CO-DESIGNING MANGROVES AS NATURE-BASED SOLUTIONS TO COASTAL HAZARDS

VOICES FROM THE EASTERN COAST OF GHANA AND BEYOND

MANCOGA

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PREFACE

The eastern coast of Ghana has a long history of coastal hazards, mainly erosion and flooding first documented in 1907 when the shoreline in Keta retreated by about 600 feet. Coupled with climate change-driven sea level rise, mangrove deforestation has been identified as a major contributor to the persistent flooding along the coast, also increasing its vulnerability to erosion.

Between 1980 and 2011 over 24% of the total mangrove cover of Ghana had been lost and the situation has since deteriorated. Reduction in mangrove cover along the eastern coast is expected to increase the exportation of land-based pollutants (nutrients, pesticides, heavy metals, etc) into the coastal environment resulting in water quality problems such as hypoxia and a decline in ecosystem services.

The potential for mangroves to stabilize and buffer the shoreline against erosion and flooding is the basis for the Mangroves as Nature-based Solutions to Coastal Hazards in Eastern Ghana (MANCOGA) Project which is being implemented under the leadership of the Department of Marine and Fisheries Sciences and the Institute of Environment and Sanitation Studies (IESS) of the University of Ghana and the Helmholtz-Zentrum Hereon in Germany.

The project employed a co-design process to engage stakeholders in designing a sustainable approach to developing robust and participatory Nature-based Solutions (NbS) to coastal hazards such as flooding, erosion, and pollution, covering aspects of blue carbon, ocean acidification, and biodiversity loss. Ultimately, the project seeks to increase community resilience and develop an information system using state-of-the-art technology to aid decision-making.

This living document presents a summary of the co-design process and the perspectives of project partners, particularly local and national level stakeholders and scientists with varying associations or links to the coastal environment, with a focus on mangroves as NbS. The document is divided into four sections.

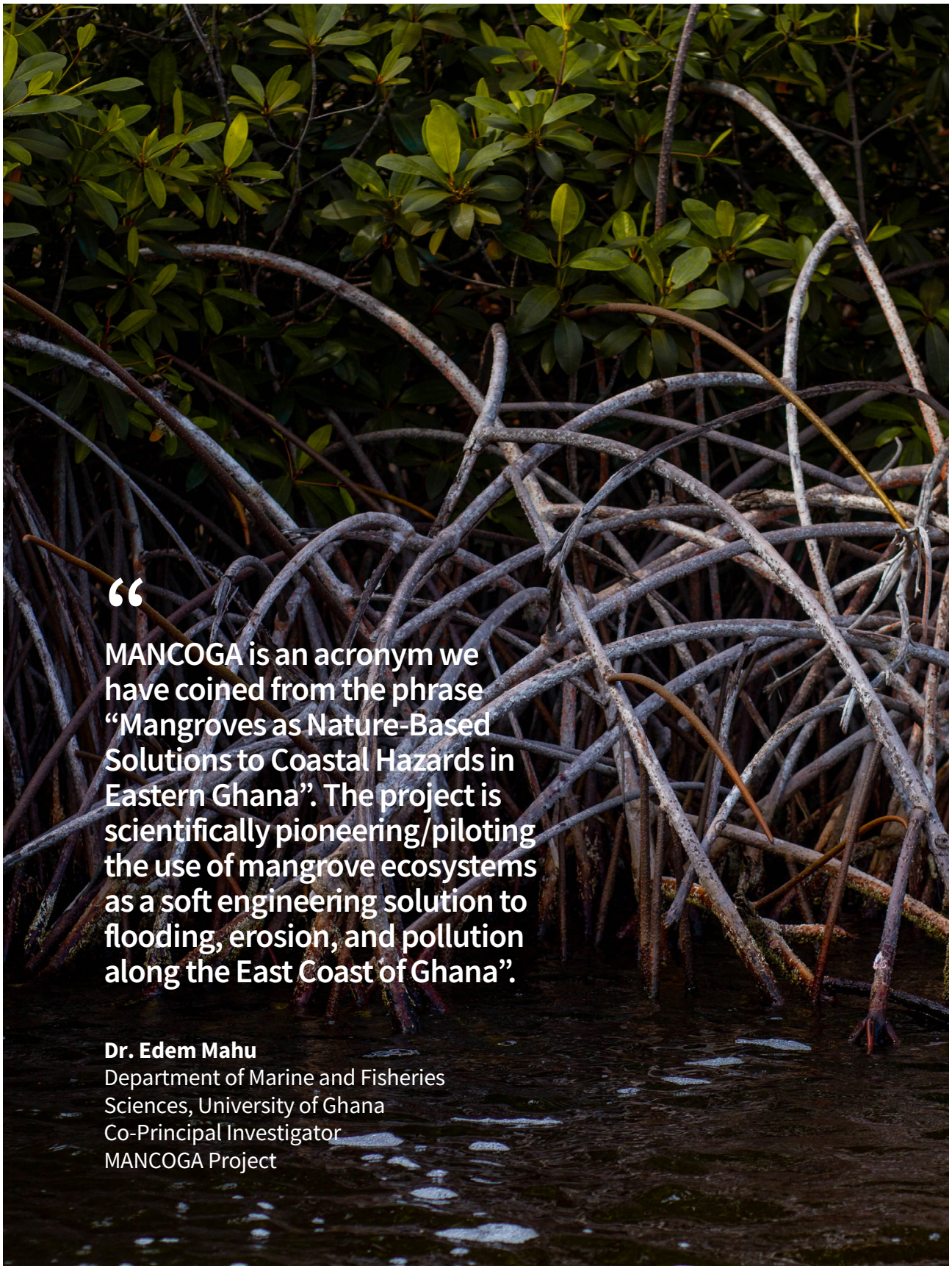
The first section describes the MANCOGA Project's co-design process. Individual interviews with local or community-level stakeholders and governmental or non-governmental level stakeholders are presented in the second and third sections.

The final section presents the perspectives of social and physical science researchers from the University of Ghana and Hereon on the MANCOGA Project. The voices you hear on the pages below should help you connect with our valued stakeholders and the MANCOGA team.

CONTENTS

ABBREVIATIONS

CODA	Coastal Development Authority
EPA	Environmental Protection Agency
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IESS	Institute of Environment and Sanitation Studies
IUU	Illegal Unregulated Unreported
MANCOGA	Mangroves as Nature-based Solutions to Coastal Hazards in Eastern Ghana
MESTI	Ministry of Environment, Science, Technology and Innovation
MLNR	Ministry Lands and Natural Resources
NbS	Nature-based Solutions
NDCs	Nationally Determined Contributions
NGOs	Non-Governmental Organizations
ToC	Theory of Change



“MANCOGA is an acronym we have coined from the phrase “Mangroves as Nature-Based Solutions to Coastal Hazards in Eastern Ghana”. The project is scientifically pioneering/piloting the use of mangrove ecosystems as a soft engineering solution to flooding, erosion, and pollution along the East Coast of Ghana”.

Dr. Edem Mahu
Department of Marine and Fisheries Sciences, University of Ghana
Co-Principal Investigator
MANCOGA Project

INTRODUCTION

Historically, coastal hazards such as erosion, flooding and pollution have been frequently reported along the East Coast of Ghana. Although, there have been several interventions including using mangroves and building sea defense walls to mitigate against coastal hazards, these hazards resurface due to multiple factors which include inadequate reliable data, unsustainable livelihood practices and insufficient coordination among stakeholders.

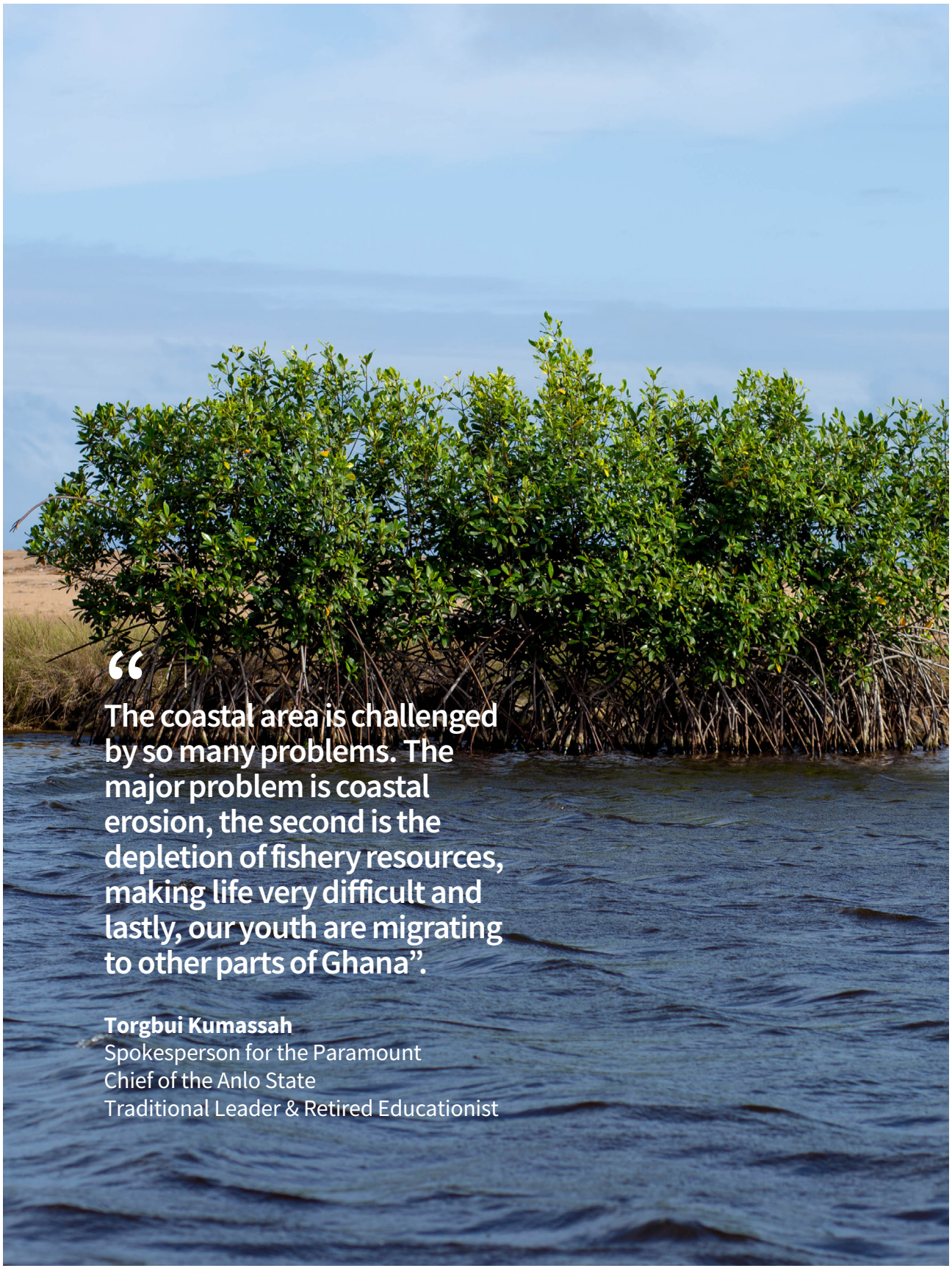
The Department of Marine and Fisheries Sciences and the Institute of Environment and Sanitation Studies (IESS) of the University of Ghana and the Helmholtz-Zentrum Hereon in Germany, have partnered to implement the MeerWissen funded project "Mangroves as Nature-Based Solutions to Coastal Hazards in Eastern Ghana (MANCOGA) Project" to support efforts at reinvigorating mangrove ecosystems and their associated services along the eastern coast of Ghana.

