End of project report highlighting key achievements and lessons learnt

ICAT Initiative for Climate Action Transparency

Initiative for Climate Action Transparency - ICAT

ICAT Achievements, challenges and lesson learnt

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Abbreviations

AFOLU	Agriculture, Forestry and Other Land Use
CSO	Central Statistics Office
CBIT	Capacity Building Initiative for Transparency
CSER	Centre for Sustainable Energy Research
EEC	Eswatini Electricity Company
ESA	Eswatini Sugar Association
ESERA	Eswatini Energy Regulatory Authority
ETF	Enhanced Transparency Framework
GHG	Greenhouse Gas
GHGMI	Greenhouse Gas Management Institute
GoE	Government of Eswatini
ICAT	Initiative for Climate Action Transparency
LULUCF	Land Use, Land Use Change and Forestry
MNRE	Ministry of Natural Resources and Energy
MoU	Memorandum of Understanding
MRV	Measurement, Reporting and Verification
MTEA	Ministry of Tourism and Environmental Affairs
NC	National Communication
NDC	Nationally Determined Contributions
UNESWA	University of Eswatini
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services

Executive summary

The purpose of the lessons learned document for the '*Technical support to increase the overall transparency capacity and set-up of sectoral MRV systems in the Kingdom of Eswatini*' project is to document systematically captured acquired experience, identified challenges and knowledge gained while executing the project and to make it accessible and a reference for future similar projects to improve their implementation and to prevent or minimize risks for future similar projects.

This lessons learned document includes input from the project Activity Teams and were captured from implementation to the closing process phase of the Initiative for Climate Action Transparency (ICAT) project. The lessons learned from this current ICAT project will be used as references for similar projects in the future in order to determine what problems occurred and recommendations on how those problems were handled. Additionally, this document details what major achievements of the project and how these were achieved. Therefore, the objectives of this report are to:

- identify key barriers and challenges that were encountered in the whole cycle of the project.
- identify lessons learned and good practice

This document will be submitted to ICAT, MTEA and appropriate stakeholders and will become a part of the CSER's assets and archives.

Key highlights

1. Successful buy in from stakeholders in all the activities of the project resulting in effective implementation of the project.
2. Multiple stakeholder engagement workshops with wide group of key stakeholders for all the activities. More interactions via physical and virtual meetings as a result of the COVID-19 pandemic enabled project stakeholders to have in-depth question and answer sessions which led to stronger project delivery.
3. Creation of collaborative partnerships and relationships between ministries and government with private companies and grassroot level stakeholders.
4. Some of the activity workshops were graced by high-level personnel from both government and private e.g. Principal Secretaries, directors and Chief Executive Officers.
5. The virtual meetings established new modes for capacity building and they enable the sharing of ideas among wider audiences (both government and private), increasing participation and contribution.

Major achievements

The project has attained its objectives and the following are the major achievements:

1. Successful broad stakeholder engagement from the inception of the project to the closing phase. These engagements resulted in creation of extended long-term networks within and/or outside the government, which will be used in future cooperation in upcoming national projects. The networks demonstrated that they trust each other and have additional confidence in working together in future.
2. The open discussions during workshops and working meetings and assured the engagement of key actors in the project and their coordination ownership of the project deliverables; and capacity building helped in the smooth implementation of the project.
3. Development of integrated government interministerial relationships and also with parastatals and private companies through the proposed institutional arrangements
4. The project built the capacity of technicians in the MTEA, line departments and national experts, institutions,

NGOs and the Eswatini private sector, as well as other stakeholders through tailor-made technical workshops, working meetings and site visit in order to sustain the impact of the project beyond its lifespan.

5. More frequent interaction via virtual meetings as a result of the COVID-19 pandemic enabled a broad base of project stakeholders locally and internationally to have attended workshops and trainings and also contribute to a stronger project delivery. All these interactions resulted in knowledge transfer and development of new ideas and solutions.

6. Knowledge transfer and creation of awareness of the various sustainable development tools available from capacity building workshops which were held by the Green House Gas Management Institute (GHGMI) to ensure the ICAT project team was equipped with the tools that they required to complete the project successfully.

7. Identification of key gaps and needs in key institutional and technical capacities which formed frameworks for development into roadmaps outlining the way forward and providing recommendations of actions to be taken to fill these data and institutional gaps

8. Developed a framework for monitoring and tracking adaptation actions in the health and water sectors to meet Eswatini's NDC targets. The roadmap for adaptation in health and water sectors which was developed in this project provides a high-level framework for strategy, timing, and feature work, many stakeholders may reference the roadmap throughout monitoring and tracking adaptation actions in the health and water sectors.

9. Development of robust sustainable data collection templates with relevant key stakeholders to assist in collection of quality data required for estimating emissions in the energy and AFOLU sectors to enable Eswatini to meet its enhanced international reporting standard requirements.

10. Developed an emissions factor database and made baseline estimates and projections for the Land Use, Land Use Change and Forestry (LULUCF) sector in Eswatini. The database was created as a spreadsheet for ease of use in future inventory updates and this will improve the GHG inventory and capacity to compile the inventory.

