AUTORITE DU BASSIN DE LA VOLTA
Direction Exécutive

VOLTA BASIN AUTHORITY
Executive Directorate

Bénin | Burkina Faso | Côte d'Ivoire | Ghana | Mali | Togo

Training Workshop on

"The management of ecosystems for climate change adaptation in the Volta basin"

(Wa, Ghana, 15 - 19 July 2019)

Report

Global Water Partnership West Africa

Table of contents

List of tables

List of figures

List of acronyms and abbreviations

Acronyms/ abbreviations	Meaning
CC	Climate Change
CIWA	Cooperation in International Waters in Africa Program
CREMA	Community Resource Management Area
CSO	Civil Society Organization
CWP	Country Water Partnership
CWP Ghana	Ghana Country Water Partnership
DRR	Disaster Risk Reduction
EbA	Ecosystem-based Approaches
GEF	Global Environment Facility
GHG	Green House Gas
GW	Groundwater
GWP-WA	Global Water Partnership of West Africa
IWRM	Integrated Water Resources Management
LI	Legislative Instrument
NBA	Niger Basin Authority
NGO	Non-Governmental Organization
PAGEV	Project for Improving Water Governance in the Volta River Basin
SAP	Strategic Action Programme
TDA	Transboundary Diagnostic Analysis
UNEP	United Nations Environment Program
VBA	Volta Basin Authority
VSIP	Volta basin Strategic Action Programme Implementation Project'
WRC	Water Resources Commission
WRI	Water Research Institute

Summary

From 15 to 19 July 2019 in Wa, Ghana, the Volta Basin Authority (VBA), in collaboration with the Global Water Partnership of West Africa (GWP-WA), convened a training workshop focusing on the theme the ‘‘Management of ecosystems for Climate Change Adaptation in the Volta Basin’’. This training workshop is part of the ‘‘Volta basin Strategic Action Programme -SAP- Implementation Project’’ (VSIP)-, co-financed by the Cooperation in International Waters in Africa (CIWA) Program, the Global Environment Facility (GEF) and the VBA through the World Bank. The main objective of the training workshop was to enhance the capacity of participants representing Civil Society Organizations (CSO), Youth associations (men and women) and Local governments on the management of ecosystems in the Volta Basin. The specific objectives were as follows: (i) Enhance the capacity of the participants in planning and mainstreaming ecosystem-based approaches to climate change adaptation into programmes and projects in the Volta basin; (ii) Strengthen the capacity of the participants in planning and implementing activities to maintain and protect riverbanks in the Volta Basin; (iii) Strengthen the capacity of the participants to understand and implement procedures and processes related to Integrated Water Resources Management (IWRM) and sustainable management of wetlands in the Volta Basin; and (iv) Enable the participants to transfer their knowledge and skills to communities.

The training workshop was facilitated by the GWP-WA, in collaboration with the Water Resources Commission (WRC), the National Focal Point for VBA in Ghana, the Water Research Institute (WRI), the Country Water Partnership of Ghana (CWP- Ghana) and the Executive Directorate of the VBA.

The methodological approach of the workshop was guided by three main steps: preparation, implementation and reporting. The training workshop was structured around a series of modules. The modules were delivered in sessions using an andragogical approach with didactic materials aimed at sharing participants’ experiences through various techniques of facilitation and for group dynamics to ensure the active participation of all trainees. Participants expressed their expectations so as to allow for assessment of the workshop in the end.

A total of thirty-three (33) participants attended the training workshop. The communication on VBA and its mandate has given trainees knowledge of the existence of the institution and the arrangements in place towards mobilising efforts at securing the resources of the Volta basin’s ecosystems to sustainably guarantee the benefits and services derived. Participants were taught the concepts of IWRM in relation to ecosystem-based approaches to climate change adaptation towards improvement in management of the Volta basin resources.

The objective of the field visit, to the Community Resilience Management Area (CREMA) at Zukpiri, was to provide practical aspects by applying the knowledge and instruments gained in the early days of the training workshop. The visit allowed for interaction with CREMA members to appreciate the progress made and the associated challenges. In general, participants noted the knowledge transfer and agreed with the organisers of the relevance of the workshop and that it was timely. Further, the trainees agreed that there was need to organise this workshop in other parts of the basin, as it provides avenues to manage better the basin’s resources to guarantee the useful services.

Trainees received certificates to acknowledge their participation.

Participants noted the following recommendations:

- The organizers should work at getting a lot of communities to participate in the training;
- The organizers should ensure that the trainees meet a certain minimum requirement in terms of their ability to read and write so as to enhance knowledge transfer;
- The trainers should make room for more group works to enhance uptake of concepts and to have more time to discuss their practical approaches;
- The organizers should increase the frequency of training workshops so as to improve knowledge of the larger populations in the basin;
- The organizers should consider holding the workshop within the district assembly setting;
- The organizers should work at providing more tools on vulnerability assessment and teach how to use them.

Participants identified and proposed measures that were consolidated into an action plan covering the timeframe 2019 - 2021 for Ghana to valorize the knowledge gained to ensure the protection of ecosystems, forest galleries and wetlands in the Volta basin. Finally, participants appreciated the call of the VBA and look forward to working closely and collaboratively through the WRC in order to improve the resources of the basin for the betterment of life of its people.

Background

From 15 to 19 July 2019 in Wa, Ghana, the Volta Basin Authority (VBA), in collaboration with Global Water Partnership West Africa (GWP-WA), convened a training workshop focusing on the theme "Management of ecosystems for Climate Change Adaptation in the Volta Basin".

This training workshop is part of the ‘‘Volta basin Strategic Action Programme -SAP- Implementation Project (VSIP)’’, co-financed by the Cooperation in International Waters in Africa (CIWA) Program, the Global Environment Facility (GEF) and the VBA through the World Bank.

The Volta Basin SAP was developed based on the findings of the Transboundary Diagnostic Analysis -TDA- (UNEP-GEF Volta, 2012) of the basin and the results of an extensive consultation process with VBA stakeholders. It consolidates the required measures and investments to: (i) ensure the availability of water; (ii) conserve and restore ecosystem functions; (iii) ensure adequate water quality; and (iv) strengthen governance and information management in the Volta basin. Those measures and investments respond to the priority transboundary problems that emerge from the TDA of the basin, particularly:

- The change in the water quantity and the seasonal flows;
- The degradation of ecosystems illustrated by the coastal erosion in downstream areas of the basin, the proliferation of invasive aquatic species, the increased sedimentation of river courses and loss of soil and vegetation;
- The water quality concerns originated from agriculture, industrial sites as well as domestic and agricultural activities.

The VSIP aims to improve the capacity of the VBA for transboundary water resources management through institutional development activities that address the main weaknesses of the institution highlighted above and implementation of priority actions of the SAP, which will result in direct environmental and livelihoods benefits.

The VSIP includes four components, including Component 3 that focuses on the implementation of the SAP, through three Sub-components, namely:

- Sub-component 3.1. Protection of ecosystems: concerning Benin, Côte d'Ivoire, Ghana and Togo; this activity enhances priority actions related to the SAP Actions B.4 and B.7 targeting degraded forest ecosystems in these regions. In Benin and Togo, those challenges are common along the mountains and near the Pendjari-Oti rivers’ banks, while in Ghana and Côte d'Ivoire they are related to the Black Volta sub-basin;
- Subcomponent 3.2. Protection of Riverbanks: it targets Burkina Faso and corresponds to the SAP Action A.2, which addresses the water level challenges of tributaries of the Mouhoun River, one of the key flows of the Volta River, and located in the northern region of Burkina Faso;
- Subcomponent 3.3. Capacity building targeting vegetables producers’ groups. This sub-component corresponds to the Action A.3 and will be applied in Mali. It will be implemented in the Sourou basin through small actions to strengthen the capacities of vegetable’s producers with training activities, the procurement of equipment for producing and storing vegetable products.

This report consolidates the outcomes and products delivered from the training workshop. It is structured around the following main points:

- Methodology employed to carry out the training;
- Opening ceremony and preliminary settings;
- Implementation of the training modules, participation and the field visit;
- Evaluation of the workshop;
- Closing ceremony and training certificate handover to participants;
- Conclusions and recommendations.

1. Objectives and methodological approach

1.1. Objectives

The main objective of the training workshop was to enhance the capacity of trainees representing Civil Society Organizations (CSO), Youth associations (men and women) and Local governments on the management of ecosystems in the Volta basin.

The specific objectives were as follows:

- Enhance the capacity of the participants in planning and mainstreaming ecosystem-based approaches to climate change adaptation into programmes and projects in the Volta basin;
- Strengthen the capacity of the participants in planning and implementing activities to maintain and protect riverbanks in the Volta basin;
- Strengthen the capacity of the participants to understand and implement procedures and processes related to Integrated Water Resources Management (IWRM) and sustainable management of wetlands in the Volta basin;
- Enable the participants to transfer their knowledge and skills to the communities.

1.2. Methodological approach

The training workshop was facilitated by the GWP-WA, in collaboration with the WRC, the Focal Point for VBA in Ghana and the CWP- Ghana and the Executive Directorate of the VBA:

- Mr. Dibi MILLOGO, VBA Deputy Executive Director;
- Mr. Razaki SANOUSSI, VBA Director in charge of IWRM Planning;
- Dr. Jacob TUMBULTO, VBA Director in charge of the Volta Observatory and Project Coordinator, VSIP;
- Mr. Armand K. HOUANYE, Lead Trainer, GWP-WA Executive Secretary;
- Prof. Fabien HOUNTONDJI, GWP-WA Associated Trainer;
- Mr. Maxwell BOATENG-GYIMAH, Local Expert Trainer, CWP-Ghana Executive Secretary;
- Mr. Joachim Ayiiwe ABUNGBA, Principal Officer, Black Volta Basin Secretariat;
- Mr. Ben AMPOMAH, Executive Secretary of Water Resources Commission;
- Dr. Felix AKPABEY, Senior Researcher, Water Research Institute of Council for Scientific and Industrial Research.

The methodological approach of the workshop was based on three main steps, namely preparation, implementation and reporting:

- The preparatory step focused on the development of the workshop concept note and agenda, development of the training modules and manual, identification and mobilization of the participants and management of the logistic related the training;
- The implementation step that alternated presentation of communications followed with debates as well as working groups which results were presented in plenary, and a field visit;
- The reporting step, which consisted of synthesizing and analyzing all products that resulted from the workshop on the one hand and preparing the workshop report on the other hand.

Participants identified and proposed measures that were consolidated into an action plan covering the timeframe 2019 - 2021 for Ghana to valorize the knowledge gained to ensure the protection of ecosystems, forest galleries and wetlands in the Volta basin.

1.2.1. Workshop facilitation methods and tools

The training workshop was structured around a series of modules. The modules were delivered in sessions using an andragogical approach with didactic materials valorizing participants' experiences through various techniques of facilitation and for dynamic group to ensure the active participation of all trainees. Participants played the first role in order to guarantee their commitment as well as to bring them to own the results expected from the training.

Teaching materials include communications, pieces of political/ legal texts, video productions, preparatory documents (agenda, terms of reference), participants' kits as well as materials and equipment like boards, flip charts, meta plan and the video projector.

Techniques used to facilitate the workshop include group works alternating with plenary sessions, role-playing and simulating games, brainstorming, sessions of questions and answers to improve understanding of participants and to assess what they gained from the previous day while starting a new day, 2 to 3-minutes to break the monotony and bring back the participants' attention.

1.2.2. Content and duration of the training workshop

The training workshop focuses on the following three thematic:

- Thematic 1 entitled ‘‘The restoration and the protection of ecosystems for climate change adaptation in the Volta basin’’ aiming at building the capacity of the actors from the local institutions in the sustainable management of the ecosystems of the Volta basin;
- Thematic 2 entitled ‘‘The maintenance of riverbanks’’ which aims to strengthen the capacity of the actors from the local institutions on the protection of the riverbanks in the Volta basin;
- Thematic 3 entitled: ‘‘The protection of the wetlands and IWRM Process’’ aiming at building the capacity of the actors from the local institutions on the sustainable management of the wetlands and the IWRM process in the Volta basin.

At the starting of the workshop, participants were introduced to the VBA's mission and mandates, its achievements and prospects in ensuring the integrated and sustainable management of natural resources of the Volta basin. This introduction was linked with the ongoing process focusing on the preparation of a water charter for the basin and related opportunities in line with the thematic covered by the training sessions.

The workshop also includes:

- A field visit targeting the national part of the Volta basin;
- A session dedicated to the approach, tools and methods for transferring knowledge and know-how to communities;
- Reflections on the identification and the implementation of actions to ensure the protection of ecosystems, the protection of forest galleries as well as wetlands in the Volta basin. The results of those reflections were used to design a consolidated action plan targeting the whole basin to be implemented by 2021, considering the specificities of the Ghanaian’s part of the Volta basin.