The project will generate new data as well as collate existing ones on mangrove ecosystems, shoreline evolution and livelihood need to develop a robust participatory Nature-based Solution and decision support tools for addressing these coastal hazards.

A key component of the MANCOGA Project is the use of a co-design approach that incorporates the perspectives of stakeholders and practitioners into the design and production of the research.

This approach ensures that stakeholders and practitioners co-own the research and actively participate in the co-production of knowledge to bridge the gap between societal needs, science, policymaking and implementation.

In this living document, project partners, including scientists and stakeholders, and rights holders, from different backgrounds share their knowledge and opinions on using mangroves as a Nature-based Solution (NbS) to coastal hazards, the co-design process and their potential contributions to the MANCOGA project.



“The coastal area is challenged by so many problems. The major problem is coastal erosion, the second is the depletion of fishery resources, making life very difficult and lastly, our youth are migrating to other parts of Ghana”.

Torgbui Kumassah
Spokesperson for the Paramount
Chief of the Anlo State
Traditional Leader & Retired Educationist

SECTION ONE:

OVERVIEW OF THE CO-DESIGN PHASE

THE CO-DESIGN APPROACH

The co-design process ensures both scientists and stakeholders participate in the generation and use of knowledge. Key derived benefits are summarized in figure 1.

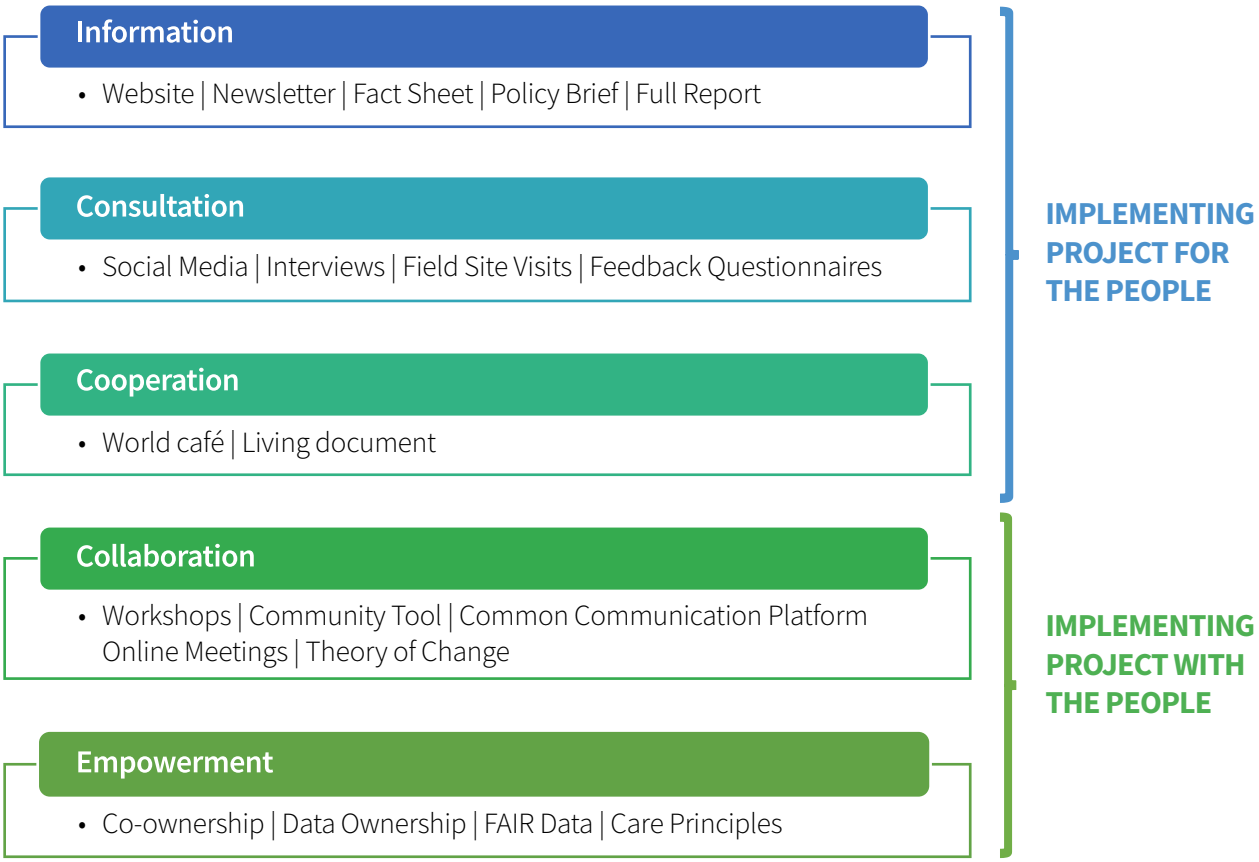


Fig. 1 Benefits derived through co-designing of research with relevant stakeholders

THE MANCOGA CO-DESIGN PHASE

The Co-design phase commenced in June 2022 and successfully ended in February 2023. Below is a summary of how the MANCOGA project rolled out its co-design process.

i. Planning Meetings

Project meetings were organized throughout the co-design phase of the project to ensure effective planning and coordination. The project team engaged in a series of in-person and virtual meetings during the co-design phase. These included planning meetings prior to stakeholder workshops as well as post-workshop meetings for evaluation purposes.

ii. Stakeholder Identification and Mapping

Stakeholders play a crucial role in project implementation; thus, all relevant stakeholders were identified. The project team employed brainstorming and snowball techniques in generating an inventory of key stakeholders at the national, sub-national and community levels. This inventory was updated with inputs from stakeholders during the first and second workshops.

iii. Stakeholder Engagement

Stakeholders were engaged through several channels including regular emails, phone calls, letters, interviews, courtesy calls and workshops.

- **Courtesy Calls**

The project team paid courtesy calls to key national institutions to introduce the project to them and solicit support in all project activities including uptake of knowledge from the project.

These institutions were the Ministry of Lands and Natural Resources (MLNR), Ministry of Environment, Science, Technology and Innovation (MESTI), Environmental Protection Agency (EPA) and Coastal Development Authority (CODA).

- **Stakeholder Interviews**

Selected stakeholders at the national, sub-national, and community levels were interviewed during the co-design phase. The purpose of the interviews was to ascertain their expectations of the project and to incorporate their views into the design and production of the research.

- **Stakeholder Workshops**

Stakeholders were engaged in three separate workshops. The first and third workshops were held in-person, while the second was held virtually. These workshops aided in developing the Theory of Change (ToC), Ground Rules and Implementation Phase Proposal to guide activities to be undertaken during the implementation phase of the project.

iv. Field Visit

The purpose of the field visit was to ascertain first-hand knowledge on the nature of the coastline and the coastal defense structures in place as well as identify the different species of mangroves, their distribution and their exploitation rate in the study area. The field visit involved a transect walk, observation and interactions with community members and local stakeholders. The Akplorwotorkor, Dzita and Anyanui communities in the Anloga district were selected for the field visits.

v. Communication Platforms

Communication platforms were created for information dissemination and effective interactions amongst the MANCOGA partners and to promote and increase the project's visibility. The platforms utilized during the co-design phase are as follows:

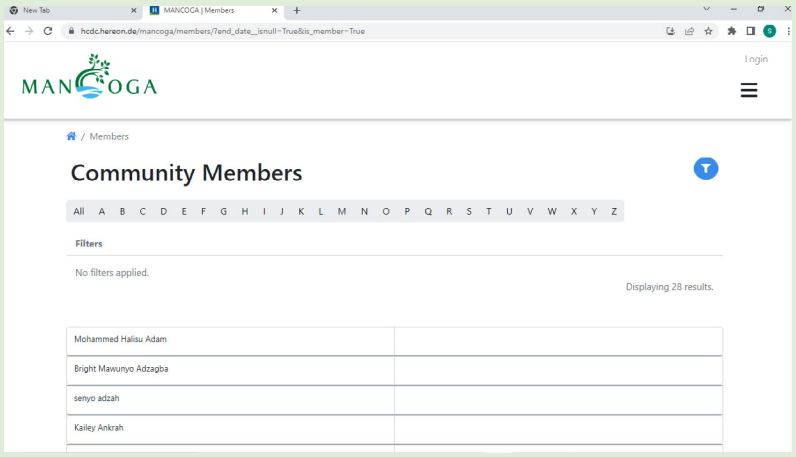
- Community Tool
- WhatsApp Platform
- Twitter (@MANCOGA)

vi. Documentation

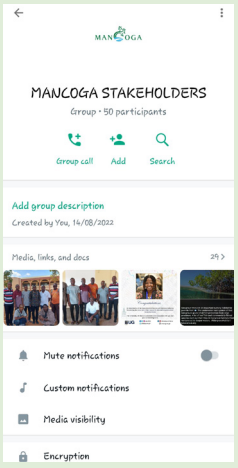
The final stage of the co-design phase involved the documentation of project deliverables. At this stage, the Theory of Change and Implementation Phase Proposal were documented following their completion at the third stakeholder workshop.

Also documented was the Living Document Product, a web-based narrative that captures the perspectives of project partners and stakeholders regarding their experience during the co-design phase. All activities undertaken during the co-design phase were documented in a report. This final report captures the achievements, challenges and lessons learned from the co-design phase.

Communication Platforms



Community Tool Interface



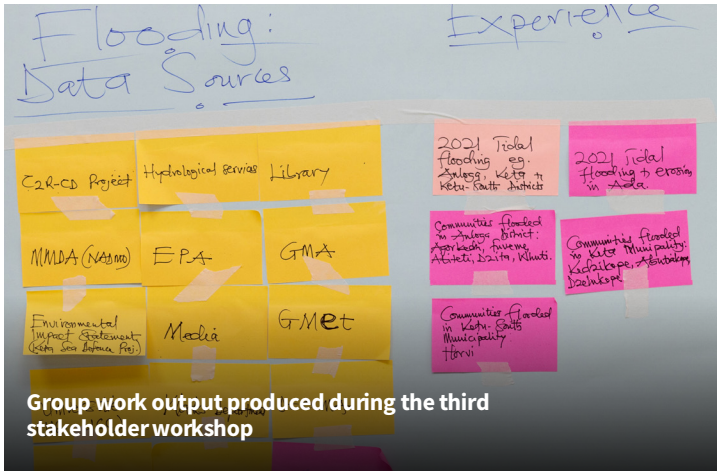
WhatsApp Platform

Twitter Platform

Courtesy Call to Ministry of Environment, Science, Technology and Innovation (MESTI)

Breakout session during the third stakeholder workshop

Spokesperson for the Paramount Chief of the Anlo State interacting with Project Leads



Group work output produced during the third stakeholder workshop

A section of the MANCOGA project team

MANCOGA Partners during the first stakeholder workshop

Mangrove market center at Anyanui in the Anloga District of Ghana

Sea defense structure at Akplorwotorkor in the Anloga District of Ghana

SUMMARY OF THE CO-DESIGN PHASE

PLANNING AND DESIGN STAGE

INCEPTION AND PREPARATORY STAGE

- Planning Meetings (Online/In-person)
- Literature Review
- Stakeholder Mapping
- Sakeholder Inventory
- Courtesy Calls
- Stakeholder Interviews
- Communication Platform (Collaboration tool, WhatsApp, Twitter)

WORKSHOP ONE OUTPUT

- Ground Rules
- Draft Theory of Change
- Knowledge of Field Conditions
- Capacity Building on Collaboration Tool
- Workshop Report
- Evaluation Feedback

WORKSHOP TWO OUTPUT

- Shared experiences and knowledge
- Revised Theory of Change
- Workshop Report
- Evaluation Feedback

WORKSHOP THREE OUTPUT

- Shared experiences and knowledge
- Final Theory of Change
- Draft Implementation Phase Proposal
- Workshop Report
- Evaluation Feedback

FINAL DOCUMENTATION STAGE

- Final Implementation Phase Proposal
- Living Document
- Co-Design Phase Report

SECTION TWO:

COMMUNITY AND LOCAL STAKEHOLDERS PERSPECTIVES

TRADITIONAL AUTHORITY

Togbui Kumassah
Spokesperson for the Paramount Chief of Anlo State.
Traditional Leader and Retired Educationalist.