11. Annual land use maps for Eswatini were created spanning from the 1990s to the present. The data forms a basis for making better estimates of GHG dynamics within the AFOLU sector as well as providing useful information for land resource management. The data will also improve the understanding of terrestrial ecosystems and the complex land use dynamics of Eswatini. The data and maps will be shared for public access

12. Four scenarios of electricity generation were created with two biomass electricity generation scenarios showing significant reduction in GHG emissions. This is an evidence-based approach in informing decisions and biomass electricity policy

Challenges encountered

The following are summarised key overarching challenges encountered during the implementation of the project:

1. The Covid situation that prevailed during the entire project;

2. Sharing data caused substantial challenges and slowed progress in the implementation of the project.

Lessons learnt

A summary of the key overarching lessons obtained from the implementation of the project are outlined below with further details on the various activities presented in the report:

1. Clear communication lines need to be setup right from the beginning of the project to ensure good management;
2. Having a full-time project facilitator was critical to help liaise between the UNESWA/CSER technical team and the MTEA, as well as to help facilitate the numerous activities of the project ranging from engaging with and interviewing dozens of stakeholders, preparing activity workshops to engage and work with key stakeholders

from government, NGOs and the private sector;

3. The Inception Workshop was vital to sensitise stakeholders on the Project's goals and objectives and to set the stage for engaging them throughout the life of the Project;
4. Early involvement of sector stakeholders facilitated good cooperation during the project;
5. In-person meetings are more fruitful than on-line meetings – however, during most of the Project, COVID required a number of on-line/virtual meetings;
6. On-line/virtual meetings can be much improved with top-of-the-line communication/meeting software;
7. Building on existing systems is important to develop a sustainable MRV system;
8. Legal institutional frameworks are absolutely critical to ensure developing strong, effective institutional arrangements;
9. Expanding existing institution mandates is essential to allow for more coverage for MRV needs and requirements;
10. It is important to develop the competence of the sectoral focal point and the key data suppliers to continually engage in the MRV process and ensure that it is embedded in each institution and organisation engaged in the MRV process;
11. Institutions to be involved in the MRV process need to understand how they can and should actively contribute towards enhancing the MRV process;
12. Engagement of stakeholders and institutions from the beginning provides them with a sense of both being a key part of the process as well as giving them an 'ownership' stake in the process, thereby fostering active participation;
13. Continuous capacity building is required to sustain a good understanding of MRV concepts in each sector;
14. There is a need to develop and establish data-sharing agreements (DSA) that protect data shared by various entities;
15. Country specific emission factors/EFs help to reduce uncertainty, particularly in the energy and agriculture sectors;
16. Capacity building (i.e., finance, technology, technology transfer, stakeholder engagement and training) is necessary on a sustained basis, and is crucial to the success of domestic MRV systems and NDC/Nationally Determined Contributions implementation;
17. Adding new Activity Data to an existing data collection process (e.g. updating national inventories and NDCs) can be a very valuable tool for ensuring stakeholder engagement and high quality of MRV data; and,
18. Capacity building of key staff and stakeholders is essential to ensuring long-lasting impact of project. interventions

Conclusion and way forward

The lessons learnt in this project are mainly from stakeholder engagement and the need for capacity building of key stakeholders. The engagement of stakeholders and institutions from the beginning provides them with a sense of both being a key part of the process as well as giving them an 'ownership' stake in the process, thereby fostering active participation. Capacity building is necessary on a sustained basis, and is crucial to the success of domestic MRV systems and Nationally Determined Contributions (NDC) implementation. Capacity building of key staff and stakeholders is essential to ensuring long-lasting impact of project. interventions A key challenge that all the Activity Teams faced was difficulty in accessing data and or not receiving data from stakeholders in a timely manner. The most crucial element in overcoming these data sharing challenges is collaboration between the relevant parties which will be facilitated a memorandum of understanding with concise data sharing agreements. combination of institutional and infrastructural arrangements positively impact research data sharing and reuse in a specific case. The lessons learned from this current ICAT project will be used as references for similar projects such as the Capacity Building Initiative for Transparency (CBIT) project in the future in order to determine what problems occurred and recommendations on how those problems were handled.

1 Introduction

The Government of Eswatini has prioritized enhancing national capacities to meet its reporting obligations under the enhanced transparency framework (ETF) of the Paris Agreement. To aid the effective implementation of the Paris Agreement and to track Eswatini's NDCs, the Initiative for Climate Action Transparency (ICAT), supported the government of Eswatini to set-up sectoral MRV systems to enhance its transparency framework as well as to build capacity on the use of transparency related tools and ICAT sustainable development assessment tools. The specific objectives of the *'Technical support to increase the overall transparency capacity and set-up of sectoral MRV systems in the Kingdom of Eswatini'* project were to:

1. Develop a framework for monitoring and tracking adaptation actions in the health and water sectors to meet Eswatini's NDC targets and to strengthen capacities to construct frameworks for other sectors;
2. Contribute towards ongoing efforts to build a national transparency framework that meets international standards but is tailored for domestic needs;
3. Contribute towards ongoing efforts to improve the availability, collection and quality of data required for estimating emissions in the energy and AFOLU sectors and enables Eswatini to meet its enhanced international reporting standard requirements;
4. Contribute towards the continued improvement of the GHG inventory and capacity to compile the inventory;
5. Enhance capacitates to analyse and assess the GHG emission reductions and selected SD impacts of renewable energy policies; and
6. Support the implementation of NDC targets.