The workshop took place over a period of five (5) days around five (05) modules.

The first three days in rooms focused on the development of the four (04) following modules:

- Module 1: The Volta Basin Authority: mission mandates, achievements and prospects for integrated and sustainable management of natural resources of the Volta basin;
- Module 2: The restoration and the protection of ecosystems for climate change adaptation in the Volta basin;
- Module 3: The maintenance of riverbanks in the Volta basin;
- Module 4: The protection of wetlands and IWRM Processes in the Volta basin.

The 4th day of the workshop was devoted to the organization of a field visit in Zukpiri Community Resource Management Area (CREMA) in the Nadowli-Kaleo District of the Upper West Region, located in the Ghanaian part of the Volta basin.

The 5th day of the workshop focused on the development of the Module 5: The transfer of knowledge and know-how to communities: approach, tools and methods with the working groups on the identification and design of actions to be implemented to conserve and protect ecosystems, forest galleries and wetlands in the Volta Basin.

The Annex 1 presents the training agenda.

1.2.3. Workshop participants

The training workshop was attended by thirty-three (33) trainees including:

- Representatives from Civil Society Organizations (CSOs) working in the field of water and the environment within the Volta basin, altogether 12 trainees including;
- Representatives of youth (men's) associations from the Volta basin, altogether 7 trainees;
- Representatives of youth (women's) associations from the Volta basin, altogether 5 trainees;
- 4 trainees representing 4 local governments in the Ghanaian part of the basin.
- Other participants, altogether 5.

The Annex 2 presents the list of participants who attended the workshop.

2. Opening ceremony and preliminary settings

At the beginning of the workshop, an opening ceremony was held and introductory sessions were made to familiarize participants with themselves and with the proposed agenda for a good implementation of the workshop.

2.1. Official opening ceremony

The Meeting started at about 10:10am with a prayer by Mr. Paul DASSAL. Following, Mr. Aaron Bundi ADUNA, Chief Officer in charge of the White Volta Basin welcomed participants to the meeting on behalf of the Executive Secretary of Water Resources Commission (WRC).

Next was the intervention of Mr. Dibi MILLOGO, Deputy Director of the VBA, who noted that the theme for the training workshop: "Management of ecosystem for climate change adaptation in the Volta Basin", was part of the activities of the Volta Basin Strategic Action Program Implementation Project (VSIP). He highlighted a number of environmental problems in the basin including land degradation and loss of vegetation cover, pollution from agricultural, industrial, domestic and mining, and change in water quantity and seasonal flows. He encouraged participants of the workshop to be ambassadors to carry the knowledge to be acquired from the training to those who were unable to participate and called for preparation of action plan for implementation in communities.

In opening the workshop, the Chief Director of Upper West Regional Coordinating Council, Mr. Mohammed NURUTEK welcomed participants from Burkina Faso and Benin to Ghana, particularly Wa, in the Upper West Regions. He outlined the critical role of ecosystems to life and livelihood of communities within the Volta Basin catchment. This had led to over exploitation of the resources, bringing in its wake extreme conditions of degradation, arising from illegal mining and deforestation. As a result, it was necessary to protect and preserve the resources for today and posterity. In conclusion, Mr. NURUTEK, on behalf of government, extended his gratitude to the WRC and partners in the implementation of the Volta Basin Authority Strategic Action Program Project (VSIP), which aims to improve the capacity of local stakeholders for trans-boundary water resources management through institutional development and related activities that will help address some of the challenges faced in the management of water resources in the basin.

The Annex 3 presents speeches delivered by the officials (Figure 1) during the opening ceremony of the training workshop.

Figure 1: Official opening ceremony
(From the left to the right: The Chief Director of Upper West Regional Coordinating Council, the Chief Officer in charge of the White Volta Basin, the VBA Deputy Executive Director, the GWP-WA Executive Secretary)

2.2. Preliminary settings

Participants took turns to introduce themselves. Following, Mr. Armand HOUANYE, Executive Secretary of GWP-WA took participants through the programme outline for the workshop. He noted the objective for the workshop, "to enhance the capacity of participants including Civil Society Organizations (CSOs), Youth Association of men and women and decentralized administrations on management and development of ecosystems in the Volta Basin". Participants adopted the programme as working document of the workshop. Further, they expressed expectations of the workshop and included the following:

- « I want to gain in-depth knowledge in Integrated Water Resources Management (IWRM) »;
- « I want to know how to implement activities related to IWRM in the field ».

For a swift implementation of the workshop, participants agreed upon a few rules to follow or a swift conduct of the workshop. These rules were about timely implementation of the workshop programme, responsibleness use of cell phone, and limited chat and movements while in the training workshop.

A chief of village and a time keeper were nominated for the workshop.

3. Implementation of the training modules and the field visit

Hereafter are summarized the key points related to the implementation of the training modules and the field visit.

3.1. Module 1: The Volta Basin Authority: mission, mandates, achievements and prospects

Module 1 introduced participants to the existence of the VBA including its mission, mandates, achievements since its establishment in 2006, and prospects for integrated and sustainable management of natural resources of the Volta Basin.

3.1.1. Session 1.1: VBA, progress in the implementation of the SAP and prospects

Dr. Jacob TUMBULTO made a presentation on progress made by the VBA in the implementation of its Strategic Action Programme « SAP, 2010-2024 ». He noted that a five-year Strategic Plan is drawn from the main framework to guide the organization's engagement. Therefore, the present document being implemented was the Strategic Plan 2015-2019, out of which the VSIP was developed. Further, he noted the Convention that set up the VBA, its mandate and organs. Further, the challenges related to financing its activities was noted, and the activities implemented since its existence as well as the gains made. Some comments/suggestions included the following:

- What is the practical contribution of the VBA to the countries?
- What has changed in terms of the water quality and quantity since the VBA interventions?
- How does VBA relate its operations to government policies in Ghana?

Dr. Jacob TUMBULTO responded to the questions from participants. In short, VBA is an institution created by the countries to ensure the international cooperation and coordination of the Volta basin resources between the its six Member States. As such, VBA policies, strategies and interventions are oriented and convened by the States and operated by and/ or with them.

3.1.2. Session 1.2: The Volta Basin Water Charter under development and prospects for the sustainable management of the basin's ecosystems

In a presentation made, Mr. Dibi MILLOGO shed light on the preparation process of the Water Charter. The Charter is a legal document containing 8 chapters, 25 articles and 170 provisions. He noted the progress made in the documentation and consultations carried out in the countries that led to the Charter and related appendices. According to him, the Council of Ministers approved the Charter in May 2019 at its 7th Conference held in Accra. This will be followed by adoption by the Heads of State and Government of the six countries and ratification by the respective Parliaments in the six countries. These are expected to be done within eighteen months. However, when the fourth country ratifies, the Charter will come into force and countries will be expected to comply with the provisions towards the sustainable development and management of the basin's resources.

Some questions which were answered included the following:

- Did the Charter consider existing charters?
- What is the mechanism for ensuring that data are shared across borders?

The Charter built on experiences of existing ones in the region, particularly that one of the Niger Basin Authority (NBA). The VBA website is under construction to support information sharing besides the focal structure channels and others.

3.2. Module 2: The restoration and the protection of ecosystems for climate change adaptation in the Volta Basin

Module 2 was prepared based on the problems of land degradation and loss of vegetation, impacting the livelihood of populations, and exacerbated by the consequences of climate change in the basin. As a result, it was important to draw the attention of participants to the need to restore and protect the ecosystems for climate change adaptation in the Volta Basin, and to ascertain opportunities and challenges of integrating ecosystem-based approaches into policies, strategies and plans.

3.2.1. Session 2.1: The Climate change and its related impacts on people and the environment in West Africa and the Volta Basin

Prof. Fabien HOUNTONDJI made a presentation on Climate Change (CC) and its related impact on people and the environment in West Africa, and particularly, the Volta basin. He noted the definitions of some concepts including climate and climate change. He provided the basis for the occurrence of climate variation and change, particularly, the high concentration of Green House Gas « GHG » in the atmosphere. He observed that the West African sub-region is expected to have an increase in temperature by 1°C to 2°C. He cited the impacts of floods and drought associated with climate change and the need to prepare against such catastrophes.

The session was very interactive, allowing questions such as the following:

- What can be done to recycle the Green House Gas « GHG » to enhance usage in the home?
- How do communities adapt in the event of floods?

Prof. HOUNTONDJI provided responses to clarify the issues raised. Recycling of GHG supposes to capture them for reuse. For domestic use, the main reference is the biogas uses for now. Communities can adapt to floods through prevention (flood risk reduction) and disaster management. Although it is considered a disaster, it is advisable to seek for potential opportunities people can gain from it; this is an add –in to the common management applications referred to as integrated flood management.

3.2.2. Session 2.2: Ecosystem approaches for climate change adaptation

Mr. Armand HOUANYE made a presentation on opportunities and challenges to integrate ecosystem approaches for climate change adaptation into programs, policies and projects in the Volta Basin. He provided the definitions of some concepts including catchment, watershed, ecosystem, abiotic and non-abiotic factors. He noted the need to promote consultations in the basin to reflect upstream-downstream relationship. He provided some of the services derived from the ecosystem including provisioning, support and cultural services. Lastly, he noted the need to use ecosystem functions and services and biodiversity as integrated components of strategies to address the challenges confronting the ecosystem.

3.2.3. Session 2.3: Opportunities and challenges to integrate ecosystem-based approaches to climate change adaptation in the Volta Basin

Mr. Maxwell BOATENG-GYIMAH made a presentation on “Opportunities and challenges for integrating climate change adaptation into policies, strategies and plans. He noted the distinction between ecosystem-based adaptation and ecosystem-based approaches. Also, three key actions areas that inform ecosystem-based approaches to climate change adaptation are: (i) integrating knowledge, technologies and practices; (ii) identifying entry points through risk assessments to understand the sectors that are vulnerable to the impacts of climate change and disasters and noted some hazards and related effects; and (iii) raising awareness and building capacity. Mr. Maxwell BOATENG-GYIMAH noted that the priority areas were underpinned by principles targeted at building resilience through effective and efficient delivery of evidence-based interventions.

Comments/suggestions of participants which were responded to are as follows:

- How can the VBA support countries to enforce the byelaws enacted?
- Is there a framework for assessing the vulnerability of communities?

Enforcement of bylaws is primarily a State affair. This geared further discussion about the responsibility of the States in low enforcement of bylaws. It is easier to realize that our States are facing multiple priorities against tight GDP and problems of management. Assessing vulnerability is based on tools that are available and will be included in the literature of the manual of the training.

3.2.4. Working group on the assessment of the Volta Basin ecosystems' vulnerability to climate change risks in Ghana

Following presentation on opportunities and challenges for integrating ecosystem-based approaches (EbA) to climate change adaptation into policies, strategies and plans, three groups of participants were formed based on communities present: (i) Group 1: Ketuo and Jambussi; (ii) Group 2: Chache and (iii) Group 3: Zukpuri.

The questions for discussion within the groups were the following:

- Identify two current or future hazards/threats (e.g. increase / decrease in rainfall and/or temperatures) as well as climate risks or effects/ impacts of climate change (e.g. floods, drought, erosion, silting, decrease in water resources);
- Identify ecosystems and communities as well as the users of water and natural resources users who are affected by identified hazards/threats and/ or climate risks or effects/ impacts of climate change;
- Highlight the anthropogenic activities that contribute to exacerbate the identified hazards/threats and/ or climate risks or effects/ impacts of climate change;
- Propose some ecosystem-based approaches to manage identified hazards/threats and/ or climate risks or effects/ impacts of climate change;
- Provide two examples of policies, strategies, plans, programmes and projects that's development/updating and/or implementation provide opportunities to integrate proposed ecosystem-based approaches;
- Provide details on how to proceed.

The groups took turns to present their results.

Some comments/suggestions raised after the presentations by the groups include the following:

- How can improper farming activities lead to increase in temperature?
- Does erratic rainfall lead to erosion and floods?
- Can we be more specific in defining the project area of intervention?

The respective groups provided answers to the questions posed by other groups. This was an occasion for the facilitators to give more insight to the raised concerns which were explained in the past sessions.

The Annex 4 presents the terms of reference for the assessment of the Volta basin ecosystems' vulnerability to climate change risks in Ghana.

The tables 1, 2 and 3 present the outcomes of the assessment reported by the 3 groups in a plenary session during the training workshop.

