro electric generation, irrigation works including storage dams] or any other natural element [flood control], the design and implementation of certain civil works, i.e. storage buildings, feeder roads, rural schools and others of that kind can provide a clear and straightforward picture of what the final outcome should be.
- In the case of implementing relatively simple civil works, ordinarily, implementing agencies do not have the need to change the scope of the project once it has begun, Unless unexpected faulty elements emerge at the beginning of the project, such as unanticipated geological faults. In this case, modifications are required. For instance, some donors finance the design and construction of bridges within one calendar year.
- In brief, a waterfall approach is useful, especially when all the prerequisites are available. These conditions are present among projects related to prime civil works including Feeder roads, rural schools, small water supply schemes, and the like.

5.2- The Evolutionary Project Design

- As an option to the drawbacks arising from the waterfall project-design, the evolutionary project- design has been budding. Instead of a sequential design process, the evolutionary project- design follows an incremental and iterative approach.
- Project-design starts off with a basic project concept, and then continues to work on small modules or components.
- The work conducted within these modules is done in an agreed upon time- series, and at the end of each time-series, project results are evaluated and tested with beneficiaries in the context of expected outcomes.

These time-series allow for defects to emerge, and beneficiaries' feedback to be incorporated into the design before the next time-series is run.

5.2.1- Advantages of the Evolutionary Approach

- The evolutionary approach allows for changes to be made after the basic planning design. A project can be re-designed in response to beneficiaries' reactions and other learning-while-doing parameters.
- Because the evolutionary approach is designed to accept changes, it is easier to add features that enable the facilitation of the implementation of learning-while-doing mechanisms or similar features. This can be critical to attain sustainability of communities undergoing climate change adaptation.
- At the end of each time-series, project results are evaluated. This allows beneficiaries and stakeholders to add their feedback so that they ultimately get the expected outcomes.
- The testing of the intermediate results at the end of each time series ensures that the defects are caught and taken care of in the development cycle.
- Because the results are tested thoroughly iterative and incremental approach, the intermediate results are more likely to reach outcome fruition within the estimated total time frame.

5.2.2- Disadvantages of Evolutionary Approach

- Although the evolutionary approach seems simple, with a less successful project manager, the project can become a continuous series of time-series—failing to deliver expected results. A sound command of the proposed techniques, the conditions on the ground, and the expectations of beneficiaries is key.
- As the basic project-design lacks a definitive framework, the final outcome can be different than what was initially intended. Put differently, the lack of a standard model that relies on a collaborative approach focusing on principles rather than process, is often criticized
- With the exception of pilot projects, donors prefer a standard model where they know what to expect in terms of the size, cost, and expected project's timeline—as this allows for a better control of fund disbursement.

5.2.3- When to Use the Evolutionary Approach?

- When it is known that beneficiaries and stakeholders are likely to request modifying the scope of the project in response to the changing conditions of, for example, an ecosystem under stress.
- When the final outcome is unclear due to a lack of real-time information of its component outputs. Often outputs cannot be precisely determined until tested on the ground. For example, a given scheme to enhance the numeracy of a given population requires testing on the ground on methods and procedures before it is possible to specify its scope.
- When there are skilled and experienced project designers who are adaptable and able to think independently.
- When the expected outcomes are intended for rapidly changing climatic conditions with a social structure under stress stemming from the climatic consequences.

6- Summary

The key to deciding which is the right approach comes down to the context of the project.

- Is it going to be changing rapidly? If so, choose the Evolutionary Approach .
- Do you know exactly what you need? Then maybe the Waterfall Approach is the better option.
- Or better yet consider taking aspects of both approaches and combining them in order to make the best possible development path for the project .

Review of Accountability Issues Associated with Aggregating Outputs Into Outcomes

It is critical vital to move forward. The daily reality of PNG is that climate change impacts are already irreversibly changing life for folks of all walks of life -- especially those living in the coastal areas. The capacity to track results is now imperative in PNG because the survival of society is at stake.

As partially discussed in Annex 11, the FRPP lacks a procedure to enable blending of outputs into tangible outcomes. Ordinarily a framework to amalgamate outputs so they are combined into a tangible and measurable outcome is a procedure that is defined in the Prodoc. This procedure is not available in the Prodoc. Thus, from the standpoint of evaluability, if there is no information on outcome progress, the next assessable information that is available is the delivery of outputs as reflected in the FRPP.[105]

The submission of the results framework showing the achievement of outcomes is the opportunity for project management authorities to demonstrate that they have met with their obligations. In this connection, this is a measure of accountability demonstrating that project management authorities have met their obligations with respect to (i) conducting work programme in accordance with agreed rules and standards and (ii) of reporting fairly and accurately on performance results in terms of mandated roles and/or plans.[106]

TOR's Annex A shows that project management authorities have not submitted the results framework indicating the achievement of outcomes by the end of the project. This Terminal Evaluation in the absence of the final results framework is unable to assess to what extent the expected outcomes have been achieved. Accountability considerations do not allow Evaluator to sketch a proxy- Terminal Results Framework. By contrast, as discussed above, based on the output- performance data tabulated [Annex 12] from the Final Project Review Report [2017] , it was possible to triangulate intermediate outcomes from outputs that were listed in the contextual information of field observations supported by focused interviews with beneficiaries and stakeholders [Annex 7]. In sum, Annex 15 is the Mission's composite estimate of progress in outcome achievement --derived from estimates from annexes 11,12 and 14.

The estimates of outcome achievement indicates the emergence of four sets of intermediate outcomes. The outputs within each set have distinct possibilities of amalgamation if synergy is induced. It is productive to keep in mind that the purpose of outputs are to morph into the expected outcomes, that is, instituting tangible and measurable change in behaviour among the population. Another purpose is a change in institutional performance among the organizations involved at the national and semi-national levels, including communities inhabited by all walks of men and women. This is the overarching purpose of designing projects under any development framework.

The four sets of intermediate outcomes are knowledge-based and purport to build institutions at the national and sub national levels together with the communities in the targeted provinces, within the framework of the reduction of hazards and disaster risks. This process focuses on expanding facilities for the reduction of hazards and disaster risks. Ultimately, the reduction of climate change- hazards and disaster risks is to ensure the results of economic development, including current physical assets that are the country's endowment, including preserving the biological and cultural diversity.

In Annex 12, Graph 1 illustrates the output composition of these four sets of intermediate outcomes. Each set is composed of outputs that logically and functionally complement each other. At this junction, the point is to review context, so we can move forward from using outputs as silos of the following four intermediate outcomes or hypothetical outcomes.