This ICAT project included the following main activities:
Activity 1: Adaptation scoping and gap analysis for the health and water sector;
Activity 2: Energy sector GHG inventory institutional arrangements and data collection roadmap;
Activity 3: Agriculture sector GHG inventory institutional arrangements and data collection roadmap;
Activity 4: Incorporation of timber and sugarcane plantation data into the LULUCF sector GHG inventory;
Activity 5: Renewable electricity policy scenario assessment and impact modelling
with recommendations for implementing NDC
Activity 6: Knowledge Sharing and Lessons Learned

The main objective of Activity 6 of the project was to organise a validation workshop. The deliverables of this activity are the following:
1. Report of the validation workshop;
2. Report highlighting key achievements and lessons learned.

To assemble a report highlighting key achievements and lessons learned, a lessons learned template was compiled and sent to the Activity Teams. This template (annex 1) helped project teams to document the challenges, solutions and lessons learned throughout each project activity life cycle. The information gathered from all the Activity Teams was then consolidated and used to compile a lessons learned report.

1.1 Scope and objective of the ICAT project

The project focused on building capacities of technicians in the Ministry of Tourism and Environmental Affairs (MTEA), particularly the Climate Change Unit in the MTEA's Meteorological Department, as well as line departments and national experts and institutions, as well as other stakeholders, to develop robust sustainable data collection processes, including institutional arrangements, and improved Tier 2 data for future inventory compilation.

Other key stakeholders included government through the Ministry of Natural Resources and Energy (particularly the Department of Energy (DOE) and the Department of Water Affairs (DWA), the MTEA's Forestry Department, the Ministries of Health, Ministry of Agriculture (MOA), Ministry of Public Works and Transport (MPWT), the Central Statistics Office/CSO, Ministry of Finance & Economic Development, the Ministry of Finance (MOF), the Eswatini Energy Regulatory Authority (ESERA) and the Eswatini Electricity Corporation.

Additionally, NGOs and the private sector participated in the project as key stakeholders, including the Eswatini Sugar Association (ESA), the Eswatini Cane Growers Association (ECGA) and a number of private groups and companies. Further, the project aimed to undertake a renewable energy policy assessment in order to model the

climate, economic and social impacts of various scenarios on emissions and the community and the economy as a whole, particularly in the agriculture and LULUCF sectors. Other NGOs were included from the health, water, agricultural and forestry sectors.

1.2 Project co-ordination

The project was co-ordinated by the CSER of the University of Eswatini (UNESWA) working under the Ministry of Tourism and Environmental Affairs (MTEA). The Greenhouse Gas Management Institute (GHGMI) provided technical support to the project team.

1.3 Consultant team

Name	Primary Position	Primary Activity	Project Primary Activity Title
Dr Mduduzi Magidzigidzi Mathunjwa	**Project Co-ordinator,** Team Lead	Activity 2	Energy sector GHG inventory institutional arrangements
Dr Gugu Sibandze	Co-Lead	Activity 1	Adaptation scoping and gap analysis for the health and water sectors
Dr Thabile Ndlovu	Co-Lead	Activity 1	Adaptation scoping and gap analysis for the health and water sectors
Dr Gcina Vilakati	Team Member	Activity 1	Adaptation scoping and gap analysis for the health and water sectors
Dr Gugu Msane	**Primary link between CSER & MTEA,** Member	Activity 2 & Activity 5	Energy sector GHG inventory institutional arrangements
Prof. Simiso Mkhonta	Team member	Activity 2 & Activity 5	Energy sector GHG inventory institutional arrangements
Dr Sizwe Mabaso	Team Lead	Activity 3	Agriculture sector GHG inventory institutional arrangements
Dr Samkele Tfwala	Team Member	Activity 3	Agriculture sector GHG inventory institutional arrangements
Dr Wisdom Dlamini	Team Lead	Activity 4	inventory institutional arrangements and the incorporation of timber and sugarcane plantations into the LULUF sector
Dr Gcina Mavimbela	Team Lead	Activity 5	Renewable electricity policy scenario and impact modelling
Dr Nosiphiwo Zwane	Team Member	Activity 5	Renewable electricity policy scenario and impact modelling
Dr. Thembelihle Dlamini	Team Member	Activity 5	Renewable electricity policy scenario and impact modelling
Dr Lihle Mafu	Team Lead	Activity 6	Knowledge sharing and lessoned learned