Table 1: Outputs on the assessment of the Volta basin ecosystems' vulnerability to climate change risks in Ghana_ Group 1

Identification of two Hazards	Ecosystem & Communities	Activities	Ecosystem Based Approaches	Policies/ strategies
Erratic rainfall/ Erosion, Flooding and drought	The Black Volta Ecosystem - Communities: Ketuo & Jambusi	• Deforestation • Improper farming practices	1. Agroforestry 2. Engaging in proper farming 3. Practice Bounding	• Communities byelaws to prevent indiscriminate cutting of trees • Forestry policies on reserve areas and wildfire

Table 2: Outputs on the assessment of the Volta basin ecosystems' vulnerability to climate change risks in Ghana_ Group 2

Identification of two Hazards	Ecosystem & Communities	Activities	Ecosystem Based Approaches	Policies/ strategies
• Heavy rainfall (leading to flooding) • High temperature (leads to the scarcity of water due to higher rates of evaporation and transpiration)	The Black Volta Ecosystem: Communities: Bui, and Chache	• Deforestation • Bush burning	• Afforestation • Sensitization • Agroforestry	• Green Economy • Buffer Zone Policy • Rio Declaration

Table 3: Outputs on the assessment of the Volta basin ecosystems' vulnerability to climate change risks in Ghana_ Group 3

Identification of two Hazards	Ecosystem & Communities	Activities	Ecosystem Based Approaches	Policies/ strategies
• Drought/High Temperature • Deforestation • Soil Erosion/Siltation • Water Pollution	The Black Volta Ecosystem: Communities: Nandom to Agbloekame	• Cutting down trees • Water Pollution from illegal mining	• Afforestation • Conservation • Agroforestry • Byelaws • Good fishing practice • Good farming practice	• National Water Policy • Wildlife Policy • Forestry Policy

3.3. Module 3: The maintenance of riverbanks in the Volta basin

The Module 3 was prepared against the backdrop that, like all ecosystems, the riverbanks of the Volta basin need to be maintained to guarantee the functions and services derived from them. Further, it was important to establish the causes and consequences of riverbanks degradation while appreciating the riverbank as a system that needs to be maintained in good health.

3.3.1. Session 3.1. Riverbanks: definition, components, roles (functions and services) and effects on water and rivers

Through an interactive session, Mr. Armand HOUANYE made a presentation on the functions and services of ecosystems and defined key terms, components and related impacts on water quality and seasonal flows of the river. He highlighted the usefulness of floodplains and buffer zones, adding their critical roles in trapping sediments of runoffs from catchments. Some concerns raised include the following:

- How do we ensure that the vegetative cover of riverbanks is preserved to serve its purpose?
- How do we maintain the micro-climate created by the vegetation around the rivers in the basin?

Mr. HOUANYE responded to the questions from participants reminding the upcoming sessions that will address these questions. In his contribution, Mr. Aaron ADUNA indicated that about 90m buffer zone is prescribed in the Buffer Zone Policy. However, the distance depended on the type of river and the activities planned or ongoing within its catchment.

3.3.2. Session 3.2: Causes and consequences of riverbanks' degradation

In a presentation made, Prof. Fabien HOUNTONDJI looked at the causes, consequences, manifestations of riverbank erosion and degradation. He noted the natural and anthropogenic causes and reiterated the human actions that accelerate erosion at various levels. Further, urbanization, improper farming practices, deforestation, climate change and hydrological characteristics of the watercourse, among others, contribute to erosion and degradation of riverbanks. He cited the types of erosion as rainfed, wind, coastal and anthropogenic erosions.

3.3.3. Session 3.3: The maintenance and the restoration of riverbanks

Following, Prof. HOUNTONDJI made a presentation on the maintenance of riverbanks. He cited the need to maintain every system in order to derive the benefits thereof. Therefore, any area along the rivers of the Volta basin will require maintenance or restoration in order to provide the needed services. He stressed on the necessity to follow-up the riverbank ecosystems' health and gave tips about the evaluation of them for maintenance and restoration purposes. This should be guided by a plan that highlights the mechanism for riverbanks restoration including the establishment of baselines to ascertain the progress made in any restoration effort. He noted some protection techniques such as mechanical and biological protections.

Some concerns raised by participants were answered and include the following:

- How can the VBA and communities collaborate in the protection of the basin's resources?
- What role can CSOs play in contributing to improve the maintenance of the basin resources?

VBA Executive Directorate Representatives started with the setup of the legal framework such as the charter under finalization and through capacity strengthening such as this workshop training and addressing transboundary issues of the ecosystems' maintenance and protection. CSO are key players in these tasks through the Stakeholders' Forum and local/national information-education and communication actions.

3.3.4. Session 3.4: The preservation of the biodiversity and the sensitive areas of the riverbanks

Mr. Armand HOUANYE made a presentation on how to preserve biodiversity of the Volta ecosystems. He noted that the stream, the head-source and the riverbank are very sensitive areas; then activities in their environs should be regulated. However, rivers are polluted through runoff from the catchments, bringing in nutrients that leads to unwanted growth of plant in the river system and water pollution. This can contribute to the disappearance of biodiversity and loss of livelihood. Finally, he called for preparation of a catchment management plan that will help in managing the water resource and related ecosystem for the present and posterity.

3.3.5. Session 3.5: The legal framework for securing riverbanks in Ghana

Understanding the existing legal framework on securing riverbanks is key to providing insight into how the Volta basin stakeholders will engage to improve the aquatic environment. Mr. Ben AMPOMAH made a presentation on the legislations, application and implications for stakeholders in all the river basins in Ghana. Firstly, he noted the Act that established the Water Resources Commission and its mandate. He cited the provisions in the Buffer Zone Policy that spells out the distance within which to keep the land free from any use. As a result, the approved distance for the buffer along the banks of rivers lies between 15m and 90m, depending on the nature of the river, be it main or (dis)tributary and the type of activity permitted within its catchment.

Some comments/questions to which answers were provided include the following:

- Doesn't the provision of discretionary powers of the regulator to admit any intervention within the buffer zone expose the same to acts of corruption?
- Does the Buffer Zone Policy address waste disposal landfill sites and groundwater interactions?
- Whose responsibility is it to communicate issues of trans-boundary impact?
- Does the Buffer Zone Policy consider protected areas?
- What is the effect of the Buffer Zone Policy on ongoing activities?

Mr. Ben AMPOMAH provided following answers to the questions mentioned above:

- "Siting of businesses within acceptable limits, per the Buffer Zone Policy will not be compromised, especially where technical assessment suggests otherwise. The good thing is that there are other institutions that grant other permits, ensuring consistency in granting of land access."

- The Buffer Zone Policy addresses waste disposal landfill sites and groundwater interactions. Yes, it does. The obvious one is surface water. Given the possible pollution of a water body from a landfill site, there is allowable distance to be satisfied before it can be admitted. For groundwater, the geological characteristics of the site need to be investigated to ensure minimal effect of leachate on GW. However, it is a fact that there are practices before this Policy was formulated. Therefore, implementation will correct some of the things happening, though it will take some time.

- The VBA has a Focal Point in Ghana, notably the WRC. The WRC does communicate trans-boundary through the Basin Secretariats/Boards, depending on the stakeholders involved. However, a study has been conducted by the VBA that seeks to explore avenues to expand the statusquo into a National Focal Structure consisting of other institutions.

- The Buffer Zone Policy considers protected areas; especially where water resources are involved. Often, WRC will collaborate with Forestry Commission, recognizing that the latter has the primary mandate as well over the protected area.

- The Buffer Zone Policy will check all activities ongoing near water bodies. The situation will be studied and remedial actions, if any, will be recommended to the business owner so as to minimize/eliminate any threat to the water resource.

The questions fueled an extended discussion focused around the flexible provisions on which the State detains exclusive rights of decision and the enforcement of the law. The key point is that these provisions are into force of application and improvement may rise following a review of the present, based upon the necessity and application experiences. Another key point is that the buffer zone applies not to all water courses but those of a certain size or importance, stated in the Policy.

In his presentation, Mr. AMPOMAH noted that land ownership was a critical issue which when addressed could enhance the implementation of the Buffer Zone Policy. The contributions on the way forward in respect of access to land are as follows:

- There is the need to consider compensation of the land owners to allow for release of the land;
- It is necessary to establish the true owners of the land and to engage them to appreciate issues of the Policy.

The experience of the Project for Improving Water Governance in the Volta River Basin « PAGEV » was shared with participants to reflect on the benefits when a few persons sacrifice for the greater good of the larger community.

3.4. Module 4: The protection of wetlands and IWRM Processes

Module 4 is based on the need to protect wetlands, recognizing that it is relevant to the recharge of water systems, including surface water and groundwater. However, the protection should consider IWRM approach and principles.

3.4.1. Session 4.1 The wetlands, definition, typology, characteristics, ecology, functions, values

Prof. Fabien HOUNTONDJI led the trainees to answer questions on their card boards about what a wetland is and to give one use of wetlands. He noted the accepted definition of Wetlands by RAMSAR Convention in 1971, and by the year, 2010 160 countries had ratified. He noted further that about 1,900 wetlands with a total area exceeding 186 million hectares existed while outlining the related objectives. Three types of wetlands were identified namely (i) Marine /Coastal; (ii) Human-made; and (iii) Inland wetlands. Finally, he identified the ecology and functions of the wetlands.

In summary, trainees were enlightened on groundwater recharge, flood prevention, favorable for water spring, retention of nutrients, fight against erosion, favorable for biodiversity, etc.

3.4.2. Working groups on the identification and analysis of current and future issues related to the management of the Wetland in the Volta basin

Mr. Armand HOUANYE led participants into group work. The work focused on (i) identification of wetlands in the Volta Basin; (ii) location of the wetland(s); (iii) type of wetland; (iv) the main functions of the wetland(s); (v) products of services derived from the wetland(s); (vi) values or attributes; (vii) the major changes observed in wetlands; (viii) the current problems; and (ix) the future or envisaged problems of the wetlands. The association of climate change with the future problems and change of the wetland. The groups took turns to present their results.

Some comments/suggestions raised after the presentations include the following:

- How do you relate the resettlement around the Bui Dam and the reservoir operations?
- How do you relate the problem of flooding to the depletion of vegetative cover?

Further, a participant noted that resettlement of communities in Jaman district was done. However, in the other areas, there was no resettlement. Prof. HOUNTONDJI suggested that resettlement should be added to the Action Plan, while emphasizing that climate change can be part of the problem leading to change in wetland but cannot be the main factor influencing the change.

The Annex 5 presents the terms of reference for the working groups on the identification and analysis of current and future issues related to the management of the Wetland in the Volta basin.

The tables 4, 5 and 6 present the outputs on the identification and analysis of current and future issues related to the management of the Wetland in the Volta basin in Ghana, reported by the 3 groups in a plenary session.

3.4.3. Session 4.2 IWRM, definition, principles, approach and pillars

Mr. Maxwell BOATENG-GYIMAH made a presentation on IWRM. He defined IWRM and presented its related four (4) principles and pillars. Participants received information on available fresh water resources in the World and the reducing trend per capita per year due to population growth. Thus, it was important to preserve water resources, recognizing its finite and vulnerable nature. He also extended explanation to the three other IWRM principles. He encouraged participants to change their attitude towards freshwater in order to guarantee usage across scales. Participants were enlightened about the water resources management issues hence the need to embrace IWRM. The IWRM implementation had three objectives which were the 3Es notably, Efficiency, Equity and Environment.

3.4.4. Session 4.3. IWRM legal institutional and technical instruments in Ghana

Mr. Ben AMPOMAH made a presentation on the legal institutional and technical framework guiding implementation of IWRM in Ghana. He noted the national policies, legislation and regulations that allows all stakeholders to play their respective roles in the development and management of water resources. Further, the focus areas of the national water policy were highlighted including access to water, water for food security and capacity building and public awareness creation. To this end, regulations including Water Use Regulations (LI 1692 (2001), Drilling License and Groundwater Development Regulations, LI 1827 (2006) and Dam Safety Regulations, LI 2236 (2016) have been developed. The current and ongoing process was the Buffer Zone Policy under development. In addition, six (6) basin offices had been set up by WRC to coordinate IWRM activities within its jurisdiction. Also, he presented the IWRM planning process, consisting of six steps including establishing the status and overall goals, analyzing gaps, preparing a strategy and action plan, building commitment, improving legal and institutional framework, and monitoring and evaluation. Finally, he presented the water quality index of rivers, for which all should be concerned and change their attitudes towards water resources.

Some concerns, raised were answered by Mr. AMPOMAH, include the following:

- Are there levels of Dam?
- When dams are constructed for communities by Ministry or the District Assemblies, who owns it?

Dams are of different sizes and importance. They are owned by operators and as such managed by them in compliance with the agreement signed with the State.