Can you tell us about the nature of coastal problems on the East Coast?
The coastal area is challenged by so many problems. The major problem is coastal erosion, the second is the depletion of fishery resources, making life very difficult and lastly, our youth are migrating to other parts of Ghana. Coastal erosion issues date back to 1907 when the sea destroyed livelihoods and properties. It was a big problem for the colonial masters because it affected their businesses as well. The colonial master felt that the cost of solving the problem was too high and didn't want to invest in resolving the situation. Many attempts were made using all kinds of approaches like wooden fences, rocks that were not too big, etc. Kwame Nkrumah tried to solve it by putting groynes wide driven into the sea, the sea did not abate. They tried using iron pillars with a concrete wall but the sea just laughed at us.

What has been done so far about the problem(s)?
In the early 2000s, the Government of Ghana led by Flt. Lt. Rawlings took a loan of $85 million to construct the defense wall at Dzita, Atorkor, and Keta areas to stabilize the shoreline and reduce the impact of the angry waves. In recent times, many concerned bodies come to assess the effectiveness of the defense structures and we are told that there are still negative effects from the current interventions. Non-governmental organizations (NGOs) have come in to plant mangroves but not on large scale and so we still need other interventions to protect us from the situation.

What are your thoughts on mangroves as NbS to these problems?
Nature-based Solutions have been the best practice in solving some environmental problems so far. For me, mangroves as natured-based solutions can work well in our area when it is designed properly, and the appropriate management measures are put in place. It can take time but it will provide other opportunities.

What are your thoughts about the Co-design approach that MANCOGA is using?
This is a wonderful approach so far. Most at times, people look up to the government for solutions to their problems but this time around this project is making us feel that we can be part or even be the solution ourselves.

What are your expectations of the project?
I expect that the government will back this project with district bye-laws about mangroves so that the mangroves planted will not be destroyed. You know that if you do Nature-based Solution, it takes time for it to become fully established.

LOCAL AUTHORITY

Mr. Samuel Brass Dedzo
Former Assemblyman, Dzita
Representative, Mangrove Landowners

Can you tell us about the nature of coastal problems on the East Coast?
For a very long time, our main issues have been this coastal erosion and flooding. It has done a lot of harm than good. Some of the harms it has caused us in the community are the loss of livelihood especially those who use the beach as their landing site, and some people who make money from tourists who come to enjoy the beach and nature.

What has been done so far about the problem(s)?
The government has constructed a sea defense wall for us. Over the years, we realized that these walls helped in the short term. We heard that some places are still being affected because of these walls.

Secondly, apart from the walls that were made with big stones, there are some made with smaller stones packed together and locked with wires. We observed that, after some time, some parts of these interlocked stones in the wire mesh began to fall apart and this happened because, some people have been opening the wires to carry out the stones into their houses for one reason or the other. Some use it as support when hauling net during fishing.

What are your thoughts on mangroves as NbS to these problems?
When the government introduced these sea walls, it helped a lot to protect the communities. But it has its own disadvantages of creating problems elsewhere, because of that, we need to try the nature-based approach or combine it with the hard engineering and see the outcome. Also, when we have a lot of mangroves around, we will be seeing a lot of the red crabs moving around and these are depended on by the locals here a lot. They can make money out of it when they pick enough to sell.

What are your thoughts about the Co-design approach that MANCOGA is using?
This approach so far is new to me because many projects that I was a part of don't use this method that MANCOGA is adopting. I think that many people from different departments coming together to share their ideas to contribute to this project is a good sign that the project will go a long way to change our lives in the area.

What are your expectations of the project?
My expectation is that MANCOGA should take the issue of livelihood alternatives for the people as important because when you talk about mangroves in our area it is a major source of livelihood for us.

What contribution can you make to the co-design approach?
My contribution is that more local people should be interviewed to be able to understand the issues that is making their lives difficult. I believe we will get more information that can help us in so many ways.

MANGROVE MERCHANT

Mr. Kugbe Gershon
Representative, Mangrove Harvesters

Can you tell us about the nature of coastal problems on the East Coast?
There are so many problems that we have in this area. Most of these problems are known to us and some of them are unknown to us.

For example, I know very well that the main issue we are experiencing in the area is the way the water enters our communities and destroys properties.

I also know that we are having problems with fish abundance, that is, we used to have a lot of fish catch but in recent times we've not been able to get plenty of fish as we used to and it is an issue that we are having challenges with. The ones that may be unknown to us are in line with the fact that we don't know that most of the things that we are doing are the causes or are the ones that are giving us the problems in the area.

For example, we cut the mangroves because we depend on them for a lot of reasons but only recently we have been able to know that we have been creating problems with the way we harvest the mangroves unsustainably. I will say that until we understand that the rate at which we are cutting is causing us problems, I am sure that we will continue having problems all the time.

What has been done so far about the problem(s)?
So far there have been a lot of awareness programmes. Many NGOs have come to talk to us about the importance of the mangroves and we ourselves are gradually realizing that we are touching the mangroves by heart (excessively).

We believe that we can reduce the way we depend on it so that some will remain for cutting later. Also, some of us also try to replant when we cut and so this is what we have been doing so far in relation to the nature of the problems that I just mentioned earlier on.

What are your thoughts on mangroves as NbS to these problems?
First of all, mangrove is a main livelihood source for us over here and initially we didn't know the benefits that it gives us indirectly. We know of the direct benefits like using it to smoke fish and to build our houses and to do one or two things inside our houses.

Of recent, we are gradually becoming aware that it does a lot to us that we don't even see with our naked eyes. For example, we were told that it reduces this bad gas called carbon dioxide in the atmosphere.

Also, we were told that it is able to protect us from the direct effects of the flood. Because of these benefits, I would say that mangroves as nature-based agents to help in addressing the issue of flooding is positive to me.

The only thing is that not only me the mangrove harvester is supposed to know of this but my other colleagues like the ones who sell the mangroves, the cutters, all must know because they also depend on it. I am saying this because once it is planted for a purpose, we must not destroy it so that it can grow well and serve the purpose for which it was planted.

What are your thoughts about the Co-design approach that MANCOGA is using?
The Co-design approach that we are using in this project is a very good one because it has given me the opportunity to voice out a lot that personally I may not have the opportunity to say to people out there. I think the co-design that we are using should be copied by other people who come to do project within these areas.

What are your expectations of the project?
I am expecting that after this particular phase the project owners should go and make sure that they come back and continue and implement the project so that most of these climate-related problems we have in the area will be addressed.

What contribution can you make to the co-design approach?
The contribution I can make to the co-design is that we should add more people where possible for them to bring their ideas also.

Stacked mangroves at Anyanui market center in the Anloga District of Ghana

FISHERY ADVOCATE

Mr. Vance Kwaku Adedze
Representative, Fisher Folks

Can you tell us the nature of coastal problems on the East Coast?
Our area has been facing a lot of problems for the past few years now. They are coastal erosion, which is affecting our fishing activities, depletion of fish stock, and Illegal Unregulated Unreported (IUU) fishing activities. The size of fish that we even catch currently has reduced. There is also a depletion of mangroves and silting of the estuary.

What has been done so far about the problem(s)?
A lot has been done so far by both private and governmental bodies. To mention, the government has engaged and educated us on the fisheries laws of Ghana to enable the conservation of the fisheries. To address the issues of erosion, groynes were constructed along some spots along the coast. These walls have been helpful in giving us a place to land our fish but still need a lot of maintenance which is very expensive. We also have received training and awareness from NGOs concerning the management of the mangroves within the area.

What are your thoughts on mangroves as NbS to these problems?
Mangrove is an important resource within our area in the Volta Region. It is a source of livelihood to us. Some people who are woodcutters depend on mangrove cutting for livelihood. Fish processors process their fish products with mangroves roots and stem parts which they still believe is the best for smoking fish. Then also, it creates an enabling environment for different fish species to breed. However, the idea to use this mangrove as a solution to address problems of coastal flooding and erosion is good. I know that the roots of the mangroves can help to protect against flooding and erosion. If it will be used to help in the coastal protection, then it is a good idea. The advantage too is that it will create an environment that will enhance biodiversity. Another advantage is that mangroves as NbS to coastal hazards is less costly (cost effective) than construction of groynes.

What are your thoughts about the Co-design approach that the MANCOGA is using?
This approach is one of the sterling ones and the conviction is that it will succeed. Participants have the opportunities for free flow of information and communication was key and effective.

What are your expectations of the project?
I am expecting that at the end of the project there will be a robust and revived fish stock in our waters. Also, I am expecting that the conservation of mangroves will increase in the area. I hope to see planting of more mangroves and engagement in other livelihoods.

What contribution can you make to the co-design approach?
I want to suggest that we collect data on fishers and their activities and other stakeholders to understand the relationship between their livelihood and the mangroves so we can address the issues well.

LOCAL SALT MINING

Mr. Raymond Lotsu
Representative, Salt Miners

Can you tell us the nature of coastal problems on the East Coast?
Currently we face many problems but the one that is pressing to me as a salt miner is the issue of flooding from the rain and the sea. There are many damages being caused by flooding and my own livelihood is also affected when there is flooding. Recently, some places got flooded and we couldn't have access to go to where we work.

What has been done so far about the problem(s)?
So far, to my knowledge, the assembly has been doing a lot of education and sensitization on matters regarding climate change and how we can adapt to the situations it is presenting. Recently, we were educated that we should not build just anywhere and that most developments are not done properly. Then also, we were sensitized on the dangers of converting the mangrove populated area into salt pans for mining our salts.