The ICAT Eswatini Team was organised around five Activities with the final activity (Activity 6) being a summary of lessons learnt during the course of the project with key takeaways that could be relevant to future ICAT projects. The activities are described in more detail below under 'key achievements'/ to generate new knowledge base for future implementation

2 Key achievements

As noted above, and described in more detail below, the ICAT Eswatini Project was organised into five technical 'activities', each with its own team, with a final activity (Activity 6) being primarily this report on 'Lessons Learnt'. Key specialists from the University of Eswatini, led by the Centre for Sustainable Energy Research (CSER), headed by Dr. Mduduzi Mathunjwa. Activity 1 was the only non-GHG mitigation activity, which focused on adaptation in the water and health sectors with a strong focus on gender (i.e. women in health and in the water sector). Three of the Activities focused primarily upon developing the framework and the data for improving Eswatini's greenhouse gas assessment, using the 2006 IPCC National GHG Guidelines, to Tier 2, namely in the energy sector (with a major focus on transport), in the agriculture (crops and livestock), forestry and land use (focusing particularly on forestry and the timber sector, and the sugar sector). Finally, Activity 5 focused on the potential for increasing sustainable electricity generation from the sugar sector and from the timber sector, and the policies necessary to do so. Each activity team led one or more stakeholder workshops, while two workshops were held with a large group of team members and external stakeholders focusing on the ICAT Assessment Guides/Tools for Sustainable Development and for Renewable Energy. These provided cross-cutting support for Activities 1 to 5.

The project produced a significant number of accomplishments in all the Activities as discussed in sections 2.1 to 2.5.

2.1 Health and water adaptation (Activity 1)

Key achievement	Methods that assisted in reaching the achievement
Good stakeholder engagement and enhanced awareness	Having MTEA assist in setting up the initial workshop with the Ministry of Health and Water Stakeholders. Identification of one person to coordinate the health stakeholders helped to bring relevant people to attend the stakeholder engagement workshops
The consultations revealed the many programmes and projects being undertaken in the Ministry of Health which feed into climate change adaptation Understanding how the health sector is structured	Multiple stakeholder engagement including grassroots stakeholders Consultations with the health sector stakeholders from different departments
Sensitising the health sector of climate change	Awareness workshop and the stakeholder engagements

The Activity 1 Team, Health and Water Adaptation, enlisted the Ministry of Tourism and Environmental Affairs (MTEA) to arrange meetings with personnel in key offices and programmes in the Ministry of Health and the Ministry of Water. This gave the Team a good start to organise a very well-attended workshop with over 50 key stakeholders from these sectors. This, in turn, provided them with the contacts and platform to engage numerous other key stakeholders to undertake their work. This set the stage for numerous other meetings, interviews and opportunities for engaging stakeholders throughout both sectors. Thus, engaging the Ministries at the beginning not only helped set the stage for extensive contacts in other ministries and institutions, but also got the MTEA actively engaged in working with the team to achieve the Activity's objectives.

Developed a framework for monitoring and tracking adaptation actions in the health and water sectors to meet Eswatini's NDC targets. The roadmap for adaptation in health and water sectors which was developed in this project provides a high-level framework for strategy, timing, and feature work, many stakeholders may reference the roadmap throughout monitoring and tracking adaptation actions in the health and water sectors.

The awareness raising workshop raised awareness among stakeholders in the health sector on climate change and its impacts on the health. Climate change issues were previously not given much consideration by the ministry leaving public health effects of climate change unaddressed. With enhanced understanding of the relationship between climate change and health, it is anticipated that the ministry will now put significant efforts to ensure that robust and sustainable systems are set up to detect and track them, and to take steps to prepare for, respond to, and manage associated climate change associated risks and climate sensitive disease outcomes. Such systems will reduce the vulnerability of the health sector to the impacts of climate change as well as linking current health responses to the climate change agenda.

The Activity 1 Team engaged a wide group of key stakeholders including stakeholders from the grass roots from both the water and health sectors e.g. community motivators 'bagcugcuteli'. This helped to bring in new insights to what is happening on the ground and the opinions of these stakeholders integrated into forming a roadmap for adaptation in health and water sectors.

Capacity building at the grassroots level contributing to community development and civil society strengthening. This will enhance meaningful engagement and effective participation of grassroots stakeholders in climate change issued and further knowledge transfer to their communities.

Capacity building of health public to respond to health threats posed by climate change and communicate clearly and efficiently with the public decision makers and healthcare providers on the health-related aspects of climate change, including risks and ways to reduce them.

2.2 Energy sector (Activity 2)

Key achievement	Methods that assisted in reaching the achievement
High level consultation with the Ministry of Natural Resources and Energy (MNRE) and the Ministry of Public Works and Transport (MPWT) made consolidation of the gap and analysis report easier to implement	Identification of relevant key stakeholders to participate in the stakeholder engagement workshops Organisation of tailor-made small working meeting which enabled effective engagement of participants.
That MPWT which in the Ministry responsible for road and air transportation had not mainstream climate action (mitigation and adaptation) in their policies. However, the Road Transportation Department was excited to participate in a possible Tier calculation of GHG inventory from the transport sector.	Working meetings assisted in raising awareness of transportation's role in climate change and greenhouse gases about climate change in the transportation department in the MPWT.