Table 4: Outputs on the identification and analysis of current and future issues related to the management of the Wetland in the Volta basin in Ghana_ Group 1

Wetland in the Volta Basin in Ghana	Geographical location	Wetland type	Main functions	Products	Attributes/ Values	Major changes in wetlands (functions, products, attributes/ values)	Current problems	Future problems
River	Wa West Jambusi	Inland	Communication channels Nutrient retention	Agriculture Water supply	Diversity Cultural	Reduction in size and depth of rivers	Reduced fishing Siltation	Flooding Water supply reduction Farming activities
Flooded caves	Jambusi	Inland	Tourism	Fishing Wildlife				
Fish pond	Ketuo	Human-made wetland						

Table 5: Outputs on the identification and analysis of current and future issues related to the management of the Wetland in the Volta basin in Ghana_ Group 2

Wetland in the Volta Basin in Ghana	Geographical location	Wetland type	Main functions	Products	Attributes/ Values	Major changes in wetlands (functions, products, attributes/ values)	Current problems	Future problems
Bui	Brong Ahafo Region (Now Bono Region)	Inland	hydro power generation	electricity	recreational or tourist activities	displacement of settlement	flooding and loss of livelihood	Endangering the live of species: eg: hippopotamus
Kulwon River	Kulwon	Inland	Communication And Fishing	Fishing Irrigation	Transportation	Decrease In Vegetation Cover	Flooding	Depletion Of biodiversity

Table 6: Outputs on the identification and analysis of current and future issues related to the management of the Wetland in the Volta basin in Ghana_ Group 3

Wetland in the Volta Basin in Ghana	Geographical location	Wetland type	Main functions	Products	Attributes/ Values	Major changes in wetlands (functions, products, attributes/ values)	Current problems	Future problems
Bui Wetlands Enclave	Bui in the Bono Region	Inland Wetlands	Crop production Aqua Culture Tourism Biodiversity conservations Ground water potential Reservoir for excess water	Food Fish Leisure Revenue Aquatic lives	Water availability Marine and wild life resources Aquatic resources	Human activities or anthropogenic actions destroying and distorting wetlands development Climate change impacts Low awareness and knowledge on the sustainable use of wetlands Poor regulatory compliance	Human activities ie encroachment and destruction of wetlands for other purposes Climate change Low awareness and knowledge on the sustainable use of wetlands Poor regulatory compliance	Water scarcity and extinction of wetlands Loss of bio diversity Climate catastrophe

3.4.5. Session 4.4. Fundamentals and IWRM Actions' Types for the sustainable management of wetlands including Ramsar sites in the Volta Basin

Mr. Armand HOUANYE made a presentation that sought to bring participants to a common understanding of IWRM implementation and related interventions to ensure the sustainable management of wetlands. He underscored the critical linkage between wetlands, water management and river basin management. Further, he noted the environmental factors, socio-economic factors and policy factors that guide management of wetlands in a sustainable manner. He cited the wetland management framework including the Enabling environment, Technical instruments and tools and financial instruments which are also key elements of IWRM. Finally, he provided some insight on the principles underlying wetland management and the actions targeted at reversing wetland degradation.

3.4.6. Session 4.5. Integration of IWRM into local development planning

Mr. Joachim ABUNGBA made a presentation on how to integrate IWRM into local development planning. He noted that IWRM was a tool that allows for challenges on water resources to be addressed in ways that are economically efficient, socially equitable and environmentally sustainable. Further, he provided some of the driving forces on water resources such as urbanization and population growth and highlighted some key functions of IWRM including water allocation for water supply and sanitation, agriculture and water quality monitoring and analysis. Thus, it was important for decision making at the lowest appropriate level to take into account issues of IWRM to ensure a coherent approach to development, recognizing that water resources is central to all development efforts, providing a platform for coordination of interventions. He emphasized collaborative planning and implementation, supporting community level engagement to improve environmental integrity.

3.4.7. Case study: The control of aquatic invasive plants and recommended standard actions in the Volta Basin in Ghana

The control of invasive aquatic species and IWRM actions types for the development and management of ecosystem in the Volta Basin was presented by Dr. Felix Jerry AKPABEY to participants. Dr. AKPABEY indicated that some aquatic plants occur naturally in Ghana, being a part of lakes, rivers and wetlands. However, some are inimical to the aquatic ecosystem and humans as well. He noted the importance of aquatic plants as providing shelter for fish, birds, and other wildlife. Further, he noted the negative impacts of the plants that poses threats to water bodies, leading to loss of livelihood and limitation to navigation. He noted that the presence of the plants promotes evapotranspiration, owing to the photosynthetic activity. He reiterated the economic loss to families on the infestation of weeds in various parts of the Volta Rivers. The critical aspect of the presentation was the anthropogenic activities that favor the growth of aquatic weeds including activities that enrich the nutrient status of water bodies. This includes open defecation on banks of rivers that are washed into the rivers, and the use of fertilizers. Finally, he provided insight into how to control the weeds, employing physical, chemical and biological approaches, and stated that chemical means had been banned while biological means are promoted across the globe.

Some concerns raised include the following:

- Can animals be used to curb the growth of the aquatic plants?
- What are the transboundary problems regarding weeds?
- Is the growth of the plants seasonal?
- In considering the priority of countries to inform interventions to carry out with its jurisdiction, is aquatic plants invasion included, considering that the spread can affect neighboring countries, especially in a transboundary setting?

In a nutshell, all the concerns pose the basin scale issues key to the IWRM implementation, which advise to consider upstream- downstream drivers (including transboundary issues) to problems for sustainable solutions. Seasonality affects aquatic weed development and proliferation and this indeed interacts with the control measures and particularly biological control.

3.5. The field visit

The day 4 was dedicated to providing the opportunity to participants to go on a field for a visit.

Figure 2: The exchange with the community during the field visit at Zukpiri

3.5.1. Objectives of the field visit and a brief description of the area visited

The main objective of the field visit is to provide practical aspects by applying the knowledge and instruments gained during the first 3 days of the training workshop and then draw lessons therefrom.

The area visited was the Zukpiri Community Resource Management Area (CREMA), located in the Nadowli-Kaleo District of the Upper West region, about 40km from Wa, the regional capital (see Figure 1). The CREMA covers an area of about 7,253 ha and consists of 25 communities with an estimated population of about 9,600. The CREMA is bordered by the Black Volta River to the west and the Oli River to the south. Due to its proximity to the Black Volta River, the CREMA serves as a critical strategy for the protection of the River and biodiversity.

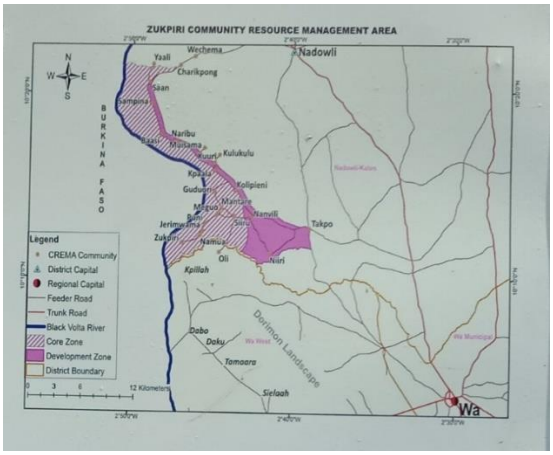


Figure 3: The Zukpiri Community Resource Management Area in the Nadowli-Kaleo District

The Annex 6 provides a summary note on the field visit.

3.5.2. Key steps of the field visit and stakeholders met

At the community, the workshop participants were welcomed by the Chief and his elders after exchange of greetings. Mr. Mohammed ZINTANG introduced the Chief and His Elders and other community members while Mr. Joachim ABUNGBA introduced the workshop participants. During the introduction, it was noted that the Chief is the Chairman of the CREMA Executive Committee and the Queen mother, the Treasurer. The Chief welcomed the visitors (workshop participants) to the community. On behalf of the visitors, he explained its mission, inter alia, to learn the good practices related to ecosystem protection that was ongoing within the CREMA belt. The Chief called on all and sundry to make observations and to ask questions whenever needed. The Chief noted that there were rangers who would accompany us for the transect walk. Also, other members of Zukpiri CREMA were present including bio-monitoring teams who take inventory of the tree species.

After the field visit, exchanges were allowed with the community for better understanding of the initiative and for reckoning the perceptions and expectations of both the community and the participants.

Figure 4: The exchange with Zukpiri community on the CREMA initiative

The exchanges with the community and during the transect walk with rangers and facilitators together with the observations made are reported by two groups of participants and presented the next day for analyses and lessons to learn. The results are presented hereafter.

3.5.3. Analysis of the main results obtained from the field visit

The workshop participants visited the CREMA, which is a largely protected area, about 8km x 20 km (160 km²). Participants visited the river banks of the Black Volta bordering the CREMA belt. Prior to the transect walk, Mr. Mohammed ZINTANG engaged participants and noted that the CREMA was started in 1999, thus about 20 years ago. The main objective of the CREMA was to restore the medicinal plants that were becoming extinct, impacting traditional healing of people who fell ill in the communities and its environs. This became the rallying point for all members within the CREMA, and accounts for the feat chalked over the period.

Several achievements were observed as follows:

- Existence of a management structure for the CREMA;
- Existence of protected area where anthropogenic activities are restricted. It was noted that farmers were relocated successfully to allow for attainment of the project objectives;
- A well stabilized riverbank with the Dicrostachus species along the Black Volta;

- Byelaws for the protected area is available;
- Existence of sub-committees to implement targeted actions in localities;
- Community acknowledgment of the roles played by NGOs and technical services of Forestry and Environmental Protection Agency and the District Assembly in the activities of CREMA.

With the field visit, trainees at the workshop came to terms with ecosystems of the CREMA reserve, and the functions and services they provide to the communities therein. Further, participants got to know the practical aspects of the pillars of IWRM, in particular management instruments including executives and sub-committees/groups formed and byelaws enacted to support effective management of the intervention. Also, meetings held by the members provide the participatory mechanisms, deliberating issues prior to implementation. Clearly, participants noted the steps taken by the CREMA to bring about the change and provides practicality of the concepts introduced to them at the workshop.

3.5.4. Lessons learned and recommendations

One key approach to enhance uptake of knowledge and technology is a blend of teaching of concepts and practical experiences. Therefore, the visit to Zukpiri CREMA was apt, and allowed participants to appreciate the concepts taught by the trainers. A few lessons learned during the visit are the following:

- The preservation of the ecosystem is founded on a common objective that everybody identifies within the community – the individual's health. Therefore, any effort to engage local communities in ecosystem restoration should endeavor to set objective(s) that the larger community will identify with. This will be a key determinant of the success of the intervention;
- Leadership is a key requirement for the success of any ecosystem restoration effort. We see the chief playing a significant role, rallying the elders of the community to lead in the affairs of CREMA;
- The adage that, "when the last tree dies, the last man dies" is proven, as the communities can relate the near extinct of medicinal plants to the present scenario where species are flourishing, with increasing health benefits to people in the community and those of its environs;
- Some trainees were triggered upon seeing the success story of Zukpiri CREMA, and thus pledged to mobilise human and financial support to replicate what was witnessed;
- The success of ecosystem restoration is more of long term. The CREMA started in 1999 and suggests that the effort should be sustained in order to materialize fully the intended purpose of the intervention;
- "Now people visit our community to engage us on success of CREMA" is a recognition of the importance attached to Zukpiri community.

Following the visit, trainees made the recommendation as follows:

- Subsequent trainings should provide for more than one field visit to enable identification of similarities and differences in the ecosystems. We can visit a degraded buffer zone and then an area where the buffer zone is well protected to better appreciate the efforts made while sensitizing the others;
- The organizers should work at getting trainers to visit mining sites to appreciate good practices or otherwise.

The visit to the field provided a lot of insight and understanding into the trainers teaching, bringing clarity to concepts. It is hoped that the lessons will motivate the trainees to follow the good example from Zukpiri CREMA so as to contribute to restoration of the Volta basin ecosystem.

3.6. Module 5: Transferring knowledge and know-how to communities: approaches, tools and methods

Module 5 focused on knowledge transfer and how communities could use the information received to identify and design actions to be implemented to conserve and protect ecosystems, forest galleries and wetlands in the Volta Basin.

This module which consists in one session was animated by Prof. HOUNTONDJI Fabien. He shared with the participants:

- The approaches and methods in rural extension;
- The group facilitation tools and techniques in rural areas;
- The principles guiding knowledge sharing;
- Key points /tips to know for good adult training;
- An outline of key steps to follow for transmission of knowledge acquired about planning and management of ecosystems for application in the Volta basin.

The participatory extension method taking into account the ecosystem-based approach to climate change adaptation from planning to implementation and monitoring should be a sustainable way to successful ecosystem management education. Knowledge and know-how to transmit should focus the stakeholders' interests with due consideration of their local experiences and case studies. Learning by doing or by practicing should as much as possible be integrated in the knowledge transmission. Soft skills useful for good knowledge transmission include promotion of mutual respect, motivation of participants and repetitively of the knowledge elements.

Participants were invited to share the knowledge acquired with collaborators and communities back home using simple and adapted figures of communication and practices related to proximal ecosystems. They were also invited to design micro projects of ecosystem management interventions and secure local funding through sensitization, advocacy, and commitment by small actions.