---

[105] UNEG Norms for Evaluation in the UN System, 2005, pp 6-9

[106] Executive Board of the United Nations Development Programme and of the United Nations Population Fund. The UNDP accountability system Accountability framework and oversight policy. New York, 2008

1- First Intermediate Outcome: Early Warning Systems and Disaster Risk Management for Climate Change Adaptation [containing six outputs]
2- Second Intermediate Outcome: Community-based Mangrove Reforestation and Conservation. [1 output]
3- Third Intermediate Outcome: Planning at all levels of Government [containing two outputs]
4- Fourth Intermediate Outcome: Knowledge Management and Education Curriculum for Climate Change Adaptation [two outputs]

ESTIMATED PROGRESS IN OUTCOME ACHIEVEMENT
[Source: Mission Estimate from Composite of Annexes 12, 11,14]

Project Strategy	Indicator	Baseline	Target at End of Project		Terminal Evaluation Comments
			Projected	Actual	
Objective Strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations	Number of risk-exposed coastal communities protected through adaptation measures	In the current scenario, risk-exposed communities are to a large extent unable to adapt to climate change due to a lack of resources, capacity, knowledge and the necessary support through provincial and national institutions as well as policy frameworks. With the scale of adaptation measures planned for implementation the total population in the 16 targeted	By the end of the project at least 8 coastal communities are protected through the use of adaptation measures against coastal flooding scenarios, with extra attention paid to the special concerns of women as participants and beneficiaries.	Outputs listed were reviewed [Cf Annex 12: section 12.1] Vendors disbursed nearly all of the available funds [Cf Table 4]. Four Intermediate Outcomes Emerged: 1-Early Warning Systems & Disaster Risk Management for CCA 2-Community-based Mangrove Reforestation and Conservation 3-Climate Change	Listed outputs were reviewed [Cf Annex 12: section 12.1]. Vendors disbursed nearly all of the available funds [Cf Table 4]. Inspection of physical targets is needed. In the targeted provinces the provincial administrations the planning, managemrnt, or monitoring of adaptation to climate change, are in the making. A framework of policies and plans, including disaster preparedness and response plans, and coastal zone management plans, are in the making.
	Number of risk-exposed riverine communities protected through adaptation measures		Eight (8) riverine communities are protected through the use of adaptation measures against inland flooding, with attention paid to the special concerns of women as participants and beneficiaries		

Project Strategy	Indicator	Baseline	Target at End of Project		Terminal Evaluation Comments
			Projected	Actual	
	Number of provinces with improved climate-related planning and policy frameworks to increase resilience	communities would be an estimated 32,000	At the end of the programme, adaptation to climate change is managed, monitored and planned at the provincial level in the targeted provinces and supported by a framework of policies and plans, including disaster preparedeness and response plans, and coastal zone management plans.	Planning for all levels of Government 4-Knowledge Management & Education Curriculum for CCA [Cf Annex 12: section 12.2]	
Project Strategy	Indicator	Baseline	Projected	Actual	Terminal Evaluation Commnets
Outcome 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards	Number of communities benefitting from improved protection from coastal floods	The vast majority of communities exposed to coastal flooding is inadequately equipped with resources, capacity and support to adapt to the	By the end of the project, 8 communities are protected from coastal flooding through the use of adaptation measures that were put in place in an agreed-upon and community-led way to preserve		The delivery of outputs seems to be completed, [Cf Annex 12: section 12.1] Inspections are needed to verify the number of AWS and voluntary weather stations.

Project Strategy	Indicator	Baseline	Target at End of Project		Terminal Evaluation Comments
			Projected	Actual	
in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region.		heightened risks from climate change The total number of inhabitants in the 8 target coastal communities that are vulnerable to coastal flooding is estimated at 16,000. An additional population of 120,000 in the cities of Lae, Wewak and Madang will benefit from the programme's implementation	the mangrove forests.		Comprehensive disaster preparedness and response plans for coastal flooding are in progress in four provinces, including dry run tests. Verify and inspect coastal engineering measures for adaptation for the provincial capitals of Lae, Madang and Wewak with respect to planning and funding. :

Project Strategy	Indicator	Baseline	Target at End of Project		Terminal Evaluation Comments
			Projected	Actual	
	Number of AWS and voluntary weather stations in operation Number of communities covered by the improved coastal warning system and weather information	There is lack of equipment and capacity of the PNGNWS, hence, the forecasting of disasters and extreme weather events is severely limited.	At least 6 tidal gauges, 6 AWS and 10 voluntary weather stations established at strategic locations meet WMO standards and contribute to the monitoring and early warning system. One AWS will have been installed in each of the 8 targetcommunities.	1-Emerging Intermediate Outcome 1: Early Warning Systems & Disaster Risk Management for Climate Change Adaptation	
	Number of provinces wth comprehensive disaster prepared ness and response plans for coastal flooding in place	The provincial and national-level disaster management frameworks are evidently inadequate to address the risks	At least four provinces will have a comprehensive disaster preparedness and response plan for coastal flooding in place and will have conducted dry run tests.		
	Number of provincial capitals with assessed engineering	No effort has been done on this aspect in the target	For the three provincial capitals of Lae, Madang and Wewak, suitable coastal		

Project Strategy	Indicator	Baseline	Target at End of Project		Terminal Evaluation Comments
			Projected	Actual	
	measures for adaptation	provincial capitals.	engineering measures for adaptation are identified and addressed through respective planning and funding.		
	Number of mangrove nurseries established and sustainably operating Resources allocated for continued operations of the nurseries	None	Eight (8) regional nurseries operate sustainably, supplying the requirements of the target sites and replication areas. Before the end of the project, sufficient resources are allocated by the government for the continued operations of the nurseries beyond the life of the project.		
Project Strategy	Indicator	Baseline	Target at end of Project		Terminal Evaluation Comment
			Projected	Actual	
Outcome 2: Reduced exposure and	Number of communities benefitting from improved	The vast majority of communities exposed to	By the end of the project, eight communities are protected from		Although the delivery of outputs seems to be completed, [Cf