The working meetings and workshops helped to raise awareness and also built capacity in the transport department and thereby understanding of the effects of transportation on climate change. The current transport policies exclude climate change action processes. The department mentioned that they will use the knowledge they have gained to better link transport priorities with the broader climate change policy process. These climate change policy process will align climate policy and transport priorities and clearly state measures that will reduce emissions of greenhouse gases transportation related GHG emissions and overall efforts to prevent climate change.
The discussions with MNRE concerning the energy balance gave direction to how data can be disaggregated so that it can be more meaningful and helpful in compiling GHG inventory. Currently, MNRE has all the data necessary for compiling the GHG inventory from energy sources, however, the data is lumped together since the Ministry is only interested in fuel consumption, yet the GHG inventory requires fuel volumes to be disaggregated in technology types.

2.3 Agriculture sector (Activity 3)

Key achievement	Methods that assisted in reaching the achievement
Good stakeholder engagement and enhanced awareness among data providers and sources created	Good initial workshop that introduced the project and its aims, highlighting the role of stakeholders
Comprehensive template development informed by stakeholders	Multiple stakeholder engagements Technical support from GHGMI and MTEA
Enabling environment for implementation of developed templates	
Stakeholders own the developed templates - greater chance for success	Continuity in stakeholders engaged and capacitated in climate change and GHGs issues, ensuring they are well informed and part of the whole process

Broad range of stakeholder (including grassroots stakeholders) engagement activities allowed collaboration between the stakeholders resulting in realization of significant benefits to cogeneration of knowledge and creation of data collection templates for the agriculture sector. The stakeholders have a sense of ownership of the templates and will be able to use them with ease collect quality data.

2.4 LULUCF sector (Activity 4)

Key achievement	Methods that assisted in reaching the achievement
Good stakeholder engagement and enhanced awareness	Creating relationships with key individuals representing various stakeholders and companies Continuous face-to-face consultative meetings and visits to the key stakeholders and role players particularly the private sector.
Improved LULUCF activity data and GHG estimates	The Continuous Change Detection and Classification (CCDC) algorithm which minimizes ephemeral effects by processing a set of dates together as a group for identifying land use change. Continuous face-to-face consultative meetings and presentations to key data providers and role players, particularly the private sector.

Developed an emissions factor database and made baseline estimates and projections for the Land Use, Land Use Change and Forestry (LULUCF) sector in Eswatini. The database was created as a spreadsheet for ease of use in future inventory updates and this will improve the GHG inventory and capacity to compile the inventory. An easily accessible public database on GHG emission factors will also improve the quality of GHG inventories in a cost-effective way.

Annual land use maps for Eswatini were created spanning from the 1990s to the present. The data forms a basis for making better estimates of GHG dynamics within the AFOLU sector as well as providing useful information for land resource management. The data will also improve the understanding of terrestrial ecosystems and the complex land use dynamics of Eswatini. The data and maps will be shared for public access.

2.5 Renewable energy policy assessment (Activity 5)

Key achievement	**Methods that assisted in reaching the achievement**
Good stakeholder engagement	Created good relationships with key individuals representing various stakeholders, companies and farmer associations An inclusive approach to stakeholder engagement strategy was used which ensured inclusion of relevant government ministries and departments, parastatals, industry, farmers association and sugar cane and wattle out-growers
Enhanced awareness of stakeholders on positive impact of biomass electricity on climate change.	Four scenarios of electricity generation were created with two biomass electricity generation scenarios showing significant reduction in GHG emissions. This is an evidence-based approach in informing decisions and biomass electricity policy
Enhanced awareness of stakeholders on positive impact of biomass electricity on Sustainable development.	The two biomass electricity scenarios have significant reduction in imports of electricity resulting in a lot of money circulating in the local economy. Given the significant role of small holder farmers in the biomass resource chain, positive economic impacts would be realized in communities.
Enhanced awareness of farmer associations in sugarcane and wattle out-growers in the value of biomass waste as a resource in electricity generation.	Considerable efforts were made to effectively engage the farmers in the discussions. Physical meetings were conducted where they made adequate input into the biomass issue and also formed part of key stakeholders in workshops.

An inclusive approach to stakeholder engagement strategy allowed the interaction of government, policy makers, energy regulator, electricity company farmer associations, sugar and timber industries to aggregate and discuss the issues of biomass in one forum. The stakeholder meetings fostered open and intensive discussions on biomass issues such as the availability of biomass stock, promoted transparent discussions on fairness issues and fostered the emergence of a consensus. The timber outgrowers and sugar cane farmers who have been left out in discussions of biomass electricity were part of the discussions in this project and their role was seen to be significant in the biomass resource chain. In the workshops held, at the end the stakeholders reached a consensus and forged a working relationship to discuss the generation of biomass electricity, policy and regulatory challenges and find workable solutions.