3.7. Development of action plans of management of ecossystems in the Volta basin in Ghana

The design of action plans is done in two working groups. In a plenary session, Prof. Fabien HOUNTONDJI introduced participants to the frameworks that would enable them make proposals on the interventions to implement in their communities. Firstly, he defined an ecosystem as consisting of biotic and abiotic components, allowing the trainees to appreciate the different types of ecosystems they interacted with during the previous day's visit to Zukpiri CREMA. Further, he reiterated biodiversity and ecosystems services and management measures to allow for the benefits thereof. With this background, participants went into groups to prepare their community action plans.

The Annex 7 presents the terms of reference for the identification and the design of actions to be implemented to conserve and protect ecosystems, forest galleries and wetlands in the Volta Basin.

The tables 7, 8, 9, 10, 11, 12 and 13 below present the outputs of the working groups (Figures 5, 6 and 7) on the development of the action plan on the management of ecosystems in the Volta basin in Ghana.

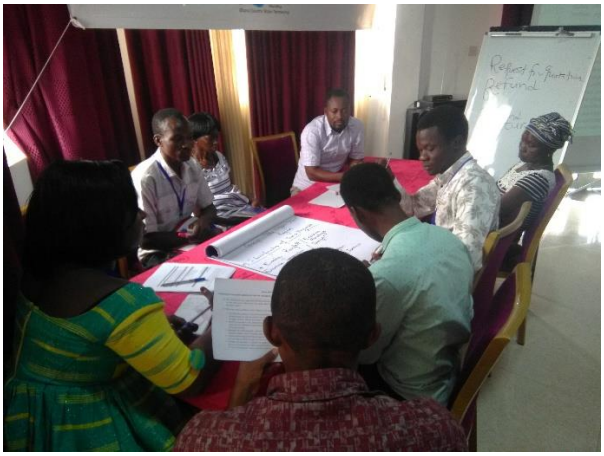


Figure 5: Participants in a working group _ Group1

Figure 6: Participants in a working group _ Group2

Figure 7: Participants in a working group _ Group3

Group 1: Ketuo and Jambusi

Table 7: Identification of sensitive ecosystems to be protected and/or restored_Group 1

Ecosystem to be protected/restored	Ecosystem services and functions provided by the ecosystem	Major degradation problems	Level of the ecosystem degradation (slight, moderate, high, very high)
River bank of Jambussi Black Volta	Support Agriculture (Fishing) Water supply	Deforestation Erosion	Very high
Forest of Ketuo Black Volta	Food (wild fruits including Shea, berries etc.) Fuel wood (energy)	Deforestation Erosion	Very high

Table 8: Action plan for the riverbank of Jambusi

The river is located in Jambusi community under the Wa west district, which shares boundary with Burkina Faso along the western part of the district. It's about 33km from the regional Wa and 36k from the district capital Wechiau.

Action to be implemented	Positive expected results/changes	Activities	By whom?	With Whom	Timeframe of implementation	Resources (physical, material and financial budget)	
						Internal	External
Community sensitization	Improved water quality Reduced river siltation and Reduced erosion	Raise awareness and interest in the need for the restoration of the bank Planting of draught resistant grass along the river bank	By community leaders / committee	District assemblies/ CSOs	August 2019-August 2021(2 years)	Labour support and Time	Materials (seedlings, protective clothes) working tools (cutlasses, hoes, wheel burrows) GHC 2000.00
Stakeholder engagement		Advocate for the creation of buffer zone	Community leadership	Government agencies (DoA, WRC)	December 2019-December 2020 (one year)	Land	Monetary support GHC 7000.00
Formulation of by-laws		Fire belts		CSOs		Community commitment	GHC 4000.00
Afforestation	Improved water quality Reduced river siltation and Reduced erosion	Marking of the area Acquisition of seeds Raising of nurseries Transplanting	Community Committee	Stake holders / CSO Groups and Agencies	December 2019-December 2020(one year)	Labor (security services, hard labor) Land	Line and pins Tape measures Fencing materials GHC 8000.00

Action to be implemented	Positive expected results/changes	Activities	By whom?	With Whom	Timeframe of implementation	Resources (physical, material and financial budget)	
						Internal	External
		Management Creation of fire belts					
Relocation of farmers close to the bank		Creation of alternative grazing and watery sources for livestock Promotion of inland gardening systems					

Table 9: Action plan for the forest of Ketuo

Ketuo is a community in the Nandom District of the Upper West Region. It is Located near the Black Volta River, about 30 minutes' drive from the Nandom and shares boundaries with Burkina Faso.

The Ketuo forest is about 100 meters away from the river bank. It is characterized by stunted trees and shrubs scattered around

Action to be implemented	Positive expected results/changes	Activities	By whom?	With Whom	Timeframe of implementation	Resources (physical, material and financial budget)	
						Internal	External
Community sensitization	Sustainable farming activities Improved micro climate Change in attitude/behaviour (change in mentality) Restoration of vegetation	create awareness and interest in the need for the restoration of the forest Sensitize and train farmers on agro-ecological farming methods	Community committee and leadership	District assemblies/ CSOs	August 2019-August 2021 (2 years)	Labour (security services, hard labour)	PA Systems Technical expertise GHC 15000.00
Stakeholder engagement		Advocate for the creation of buffer zone	Community	Government agencies (DoA, WRC) CSOs Government agencies (DoA,	December 2019-December 2020 (one year)	Land	Monetary support GHC 20,000.00
Formulation of by-laws		Engagement of Traditional Authorities Sensitization	Community leaders/community		August – Octobers, 2019		

Action to be implemented	Positive expected results/changes	Activities	By whom?	With Whom	Timeframe of implementation	Resources (physical, material and financial budget)	
						Internal	External
		Fire belts		WRC, Forestry Commission, EPA)			
Afforestation		Train communities with the capacity to raise nurseries Pruning and protection of natural vegetation (FMNR) Marking of the area Acquisition of seeds Raising of nurseries Transplanting Management Creation of fire belts	Community/committee members		July, 2020	Labour (security services, hard labour)	Materials (seedlings, protective clothes) working tools(cutlasses, hoes, wheel burrows) GHC 8000.00

Group 2: Chache

Table 10: Identification of sensitive ecosystems to be protected and/or restored Group 2

Ecosystem to be protected and/or restored	Ecosystem services and functions provided by the ecosystem	Major degradation problems	Level of the ecosystem degradation (slight, moderate, high, very high)
Black Volta, Chache	Communication, Fishing, Medicine,	• Deforestation, • bush burning, • pollution,	• High • High • moderate
Bui National Park	Hydro-power, tourism, fishing	• Poaching, • illegal mining • deforestation	• slight • moderate

Table 11: Action plan for Chache river

The Chache River is located in Bole District of the Savannah Region of Ghana, about 30km away from Bole. The river covers an area of about 6,532ha with an estimated population of 2,023. The river is a trans boundary water body that separates Cote' d'ivoire and Ghana. It is a critical environment for the protection of biodiversity.

Action to be implemented	Positive expected results/ changes	Activities	By whom?	With Whom?	Timeframe-implementation	Resources (physical, material and financial - budget)	
						Internal	External
Afforestation	Restauration of vegetation cover of the Black Volta Catchment, Chache	• Community sensitization • Production of seedlings • Transplanting of seedlings • Watering and protection of the seedlings	• District Assembly • Forestry Commission (Bole) • Community members	Community Leader/stakeholders Water Resources Commission	2019-2021	**Ghc50,000.00, 20,000ha of land and 30labourers** **Provision of land and labour**	**Ghc10,000.00, technical support**
Maintenance and protection of the Black Volta River banks, Chache	To prevent siltation and destruction of aquatic life	• Sensitization • Protection of riparian forest • Creation of fire belt (10m) • Establishment of community forest guards • Support for water user groups for proper water allocation	• Forestry Deparment, Bole • Water Resources Commission	Community Leaders/stakeholders	2019-2021	**Ghc 30,000.00, 20 labourers** **Provision of labour**	**Training** **Ghc …..**

Group 3: Zukpiri

Identification Sensitive ecosystems to be protected and or restored

The Zukpiri Ecosystem is located along the Black Volta River Basin in the Nadowli/Kaleo District of the Upper West Region. It is a sensitive ecosystem that needs to be protected because of its significance to the people within its catchment area and the country at large.

Efforts by the local people in protecting the ecosystem has chalked significant success in terms of conserving the forest cover, protection of flora and fauna and the Black Volta Basin. Despite the efforts of the locals, erosion, pollution of the upstream and down streams of the river basin as a result of illegal mining activities poses a present danger to the ecosystem.

The proposed action plan is thus urgent to safeguard and protect the ecosystem for the present and future generations.

Table 12: Identification of sensitive ecosystems to be protected and/or restored_ Group 3

Ecosystems to be protected and or restored	Ecosystem services and functions provided by Ecosystem	Major Degradation problems	Level Ecosystem Degradation
Zukpiri (Black Vota Enclave)	• Transportation • Fisheries/Aqua Culture • Irrigation / Farming • Tourism • Religious/Culture • Medicinal Plants • Animal Husbandry • Climate Regulation	• Erosion • Grazing and potential conflict • Pollution • Mining or "Galamsey" • Upstream Degradation of river bank • Bush fires	• High rate of erosion • Moderate Grazing • Low conflicts • Very High Pollution • High galamsey (Illegal Mining) activities • High Upstream Degradation of River bank • Slight Bush fires

Table 13: Action plan for the protection of Zukpiri Enclave of the Black Volta Basin in the Nadowli District of the Upper West Region of Ghana.

Actions to be Implemented	Positive Expected Results/ Changes	Activities	By Whom	With Whom	Timeframe – Implementation	Resources	
						Internal	External
Identification of Boundary partners/Stakeholders	Improved coordination and responsiveness among stakeholders groups	Conduct stakeholder analysis and mapping of bounding partners	ZUKPIRI CRMA, CSO/NGOs, YOUTH YDRHR	Water Resources Commission	November 2019 – October 2023	Personnel/ Resource Persons	GH₵20,000
Education and Sensitization of stakeholder groups	Increased awareness, Knowledge and influence positive behaviors towards protection of the ecosystem	Organize community durbars and sensitization dialogues Capacity building trainings for boundary partners	ZUKPIRI CRMA, CSO/NGOs, YOUTH YDRHR	Nadowli/Kaleo District Assembly Water Resources Commission	November 2019 – October 2023	Personnel Cost	GH₵ 70,000
River bank protection	Reduced Erosion and siltation, Protects ecosystem and improves services	Agro ecology and Tree Planting, Planting of Vetiver to check erosion	ZUKPIRI CRMA, CSO/NGO	Traditional Council Water Resources Commission	November 2019 – October 2023	Labour Cost	GH₵ 150,000

Actions to be Implemented	Positive Expected Results/ Changes	Activities	By Whom	With Whom	Timeframe – Implementation	Resources	
						Internal	External
Livelihood empowerment interventions	Reduced degradation of ecosystem, enhanced protection and ownership by stakeholders	Support for Dry Season Irrigation farming using pumping machines	ZUKPIRI CRMA, CSO/NGO	CSOs/NGOs Water Resources Commission	November 2019 – October 2023	CSOs/NGOs	GH₵ 150,000
Advocacy for enforcement of mining regulations around the river bodies	Enforcement of regulations, reduced mining activities in the ecosystem, reduced pollution of river bodies and sustainable management of the ecosystem.	Organize Advocacy campaigns on illegal mining Submission of petitions to duty bearers including mineral resource commissions	ZUKPIRI CRMA, CSOs/NGOs	Volta Basin Authority Water Resources Commission	November 2019 – October 2023		GH₵ 120,000
Total							GH₵510,000

4. Evaluation of the workshop by the participants

On the last day, the trainees assessed the training and gave their impressions on the content of the modules and the facilities employed to support the workshop delivery. Details of the scores is presented in Table 2.

Generally, the trainees were satisfied (over 95%) with the information provided in the modules and the manner in which the facilitators delivered them. A few observations made on the comments as regards the suggestions for consideration in future training workshops indicate that they really understood the concepts they were exposed to, and would like other communities in the basin to hear the same information in order to inform their interactions with the basin's resources. The fact that the training also took into account field visit brought to the fore the practical dimension of the course. This meant that all the issues raised and discussed were possible with the commitment and right attitude of members in any community.

However, some of the responses touched on the hotel facility, suggesting that we should consider moving the training to a District Assembly. Also, participants should be allowed to seek their own accommodation. Further, a lot more time should be allowed for group work to allow for more discussion on issues.

In summary, participants were content with the delivery of the training, baring administrative and financial challenges. In subsequent meetings, the organizers should envisage the intended participants and take into account in the financial and administrative procedures.