Project Strategy	Indicator	Baseline	Target at End of Project		Terminal Evaluation Comments
			Projected	Actual	
increased adaptive capacity of 8 riverine communities in 4 provinces	protection from inland flooding	inland flooding risk is inadequately equipped with resources, capacity and support to adapt to the changed scenario The total number of inhabitants in the 8 target riverine communities that are vulnerable to coastal flooding is estimated at a minimum 32000 people.	inland flooding through the use of adaptation measures that were put in place in a community-led way.	1-Emerging Intermediate Outcome 1: Early Warning Systems & Disaster Risk Management for Climate Change Adaptation	Annex 12: section 12.12], an inspection is needed to verify that at least 6 AWS and 20 voluntary weather stations have been established at strategic locations, and are contributing to the monitoring and early warning system. One AWS should have been installed in each of the 8 targeted communities. Inspection needed of eight communities currently protected from inland flooding through the use of adaptation measures that were put in place using a community-based approach . A comprehensive disaster preparedness and response plan for inland flooding is in progress in four provinces, including
	Number of communities covered by the improved warning system and weather information	Disaster preparedness is limited by the lack of and state of facilites and plans	At least 6 AWS and 20 voluntary weather stations established at strategic locations meet WMO standards and contribute to the monitoring and		

Project Strategy	Indicator	Baseline	Target at End of Project		Terminal Evaluation Comments
			Projected	Actual	
	Number of AWS and voluntary weather stations in operation	There is lack of equipment and capacity of the PNGNWS is weak, hence theh forecasting of disasters and weather patterns is limited.	early warning system. One AWS will have been installed in each of the 8 target communities.		the use of dry run tests.
	Number of provinces with comprehensive disaster preparedness and response plan for inland flooding	The provincial and national-level disaster managment frameworks are evidently inadquate	At least four provinces will have a comprehensive disaster preparedness and response plan for inland flooding in place and will have conducted dry run tests.		

Project Strategy	Indicator	Baseline	Target at end of Project		Terminal Evaluation Comments
			Projected	Actual	
Outcome 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices	Number of national and provincial level policies, strategies, plans and coordinating mechanisms reviewed and incorporating resilience to climate change	Adaptation to the changed climate scenario of the present and future is inadequately considered in national and provincial level policies and planning frameworks	At the end of the project, all major development plans in the targeted provinces will reflect climate change and adaptation considerations and ensure that coastal zone management policies are developed for the most populated areas (especially Wewak, Kavieng, Madang, Lae)	3- Emerging Intermediate Outcome 3: Climate Change Adaptation Planning for all levels of Government [Cf Annex 12: section 12.2]	All Outputs Were Completed [Cf Annex 12:section 12.2] Major development plans in the targeted provinces are in progress, reflecting climate change and adaptation considerations and coastal zone management policies are being developed for the most populated areas (especially Wewak, Kavieng, Madang, Lae) Linkages at the provincial level are in progress between all climate change officers/focal points and the communities in their respective provinces. The officers require more focused capacity build up to identify and manage the province's adaptation needs. Increased (at least 20%) the number of women participating in capacity building activities at the national and subnational levels
	Number of provincial and national-level officers trained in climate adaptation planning and implementation Participation of women in project activities	At the provincial level the lack of resources, capacity and in some cases basic management mechanisms/plans is evident To be established at project inception	At the provincial level, there is a strong link between the climate change officers/focal points and the communities in their respective provinces. The officers are equipped with the resources and capacity to identify and manage adaptation needs in the province. Increased (at least 20%) the number of women participating in capacity		

			building activities at the national and subnational levels.		
Project Strategy	Indicator	Baseline	Target at end of Project		Terminal Evaluation Comments
			Projected	Actual	
Outcome 4: Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels	% of the risk-affected population exposed to awareness raising activities and materials	Awareness raising efforts to date remain ad-hoc, uncoordinated and often undertaken with insufficient technical basis	75 % of the risk-affected population is exposed to awareness raising activities and materials.	4-Emerging Intermediate Outcome 4 : Climate Change Adaptation Linked to Knowledge Management and Education Curriculum [Cf Annex 12: section 12.2]	All Outputs Were Completed [Cf Annex 12: section 12.1] Confirm if 75 % of the risk-affected population is exposed to awareness raising activities and materials. Verify to what extent the topics of climate change and adaptation are introduced in PNG's school curricula and university programmes and teachers are equipped with the required knowledge and material
	Integration of climate change into the national school curricula and university academic programmes	Only few schools cover climate change in their classes and activites; there is very limited guidance for teachers	The topics of climate change and adaptation are introduced in PNG's school curricula and university academic programmes and teachers are equipped with the required knowledge and materials		

ANNEX 16: PROMOTING ACCOUNTABILITY AND TRANSPARENCY

In the context of a Terminal Evaluation, the issue of promoting accountability and transparency is a multifaceted topic because of the interface between the evaluation and audit. In a nutshell, the evaluation intends to draw lessons learned to enhance performance and optimize the impact on beneficiaries. The audit, on the other hand, adjudicates on the use of resources according to stipulated norms and procedures, and is conducted by financial auditors, who are equipped with the tools to conduct this kind of appraisal.[107] It is productive to stress the differences in purpose of both the evaluation and audit according to the UNEG's norms for evaluation in the UN system. [108]

" An **evaluation** is an assessment, as systematic and impartial as possible, of an activity, project, programme, strategy, policy, topic, theme, sector, operational area, institutional performance, etc. It focuses on expected and achieved accomplishments, examining the results chain, processes, contextual factors and causality, in order to understand achievements or the lack thereof. It aims at determining the relevance, impact, effectiveness, efficiency and sustainability of the interventions and contributions of the organizations of the UN system. An evaluation should provide evidence-based information that is credible, reliable and useful, enabling the timely incorporation of findings, recommendations and lessons into the decision-making processes of the organizations of the UN system and its members." UNEG 2005 [page 4]

A **financial audit** intends " to assess the adequacy of management controls to ensure the economical and efficient use of resources; the safeguarding of assets; the reliability of financial and other information; the compliance with regulations, rules and established policies; the effectiveness of risk management; and the adequacy of organizational structures, systems and processes." UNEG 2005 [page 5]

Before proceeding with the assessment, it is critical to recognize that the interface between an evaluation and issues of accountability and transparency is circumstantial. Ordinarily, it is in the process of data collection and interaction with stakeholders that accountability and transparency matters arise. However, because of the institutional mandate and skill set, evaluators focus on development results.

- To the extent that transparency and accountability affect development results, evaluators report on the problems encountered for greater awareness of issues leading to limited success of a project from a development standpoint. This seems to be the contribution of evaluators to the overarching purpose of promoting accountability and transparency. It is not the function of an evaluation to assign fault or liability to any of the actors involved in the design and implementation of the Project.
- The assessment is inferential. Based on the UNDP's framework of accountability [Box 2], the assessment then proceeds to describe the context where issues associated with the use of resources and the application of policies and management procedures arise as probable impediments to development results.