3 Overarching challenges and solutions

Challenges	Solutions
The Covid situation that prevailed during the entire project, making contact with, and building the interest in the target audience	Virtual meeting were organised
Delays to project implementation start date due to civil unrest in the country	Initial date of completion was shifted from April to July
Difficulty in accessing data Sharing data caused substantial challenges and slowed progress in the implementation of the project.	Accessing data from international repositories Proposed data sharing agreements

3.1 Health and water adaptation

Challenges	Solutions
Given the Covid situation that prevailed during the entire project, making contact with, and building the interest in the target audience, particularly the Ministry of Health, initially proved difficult.	However, the MTEA played a pivotal role in assisting the Activity 1, Health and Water Adaptation Team by introducing them to key stakeholders in both the Ministry of Health and the Ministry of Natural Resources and Energy/MNRE' Department of Water Affairs/DWA. This MTEA assistance not only resulted in strong engagement with the health and water sector stakeholders (which was supported by a two day workshop early on), but also ensured these Government of Eswatini stakeholders' ownership of the process and work on adaptation in these two sectors. This added more participation and engagement from these sector stakeholders, but helped obtain essential information necessary to operationalise Eswatini's updated NDC (submitted to the UNFCCC October 2021) that would have otherwise been possible.
Response is not guaranteed (questionnaires & reports)	Follow up was done by phone stating
Limited access to data	Signing of data confidentiality agreements.

3.2 Energy

Challenges	Solutions
Limited access to data	Signing of data confidentiality agreements.

3.3 Agriculture sector

Challenges	Solutions
Limited access to data	Signing of data confidentiality agreements.

3.4 LULUCF sector

Challenges	Solutions
Stakeholder engagement and buy-in Limited private sector engagement and buy-in	Creating strong relationships with key individuals representing various stakeholders and companies Continuous face-to-face consultative meetings and visits to the key stakeholders and role players particularly the private sector.
Limited access to data from the private sector, particularly the timber sector.	Continuous engagement and signing of data confidentiality agreements. A data collection tool was developed with the Department of Forestry to facilitate systematic annual data collection.
Limited budget to do undertake detailed national land use change analysis	Combined both desktop and field-based data collection (Collect Earth) to develop land use maps.
Timelines Limited time to do undertake detailed national land use change analysis	Combined both desktop and field-based data collection (Collect Earth) to develop land use maps. A need to undertake a detailed national forest inventory was highlighted

3.5 Renewable energy policy assessment

Challenges	Solutions
Low response rates on questionnaires	Follow-up contact with non-respondents Accessing data from companies' online repositories
Capacity/resources to ensure project sustainability. Lack of policy to make assessment on.	Considered the potential of biomass electricity and proposed possible policy frameworks
Limited access of data from the sugar cane and timber sector	Continuous engagement with stakeholders led to eventual release of some of the data by organizations
Limited time to engage all timber and sugarcane out-growers in the country	Continuous engagement and visits to these key stakeholders as their opinions are important in crafting an encompassing biomass electricity policy

4 Lessons learnt

Based on the previously discussed challenges, this section explains the lessons learned of the project Implementation.

4.1 Overarching lessons

A key lesson that this project demonstrated is that having the UNOPS/ICAT contract with an external institution, rather than with the Government agency responsible for the project made it difficult for the MTEA to have true ownership' of the project and complicated both communications and implementation. Given both the physical distance between the University of Eswatini (UNESWA) and the MTEA made it difficult to have face-to-face meetings on a regular basis, which hindered communications. The hiring of an excellent project facilitator who was based primarily at MTEA, however, went far to bridge those communication and 'ownership' issues. However, it should be noted that it also made it difficult to keep management roles and responsibilities clear for both UNESWA and MTEA. Had the UNOPS contract been with the MTEA, this would have gone a long way to avoid these difficulties. Fortunately, due to strong good will and dedication to achieving the objectives of the project on all parties' parts, enabled the project to be executed successfully.

The following are overarching lessons learnt from the implementation of project:

1. Clear communication lines need to be setup right from the beginning of the project to ensure good management;
2. Having a full-time project facilitator was critical to help liaise between the UNESWA/CSER technical team and the MTEA, as well as to help facilitate the numerous activities of the project ranging from engaging with and interviewing dozens of stakeholders, preparing activity workshops to engage and work with key stakeholders from government, NGOs and the private sector;
3. The Inception Workshop was vital to sensitise stakeholders on the Project's goals and objectives and to set the stage for engaging them throughout the life of the Project;
4. Early involvement of sector stakeholders facilitated good cooperation during the project;
5. In-person meetings are more fruitful than on-line meetings – however, during most of the Project, COVID required a number of on-line/virtual meetings;
6. On-line/virtual meetings can be much improved with top-of-the-line communication/meeting software;
7. Building on existing systems is important to develop a sustainable MRV system;
8. Legal institutional frameworks are absolutely critical to ensure developing strong, effective institutional arrangements;
9. Expanding existing institution mandates is essential to allow for more coverage for MRV needs and requirements;
10. It is important to develop the competence of the sectoral focal point and the key data suppliers to continually engage in the MRV process and ensure that it is embedded in each institution and organisation engaged in the MRV process;
11. Institutions to be involved in the MRV process need to understand how they can and should actively contribute towards enhancing the MRV process;
12. Engagement of stakeholders and institutions from the beginning provides them with a sense of both being a key part of the process as well as giving them an 'ownership' stake in the process, thereby fostering active participation;
13. Continuous capacity building is required to sustain a good understanding of MRV concepts in each sector;
14. There is a need to develop and establish data-sharing agreements (DSA) that protect data shared by various

entities;