Table 2: Workshop evaluation

N°	Technical aspects	Fully satisfied	Satisfied	Not really satisfied	Not satisfied at all	Overall
1	Overall assessment	20	12	0	0	32
2	Objectives and expected results	26	6	0	0	32
3	Knowledge about VBA	32	0	0	0	32
4	Recognition of ecosystems	31	1	0	0	32
5	Knowledge about IWRM	26	6	0	0	32
6	Knowledge about ecosystem-based approach to climate change adaptation	26	6	0	0	32
7	Knowledge about riverbank ecosystem services and functions	30	2	0	0	32
8	Knowledge about causes and consequences of riverbank degradation	32	0	0	0	32
9	Knowledge about wetlands protection actions	27	5	0	0	32
10	Knowledge and experiences sharing between participants	26	5	1	0	32
11	Overall impression about the field visit	14	17	1	0	32
12	Pertinence of the field visit	29	3	0	0	32
13	Impression about venue and room	12	19	1	0	32
14	Impression about the catering services	16	14	2	0	32

5. Workshop closure and training certificates handover to participants

Mr. Armand HOUANYE, on behalf of the team of facilitators, expressed his appreciation to trainees for the patience and support throughout the training programme. He applauded the trainees for the zeal and fortitude throughout the presentations and the interactive sessions that fostered discussions as well as cross-questioning of groups for clarity on issues. He was hopeful that the participants will put to good use the concepts and seize opportunities in their communities to transfer the knowledge gained and to be agents of change.

Following, Prof. Fabien HOUNTONDJI, Dr. Jacob TUMBULTO, Mr. Razaki SANOUSSI and Mr. Dibi MILLOGO took turns to present certificates to the trainees.

The end of the training workshop was marked by speeches by representatives of the relevant institutions present. In his closing remarks, Mr. MILLOGO appreciated the trainees for staying through to the end of the programme. He lauded the diligence of participants in coming out with a draft action and to pilot same in their communities. He expressed gratitude to participants for their quest to contribute their quota to the progress of the Volta Basin, in particular, the conservation and protection of the rich resources for the present generation and posterity. He was grateful to the facilitators and local experts who delivered the training since its commencement in May 2019. Finally, he thanked the Ghanaian authority for supporting the process, leading to the final delivery of workshop at Wa, the Upper West Regional capital.

Mr. Joachim ABUNGBA closed the workshop by thanking all participants for making it to the meeting. He was grateful to the VBA and GWP-WA for extending support to the Black Volta Basin, while ensuring that the capacity of stakeholders is built to implement actions geared towards ecosystem integrity. On behalf of Executive Secretary of WRC, he thanked partners who came from far and near, and pledged to work together to contribute to improving the services derived from Black Volta Basin. Finally, on behalf of the Chief Director at Upper West Regional Coordinating Council, he declared closed the workshop and wished all and sundry safe travel to their respective destinations.

Figure 8 : Mr. Abungba addressing the closing words of the workshop

Conclusion and recommendations

From 15 to 19 July 2019 in Wa, Ghana, the Volta Basin Authority (VBA), in collaboration with Global Water Partnership West Africa (GWP-WA), convened a training workshop focusing on the theme the "Management of ecosystems for Climate Change Adaptation in the Volta Basin". This training workshop is part of the "Volta basin Strategic Action Programme – SAP- Implementation Project -VSIP-, co-financed by the Cooperation in International Waters in Africa (CIWA) Program, the Global Environment Facility (GEF) and the VBA through the World Bank. The main objective of the training workshop was to enhance the capacity of trainees representing Civil Society Organizations (CSO), youth associations (men and women) and local governments on the management of ecosystems in the Volta Basin.

A total of thirty-three (33) participants attended the training workshop. The communication on VBA and its mandates has given trainees knowledge of the existence of the institution and the arrangements in place to mobilise efforts at securing the resources of the Volta ecosystem to guarantee the benefits and services derived. Participants were taught the concepts of IWRM in relation to ecosystem-based approaches to climate change adaptation towards improvement in management of the Volta Basin resources. The field visit to the Community Resilience Management Area at Zukpiri, which objective was to provide practical aspects by applying the knowledge and instruments gained in the early days of the training workshop, indeed was apt. The visit allowed interaction with CREMA members to appreciate the progress made and the associated challenges. Participants identified and proposed measures that will be consolidated into an action plan covering the timeframe 2019 - 2021 for Ghana.

In general, participants noted the knowledge transfer and came to consensus that there was need to organise this workshop in other parts of the basin, as it provides avenues to manage better the basins resources to guarantee the useful services. Participants noted the following recommendations:

- The organizers should work at getting a lot of communities to participate in the training;
- The organizers should ensure that the trainees meet a certain minimum requirement in terms of their ability to read and write so as to enhance knowledge transfer;
- The trainers should make room for more working groups to enhance uptake of concepts and to have more time to discuss their practical approaches;
- The organizers should increase the frequency of training workshops so as to improve knowledge of the larger populations in the basin;
- The organizers should consider holding the workshop within the district assembly setting;
- The organizers should manage the time such that groups are able to finalize their action plans and present for adoption/acceptance before closing the workshop;
- The organizers should work at providing more tools on vulnerability assessment and teach how to use them.

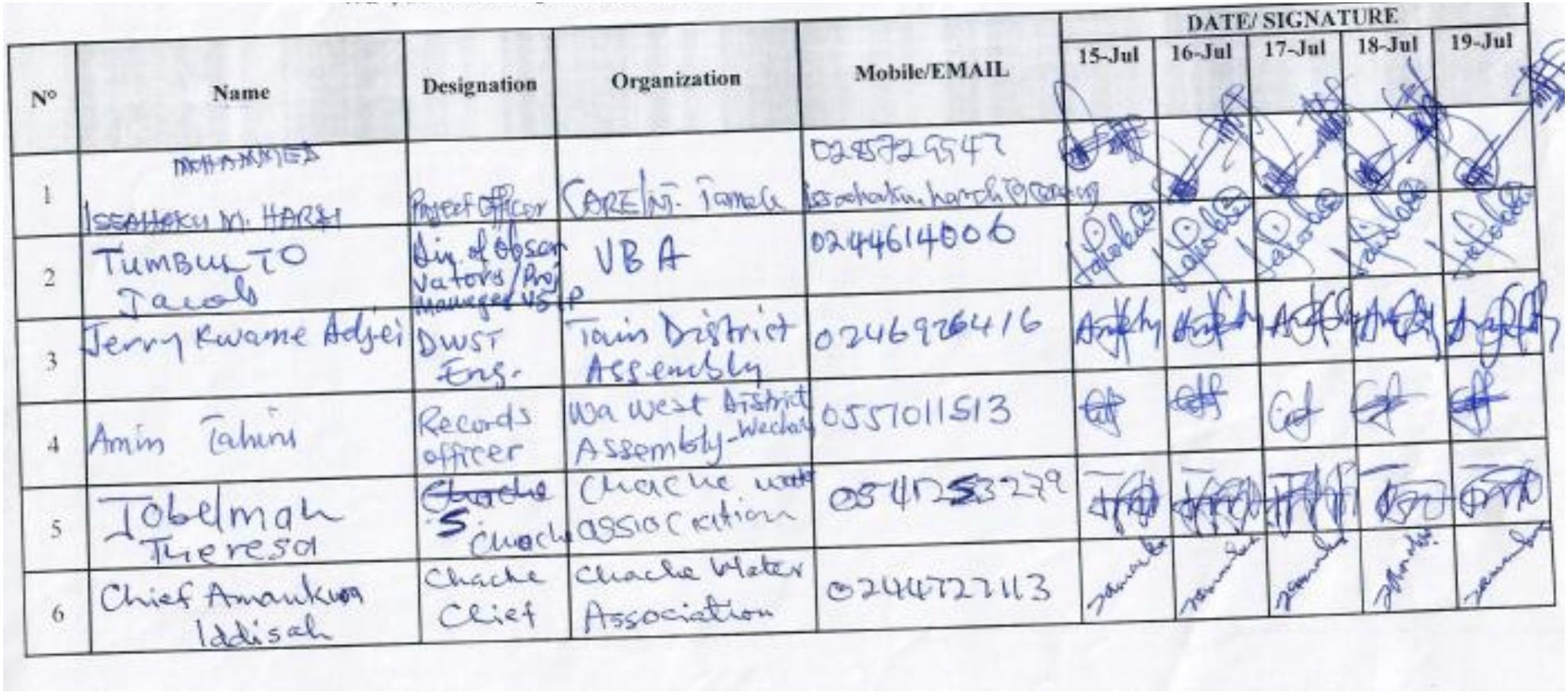
Finally, participants appreciated the call of the VBA and look forward to working closely and collaboratively through the Water Resources Commission in order to improve the resources of the basin for the betterment of life of its people.

Annex 1: Training Agenda

Timing	Activities	Stakeholders
Day 1: Monday, July 15, 2019		
Module 0: Introduction to the training workshop		
07:30-08:30	• Participants' registration	• CWP- Ghana
08:30-10:30	• Official Opening Ceremony	• VBA Focal Structure for Ghana • VBA Executive Directorate • Representative from the VBA Tutorship Ministry in Ghana
	• Participants' introduction • Clarification and validation of the objectives and the agenda of the workshop • Assessing participants' initial knowledge • Assessing participants' expectations and fears • Defining rules and standards for the management of the sessions • Constitution of the management and reporting teams	• GWP-WA • Participants
Module 1: The Volta Basin Authority: mission, mandates, achievements and prospects for integrated and sustainable management of natural resources of the Volta basin		
10:30-10:45	**Coffee break**	
10:45-11:45	• Session 1.1: VBA, progress in the implementation of the SAP and prospects	• VBA Executive Direction Representative • Participants
11:45-13:00	• Session 1.2: The Volta Basin Water Charter under development and prospects for the sustainable management of the ecosystems in the basin	• VBA Executive Direction Representative • Participants
13:00-14:00	**Lunch break – lunch**	
Module 2: The restoration and the protection of ecosystems for climate change adaptation in the Volta Basin		
14:00-15:00	• Session 2.1: The Climate change (CC) and its related impacts on people and the environment in West Africa and the Volta Basin	• Prof. Fabien Hountondji • Participants
15:00-15:45	• Session 2.2: Ecosystem approaches for climate change adaptation	• Armand Houanye • Participants
15:45-16:30	• Session 2.3: Opportunities and challenges to integrate ecosystem approaches for climate change adaptation into programs, policies and projects in the Volta Basin	• Maxwell Boateng-Gyimah • Participants
16:30-16:45	**Coffee break**	
16:45-17:30	• Session 2.3: Working group (Continuation and End)	• GWP-WA • Participants
17:45	**End of the Day 1**	
Day 2: Tuesday, July 16, 2019		
08:30-09:00	• Day 1 Report • Reminder and questions of understanding on the concepts presented during the day1	• Participants • CWP- Ghana
Module 3: The maintenance of riverbanks in the Volta basin		
09:00-10:15	• Session 3.1. Riverbanks: definition, components, roles (functions and services) and effects on water and rivers	• Armand Houanye • Participants
10:15-10:30	**Coffee break**	
10:30-12:00	• Session 3.2: Causes and consequences of riverbanks' degradation. This session will also focus on the assessment of the health of ecosystems	• Prof. Fabien Hountondji • Participants
12:00-13:00	• Session 3.3: The maintenance and the restoration of riverbanks	• Maxwell Boateng-Gyimah • Participants
13:00-14:00	**Lunch break - lunch**	
14:00-15:00	• Session 3.4: The preservation of the biodiversity and the sensitive areas of the riverbanks	• Armand Houanye • Participants
15:00-16:00	• Session 3.5: The legal framework for securing and protecting riverbanks in Ghana	• Mr. Ben Ampomah, WRC Executive Sec- Accra • Participants
16:00-16:15	**Coffee break**	
16:15-17:15	• Session 3.5: (Continuation and end): debates on the application of the legal framework for securing and protecting riverbanks in Ghana	• GWP- WA • Participants
17:15	**End of the 2nd day**	•
Day 3: Wednesday, July 17, 2019		
08:30-09:00	• Day 2 Report	• Participants