UNDP's Accountability Framework

As noted, accountability is multi-dimensional as it depends on the lens through which it is viewed. In this TE exercise the focus is on project performance and its concomitant effects on climate change adaptation and resilience. As discussed in detail in Annex 14, the daily reality of PNG is that climate change impacts are already irreversibly changing life for communities-- especially those living in the coastal areas. The capacity to track results is now imperative in PNG because the survival of society is now at stake. The accountability framework is expected to enhance the performance management of organizations.

---

[107] UNDP Results-oriented monitoring and evaluation. Handbook series, New York, 1997, page 10

[108] United Nations Evaluation Group (UNEG) Norms for Evaluation in the UN System. Geneva , 2005 pp 4 - 5

Box 2 : Accountability and Transparency: Principles

UNDP Accountability System, Accountability Framework and Oversight Policy 2008, page 2

Accountability is the obligation to (i) demonstrate that work has been conducted in accordance with agreed upon rules and standards and (ii) report fairly and accurately on performance results vis-à-vis mandated roles and/or plans.[109]

Accountability Frameworks in the United Nations System. Joint Inspection Unit. 2011, pp 6-10 [110]

Accountability goes beyond a robust internal control system. It encompasses issues such as identifying the political covenant with member States; recourse for key stakeholders to complaints and response mechanisms; transparency within organizations to its member States, beneficiaries and the general public; and a strong culture of accountability. The area of information and communication, especially in the case of internal and external communication and complaints and response mechanisms to member States, donors, beneficiaries and the public, requires strengthening.

A culture of accountability is nascent in most United Nations system organizations and needs further efforts to reach maturity. In addition to training and ownership, the consistent application of discipline and rewards Is needed.

There is also the need to develop a stronger system to ensure personal accountability. However, the culture will only reach full maturity when the senior managers set the tone at the top, bolstered by examples for all to see of holding themselves accountable.

Staff must first be granted the responsibility and authority to carry out their assigned duties in order to be held accountable. This is a challenge, especially for organizations with a decentralized field structure where delegation of authority may differ by subject area.

Overall, the United Nations system organizations need to put more effort into their complaints and response mechanisms, especially in opening up their channels of communication to receive complaints/concerns from the general public, and stakeholders such as beneficiaries. The establishment of credible channels such as ombudspersons and mediators would further cement internal controls.

Pillars of accountability

Transparency refers to an organization's openness about its activities, providing information on what it is doing, where and how this takes place, and how it is performing. Implementation of RBM is clearly a step towards greater transparency throughout the United Nations system. Transparency also enables stakeholders (member States, staff, beneficiaries from aid agencies, and the general public) to identify whether an organization is operating according to the law, whether it is conforming to relevant standards, and how its performance relates to targets. In turn, this enables stakeholders to make informed decisions and assess choices made by the organization. Transparency relates to information being available both inside (e.g. via knowledge management systems, intranet, etc) and outside the organization (via website and social networks, and external and public relations). The organization must actively disseminate information to relevant stakeholders. In other words, it should take a proactive approach to information and not release it only if requested by a stakeholder.

Culture of accountability Accountability is applicable at all levels, from the top down. The executive heads and the heads of major organizational units are therefore the first to be held accountable for the results that they are expected to deliver. This culture is mainly modelled by humans and their behaviours and interactions. The tools and systems are only a means to ensure compliance and to provide a strong control environment for accountability. It should not be taken for granted that organizations that have a perfect accountability framework are able to implement it effectively. An organization with a framework, or many of the accountability components, may be an organization with no effective accountability if it lacks a culture of accountability.

[109] Executive Board of the United Nations Development Programme and of the United Nations Population Fund. The UNDP accountability system . Accountability framework and oversight policy. Second regular session 2008 8 to 12 September 2008, New York

[110] Accountability Frameworks in the United Nations System. Joint Inspection Unit. Geneva 2011

The Context Surrounding Accountability and Transparency Issues

Broad concerns about accountability and transparency arose in the presence of the Evaluator and CO programme analyst that accompanied the mission, during their conduction of focused interviews and unstructured interaction with stakeholders and beneficiaries, both during field visits and in working sessions with partners held both in the capital and the five provincial offices.

As noted, evaluators do not adjudicate on procurement matters, as this requires reviewing the relevant documentation in the context of the legal and administrative norms prevailing in the PNG. Evaluators do not review compliance with existing regulations unless development results have been affected by financial matters. This appeared to be the case during the the Mid Term Evaluation [MTE page 3] where it was found that project management and procurement matters were negatively influencing the performance of the Project two years ago.

It seemed constructive to collect the queries raised by beneficiaries and stakeholders into one annex [Annex 13] for the attention of the Auditors. A summary of these queries follows, and then the immediate causes to explain these matters are proposed.

Queries on Procurement

Queries on procurement were prominent among stakeholders and beneficiaries. Stakeholders indicated that although UNDP procurement procedures were expounded on during the inception period, realities on the ground showed that procurement was far too slow and took many months to deliver services or material to the beneficiaries in the five provinces. Discussions on procurement matters began consuming the limited time assigned to the evaluation's working sessions. As it was important to listen to these concerns, it was therefore requested that stakeholders e-mail their queries to the Evaluator, with copies to the CO. These e-mails are found in Annex 13.

Stakeholder concerns are exemplified by one procurement case outlined in Box 3. This case outlines a situation where UNDP procurement procedures were apparently applied unevenly. On the whole, stakeholders questioned why the resources took so long to reach the final user. Stakeholders showed gaps in their understanding of UNDP procurement procedures that should have been dealt with by those responsible for procurement, by the project management unit, or by the CO . This may have been omitted because of project management issues that likely governed the behavior of the CO procurement process. These issues are discussed in detail in Annex 14, and a summary is outlined below.

The beneficiaries' concerns, arising from the interactions with the Evaluator in the few villages visited, are of a different nature and more complex.[111] Villagers' key concerns were that the resources received were insufficient. This disapproving query is consistent with the a priori delivery of outputs discussed in detail in Annex 11. The needs both men and women participating in climate change adaptation activities, in a community are practically unlimited. This is why, as argued in Annex 11, it is unsustainable to directly distribute goods and services to communities whose unmet needs can be almost endless. As UNDP resources are limited by necessity, by distributing outputs to a small proportion of villagers, a measure of unintended inequality is introduced.

The issue of a priory delivery of outputs, without reference to a sustainable procedure or economic development principle, became prominent from the fact that during the last 18 months of the Project timeline, approximately USD 1.7 M was disbursed. The FPRR does not specify what proportion of these funds was delivered to the communities as a priory outputs and what proportion was used to continue efforts for data collection.