15. Country specific emission factors/EFs help to reduce uncertainty, particularly in the energy and agriculture sectors;
16. Capacity building (i.e., finance, technology, technology transfer, stakeholder engagement and training) is necessary on a sustained basis, and is crucial to the success of domestic MRV systems and NDC/Nationally Determined Contributions implementation;
17. Adding new Activity Data to an existing data collection process (e.g. updating national inventories and NDCs) can be a very valuable tool for ensuring stakeholder engagement and high quality of MRV data; and,
18. Capacity building of key staff and stakeholders is essential to ensuring long-lasting impact of project. interventions

4.2 Health and water adaptation

1. Information on climate change impacts needs to be translated from the scientific research domain into language and time scales relevant for policy makers and local people;
2. Intentional and high-level research should be funded and undertaken to accurately diagnose local challenges and present relevant localized solutions;
3. National and international experts and researchers need to share their knowledge with policy makers and implementers more effectively;
4. Stakeholder engagement ought to align with the system of governance, geographical characteristics and done through MTAD;
5. Water entrepreneurship and the overall water economy remains an opportunity for the youth and the country to reduce unemployment and improve service provision and the size of the private sector;
6. WASH presents opportunities of synergistic operations between the water and health sectors;
7. There is an urgent need to build capacity and institutional arrangements for effective regulation of the sector;
8. The water sector has made strides in climate adaptation and various collaborations has resulted in the many achievements the country can be proud of.

4.3 Energy sector

The following lessons were learnt during the implementation of Activity two

1. High level consultation with the Ministry of Natural Resources and Energy (MNRE) and the Ministry of Public Works and Transport (MPWT) made consolidation of the gap and analysis report easier to implement;
2. That MNRE has all the data necessary for compiling the GHG inventory from energy sources, however, the data is lumped together since the Ministry is only interested in fuel consumption, yet the GHG inventory requires fuel volumes to be disaggregated in technology types;
3. That MPWT which in the Ministry responsible for road and air transportation had not mainstream climate action (mitigation and adaptation) in their policies. However, the Road Transportation Department was excited to participate in a possible Tier calculations of GHG inventory from the transport sector;
4. That the MPWT possess a rich data set that would be used to estimate the amount kilometres travelled annually by each register vehicle (amount of fuel consumed by each vehicle technology) that can be used for Tier 2 GHG calculations with a little improvement;
5. There is need of a dashboard where national mitigation report may be deposited for public consumption;
6. The Road Transportation Department (RTD) welcomes their direct involvement in the MRV system for GHG

emissions;

7. RTD recognizes their potential to contribute to NDCs
    a) Opportunities for climate action - Park and ride systems
    b) Setting of vehicle emission standards;
8. Municipalities can offer an efficient a one-stop for industrial data;
9. The CSO is ready to support and facilitate data sharing initiatives;
10. Need for portal for climate action well as for the national energy balance.

Lesson learnt during the project that need to be considered in the near future

1. There is need to sector of MRV working groups that will be constituted by officers from the MNRE, MPWT, EEA and tertiary institutions to monitor and verify the GHG emissions from the energy sector;
2. That there is need to activate the existing National Climate Change Committee of Principal Secretaries from relevant ministries, perhaps through an annual workshop reporting the "state-of-climate action" in the Kingdom of Eswatini.

4.4 Agriculture sector

1. Data sharing agreements should be created to allow sharing of data;
2. It is crucial to include stakeholders at grassroots level in discussions as capacity-building initiative;

4.5 LULUCF sector

1. It is crucial to create strong relationships with key individuals representing various stakeholders and companies;
2. Stakeholders should be continuously engaged in the project implementation and data confidentiality agreements signed;
3. There is a need to undertake a detailed national forest inventory was highlighted

4.6 Renewable energy policy assessment

1. Timber and Sugar companies highly interested in biomass electricity generation.
2. Out-growers in sugar and timber highly interested
3. Engagement with stakeholders needs to include sugar and timber out-growers (added benefit of engaging out-growers is major sustainable development/SD impacts in rural areas from increased incomes)
4. There is an opportunity to organize and expand timber out-grower programs. Wattle "jungles" in the south of Eswatini not yet rehabilitated, this will lead to substantial increase in biomass resource availability
5. Biomass group revival could speed up a cooperative approach to procurement of biomass electricity