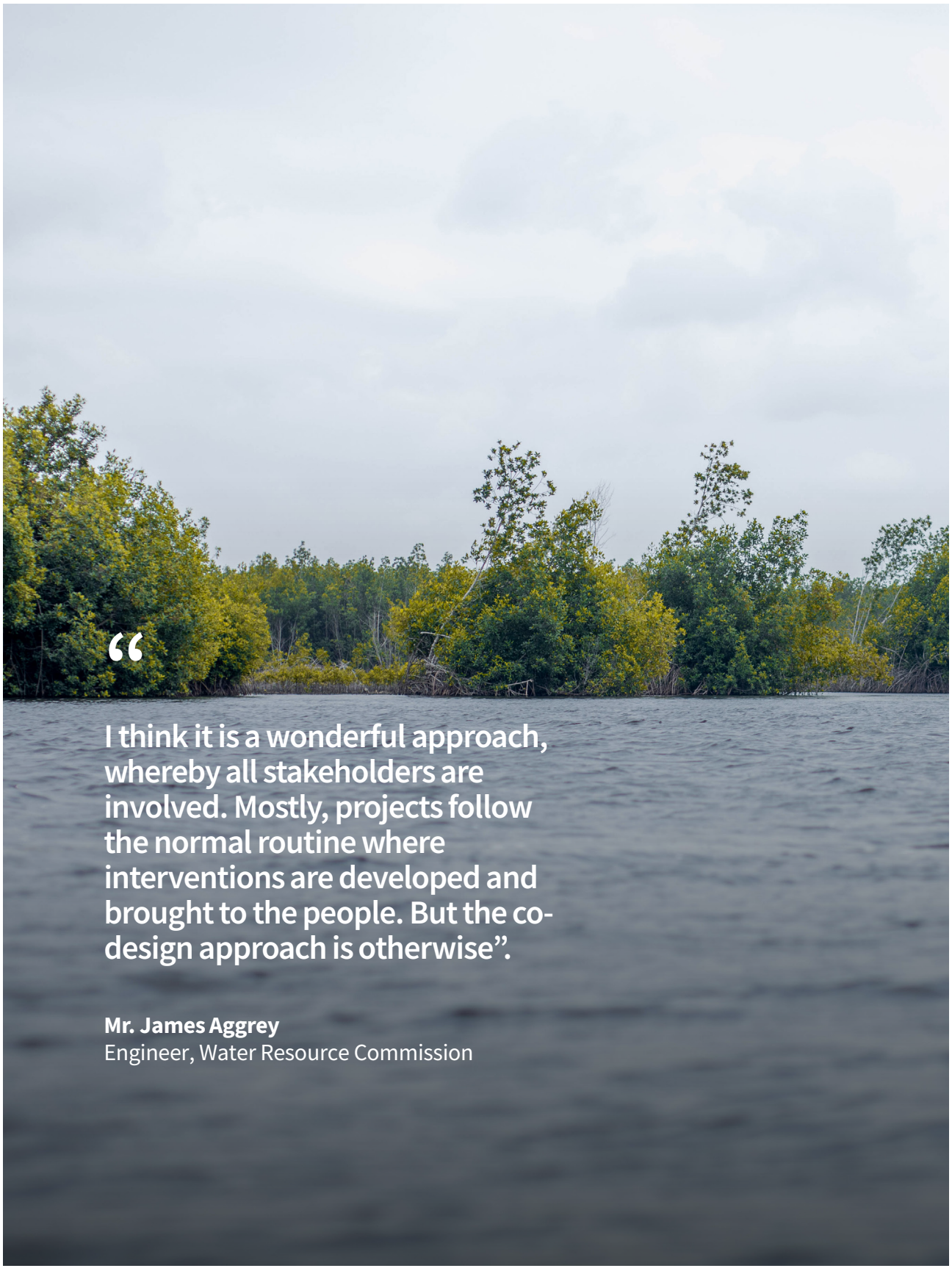
What are your thoughts on mangroves as NbS to these problems?
I think adopting Nature-based Solutions to solve these climate-related problems is better than using sea defense type of protecting the environment. This is because Nature-based Solutions will fit naturally into the nature of the place which I believe will reduce the wave strength of the sea from destroying our properties

What are your thoughts about the Co-design approach that MANCOGA is using?
Yes, the co-design approach makes it possible for different people to come in, to brainstorm and digest issues relating to the environment. With this approach, we can get different recommendations on how the environment can be protected using mangrove and other nature-based approaches.

What are your expectations of the project?
My expectation is simple. I want to see that the implementation of the project comes to reality and I am ready at any stage to support in my capacity.

What contribution can you make to the co-design approach?
I am ready to contribute information where needed towards a successful co-designing process.

Salt pans constructed in the wetlands of the Keta District of Ghana



“

I think it is a wonderful approach, whereby all stakeholders are involved. Mostly, projects follow the normal routine where interventions are developed and brought to the people. But the co-design approach is otherwise”.

Mr. James Aggrey
Engineer, Water Resource Commission

SECTION THREE:

GOVERNMENT AND NON-GOVERNMENT STAKEHOLDERS PERSPECTIVES

FOREST AND WILDLIFE CONSERVATION

Mr. Dickson Agyeman
Wetlands Operations Manager
Wildlife Division
Forestry Commission

Can you tell us the nature of coastal problems on the East Coast?
There are many challenges but I will just highlight on some of the major ones. In ecosystem, for example, the major challenge has been the erosion at the beach, which affects most of our biodiversity.

Also, when you come to the mangrove area, the unsustainable use of the mangrove is also creating a lot of problems for the management of the site. Then also we have other problems associated with the mangroves, we have this pest taking over the whole place which is Acrostichum sp., and also blocking the creeks, which is not allowing for natural regeneration of the mangroves. These are some pressing problems that we are having.

What has been done so far about the problem(s)?
If we talk about coastal erosion, it is a challenge that requires major investment to address.

So, the government is doing what we call, protection methodology, which is using groynes to protect the coast, and it's segmented such that they do not occur in the entire coastline but the problem with this method is that the backlash is being pushed to another area.

So that's one solution government has used to resolve this problem. But going forward, I think for the Wildlife Division it is something beyond us. Now, we also try to see how within this limitation we can help improve biodiversity along the coastline, the marine turtles that come to nest, hand in hand we work to see that though the coast is eroding we also help to protect them along the coast.

What are your thoughts on mangroves as NbS to these problems?
The hard system has been a system that the government had adopted in addressing the issue of coastal erosion but we've seen that it has also created some problems at different locations at some point in time. There is a method that is adopted in other countries, that is the pumping of sand from the deep sea to reclaim the land or to stabilize the shoreline. But then it is a very expensive method.

We've also heard of developed countries using soft solutions or going the nature-based way to address these issues, that is using mangroves to address the issue of coastal erosion, but I think the combination of both hard and soft measure will work best. What we can do is that we carry out a few trials and conduct some research and then once successful, we then replicate in other areas.

What are your thoughts about the Co-design approach that MANCOGA is using?
The co-design approach is a very excellent approach that MANCOGA project is adopting. Previously, people come to do one or two interventions after they take information and then implement what they intend to do within the landscape but with the co design approach, the project is not for only the original project writers or owners but it becomes the project that is co-owned by us the stakeholders. The advantage also is that it makes implementation very easy right from the onset till the very end of the project.

When the project ends, it is easy for the project community to take responsibility for the project and sustain it.

What are your expectations of the project?
I am expecting the nature-based approach works well so the government can adopt it in addressing similar issues elsewhere. Also, we need to take livelihood alternatives into consideration and educate them so that the over dependence on the mangroves can minimize.

What contribution can you make to the co-design approach?
I want us to fill the gaps where necessary as we move along this phase of the project.

Nesting area of the marine turtle in the Anloga District of Ghana

ENVIRONMENTAL PROTECTION

Ing. Maxwell Zu-Cudjoe
Acting Head
Environmental Protection Agency
South Tongu Area

Can you tell us the nature of coastal problems within the East Coast?
Over-exploitation of mangroves has led to two main concerns: flooding and depletion of natural resources. Mangroves serve as natural control to flooding and erosion. The frequent cases of flooding can be associated with the large-scale depletion of mangroves. The communities depend highly on the sea and the Keta Lagoon Complex for fish.

Recent studies show that quite a number of fish species have been lost and the ones being harvested are of smaller sizes. In the same fish industry, many of the women smoke fish and the use of mangroves is preferred as they have natural preservative qualities and give the fish a better taste. Bakeries are not exempted from the use of mangroves as fuel for baking.

What has been done so far about the problem(s)?
The Government of Ghana, through agencies such as the Environmental Protection Agency and Forestry Commission, has enacted acts and regulations for the protection of trees which include mangroves. The Environmental Assessment Regulations, 199 (LI 1652) indicates that an environmental permit is required to fell any tree especially in sensitive areas or reserves.

What are your thoughts on mangroves as NbS to these problems?
The increasing demands of growing population has led to over exploitation of natural resources, hence coastal degradation. Mangroves used as Nature-based Solution is a good method and has several benefits. It has carbon storage potential 3 to 5 times higher than other tropical forest plants. They act as breeding and safe havens for varieties of fish species. Mangroves are very effective in controlling erosion. About 2 to 5 hectares of mangroves can treat or filter effluents of one hectare of aquaculture operations. They are a good source of tourism revenue. The density of mangroves makes its wood a valuable source of timber and fuel.

However, a disadvantage of mangrove as Nature-based Solution agent is that when over exploited it cannot be manufactured or replaced in a short time. Also, since mangroves have so many uses coupled with the ever-growing population demands, it becomes difficult and expensive to control its felling.

What is your opinion about the MANCOGA co-design approach and what you think should have been part of it?
The co-design approach is brilliant because it acknowledges the inclusion of all stakeholders in the project design and implementation process. Including women community leaders, assemblymen, chiefs, government agencies, NGOs and other stakeholders ensures that every aspect of the project, i.e. culture, tradition, economic, legislation etc. are considered. Suggestions, contributions, and recommendations are accepted and responsibilities shared for all stakeholders to be part of its implementation.

What are your expectations of the project?
I expect the project to be sustainable.

Decisions taken must find their way into the laws of the land. Communities must be sensitized about the impacts of mangroves through all media to cause the change we want to see. Again, alternative sources of livelihood for the people in the communities, where dependence on mangroves is reduced must be introduced to reduce the dependency on mangroves.

What contributions can you add to the co-design approach used?

From the onset, I expect that information that will be gathered and initial engagements will be built upon in subsequent engagements. This ensures that everyone is on the same page with the team.

Fish harvested at the Anloga beach in the Volta Region of Ghana

COASTAL PROTECTION

Mr. Hoenyedzi Godson Kafui
Coastal Engineer
Hydrological Services Department

Can you tell us the nature of coastal problems on the East Coast?
Well, for Ghana's coastal area, coastal flooding and coastal erosion are the main issues that we have so far that I am familiar with.