Timing	Activities	Stakeholders
	• Reminder and questions of understanding on the concepts presented during the day 2	• GWP- WA
Module 4: The protection of wetlands and IWRM Processes in the Volta basin		
09:00-10:00	• Session 4.1 The wetlands, definition, typology, characteristics, ecology, functions, values	• Prof. Fabien Hountondji • GWP- WA
10:00-10:15	**Coffee break**	
10:15-11:30	• Session 4.1. (Continued and concluded) Working groups on the identification and analysis of current and future issues related to the management of the Wetland in the Volta Basin	• Participants • GWP- WA
11:30-12:15	• Session 4.2 IWRM, definition, principles, approach and pillars	• Maxwell Boateng-Gyimah • Participants
12:15-13:00	• Session 4.3. Main legal/ institutional instruments and tools for IWRM planning in Ghana	• Mr. Ben Ampomah, WRC Executive Sec- Accra • Participants
13:00-14:00	**Lunch break - lunch**	
14:00-15:00	• Session 4.4. Fundamentals and IWRM Actions' Types for the sustainable management of wetlands including Ramsar sites in the Volta Basin	• Armand Houanye • Participants
15:00-16:00	• Session 4.5. Integration of IWRM into local development planning	• Joachim Abungba, WRC- Wa • Participants
16:00-16:15	**Coffee break**	
16:15-17:00	• Case study: The control of aquatic invasive plants and recommended standard actions for the development and management of ecosystems in the Volta Basin in Ghana	• Dr. Felix Akpabey, CSIR-Aquatic Biology division - Tamale • Participants
17:00	**End of the 3rd day**	
Timing	**Activities**	**Stakeholders**
Day 4: Thursday, July 18, 2019		
08:00-16:00	• Departure from the training venue • Field visit to the national part of the basin • Return to the training venue at 16:00	• Participants • GWP- WA • Representatives of local governments • Local communities • VBA Executive Direction Representative/ Head of the VBA Focal Structure for Ghana
16:00	**End of the 4th day**	
Timing	**Activities**	**Stakeholders**
Day 5: Friday, July 19, 2019		
08:30-10:15	• Day 3 and Day 4 Reports • Reminder and questions of understanding on the concepts presented during days 3 and 4 • Debriefing and the assessment of the field visit	• Participants • GWP- WA • VBA Executive Direction Representative/ Head of the VBA Focal Structure for Ghana
10:00-10:30	**Coffee break**	
Module 5: Transferring knowledge and know-how to communities: approaches, tools and methods		
10:30- 11:00	• Rural extension approaches and methods	• Prof. Fabien Hountondji • Participants
Working groups: identification and the design of actions to be implemented to conserve and protect ecosystems, forest galleries and wetlands in the Volta basin		
11:30- 13:00	• Working groups on the identification and design of applicable measures and methods to ensure the protection of ecosystems in the Volta Basin	• GWP-WA • Participants
13:00-14:00	**Lunch break - lunch**	
14:00-15:00	• Working groups on the identification and design of the actions (Continuation and end)	• GWP- WA • Participants
15:00-16:00	• Overall evaluation of the training workshop • Awarding the attendance certificates to the trainees • Official closing ceremony of the training workshop	• GWP- WA • Participants • VBA Focal Structure for Ghana • VBA Executive Directorate • Representative from the VBA Tutorship Ministry in Ghana
17:00	**End of the training workshop**	

Annex 2: List of participants

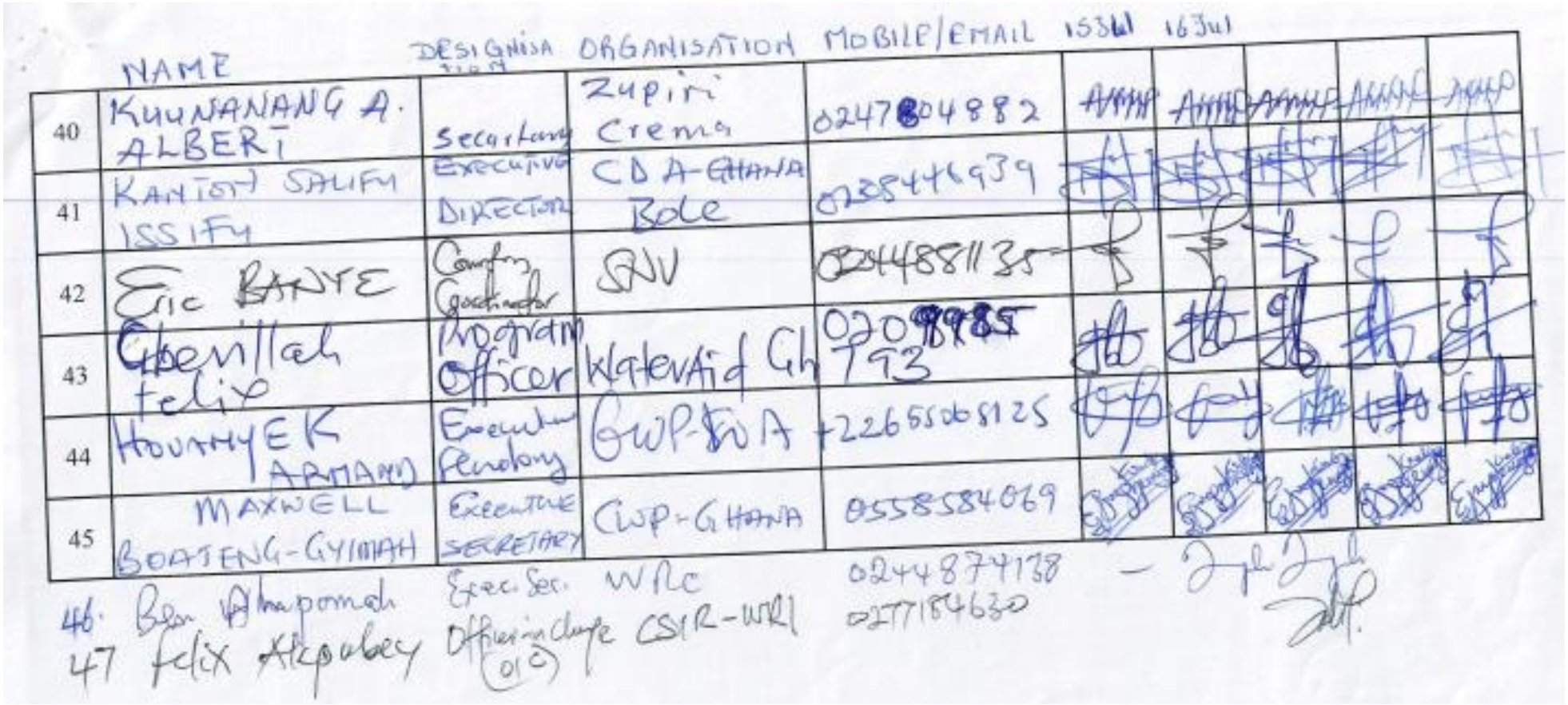


N°	Name	Designation	Organization	Mobile/EMAIL	DATE/ SIGNATURE				
					15-Jul	16-Jul	17-Jul	18-Jul	19-Jul
1	[illegible]	Project Officer	CARE/NJ- Tamale	0285729547					
2	TUMBULTO Jacob	Dir. of Observators / Proj Manager VSLP	VBA	0244614006					
3	Jerry Kwame Adjei	DWST Eng.	Tain District Assembly	0246926416					
4	Amin Tahiru	Records officer	Wa West District Assembly-Wechiau	0557011513					
5	Iobelmah Theresa	Chache S Chache	Chache water association	0541253279					
6	Chief Amankwa Iddisah	Chache Chief	Chache Water Association	0244727113					

	NAME	DESIGNATION	ORGANIZATION	MOBILE/Email	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
7	Dumakuru Hawa	Water User Association Agbelekame	Agbelekame organaza	0246992793					
8	Aaron Buneli Aduna	Chief Rest Off	WRC	0242074137					
9	Sena Kahamata	Secretary	Youth in dryland and hunger restoration	0241752428					
10	Aimadu Salam Mwini-balonno	Programme Manager	Pronet north Wechiau	0246556611					
11	MILLOGO Bibi	DGA	ABV	00226704377317					
12	Andema Johnpeter	Accountant	Lasjoe Consult Golga	0248885995					
13	ISMAEL ABDUL-RASHID	Deputy Youth Coordinator	Youth in Dry Lands Restoration Network	0244783137					
14	Tomle Charles	Security	Nadowli Fisherman	0502859075					
15	Hai Victoria	LOUG	Nadowli Irrena	0508542168					
16	Zintang B. Mohammed	Coordinator	Zukpiri Crema	0542445310					
17	Brimah D Hakeem	Coordinator	NAKAID	0243773762 0200160076					

	NAME	DESIGNATION	ORG	MOBILE	DAY 1	2	3	4	5
18	JOHN DAKORAH	D.P.O	S.T.C District Assembly	0208296927					
19	Wumtima M. Cheuringa	Ass. planing officer	Bole District Assembly	02063 11111					
20	MOHAMMED OSMAN	HR OFFICER	CARD-GHANA TAMALE	0248391356					
21	SAWADOGO Sanning	VBA	VBA	+226 74-86-87-47					
22	KABORE. K. Anina Stephanie	VBA	VBA Burkina Faso	+226 71412900					
23	ADEKOLA Adébayo	VBA	VBA Burkina-faso	+ 226 71748317					
24	Paul Dassah	Water User Associatio k/ UG	Secretary Jambusi	0502399967					
25	Fati Daful	Water User Associatio k/ UG	Organiser Jambusi	0550955012					
26	Dakurah Mbaifaa	Secretary	Agbolekame	0248002079					
27	Nafisa Mohammed	Project Officer	SURD_GH	0201135193					
28	RAYMOND DAKURAH	organiz	Zupini crema	0242092114					

	NAME	DESIGNATION	ORGANIZATION	MOBILE / EMAIL	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
29	HOUNTONDJI Fabien	Expert	GWP-WA	+229 66008202	[signature]	[signature]	[signature]	[signature]	[signature]
30	SANOUSSI RAZAKI	DP/GIRE	ABV	+226 67393313	[signature]	[signature]	[signature]	[signature]	[signature]
31	Joachim Abungba	WRC Black Volta	WRC	0246757819	[signature]	[signature]	[signature]	[signature]	[signature]
32	Evans Wanikuu Niekun	Program Officer	CIKOD-Nandom	0501322908	[signature]	[signature]	[signature]	[signature]	[signature]
33	BAAKO EUGENIA L	Intern	WRC	0549441282	[signature]	[signature]	[signature]	[signature]	[signature]
34	~~David~~ YAHAYA Yabang	Attached water user	WRG Kertuo-Nandom	0241539733	[signature]	[signature]	[signature]	[signature]	[signature]
35	Bangpuku Jude	H.S.P	WRG Tizaza	0547962983	[signature]	[signature]	[signature]	[signature]	[signature]
36	SIGNE SALIM MARIE FABIOLA	Intern Water user	WRG Bolga	0509032388	[signature]	[signature]	[signature]	[signature]	[signature]
37	Awaafo Philip	Intern	WRC	0545983017	[signature]	[signature]	[signature]	[signature]	[signature]
38	ZABRE A Jérôme	Grand talk	ABV	00022670279934	[signature]	[signature]	[signature]	[signature]	[signature]
39	Athy B. M. Ehye Kuka	[illegible]	[illegible]	0244218946	[signature]	[signature]	[signature]	[signature]	[signature]



	NAME	DESIGNATION	ORGANISATION	MOBILE/EMAIL	15 Jul	16 Jul			
40	KUUNANANG A. ALBERI	Secretary	Zupiri Crema	0247804882					
41	KANTON SALIFU ISSIFU	Executive DIRECTOR	CDA-GHANA Bole	0238446939					
42	Eric BANYE	Country Coordinator	SNV	0244881135					
43	Ebenillah felix	Program Officer	WaterAid Gh	0209[illegible]793					
44	HOUNHYEK ARMAND	Executive Secretary	GWP-WA	+22655068125					
45	MAXWELL BOATENG-GYIMAH	EXECUTIVE SECRETARY	GWP-GHANA	0558584069					
46	Ben Ahaponmah	Exec. Sec.	WRC	0244874138					
47	felix Akpalecy	Officer in charge (OIC)	CSIR-WRI	0277184630					

Annex 3: Speeches delivered during the opening ceremony

Deputy Executive Director of the Volta Basin Authority

VBA Deputy Executive Director Speech for the training workshop of civil society organizations and local authorities IN GHANA, Wa, 15th July 2019

Dear ….,

The executive secretary of Water Resources Commission, VBA National Focal Point;

The Executive Secretary of GWP - WA and dear trainers;

The VSIP Project Coordinator and Staff of the VBA Executive Directorate;

Representatives of local authorities;

Members of Civil Society Organizations;

Ladies and gentlemen, all protocols observed.

It is a privilege for me to take the floor to welcome you here to WA for the training of members of the Civil Society Organizations and local authorities on the theme: "Ecosystem management and planning for adaptation to climate change in the Volta Basin ".

This is the 6th and last training on the above theme and it follows 5 other training workshops held in the other 5 Member States of VBA. The training workshop forms part of the activities of the **Volta Basin Strategic Action Program Implementation Project (VSIP)**, funded by the Cooperation in International Waters in Africa (CIWA), the Global Environment Facility (GEF) and the VBA through the World Bank.

This VSIP project itself stems from the Volta Basin Strategic Action Programme (SAP) which was developed based on the conclusions of the Transboundary Diagnostic Analysis (TDA) (UNEP-GEF Volta, 2012-2013) highlighting a number of environmental problems in the basin. Unfortunately, since 2013 the problems remained the same while they are amplified in some places.

These are among others:

- The change in water quantity and seasonal flows;
- The coastal erosion downstream of the catchment;
- The proliferation of aquatic invasive species;
- Increased sedimentation in streams;
- Loss of land and vegetation cover;
- The pollution (agricultural, industrial, domestic and especially mining).