[111] It is acknowledged that the observations below are triangulated from projects in the region and from villagers under the same circumstances as the ones visited. In addition, it must be recognized that the linguistic diversity slowed down significantly the interaction with villagers and folks of different walks of life. In many circumstances, the villagers' message had to be translated first to pidgin and then to English. Something was lost in the translation, but the observation of non verbal behavior in the surroundings of their material culture where villagers live expanded understanding of the issues discussed.

One critical query was shared with the Evaluator. One stakeholder [Annex 13] wrote a statement, coherently arguing that the climate-risk and climate-shocks have worsened the poverty conditions in PNG and that consequently, actions in the rural world should take into consideration measures to avoid amplifying economic inequality.

- It is noteworthy that this stakeholder brought this up to the Evaluator, suggesting that [1] management did not take into consideration the unintended inequalities introduced in the rural sector by delivering outputs a priori, and that [2] there was an absence of mechanisms for stakeholders and beneficiaries to submit their perceptions as well as their grievances and complaints.

There is development evidence indicating that it is possible to induce development results among impoverished communities by delivering outputs where communities contribute with their labor to public work/asset building projects that the community has identified themselves. As discussed in detail in Annex 11, WFP[112] has successfully worked with impoverished communities by supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives that could contribute to sustainable increases in household and community-level food security by supporting long-term resilience-building in traditionally food-deficit areas.

Box 3: The Billboard Procurement Case

Issue: After nearly two years of following up with the Procurement procedure to purchase awareness billboards for the Northern (Oro) Province, the account was ultimately closed down, without purchasing the billboards, despite the availability of funds.

General Timeline

2015 = All Provinces agree at the Project Steering Committee Meeting (PSCM) that they would like to produce billboards to raise awareness on the effects of climate change in their Provinces.

July 2016 = Oro Provincial Climate Change Committee (PCCC) meets. On the agenda is the development and setting up of awareness billboards.

Sept 2016 = Oro submits billboard design draft to CCDA for comment.

Feb 2017 = PSCM discusses billboards as an agenda item and all provinces provide their updates

April 2017 = Oro work plan for 2017 submitted with billboard erection planned for Q3/2017

May 2017 = Agenda for June PCCC meeting submitted to CCDA. Billboard locations to be be discussed at June meeting.

July 2017 = Billboard quotes submitted for approval and payment

Sept 2017 = Oro asks for further follow-up on billboards.

Nov 2017 = Follow-Up on billboards from Oro Province. Number of Billboards for Oro reduced from 5 to 3.

Dec 2017 = Number of Billboards for Oro reduced from 3 to 2.

Final Status = Billboards not delivered for Oro.

Source: Project stakeholder [Annex 13]

Queries on Evaluability Issues

In the context of an accountability framework, which is expected to enhance the management performance of organizations, a pivotal element in assessing results leading to the enhancement of the resilience of communities, is the evaluability of an evaluation assignment within programmes. There is simply no other way than evaluations to learn what went right or wrong and for what reasons, in initiatives intending to adapt to climate variability. As noted, the daily reality of PNG is that climate change impacts are already irreversibly changing life for people--especially those living in the coastal areas. The capacity to track results is now imperative in PNG because the survival of society is at stake [Annex 14].

UNEG Norms for Evaluation in the UN System, Geneva, 2005, page 9, stipulates that :

[112] CF WFP Policy on Disaster Risk Reduction and Management. Policy issues… op cit

" Before undertaking a major evaluation requiring a significant investment of resources, it may be useful to conduct an evaluability exercise. This would consist of verifying if there is clarity in the intent of the subject to be evaluated, sufficient measurable indicators, assessable reliable information sources and no major factor hindering an impartial evaluation process."
When the data is not consistent with evaluability standards, there is considerable risk of underreporting the findings. The project managers are responsible for delivering the results of the project. If an evaluator was responsible for preparing the results achieved, it would be tantamount to an auditor preparing the financial data he /she is going to review.

In this context, sending raw data to the evaluator suggests unsatisfactory accountability. Those responsible are accountable to deliver, with precision, the kind of data needed to support progress or the reasons for the lack of progress. It is noteworthy that there are legal implications of going through files searching for a piece of evidence. The specific evidence must be provided to the evaluator by the appropriate authority. Otherwise, the evidence is fit for journalism or research purposes.[113] This is not what the UN system envisages as evaluation. UNEG Norms for Evaluation in the UN System, Geneva, 2005, page 5.

This critical issue is reflected specifically in preparing the final results framework to determine to what extent the Project has achieved the expected outcomes. In this context, there is a measure of accountability as the implementing agency has the obligation to (i) demonstrate that work has been conducted in accordance with the agreed upon rules and standards and (ii) report fairly and accurately on performance results vis-à-vis mandated roles and/or plans.[114]

As shown in the TOR's Annex A, project management authorities have not submitted the results framework showing the achievement of outcomes by the end of the project. In the absence of the final results framework, this Terminal Evaluation is unable to assess to what extent the expected outcomes have been achieved. Accountability considerations do not allow the Evaluator to sketch a proxy- Terminal Results Framework. By contrast, as discussed above, based on the output- performance data tabulated [section 12.1] from the Final Project Review Report [2017] , it was possible to triangulate intermediate outcomes from outputs that were listed in the contextual information of field observations and focused interviews with beneficiaries and stakeholders [Annex 7]. This was done with the purpose of moving forward as the country, especially communities living in coastal areas, are enduring the shocks of climate change daily.

Another critical accountability matter arising from reviewing implementation is the question of who is responsible for incorporating the vendor's outputs into the social structure and value system of the communities such that these communities adopt new skill sets that are essential to adapting to climate change hazards.

As reviewed in Annex 14, the available evidence indicates that vendors command nearly the total delivery of outputs without the necessary filters to ensure that outputs "fit" the biological and cultural diversity of the country. On the one hand Project management seemed to lack the mechanism for quality control of outputs, and on the other hand, vendors seem to deliver outputs on the ground without due diligence. Contractually, vendors are obliged only to deliver outputs to the communities without ensuring the procedures and training needed to transfer the know-how to the community.

This is illustrated by work done on reforestation and the rehabilitation of mangroves. This is a critical element for the survival of the communities living in coastal areas. The villagers' perceptions about the importance of mangrove restoration in terms of improving food security through enhanced adaptive capacity to respond to the

[113] In countries with fragile institutional framework, evaluations are conducted with less than perfect data array, as discussed in Annex 7 in the case of Sudan before it was divided in two different countries.