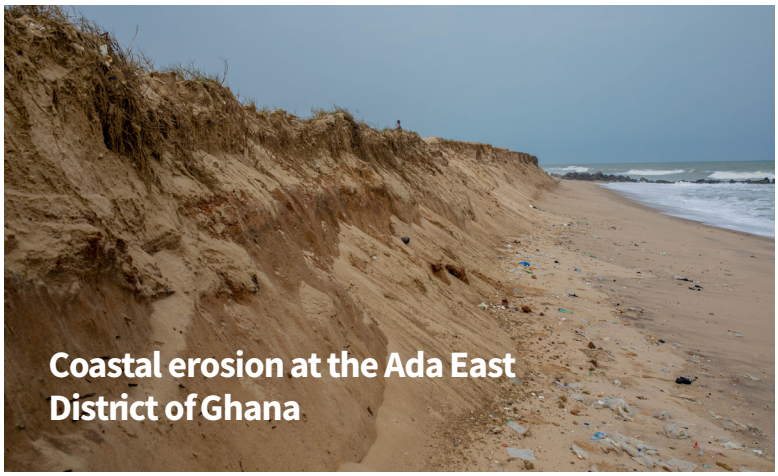
What has been done so far about the problem(s)?
So far, I know defense structures have been placed along some stretches of the coastline and they are doing well. I need to mention that there are some disadvantages it has produced so far and some research work is being done to assess the disadvantage and possible alternative solutions to arrest the situation.

What are your thoughts on mangroves as NbS to these problems?
Global attention is now shifting to nature-based strategies and I think mangroves as one of them is excellent but let us take some lessons from where they have been tried and tested because I know we don't have enough data on these strategies yet. I believe if we have sufficient data and experience from other countries, we will benefit from them greatly.

What are your thoughts about the Co-design approach that MANCOGA is using?
I think is a great initiative to bring all stakeholders on board to get different perspectives on what should be done. I believe this is like the first time it's being implemented in Ghana. I like the fact that you're getting everyone's idea on board. Going forward, we look forward to get good results. I like the approach!

What are your expectations of the project?
The project seeks to protect this coastline and I know we will adopt lessons from other places with similar problems. I think we should try to consider specific areas and have case studies and rather not generalize whatever framework that will come out of this co-design workshop. I think with this in mind, we can get rich data from the specific areas of focus. I think this can help us in the long run. I expect to see successful implemented project.

What contribution can you make to the co-design approach?
I know MANCOGA has experts on board. But I will say that we should try to model many scenarios at different locations to give us a good picture of the outcomes we are expecting to see.



Coastal erosion at the Ada East District of Ghana

WATER RESOURCE MANAGEMENT

Mr. James Aggrey
Engineer, Water Resource Commission

Can you tell us about the nature of coastal problems on the East Coast?
The Water Resources Commission is charged with the management of all water resources in the country. So, our jurisdiction spreads all through the country and the coastal areas are part of the jurisdiction including the Keta Lagoon Complex. Over the years, some of the key issues that we have identified are the frequent floods that we experience. We have also seen that coastal erosion is a big issue. We have also identified pollution as one of the main issues and many others but poverty also stands out. That is one key issue, we think needs to be addressed.

What has been done so far about the problem(s)?
Especially in relation to the coastal issues, one key intervention I know the government has done is to put in all these coastal defense structures across some coastal areas in Ghana. On the other hand, I know some communities have also been sensitized one way or the other as to how to manage themselves during times of flooding or when these issues arise.

What are your thoughts on mangroves as NbS to these problems?
I know Nature-based Solutions work because they are in synergy with nature. My only concern arises from the period that it takes for the mangroves to grow for them to render their intended purpose. People may still face these challenges when the mangroves have not been fully established yet. When we do the nature-based approach, we still need another extension of time for nature to solve the situation, so using mangroves as a solution to the flooding, the mangroves will take time to grow which means we must be patient with it to arrive at that point.

Whilst it is growing to have that capacity of bringing a solution to these issues, we must also find avenues, and interventions in between, so that we can realize the full potential the Nature-based Solution will bring. With this kind of solution, an advantage is that it is less costly as compared to hard engineering.

Both have their pros and cons but I think we should find a good balance between them, whereby we can grow towards making nature solve its problems, and even the problems that are created by human beings.

What are your thoughts about the Co-design approach that MANCOGA is using?
I think it's a very good initiative by engaging all stakeholders and even the communities into the designing of it, or understanding the basic problems within their area, and then working together with them to find solutions. I think it is a wonderful approach, whereby all stakeholders are involved. Mostly, projects follow the normal routine where interventions are developed and brought to the people. But the co-design approach is otherwise.

What contribution can you make to the co-design approach?
Currently, as the journey is only beginning, I'm sure we will go a long way to do this co-designing project together.

So, I would suggest that we take our time in identifying all stakeholders to bring them on board, and to specifically also include indigenous knowledge. As we develop this project, I'm sure other missing things will be covered.

What are your expectations of the project?

At the end of the project, I would want to see the co-ownership of the products that will be developed.

I would want to see the products solving the problems that we want to solve and to see the problem being sustainable and bringing better livelihoods to the people who are living along the coast, whilst mitigating and solving the issues that we have.

Flooded communities in the Ada West District of Ghana

LOCAL GOVERNANCE

Mr. Gershon Tudoabor
District Planning Officer
South Tongu

Can you tell us about the nature of coastal problems on the East Coast?
I have been working here for years and I have observed that there is massive trade of mangroves within our district. The major problem I see currently is the overharvesting of the mangroves than the rate they are replacing them and it is causing a lot of direct and indirect problems to our environment.

What has been done so far about the problem(s)?
I would say so far it has been awareness creation that we have been doing actively so far concerning the problem.

We mainly try to let them know about the importance of the mangroves and why they should be conserved. We do this exercise with NGOs that work within the area.

What are your thoughts on mangroves as NbS to these problems?
I think this is an initiative that we as a country have not explored so much. So, my thoughts are that if these ideas and initiatives are now coming in for us to see the possibility of using the mangroves as a Nature-based Solution for coastal protection, I say it is welcomed.

Let's give it a try and see how it goes. For now, I foresee some advantages. A key one could be that our biodiversity will be maintained to serve functions within the ecosystem as compared to if it were different technology like the hard structure that is used for the coastal defense.

We have to look at the nature of our terrain and where the mangroves are. It is a little bit far from the shoreline, and so I think that now we have to extend it to the shoreline. We don't fully have control over what the outcome will be yet. I think it's a new thing that we want to explore.

What are your thoughts about the Co-design approach that the MANCOGA is using?
It's a good approach being used in designing the project. Designing the project together with all the stakeholders and with the communities will help the project have many inputs right away from all angles that is getting the local knowledge and scientific knowledge and to get a blend of them together to design the project right from the beginning.

What are your expectations of the project?
We are counting on the MANCOGA project that some documentations will come out which can also help us in our decision-making within the district.

What contribution can you make to the co-design approach?
Currently, I believe we are on course, and I wish to say that as we move on, we add other stakeholders that we see fit into this project.

CIVIL SOCIETY

Mr. Raphael Ahiakpe
Country Director
Seawater Solutions

Can you tell us the nature of coastal problems within the East Coast?
As the name sounds, Seawater Solutions, our operations have something to do with seawater, and the final part of the name, solutions, connotes that we try to solve challenges and problems that arise as a result of seawater. From what I have observed so far working in the landscape, the fisheries are dwindling. The catches of recent compared to some years ago have reduced. I can say the greater part of the cause of this problem can be attributed to us, human beings. We are using gear that is not sustainable and the critical one is that we are destroying all the places that help in protecting our fish. Some key mangrove areas are being destroyed which is affecting our fisheries. Also, the beach areas are becoming thinner due to the loss of land to the sea. These are two pressing ones I can mention so far.

What has been done so far about the problem(s)?
Currently, I see big stones being used to protect the coastline within the Keta landscape. From what I hear so far, this has done some good to the land and properties for some years now but it has caused some negative effects in other parts of the coastline. I think we could adopt some proven examples from other countries especially those that are natured-based.

What are your thoughts on mangroves as NbS to these problems?
Mangroves are excellent options for protecting the coastline against climate hazards. Countries like Bangladesh and Sri Lanka have adopted these mangroves in protecting lives and properties. It can work here as well and so that is why Seawater Solutions test planted some mangroves around the estuary areas. And what I observed was that they need maximum protection to establish over a long period of time before they can perform the expected function within the area. The best for now I think is to combine the hard method and the nature-based strategy and this should be backed by a national policy directive supported by people around the field, people that have the knowledge and expertise, or putting their efforts together.

What are your thoughts about the Co-design approach that the MANCOGA is using?
Involving all the stakeholders to design the project is a very good approach. What I think will need to be hammered on by the people behind this idea is to make sure that the right people are contacted for the right information. In most cases of different projects, they don't get adequate inputs because they didn't involve the required stakeholders. So far, I see all the relevant ones present and already many inputs have been made so, I think it's a very good initiative MANCOGA project has started with.

What are your expectations of the project?
I know that the co-design workshop will produce results, given the fact that different stakeholders have attended.

My expectations are that MANCOGA comes out with some tools that address specific issues. These tools should be specific to address specific problems so that when the government wants to tackle a specific problem it can adopt it.

What contribution can you make to the co-design approach?
I am always available to give data to contribute to this phase of the project.

Mangroves at Dzita in the Anloga District of Ghana

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The idea is to have a sustainable project that will live beyond the time that we have the funding”.

Dr. Holger Brix
Helmholtz-Zentrum Hereon, Germany.
Co-Principal Investigator, MANCOGA Project

SECTION FOUR:

ACADEMIC PERSPECTIVES FROM GHANAIAN AND GERMAN PARTNERS

Co-lead of the MANCOGA project delivering a speech at the third stakeholder workshop

PROJECT LEAD

Dr. Edem Mahu
Department of Marine and Fisheries Sciences, University of Ghana
Co-Principal Investigator
MANCOGA Project

As the Project lead, what is the MANCOGA project and what does this phase of the project seek to achieve?

MANCOGA is an acronym we have coined from the phrase "Mangroves as Nature-Based Solutions to Coastal Hazards in Eastern Ghana".

The project is scientifically pioneering/piloting the use of mangrove ecosystems as a soft engineering solution to flooding, erosion, and pollution along the East Coast of Ghana. We are doing this with everyone we think connects with the problem and finding solutions to it.

Research uptake is a huge challenge for both scientists and knowledge users. Before designing and implementing any research, it is important to understand which problem the research seeks to address, whom this problem affects most, who needs the knowledge, who can implement research findings and how the research can be designed such that its anticipated outcomes and impacts are realized.

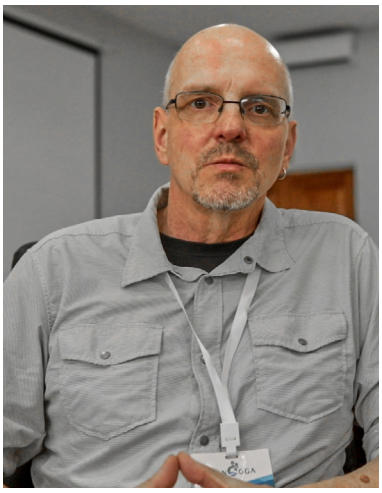
The co-design phase of the MANCOGA project is relevant for the uptake and implementation of the knowledge that will be generated from this project. During this phase, we have worked with a variety of stakeholders with varying interests in the research to co-design and co-implement it.

We have engaged widely with national, regional to community level stakeholders through various media, including but not limited to workshops, special visits, interviews, phone calls, field trips etc. to gather as much information as possible.

Ultimately, we hope that with this co-design approach, the uptake of knowledge generated from the research will be timely and effective.