5 Conclusions

The lessons learned from this project can be summarised as follows:

1. Clear communication lines need to be setup right from the beginning of the project to ensure good management;
2. Early involvement of sector stakeholders facilitated good cooperation during the project;
3. Building on existing systems is important to develop a sustainable MRV system;
4. Legal institutional frameworks are absolutely critical to ensure developing strong, effective institutional arrangements;
5. Expanding existing institution mandates is essential to allow for more coverage for MRV needs and requirements;
6. It is important to develop the competence of the sectoral focal point and the key data suppliers to continually engage in the MRV process and ensure that it is embedded in each institution and organisation engaged in the MRV process;
7. Institutions to be involved in the MRV process need to understand how they can and should actively contribute towards enhancing the MRV process;
8. Engagement of stakeholders and institutions from the beginning provides them with a sense of both being a key part of the process as well as giving them an 'ownership' stake in the process, thereby fostering active participation;
9. Continuous capacity building is required to sustain a good understanding of MRV concepts in each sector;
10. There is a need to develop and establish data-sharing agreements (DSA) that protect data shared by various entities;
11. Country specific emission factors/EFs help to reduce uncertainty, particularly in the energy and agriculture sectors;
12. Capacity building (i.e., finance, technology, technology transfer, stakeholder engagement and training) is necessary on a sustained basis, and is crucial to the success of domestic MRV systems and NDC/Nationally Determined Contributions implementation;
13. Adding new Activity Data to an existing data collection process (e.g. updating national inventories and NDCs) can be a very valuable tool for ensuring stakeholder engagement and high quality of MRV data; and,
14. Capacity building of key staff and stakeholders is essential to ensuring long-lasting impact of project. interventions

A key challenge that all the Activity Teams faced was difficulty in accessing data and or not receiving data from stakeholders in a timely manner. The most crucial element in overcoming these data sharing challenges is collaboration between parties which will be facilitated a memorandum of understanding with concise data sharing agreements. combination of institutional and infrastructural arrangements positively impact research data sharing and reuse in a specific case.

The lessons learned from this current ICAT project will be used as references for similar projects in the future in order to determine what problems occurred and recommendations on how those problems were handled.

Annexure

Lessons Learnt template

Health and water adaptation (Activity 1)

Key achievement	Methods that assisted in reaching the achievement

Energy sector (Activity 2)

Key achievement	Methods that assisted in reaching the achievement

Agriculture sector (Activity 3)

Key achievement	Methods that assisted in reaching the achievement

LULUCF sector (Activity 4)

Key achievement	Methods that assisted in reaching the achievement

Renewable energy policy assessment (Activity 5)

Key achievement	Methods that assisted in reaching the achievement

Project challenges and solutions

Overarching challenges and solutions

Objective	Achieved? (Y/N)	Reasons for target not being achieved
PLANNING PHASE		
Project plans and scheduling were well documented, and a detailed workplan compiled		
Project schedule contained all elements of the project		
Stakeholders had adequate input in the inception meeting		
EXECUTION		
Unexpected changes were managed		
Project progress was tracked and reported in an accurate, organized manner to PMU then MTEA		
Workshops were well organized and stakeholders were involved		
HUMAN FACTORS		
Project management unit was effective		
Project teams were organized and well-staffed		
Project teams received appropriate and adequate training		
Efficient communication among project team members		
Sufficient communication among the team leads and PMU		
Functional areas (team leads, co-ordination, PMU and MTEA) collaborated effectively		
OVERALL		

Deliverables were presented on time with amended schedule.		
Project was concluded within the original budget		
Objectives of the project were met		

Key challenge	Problem	Solution
Budgeting		
Scheduling/Timelines		
Communication between Activity teams with PMU		
Communication between PMU and MTEA		
Communication between PF and GHGMI		
Communication between activity teams and GHGMI		
Technology/resources		
Covid restrictions		
Civil unrest		

Health and water adaptation

Key challenge	Problem statement	Solution
Stakeholder engagement and buy-in		
Capacity/resources to ensure project sustainability		
Data		
Budget		
Timelines		
Communication between team and project management		

Communication between team members		
Capacity/Resources		
Training		

Energy sector

Key challenge	Problem statement	Solution
Stakeholder engagement and buy-in		
Capacity/resources to ensure project sustainability		
Data		
Budget		
Timelines		
Communication between team and project management		
Communication between team members		
Capacity/Resources		
Training		

Agriculture sector

Key challenge	Problem statement	Solution
Stakeholder engagement and buy-in		
Capacity/resources to ensure project sustainability		
Data		
Budget		
Timelines		
Communication between team and project management		
Communication between team members		
Capacity/Resources		

Training		

LULUCF sector

Key challenge	Problem statement	Solution
Training	n/a	n/a

Renewable energy policy assessment

Key challenge	Problem statement	Solution
Stakeholder engagement and buy-in		
Capacity/resources to ensure project sustainability		
Data		
Budget		
Timelines		
Communication between team and project management		
Communication between team members		
Capacity/Resources		
Training		