[114] Executive Board of the United Nations Development Programme and of the United Nations Population Fund. The UNDP accountability system Accountability framework and oversight policy. New York, 2008

risks posed by the effects of climate change has been established in Annex 8 using the Most Significant Change Technique [MSC] applied in the field by the Evaluator.

Vendors did not provide guidelines to carry on interacting with the communities and continue expanding the opportunities of mangrove rehabilitation and reforestation. The evaluator drafted Annex 9 outlining an approach that helps to better understand the reasons why family-units participate in project initiatives. This is indispensable to ensuring that the proposed changes [1] are responsive to the priorities and objectives of those family-units under environmental and economic stress; [2] reflect the reality that family-units in these provinces are the product of a complex and dynamic interaction of risk-prone and resource-poor factors; and [3] continue the process of incorporating the know-how in the community such that results are economically feasible, socially acceptable and environmentally sustainable.

Summation

Wittingly or unwittingly, there were policies emanating from the project management unit that seem to have governed the behavior of the application of the procurement policies and use of resources, as discussed in detail in Annex 14. The organizational structure of the management unit was characterized by isolated or semi-isolated teams situated in five provinces that were difficult to access. The provincial teams lacked communication on technical and administrative matters with PMU, which was situated in the capital. There was no budget anticipated for PMU's technical staff to facilitate the coordination of activities on site with the five provincial teams. This was exacerbated by the fact that it was assumed that the provincial authorities [without specification] would supervise the implementation of works.

The evidence indicates that management focused on using funds and resources without coordinating the sequencing of activities in the five provinces to achieve results on the ground. Consequently, during the first half of the project the funds disbursement was sluggish. During the second half, management made considerable efforts and were able to disburse more funds through vendors so as to increase performance despite the limited coordination. The PMU conducted little or no technical supervision in the execution of works in the five provinces. There was no budget allocated for PMU facilitation of implementation in the five provinces. It is difficult to imagine how to execute works leading to results in the five provinces by delegating all the implementation-coordination to the provinces themselves. It was almost inevitable that under these conditions the Project became dependent on output delivery from vendors without filters to ensure the "fit" of the output to the considerable biological and cultural diversity of the PNG.

Lessons Learned

As partially discussed above, UN organizations are mandated to conduct normative work.[115] This includes environmental protection, health standards, and capacity development, etc. The central characteristic of normative work is its indirect nature and long-term effect. The project design of a UN organization requires the participation of partners. If partners perform as expected, then the benefits accrue on the beneficiaries—and the UN agency can take relative ownership of the project.

If a priori delivery of outputs is a strategy to reach special segments of the population, this requires a special project design for this purpose to avoid unintended inequality effects. WFP[116] has proven comparative advantage in the area of disaster risk reduction and management. In a recent intervention in Ethiopia and Kenya, WFP demonstrated that supporting natural resource management, infrastructure rehabilitation and disaster risk reduction objectives contributed to sustainable increases in household and community-level food security, supporting long-term resilience-building in traditionally food-deficit areas. The critical result is long term resilience, and the fact that the women and men in communities do not become dependent on donors.

---

[115] UNEG Handbook for Conducting Evaluations of Normative Work in the UN System. Geneva, 2013

[116] WFP Policy on Disaster Risk Reduction and Management. Policy Issues. WFP/EB.2/2011/4-A. Rome, 2011 Extracted on 10 July 2018 from www.wfp.org

ANNEX 17: ESTIMATED PROGRESS IN OUTCOME DEVELOPMENT SUBMITTED BY COUNTRY OFFICE ON 23 OCTOBER 2018

Annex A: Project Logical Framework [Received 23 October 2018]

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
Objective Strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations	Number of risk-exposed coastal communities protected through adaptation measures	In the current scenario, risk-exposed communities are to a large extent unable to adapt to climate change due to a lack of resources, capacity, knowledge and the necessary support through provincial and national institutions as well as policy frameworks. With the scale of adaptation measures planned for implementation the total population in the 16 targeted communities would be an estimated 32,000	By the end of the project at least 8 coastal communities are protected through adaptation measures against coastal flooding scenarios, with attention to the special concerns of women as participants and beneficiaries.				Project reports Minutes form the ATWG & PSC Provincial policy documents, development plans Disaster preparedness and response plans, project monitoring and evaluation reports Gender-disaggregated data reflecting participation of women and in terms of project impacts	Policital stability and commitment to climate compatible development is maintained Political will and commitment by senior government officials to integrate climate change and adaptation Strong coordination amongst climate change stakeholders in the country, especially at provincial level Strong community leadership, cooperation and support for project activities. Financial resources are allocated from government budgets and cofinanciers to address climate-related risks
	Number of risk-exposed riverine communities protected through adaptation measures		Eight (8) riverine communities are protected through adaptation measures against inland flooding, with attention to the special concerns of women as participants and beneficiaries					
	Number of provinces with improved climate-related planning and policy frameworks to increase resilience		At the end of the programme, adaptation to climate change is managed, monitored and planned at the provincial level in the targeted provinces and supported by a framework of policies and plans including disaster preparedeness and response plans, coastal zone management plans.					
Outcome 1: Reduced exposure	Number of communities benefitting from	The vast majority of communities exposed	By the end of the project, 8 communities are protected from	• Madang – out of 23 coastal	Intermediary as mangrove restoration		*Project reports, monitoring &*	*There is a strong commitment from the*

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region.	improved protection from coastal floods	to coastal flooding is inadequately equipped with resources, capacity and support to adapt to the heightened risks from climate change The total number of inhabitants in the 8 target coastal communities that are vulnerable to coastal flooding is estimated at 16,000. An additional population of 120,000 in the cities of Lae, Wewak and Madang will benefit from the programme's implementation	coastal flooding through adaptation measures that were put in place in a community-led way with the agreements/compacts agreed on by communities to preserve the mangrove forests	communities who were consulted, only 16 became actively involved in mangrove restoration • Madang - 16 coastal landuse management plans to mitigate risks from coastal flooding • Madang – 12 DRM plans and 12 mangrove management plans • New Ireland – 12 communities on mangrove restoration. • New Ireland – 9 nurseries • New Ireland – 9 endorsed and signed Community Mangrove Management Plan and 3 drafts pending community endorsement. • New Ireland – provincial mangrove manageme	seems to be the only community-based/led coastal adaptation option		*evaluation reports,* *Minutes from the ATWG, project reports, verification through reports from local CBOs and NGOs* *Procurement records of relevant agencies* *Site plans for establishment of AWS.* *Progress reports from PNGNWS* *Distributed weather information reports* *Provincial policies, disaster managment plan, project reports* *Feasibility studies, provincial coastal infrastructure development plans*	*communities and their leadership throughout the time of the project* *PNGNWS remains committed to expand and manage their weather monitoring and forecasting activities and is adequately funded through government resources to allow for maintenance and further expansion after the project.* *There is strong support from district and provincial level officials that ensure the continued cooperation among communities, districts and provinces* *Provincial governments are supportive in expanding the role and resources for the climate change officers/focal points* *Landowners allowing their land to be used to establish the AWS and voluntary weather recorders are committed and consistently recording data.*