Erosion along the eastern coast of Ghana

PROJECT LEAD



Dr. Holger Brix
Helmholtz-Zentrum Hereon, Germany
Co-Principal Investigator
MANCOGA Project

Give us a brief about the MANCOGA project.
MANCOGA is about co-designing, looking into mangroves in general, and any accompanying knowledge of what the local conditions are. We would bring in some tools, these tools can include infrastructure, in the sense that we would bring some measurement equipment if needed. But it can also be a computer model, we have developed a digital twin in our institute (Hereon) and this can be adapted for the situation in Ghana and off the coast here, it can be adapted to contain mangroves. We will then put all these results that would be generated from the project into something that we call a digital toolbox.

A digital toolbox would be a device that users/stakeholders can easily use because what we do as scientists is often too complicated to transfer directly to a stakeholder and politician or a local person. We are trying to bring them in a shape and form that is easy to use.

And also here, the aspect of co-design will be important that we hear from the people on the ground what they need and try to form these devices that are the most useful.

What are your expectations at the end of the project?
I would like to not have an end to the project in a way. I mean, the idea is to have a sustainable project that will live beyond the time that we have the funding. For the end of the project, we would be hopefully at a point where we can pass things on to people locally here. We're happy to be involved in the long run. But the core is that the people here locally in Ghana are the ones who own the project and own the tools and everything.

Coastal defense structure at Atorkor in the Anloga District of Ghana

PROJECT LEAD

Prof. Kwasi Appeaning Addo
Institute of Environment and Sanitation Studies, University of Ghana
Co-Principal Investigator
MANCOGA Project

As a coastal erosion expert, what would you want people to know about the current erosion and flooding situations occurring on the eastern coast of Ghana?
The eastern coast is a coastal erosion hot spot in Ghana. Erosion and flooding have damaged properties and brought hardship to the vulnerable communities. Sources of livelihoods have been affected and some natural fish landing sites have also been destroyed.

What are your thoughts in terms of advantages and disadvantages on the current protection method, (that is the hard engineering structures) used in the stabilization of the shoreline?
The hard engineering approach adopted to manage coastal erosion and flooding along the eastern coast is not sustainable. It basically transfers the problem from one location to the other. As the defense structures (groynes) trap sediment to build the eroding beaches, the down drift side is denied of sediment, which results in increased erosion challenges.

What would you say about the use of mangroves to address the issues of flooding and erosion in the eastern coast of Ghana as compared to the hard protection method?
The use of mangroves will enable the erosion and flooding challenges to be sustainably and effectively managed. This approach will enable the systems to naturally evolve and reduce impact on the downdrift coast. In areas where adopting this method will be a challenge due to strong and energetic waves, the hybrid approach can be adopted.

What contribution can you share in relation to the co-design phase of the project?
Involving the community members in co-designing enhances ownership, facilitates partnership and ensures effective participation which will result in sustainable management of the erosion and flooding challenges.

Participants engaged in a group work session during the first stakeholder workshop

CO-DESIGN LEAD

Dr. Christiane Eschenbach
Helmholtz-Zentrum Hereon, Germany
Co-design Lead
MANCOGA Project

What is your role on the MANCOGA project?

I'm a co-lead of the co-design phase and will be co-responsible for the measure "Stakeholder Dialogue & Science-Policy-Society Interface" in the implementation phase of the project. That means, my focus is on the interaction with the stakeholders, which means persons who are involved in or buy from the project.

Stakeholders in MANCOGA come from different sectors, levels, and generations, and include for example representatives of sector ministries, agencies, traditional leaders, and livelihood interest groups (like mangrove planters, harvesters, retailers, etc.). In the first step, we from Germany had to understand better the problems in the Keta Lagoon. During our excursions to the coastline in Keta and the discussions at the three participatory workshops, we got in-depth insights and learned a lot about land use changes, decreasing areas covered by mangroves, and the strong erosion problems in the region.

What are your thoughts on mangroves as NbS to address these problems?

In my opinion, mangroves provide manifold advantages. From scientific studies in other regions, we know that mangroves can present a strong solution to hazards that come with global climatic change, such as flooding and erosion. And they provide more so-called ecosystem services and contribute e.g. to purification of water, biodiversity increase and to blue carbon. As there has been a substantial loss of mangroves in the region, these areas where mangroves have grown before may have a good potential for reforestation. I'm convinced that with MANCOGA we can support decisions in favour of sustainable mangrove management.

What are your thoughts about the Co-design approach that the MANCOGA used?

I'm very impressed by the engagement of all the stakeholders from various societal and administrative sectors and levels. Especially, the discussions during workshops' group work were very intense and produced numerous good and fruitful outcomes. Together we discussed and coined the research questions to be implemented in MANCOGA. I think, the greatest strength of the MANCOGA co-design approach are the connections established

> **My goosebumps moment was when the stakeholders proposed and intoned their new MANCOGA slogan in the local Ewe language, which translate as "MANCOGA, our own! MANCOGA, our own! MANCOGA, it is our own". MANCOGA, Mia tɔe!, MANCOGA, Mia tɔe!!, MANCOGA, Mia'ŋutɔ, Mia tɔe!!!".**

Dr. Christiane Eschenbach
Helmholtz-Zentrum Hereon, Germany
Co-design Lead, MANCOGA Project

and the common understanding derived. Based on this joint understanding all participants exchange experiences at eye level and I think most of us got new interesting insights – for me at least. As the stakeholders' feedback was very positive, I'm pretty confident they also considered their efforts and outcomes to be fruitful. And I'm very confident, that the relationships developed during the co-design phase are an excellent basis for continued engagement with stakeholders in the following MANCOGA implementation phase.

What are your expectations of the project?

The ultimate aim of MANCOGA is to contribute to the improvement of the situation of local people in the Keta region. People at the Keta coast suffer from various hazards and their livelihoods are at risk. And my impression is that they are aware of the necessity to change something in order to improve the situation, but do not have the means to change their situation on their own. There needs to be political decisions to underpin the efforts for sustainable livelihoods - and protection and reforestation of mangroves may be part of the solution. MANCOGA aims to support decisions in favour of mangroves as Nature-based Solutions. We strive for a list of mitigation options and policy reforms. The point where I have some slight concern is that we may not be able to fulfil all the high expectations of the local stakeholders in the two-year duration of the MANCOGA project. However, we assume there will be follow-up projects where we can continue the work and go further steps in order to improve the situation.

What contribution can you make to the co-design approach?

As I'm co-lead of the co-design phase, I hope I could make a substantial contribution by designing and implementing the co-design measures and activities. I'm very happy that we had a successful co-design-phase (as I perceive it) and now got the thumbs up for the implementation phase.
I'm really looking forward to continuing work with the stakeholders and hope we can involve more women from different sectors and engage more with younger people. For this purpose, we will tailor specific measures.

In your MANCOGA experience so far, can you think of a moment that was the most remarkable one?

As I haven't been to Ghana before, there have been many new and very interesting situations and moments during the project. But, my goosebumps moment was when the stakeholders proposed and intoned their new MANCOGA slogan in the local Ewe language, which translate as "MANCOGA, our own! MANCOGA, our own! MANCOGA, it is our own".

MANCOGA, Mia tɔe!, MANCOGA, Mia tɔe!!, MANCOGA, Mia'ŋutɔ, Mia tɔe!!!

CO-DESIGN LEAD

Dr D. Yaw Atiglo
Regional Institute for Population Studies
University of Ghana
Co-design Lead
MANCOGA Project

Tell us the nature of coastal problems on the East Coast?
The environmental hazards on the eastern coast of Ghana include coastal erosion, inundation, salinization and saline intrusion, pollution, land degradation, and depletion of ecosystem services. In some cases, coastal hazards have resulted in the loss of livelihoods, displacement, and resettlement of entire communities.

What interventions are you aware of that have been put in place so far?
The main interventions in these areas include hard engineering infrastructure such as groynes and defense walls. These, however, are expensive and inadequate to solve the challenges associated with coastal erosion in the eastern coast of Ghana.

What are your thoughts on mangroves as NbS to address these problems?
Mangroves provide long term ecological balance, guarding against the effect of erosion and inundation as well as limiting human exposure to these hazards. With the high level of population dependence on mangroves for social and economic livelihoods, mangrove regeneration is necessary for sustained provision of ecosystem services.

What are your thoughts about the Co-design approach that the MANCOGA used?
The co-design approach has yielded immense benefit as stakeholders and researchers have jointly formed a sense of co-ownership of the MANCOGA project.

What are your expectations of the project?
It is expected that the project will inculcate in the population the need to protect and regenerate depleted mangrove resources as well as offer communities and government agencies the needed evidence and knowledge resources for informed decision-making.

What contribution can you make to the co-design approach?
I co-led the co-design phase and facilitated stakeholder engagements as well as contributing to the developed plans for implementation phase of the project.

Modified world cafe session during the first stakeholder workshop

Participants engaged in a world café session during the first stakeholder workshop

IMPLEMENTATION RESEARCH

Prof. Chris Gordon
Institute of Environment and Sanitation Studies, University of Ghana
Senior Research Scientist
MANCOGA Project

As a scientist with years of experience on conservation-related matters, share with us the major challenges of mangrove ecosystems conservation.
Habitat destruction, over-exploitation, poor land-use management, lack of alternative employment, hydrological and climate change are some major challenges in relation to mangrove ecosystems conservation.

As a scientist who has worked within coastal ecosystems, what management measures would you prescribe for mangrove ecosystems within the eastern coast of Ghana?
I suggest that there should be greater involvement of local institutions in management such as chiefs and also management actions based on evidence gathered through research.

Do you foresee any challenge in using mangroves as a Nature-based Solution agent and if so, what possible ways can we address them to ensure their efficiency when used?
An anticipated challenge I foresee in using mangroves as Nature-based Solution is the time lag before effect is held and also a possible tension arising between green and gray solutions. A possible way to address the situation is by education and managing stakeholder expectations.

What key message can you share for consideration in the co-design phase of the project?
There should be true consultation with all and respect shown to differing views.

Sea defense wall at Akplorwotorkor in the Anloga District of Ghana

SCIENTIFIC RESEARCH

Dr. Joanna Staneva
Helmholtz-Zentrum Hereon Germany.
Co-Principal Investigator
MANCOGA Project.

Can you tell us about the observations you have made along the East Coast?
The observations that I made with the knowledge of oceanography of the coast in this part of Ghana, is that it is much affected by different conditions with extreme surges coupled with extreme waves. This is one of the most effective places in Ghana because we have seen the role and the combined impact of surface waves and tides on the coastal erosions, and what we have seen is that in some places the problem of coastal erosion intensifies due to both the climate change but also induced by mangrove changes. For example, in the area where we observe the cutting of mangroves, we can see that the wind has increased and also the waves are stronger increased, which actually leads to intensifying the coastal erosions.

Do you see any interventions in place?
From my field observation, I see that some defense structures have been put into place.

What are your thoughts on mangroves as NbS to these problems?
If it's possible to go by Nature-based Solutions alone then it will be the best solution. It has been used in many areas in developed countries, for example, in Asia, or in Europe. In Asia, of course, mangroves have been used, but in Europe, it's the grasses that are used and this is the best solution for protecting the coast because it is a natural solution, and of course as compared to the coastal engineering construction. So, as we have seen, the hard structures protect of course but also cause problems elsewhere.