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
				nt plan pending endorsement provincial executive council endorsement. • Overall, 26 communities have improved restoration and management of mangrove forests as protection against coastal flooding of which 9 have approved community mangrove management plans and 16 coastal landuse management plans.				*The provincial administrations support the identified coastal engineering measures and adopt them in their development plans* *Financial resources are allocated from government budgets and cofinanciers to address climate-related risks* The mangrove-focussed training concept will translate into new community-driven mangrove rehabilitation and conservation initiatives as indicated by feedback from the consultation
	Number of AWS and voluntary weather stations in operation Number of communities covered by the improved coastal warning system and weather information	There is lack of equipment and capacity of the PNGNWS, hence, the forecasting of disasters and extreme weather events is severely limited.	At least 6 tidal gauges and at least 6 AWS and 10 voluntary weather stations established at strategic locations, meet WMO standards and contribute to the monitoring and early warning system. One AWS will have been installed in each target 8 communities.	• 9 AWS – 5 in Morobe and 1 each in ESP, Madang, New Ireland and Northern Provinces. • 3 tidal gauges in Morobe Province. • Overall, 9 AWS that met WMO standards were installed in	Intermediary as nothing has been set-up at community level			

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
				all 5 pilot provinces where Morobe Province has the highest (5) due to piloting of flood early warning system for Bumbu River which included installation of 3 rain gauges and 3 tidal gauges. Nothing was installed at community level due to uncertainties over ownership issues that threatened security of equipments and more concerning is the poor infrastructing in rural areas covering the project sites. The integrated data management systems from these stations are transmitted through NIWA's NEON telemetry systems to NWS and CEPA				
	Number of provinces with comprehen	The provincial and national-	At least four provinces will have a comprehensive	• ESP – Provincial Disaster Maagemen	Intermediary as both provincial DRM	No		

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
	sive disaster preparedness and response plans for coastal flooding in place	level disaster management frameworks are evidently inadequate to address the risks	disaster preparedness and response plans for coastal flooding in place and will have conducted dry run tests.	t Plan completed • New Ireland – draft Provincial Disaster Risk Management Plan reviewed and revised, pending finalisation • Overall, only these two provinces developed comprehensive disaster preparedness and response plans that are pending Provincial Executive Council approval. These plans articulate the hazard risks in the provinces, institutional framework for disaster risk management, roles and responsibilities of key stakeholders and standard operating procedures for disaster response. The Provincial Adaptation Plans for all the five pilot	plans were not endorsed and opertional			

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
				Provinces were not completed.				
	Number of provincial capitals with assessed engineering measures for adaptation	No effort has been done on this aspect in the target provincial capitals.	For three provincial capitals of Lae, Madang and Wewak suitable coastal engineering measures for adaptation are identified and addressed through respective planning and funding. For three provincial capitals of Lae, Madang and Wewak suitable coastal engineering measures for adaptation are identified and addressed through respective planning and funding.	• The Comprehensive Hazard Profiling coverining coastal and inland flooding of five pilot provinces provides exposure data for the three provincial capitals – Wewak (East Sepik), Madang (Madan) and Lae (Morobe). The exposure data/maps were shared with provinces who are at different stages of identifying engineering measures to adapt to climate relate coastal flooding.	Three provinces are at different stages of identifying engineering measures to adapt to climate relate coastal flooding.	Partially		
	Number of community-led mangrove projects benefitting from support system for mangrove projects	Community-based mangrove projects are undertaken ad-hoc and largely without sufficient expertise and support	33 community-led mangrove conservation and/or reforestation projects, covering about 100 hectares are supported through the support network and nurseries	• Madang – out of 23 coastal communities who were consulted, only 12 are actively involved and 2 ceased due to internal			Project reports, monitoring and evaluation reports Annual reports from the nurseries	

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
				community issues. • Madang - 13.2 ha of mangrove restoration activities. • New Ireland – 10 communities on mangrove restoration. • New Ireland – 9 endorsed and signed Community Mangrove Management Plan and 3 drafts pending community endorsement. • New Ireland – provincial mangrove management plan pending endorsement provincial executive council endorsement. • Overall, 26 communities have improved restoration and management of mangrove forests as protection against			Government budgets at local and national levels indicating allocation for operation of nurseries	

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
				coastal flooding of which 9 have approved community mangrove management plans and 16 coastal landuse management plans.				
	Number of mangrove nurseries established and sustainably operating Resources allocated for continued operations of the nurseries	None	Eight (8) regional nurseries operate sustainably supplying the requirements of the target sites and replication areas Before the end of the project, sufficient resources are allocated by government for the continued operations of the nurseries beyond the life of the project.	• Madang - 21 mangrove nursery established but 19 in active operation and management. Out of the 21, 16 were trials/pilots that were replicated to 5 sites. Only 12 are actively involved and 2 ceased due to internal community issue. • New Ireland – 9 community specific nurseries • Overall, 28 mangrove nurseries in Madang and New Ireland provinces were in	Intermediary as nurseries served specific needs of the participating communities thus no regional nurseries.	Yes		

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual (Final)	Intermediary	Achieved (Yes/ No)		
				active operation and management.				

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual	Intermediary	Achieved (Yes /No)		
Outcome 2: Reduced exposure and increased adaptive capacity of 8 riverine communities in 4 provinces	Number of communities benefitting from improved protection from inland flooding	The vast majority of communities exposed to inland flooding risk is inadequately equipped with resources, capacity and support to adapt to the changed scenario The total number of inhabitants in the 8 target riverine communities that are vulnerable to inland flooding is estimated at a minimum 32000 people.	By the end of the project, eight communities are protected from inland flooding through adaptation measures that were put in place in a community-led way.	• Madang – 10 riverine communities adopted disaster risk mitigation measures i.e. 10 communities planted bamboos, 2 communities relocated, 9 communities and 1 school installed 10 raincatchment systems. • Madang – 3,045 people from 10 communities in upper Ramu • Morobe – 5 communities development Community-based Disaster	Intermediary as this was only achieved in one part of one Province and not the other provinces		Project reports, monitoring & evaluation reports, Minutes from the ATWG, project reports, verification through reports from local CBOs and NGOs Procurement records Site plans for establishment of AWS. Progress reports from PNGNWS Distributed weather information reports Provincial policies, disaster management plan	There is a strong commitment from the communities and their leadership throughout the time of the project PNGNWS remains committed to expand and manage their weather monitoring and forecasting activities and is adequately funded through government resources to allow for maintenance and further expansion after the project. There is strong support from district and provincial

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual	Intermediary	Achieved (Yes /No)		
				Risk Management Plan. • Overall, 10 communities along Ramu River in Madang Province and 5 communities along Bumbu River, Morobe Province				level officials that ensure the continued cooperation among communities, districts and provinces Provincial governments are supportive in expanding the role and resources for the climate change officers/focal points Landowners allowing their land to be used to establish the AWSs. Voluntary weather recorders are committed and consistently recording data.
	Number of communities covered by the improved warning system and weather information Number of AWS and voluntary weather stations in operation	Disaster preparedness is limited by the lack of and state of facilites and plans There is lack of equipment and capacity of the PNGNWS is weak, hence theh forecasting of disasters and weather patterns is limited.	At least 6 AWS and at least 20 voluntary weather stations established at strategic locations, meet WMO standards and contribute to the monitoring and early warning system. One AWS will have been installed in each target 8 communities.	• 9 AWS – 5 in Morobe and 1 each in ESP, Madang, New Ireland and Northern Provinces • 3 tidal gauges in Morobe Province • 20 voluntary weather stations • Madang - 2 river gauges within the Ramu River catchment. • Madang - 11 rainfall gauges installed within the Ramu River catchment. • Madang - 26,682 villagers, including women, and children living within the Ramu River	Intermediary as these were installed at community level in one province Intermediary as few additional stations were established in Morobe Province			

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assumptions
			Projected	Actual	Intermediary	Achieved (Yes /No)		
				catchment were educated on climate influenced floods as well as installation and community ownership of rain gauges and a river flow gauging stations				
	Number of provinces with comprehensive disaster preparedness and response plan for inland flooding	The provincial and national-level disaster managment frameworks are evidently inadquate	At least four provinces will have a comprehensive disaster preparedness and response plan for inland flooding in place and will have conducted dry run tests.	• East Sepik Province – Provincial Disaster Maagement Plan completed • New Ireland – draft Provincial Disaster Risk Management Plan reviewed and revised, pending finalisation • Madang – 12 Community-based Disaster Risk Manageent Plans • Madang – 6 Ward Disaster Risk Management Plans	Intermediary as only two provinces attempted the DRM Plan and 6 Ward Disaster Risk Management Plans in 1 province			

Project Strategy	Indicator	Baseline	Target at end of Project				Sources of Verification	Assu
			Projected	Actual	Intermediary	Achieved (Yes/No)		
Outcome 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices	Number of national and provincial level policies, strategies, plans and coordinating mechanisms reviewed and incorporating resilience to climate change	Adaptation to the changed climate scenario of the present and future is inadequately considered in national and provincial level policies and planning frameworks	At the end of the project, all major development plans in the targeted provinces reflect climate change and adaptation considerations and coastal zone management policies are developed for the most populated areas (especially Wewak, Kavieng, Madang, Lae)	• East Sepik Province – Provincial Disaster Maagement Plan completed • New Ireland – draft Provincial Disaster Risk Management Plan reviewed and revised, pending finalisation • Madang – 12 Community-based Disaster Risk Manageent Plans • Madang – 6 Ward Disaster Risk Management Plans			Development plans, monitoring and evaluation reports Coastal zone management policies and their gazettment Project reports, monitoring and evaluation reports, verification through CBOs and NGOs Minutes of high-level policy meetings (NEC/NCCC/OCCD, etc) Gender-disaggregated data analysis	Senio of the provi admi are su of the and th integ clima and a in devel plans polici Clima chang office points provi are a utilise and r to bui own a capac adapt The C Chan gazet the C estab The gover rema comm the C
				• 5 Provincial Climate Change Committees for all pilot provinces		Achieved		
	Number of provincial and national-level officers trained in climate adaptation	At the provincial level the lack of resources, capacity and in some cases basic management	At the provincial level, there is a strong link between all climate change	• Madang – 25 ward disaster management committee members				

	planning and implementation Participation of women in project activities	mechanisms/plans is evident To be established at project inception	officers/focal points and the communities in their respective provinces and the officers are equipped with the resources and capacity to identify and manage adaptation needs in the province Increased (at least 20%) number of women participating in capacity building activities at national and subnational level					
Project Strategy	**Indicator**	**Baseline**	**Target at end of Project**				**Sources of Verification**	**Assu**
Outcome 4: Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels	% of the risk-affected population exposed to awareness raising activities and materials	Awareness raising efforts to date remain ad-hoc, uncoordinated and often undertaken with insufficient technical basis	75 % of the risk-affected population is exposed to awareness raising activities and materials.				Awareness raising materials, best practice toolkits, monitroing and evaluation reports, Field reports, project monitoring and evaluation reports School curricula documents Training materials and records of trainings MOUs/agreements	Stron comm leade allow capac buildi aware raisin transl comm replic activi Depa Educ rema comm the in of cli chang schoo curric The r corpo socia respo in PN
	Integration of climate change into the national school curricula and university academic programmes	Only few schools cover climate change in their classes and activites; there is very limited guidance for teachers	The topics of climate change and adaptation are introduced in PNG's school curricula and university academic programmes and teachers are equipped with the required	• Wildlife Conservation Society – Impacts of climate change" in the supplementary teaching material titled "Introduction to Climate Change: Supporting Existing Education Curricula in Papua New	Intermediary as these materials are yet to be formerly incoprated into the formal school curricula			

			knowledge and material	Guinea schools". A supplementary resource for teachers • WCS – 18 short videos in local languages on climate change adaptation • WCS – 1 online photo gallery on climate change stories by 23 individuals • FPCD – 6 minute video on climate change adaptation				furthe mom and c tappe contri the a clima and a Infras tax cr scher remai place
	Amount of funding mobilized via CSR and sponsorship agreements	CSR funding sources is currently nil.	By the end of the project agreements on continuation of awareness raising and adaptation activities (especially replication) through contributions from Corporate Social Responsibilty programmes and private sector participation are reached (including projects under infrastructure tax credit schemes) and make resources available for the community-led adaption in at least 10 further communities	Nil	Nil	No		

			(estimated 500,000 USD)					