However, if we are able to use a Nature-based Solution, that is by planting mangrove trees on the Ghana coast, then this will be the best option for protecting the coast. But not only for protecting the coast and oceans but also for reducing pollution, for carbon dioxide sequestration as well. The disadvantage of coastal engineering structures, of course, is that they are very expensive, especially for developing countries, it is an issue. The second disadvantage, of course, is that they're not natural.

So, if you like to develop ecotourism, for example, most of the defense structures won't be attractive to the tourists.

What are your thoughts about the Co-design approach that MANCOGA is using?

The co-design approach is good and this is a broad show, which allows sharing and adopting opinions not only from the scientists, from the partner institutions which are here, and University of Ghana, but most importantly from the stakeholders. It will be the stakeholders, it will be the community, who will tell us what the most important problems are when it comes to coastal protection and costal erosion, and then how they think that it is possible to solve it. It will be the community and stakeholders who will advise us on what we should do in the implementation phase, such as what kind of model is needed.

For example, during the discussion, it was mentioned that understanding the wave dynamics is more important. Therefore, we are going to set up and develop and validate the wave model and we are going to set up the coastal erosion model. And even more, the stakeholders can advise us what will be the most important 'what if scenario' that we can define and then make with these kinds of tools, which are integrated observing and modeling tools.

What are your expectations of the project?

This kind of project is just a start. So, we have to be aware that now we have nine months of co-design and then two years of project details. This is just the beginning, we are nicely aware that here we are at the very beginning when it comes to the observational system. What we have seen from the field trip and from the discussions during the workshop is that this part of the earth in this part of Africa really suffered severe acts of erosion.

So, without sufficient observation, it is very difficult to proceed, it is very difficult to further develop the model and the idea is that we will develop the models based on what is existing. But what is also important is that the models and tools that are developed are transferable. So, we don't want just to make science and develop some tools that we use for nice publication, but what is important is that we transfer this knowledge to actively aid capacity building.

The outcome is transferred, not only to the academic and scientific community but also to the stakeholders, the decision makers, when it comes to Nature-based Solutions.

Erosion along the eastern coast of Ghana

SCIENTIFIC RESEARCH

Dr. David Kaiser
Helmholtz-Zentrum Hereon, Germany
Research Scientist
MANCOGA Project

Can you and tell us the nature of coastal problems on the East Coast?
The eastern coast of Ghana suffers erosion of the beaches and coastline. This threatens the living environment for local communities. Water exchange between the Keta Lagoon and the ocean is disrupted by sediment accumulation.

This creates problems for fisheries and water quality. Reduced profitability of fishing in the lagoon and Volta estuary as well as in the coastal ocean, has increased the reliance on exploitation of mangroves.

What interventions are you aware of that have been done so far?
Hard engineering measure have been implemented to prevent erosion. The Volta estuary has been dredged occasionally to increase water exchange. Assessments have started in western Ghana for more sustainable mangrove use as alternative livelihoods.

What are your thoughts on mangroves as NbS to address these problems?
Using mangroves to prevent erosion along coastal beaches will be challenging because of the high energy of the system and slope of the shoreline. These conditions are not ideal for the establishment, growth and maintenance of mangroves. Modelling the erosion in this system with and without mangrove vegetation is important. Exploring the non-destructive mangrove-based livelihoods is very promising.

Mangroves may contribute more to small-scale high-value fisheries, and other uses such as honey collection, if left uncut for longer periods.

This would also increase their capacity to maintain water quality, with positive feedback on other exploitable resources.

Larger areas of uncut mangroves increase carbon dioxide uptake, contributing to Ghana's Paris Agreement Nationally Determined Contributions (NDCs) and providing livelihood benefits in the form of carbon credits.

What are your thoughts about the Co-design approach that MANCOGA used?
Co-design is necessary to optimise MANCOGA outcomes. The effective implementation of scientific expertise is enhanced by expert knowledge and experience of local communities, and its transfer into action can only be fruitful through the inclusion and participation of political decision makers. Moreover, a feeling of ownership of the efforts and outcomes of all project activities will improve the chances for sustained effects of the knowledge-driven actions.

What are your expectations of the project?
I hope to see a group of people from different backgrounds, who fight together for sustainable livelihoods for coastal communities in Ghana, who understand that the effects carry beyond these communities, and who are armed with the scientific knowledge and socio-political tools to win this fight.

What contribution can you make to the co-design approach?
I contribute my background as a researcher in coastal biogeochemistry and mangrove ecology to the stakeholder's toolbox. Beyond that, I work to facilitate the meeting of and communication between these stakeholders, and to be an approachable equal who shares his expertise and energy openly.

Flooded coastal community in the Anloga District of Ghana

SCIENTIFIC RESEARCH

Dr. Benjamin Osei Botwe
Department of Marine and Fisheries Sciences, University of Ghana.
Research Scientist
MANCOGA Project

Can you tell us the nature of coastal problems on the East Coast?

I am aware of storm surges, flooding, erosion, and subsidence which pose hazard to human safety with adverse socio-economic implications.

What interventions are you aware of that have been done so far?

In recent times, the Government of Ghana has built hard engineering structures such as revetments, and groynes have been constructed along the coast to minimize the erosion and flooding from the waves.

What are your thoughts on mangroves as NbS to address these problems?

Mangroves are a better alternative to the hard engineering structures. Hard engineering structures provide transient or short-term solutions, are expensive and unsustainable and transfer the problem downdrift. They may also be destructive to coastal ecosystems and disrupt livelihoods.

Mangroves on the other hand provide a lasting solution at a cheaper cost and they are sustainable.

What are your thoughts about the Co-design approach that MANCOGA used?

The project team will work with wider stakeholders from diverse sectors including community and local level representatives to design the project from its inception and co-deliver the scientific knowledge and the partnerships needed to increase understanding of the coastal environment, build local-level capacity to promote the adoption of mangroves as Nature-based Solutions to address coastal erosion.

What are your expectations of the project?

A successful project implementation, improved quality of the coast, and increased local level capacity to promote the adoption of mangroves as Nature-based Solutions to address coastal erosion as well as share knowledge.

The Volta River estuary at the eastern coast of Ghana

SCIENTIFIC RESEARCH

Mr. Senyo Adzah
Research Assistant
MANCOGA Project

Can you tell us the nature of coastal problems on the East Coast?
There are many problems within the eastern coast. For me, the main problems include coastal erosion, flooding, unsustainable mangrove exploitation and low fish catch in recent times.

The issues also create other effects within the area. For example, the nesting areas of vulnerable biodiversity like the marine sea turtle is destroyed and this in turn affects tourist activities.

The abundance of freshwater and brackish fish is negatively affected as result of the destruction of the mangrove ecosystems as well. These problems have affected income levels in the local communities.

What are your thoughts on mangroves as NbS in addressing coastal flooding and erosion?
Nature-based Solutions are the way to go currently when we want to repair nature. The current solution by the government of Ghana to address the situation is the use of stones to stabilize the coast lines.

Research has shown that this method is pushing some other effects elsewhere.

As the name suggests, we need to consider methods that will be in consonance with nature and it is possible that it can be done here on our coast. Where possible, we may combine this nature-based strategy with the hard engineering method that is currently in place to address the problems of erosion and flooding.

PROJECT COORDINATION

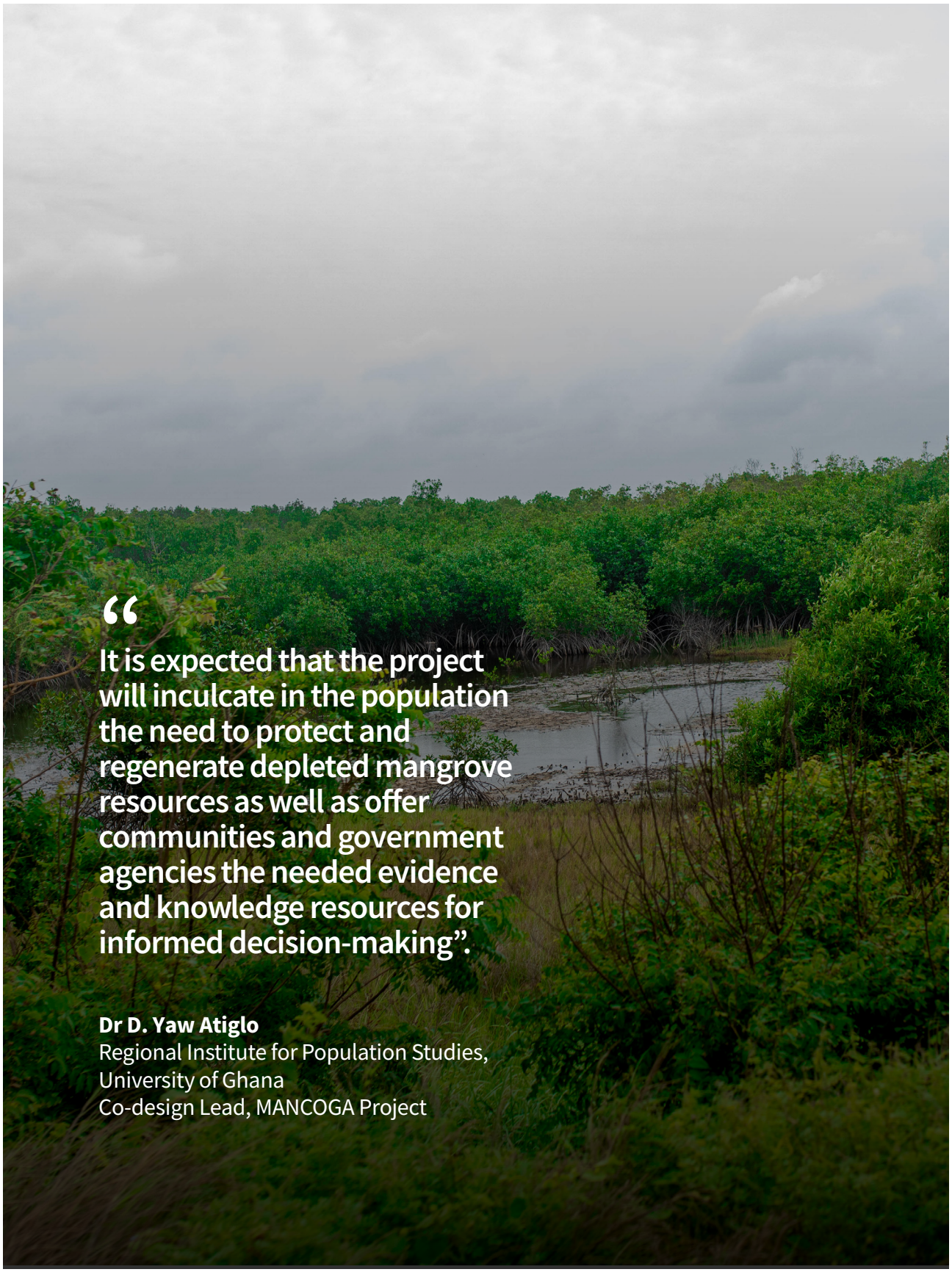
Ms. Antoinette K. Ankrah
Project Coordinator
MANCOGA Project

Tell us your experience about the co-design phase of the project?
My journey on the co-design phase has been phenomenal. This phase has enlightened me on the wonderful experience of engaging stakeholders of different facets in planning for a project rather than the norm of sparingly engaging stakeholders during implementation.

The new experience has helped me improve my teamwork abilities, especially with people with a broader range of expertise.

The phase was a success and I am looking forward to its impact during the implementation stage. After reaping the benefits, I hope this will be a stepping stone to a new era of project implementation in the country and beyond. Many thanks to all who made this stage a possibility. Long live MANCOGA!

MANCOGA project partners during a field visit along the eastern coast of Ghana



“It is expected that the project will inculcate in the population the need to protect and regenerate depleted mangrove resources as well as offer communities and government agencies the needed evidence and knowledge resources for informed decision-making”.

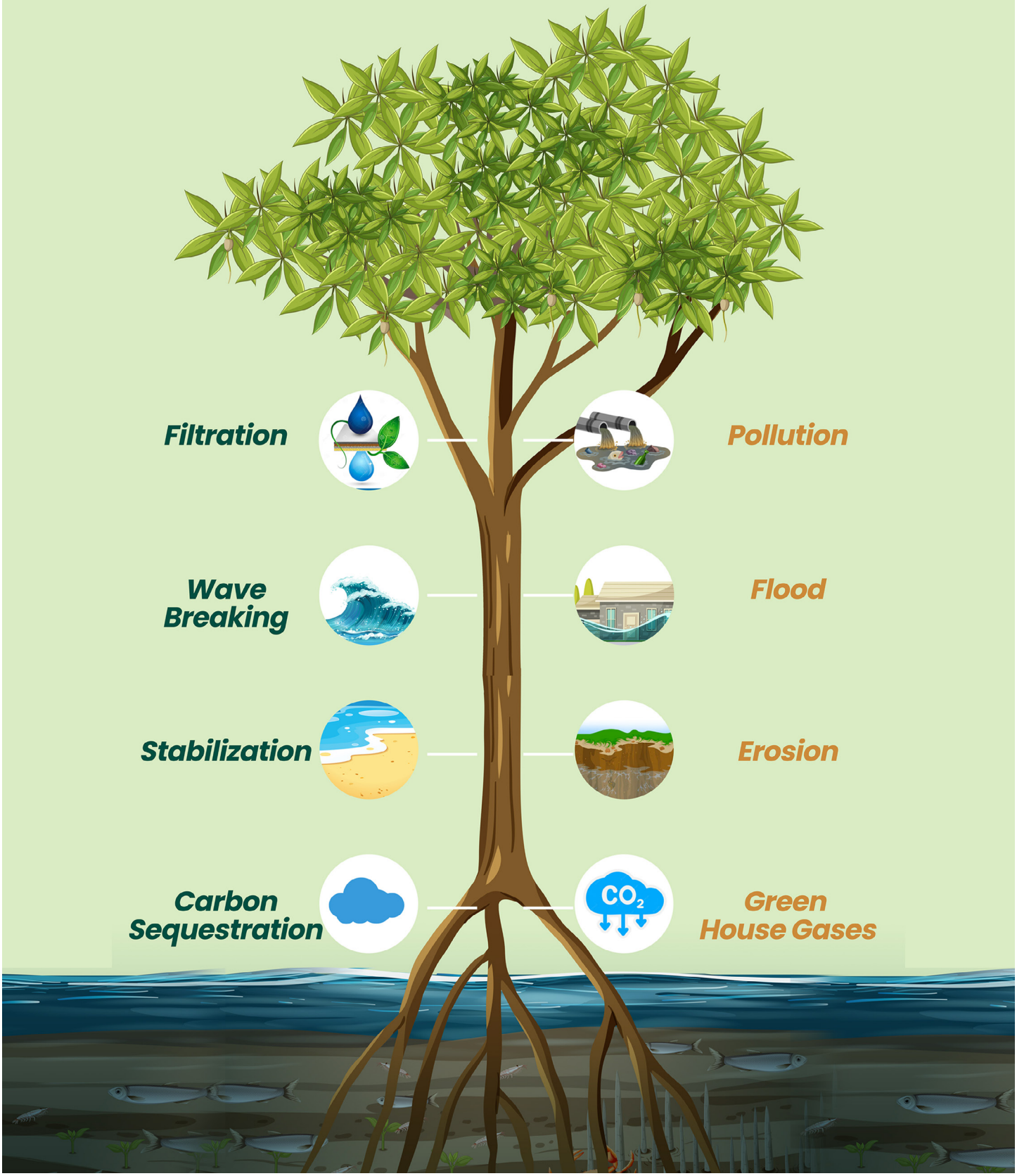
Dr D. Yaw Atiglo
Regional Institute for Population Studies,
University of Ghana
Co-design Lead, MANCOGA Project

LIST OF MANCOGA PARTNERS

NO	NAME OF REPRESENTATIVE	INSTITUTION
STAKEHOLDERS		
1.	EMELYNE WRIGHT-HANSON	MINISTRY OF ENVIRONMENT, SCIENCE, TECHNOLOGY & INNOVATION
2.	MATHIAS KUMAH	MINISTRY OF ENVIRONMENT, SCIENCE, TECHNOLOGY & INNOVATION
3.	ISAAC DAKURAH	MINISTRY OF ENVIRONMENT, SCIENCE, TECHNOLOGY & INNOVATION
4.	SAFIATU SEIDU	MINISTRY OF LANDS & NATURAL RESOURCES
5.	DONNAN TAY	MINISTRY OF SANITATION AND WATER RESOURCES
6.	GEOFFREY TAMAKLOE	MINISTRY OF TOURISM, ARTS AND CULTURE
7.	KILAN B. GYADOR	MINISTRY OF TOURISM, ARTS AND CULTURE
8.	DAVID AKRASI	MINISTRY OF LOCAL GOVERNMENT, DECENTRALIZATION & RURAL DEVELOPMENT
9.	DICKSON AGYEMAN	FORESTRY COMMISSION
10.	LAWRENCE KISSEH TETTEH-OCLOO	KETA LAGOON COMPLEX RAMSAR SITE, WILDLIFE DIVISION OF THE FORESTRY COMMISSION
11.	GODWIN YEGBE	FORESTRY COMMISSION- WILDLIFE DIVISION
12.	ERNESTINA LARBI-MENSAH	COASTAL DEVELOPMENT AUTHORITY
13.	CELESTINA DEKU	LAND USE AND SPATIAL PLANNING AUTHORITY
14.	EBENEZER NTSIFUL	LAND USE AND SPATIAL PLANNING AUTHORITY
15.	MAXWELL ZU-CUDJOE	ENVIRONMENTAL PROTECTION AGENCY (KETA)
16.	THEODARE TELLO NELSON	ENVIRONMENTAL PROTECTION AGENCY (KETA)
17.	MUSTAPHA ADAMAH	GHANA MARITIME AUTHORITY
18.	JAMES AGGREY	WATER RESOURCES COMMISSION
19.	ERIC MUALA	WATER RESOURCES COMMISSION
20.	HOENYEDZI GODSON KAFUI	HYDROLOGICAL SERVICES DEPARTMENT
21.	EUNICE OFOLI-ANUM	FISHERIES COMMISSION
22.	HENRIETTA ASANTE-SARPONG	NATIONAL COMMISSION FOR CIVIC EDUCATION
23.	IRENE AMIHERE	NATIONAL COMMISSION FOR CIVIC EDUCATION
24.	IMURANA MOHAMMED	NATIONAL COMMISSION FOR CIVIC EDUCATION

25.	ANTHONY ADEEA MBA	INTERNATIONAL UNION FOR CONSERVATION OF NATURE
26.	BRIGHT ELORM DOVIAVU	NATIONAL DISASTER MANAGEMENT ORGANIZATION
27.	RAPHAEL DE-SOUZA	NATIONAL DISASTER MANAGEMENT ORGANIZATION
28.	ERNEST APENKWAH	SONGOR RAMSAR SITE, ADA
29.	GERSHON KWADZO TUDOABOR	SOUTH TONGU DISTRICT ASSEMBLY
30.	WISDOM ATTIGAH	ANLOGA DISTRICT ASSEMBLY
31.	GIDEON MARC NUVIADENU	ANLOGA DISTRICT ASSEMBLY
32.	LAWRENCE AWUNYO	KETA MUNICIPAL ASSEMBLY
33.	MOHAMMED HALISU ADAM	KETU- SOUTH MUNICIPAL ASSEMBLY
34.	FAUSTINA BORKLOE	SOCIAL WELFARE DEPARTMENT (GENDER DESK)
35.	TOGBUI KUMASSAH	TRADITIONAL LEADER- ANLO STATE
36.	TOGBE TAY-AGBOZO	KETA MUNICIPALITY
37.	BRIGHT ADZAGBA	KETA RAMSAR CENTRE
38.	RAPHAEL AHIAKPE	SEAWATER SOLUTIONS
39.	JOHN LUMOR	MANGROVE PLANTERS ASSOCIATION
40.	KUGBE GERSHON	MANGROVE HARVESTERS ASSOCIATION
41.	ELISHA ABRAHAM AMETEPE	MANGROVE TRANSPORTERS ASSOCIATION
42.	MOSES AGBENYEGAH	MANGROVE RETAILERS ASSOCIATION
43.	SAMUEL BRASS DEDZO	LAND OWNERS ASSOCIATION
44.	REDEEMER AKOSUA FIASHIEDE	LAND OWNERS ASSOCIATION
45.	VANCE KWAKU ADEDZE	GHANA NATIONAL CANOE FISHERMEN COUNCIL
46.	LOTSU RAYMOND	SALT MINERS ASSOCIATION
47.	DANIEL DUNYAH	FARMERS ASSOCIATION
PROJECT TEAM		
48.	EDEM MAHU	UNIVERSITY OF GHANA
49.	KWASI APPEANING ADDO	UNIVERSITY OF GHANA
50.	CHRIS GORDON	UNIVERSITY OF GHANA
51.	DONATUS YAW ATIGLO	UNIVERSITY OF GHANA
52.	PHILIP-NERI JAYSON-QUASHIGAH	UNIVERSITY OF GHANA
53.	BENJAMIN BOTWE	UNIVERSITY OF GHANA
54.	ANDY AGYEKUMHENE	UNIVERSITY OF GHANA
55.	SENYO ADZAH	UNIVERSITY OF GHANA
56.	ANTOINETTE KAILEY ANKRAH	UNIVERSITY OF GHANA
57.	HOLGER BRIX	HELMHOLTZ-ZENTRUM HEREON, GERMANY
58.	CHRISTIANE ESCHENBACH	HELMHOLTZ-ZENTRUM HEREON, GERMANY
59.	DAVID KAISER	HELMHOLTZ-ZENTRUM HEREON, GERMANY
60.	JOANNA STANEVA	HELMHOLTZ-ZENTRUM HEREON, GERMANY
61.	BUGHSIN' DJATH	HELMHOLTZ-ZENTRUM HEREON, GERMANY

Mangroves Save Vulnerable Coasts



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The EventPR Company Limited
WhatsApp: +233 (0)26 160 9953
@theeventpr