Ladies and gentlemen,

Clearly, this is about the general degradation of our ecosystems.

Faced with such a situation, the VBA, thought that change first comes from the mind and affects our ways of doing things better on the ground. Therefore, under the component 3 of the VSIP project, we initiated this training on ecosystem management.

Dear participants,

You have received many trainings and you will receive many more in future, but I wish that this one is special at least in two respects: you will train others and implement concrete actions for reversing the degradation trends in your respective localities.

Yes, I want at least, two results to be achieved through this training workshop:

- I wish you to be our ambassadors to carry the results of this training to those who were unable to participate;
- I hope that you can get out of here with an action plan for tangible changes in your respective localities (even without the intervention of the executive directorate of VBA).

Ladies and gentlemen,

Dear participants,

You must clearly understand that such a mission requires you to be diligent and attentive to everything that is going to be said here.

But considering the quality of participants, I remain convinced that it will certainly be one of the best workshops. That's why, while, very sincerely thanking you for your participation, I would also like to thank the organizers who made it possible to mobilize such people.

I acknowledge the contributions of the Water Resources Commission, Ghana's National Water Partnership, the GWP / WA itself, the VSIP Project Coordination Unit, including the coordinator (Dr. Jacob Tumbulto) and the leader of component 3 of VSIP project (Mr. Razaki SANOUSSI) and the trainees who are with us here. For the two Basin Officers of the White and the Black Volta Basins who were with us in Ouagadougou for another workshop on Saturday, I thank you for being here again. My thanks also go to the World Bank, the GEF and CIWA, the financial partners of the VSIP project.

Finally, I'd like to sincerely thank all those Ghanaian authorities who have contributed to the holding of this important workshop and with their blessings I wish you very successful deliberations.

Long live regional cooperation!

Long live Volta Basin Authority!

Thank you!

Chief Director at Upper West Regional Coordinating Council

VOLTA BASIN STRATEGIC ACTION PROGRAMME IMPLEMENTATION PROJECT (VSIP)

Theme: The management and development of ecosystems for climate change adaptation in the Volta Basin (Wa, Ghana, 15th – 19th July, 2019)

DRAFT KEYNOTE ADDRESS

BY UPPER WEST REGIONAL COORDINATING COUNCIL – CHIEF DIRECTOR

Chairman

Executive Secretary of the Water Resources Commission

Representatives of the Volta Basin Authority (VBA)

Partners from International Union for Conservation of Nature (IUCN), Burkina Faso

Distinguished Guests, Ladies and Gentlemen

It is a joy to be with you this day to share a couple of considerations on how we can together assist concerning the use, development and management of the ecosystem especially in the wake of the current rate of ecosystem degradation coupled with climate change adaptation in the Black Volta Basin, and by extension the Volta Basin.

Ecosystems are a critical part of our life and environment as most of our livelihood activities depend on them. It is therefore our collective responsibility to protect and preserve the health and integrity of these ecosystems.

Ladies and Gentlemen, I suspect that all the riparian states of the Basin including Ghana are developing their national portions to meet the socioeconomic aspirations of their peoples. However, ensuring the sustainable management of our ecosystem is critical to guarantee its integrity.

The importance of the Black Volta River both in terms of its ecosystem services and contribution to the local and national economies cannot be over emphasized. Some direct benefits derived from the river include livestock watering, water abstraction for irrigation and municipal use, fishing, power generation etc. Despite these benefits, the basin has suffered typically, extreme conditions of degradation mostly due to illegal mining activities, deforestation, unsustainable agricultural practices, among others, all of which negatively affect water quality and seasonal flows.

The establishment of the Black Volta Basin Secretariat and its Board is a major achievement, not only for the conservation of the Black Volta River but also for the protection and restoration of other water resources and ecosystems.

Just about a month ago, I heard of the remarkable work that the basin secretariat carried out in Nyonli community where a Chief had given orders to a private contractor to cut the Mahogany trees around the Nyonli dam. But for the intervention of the Basin Secretariat and other stakeholders, the entire vegetation around the dam would have been destroyed putting the sustenance of the dam in jeopardy.

The recognition that human wellbeing is inextricably linked to the health of natural systems is probably not well understood by us all especially our people in the rural communities, or simply overlooked, due to our quest for survival. This is where programmes like this one is relevant to contribute to raising awareness and understanding of those whose activities directly or indirectly impact negatively on the ecosystem on the importance of the conservation and ecosystem protection.

I hope that at the end of this workshop we will all have a better appreciation of why there is a need to protect our ecosystems, what we all as stakeholders can do both individually and collectively to contribute toward the protection, conservation and enhancement of biodiversity both for its intrinsic value and the wide range of benefits that natural systems provide to the human wellbeing.

Ladies and gentlemen, the solution to ecosystem degradations does not only reside in high-level meetings such as this but also when the ideas and concepts shared lead to behavioural change through implementation of actions on the ground. While carrying out sensitization on ecosystem protection, we should also find means of providing tools and livelihood interventions to the local people who depend on the exploitation of the ecosystem to make a living.

I will like to, on behalf of government, extend my sincere gratitude and support to the Water Resources Commission and its partners in the implementation of the Volta Basin Authority Strategic Action Program (VSIP) Project which aims to improve the capacity of local stakeholders for trans-boundary water resources management through institutional development and other activities that will help address some of the challenges faced in the management of our water resources.

It is my sincere hope that this workshop will stimulate the required knowledge and understanding that can be translated to solving the challenges of water resources management on the ground.

On this note, I would like to thank you for coming and wish you a productive discussion.

Thank you.

Annex 4: Terms of reference for the group work on the assessment of the vulnerability the Volta Basin's ecosystems in Ghana

The participants are organized into three groups according to the Volta basin's part they belong to or they intervene in Ghana: (i) Group 1: Ketuo and Jambussi; (ii) Group 2: Chache and (iii) Group 3: Zupuri.

Referring to the realities in each region in the Volta Basin in Ghana, participants are tasked to:

- Identify two current or future hazards/threats (e.g. increase / decrease in rainfall and/or temperatures) as well as climate risks or effects/ impacts of climate change (e.g. floods, drought, erosion, silting, decrease in water resources) -Altogether, do not exceed three-;
- Identify ecosystems and communities as well as the users of water and natural resources users who are affected by identified hazards/threats and/ or climate risks or effects/ impacts of climate change;
- Highlight the anthropogenic activities that contribute to exacerbate the identified hazards/threats and/ or climate risks or effects/ impacts of climate change;
- Propose some ecosystem-based approaches to manage identified hazards/threats and/ or climate risks or effects/ impacts of climate change;
- Provide two examples of policies, strategies, plans, programmes and projects that's development/updating and/or implementation provide opportunities to integrate proposed ecosystem-based approaches. Provide details on how to proceed.

Annex 5: Terms of reference for working groups on the identification and the assessment of the wetlands in the Volta Basin in Ghana

Training workshop – Management of ecosystems for climate change adaptation in the Volta Basin in Ghana (15 – 19 July 2019, Wa, Ghana)

Group work on session 4.1: Wetlands, definition, typology, characteristics, ecology, functions, values

Main objective: Identify and analyze current and future wetland management issues in the Volta Basin

Wetland in the Volta Basin in Ghana	Geographical location	Wetland type	Main functions	Products	Attributes/ Values	Major changes in wetlands (functions, products, attributes/ values)	Current problems	Future problems

Annex 6: Note on the field visit

1. Background

The Volta Basin Authority (VBA) convened a 5-day training workshop on "Management of ecosystems for Climate Change Adaptation in the Volta Basin" from 15th to 19th July 2019 in Wa, Ghana. The training workshop is part of the "Volta Basin Strategic Action Programme (SAP) Implementation Project -VSIP-, co-financed by the Cooperation in International Waters in Africa (CIWA) Programme, the Global Environment Facility (GEF) and the VBA through the World Bank.

The day 4 is dedicated to provide the opportunity to participants to go on a field for a visit.

2. Main and specific objectives

The main objective of the field visit is to provide practical aspects by applying the knowledge and instruments gained during the first 3 days of the training workshop and then draw lessons therefrom. The participants will use this opportunity for in-depth study and exchange with local communities and field actors on:

- The state of the ecosystems in the national portion of the basin, as well as trends and issues related to their degradation, and
- The habits and experiences of related communities and local actors involved and the sustainable and innovative shared solutions to be put in place.

Specifically, it involves getting participants to:

- Describe briefly the site in the respective hydrological basin;
- Enumerate the ecosystems present and their functions and services;
- Enumerate the uses of the ecosystem services identified;
- Identify, establish the typology and analyse the actors in the management and exploitation of the ecosystems of the site visited;
- Examine the major problems linked to the management and exploitation of the ecosystems of the visit site;
- Identify with the local authorities, the communities and stakeholders in the field the cases and impacts of the major problems of degradation of ecosystems of the site visited;
- Evaluate the perception of the effects of climate change by the communities and stakeholders in the site visited;
- Appreciate in the field, the elements of vulnerability of the ecosystems at the site visited that are related to the effects and impacts of climate change;
- Identify potential solutions to be implemented to reverse sustainably the observed trends with respect to degradation of ecosystem of the site visited.

3. The field visit site

The Zukpiri Community Resource Management Area (CREMA) is located in the Nadowli-Kaleo District of the Upper West region, about 40km from Wa (see Figure 1). The CREMA covers an area of about 7,253 ha and consists of 25 communities with an estimated population of 9,600. The CREMA area is bordered by the Black Volta River to the west and the Oli River to the south. Due to its proximity to the Black Volta River, the CREMA serves as a critical strategy for the protection of the River and biodiversity.

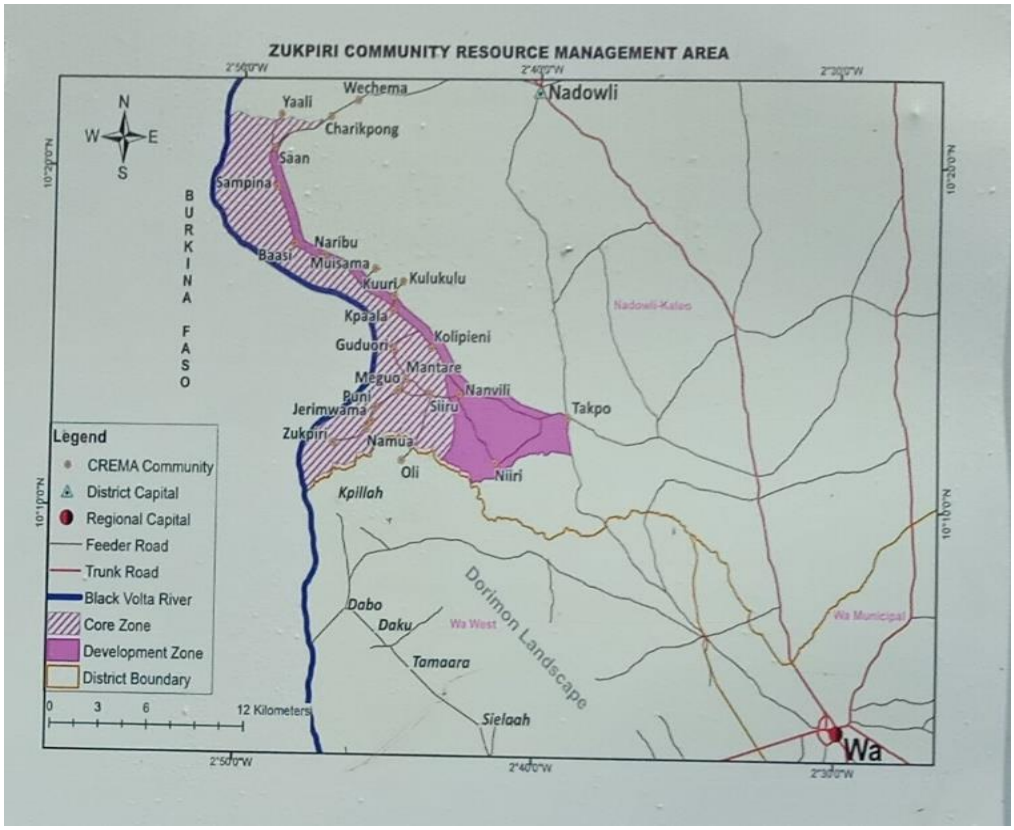


Figure Project site of Zukpiri CREMA in the Nadowli-Kaleo District

4. The water uses in the area

The Black Volta River resources is used for various activities including irrigation, livestock watering, fishing and domestic purposes. However, some of the livelihood activities of the communities (mostly those outside the CREMA delineated area) pose serious threat to the sustainability of the river and other ecosystems.

5. The characteristics of the ecosystems and riverbanks on site

The prospects and challenges to ecosystem management pertaining in the Zukpiri CREMA is similar to most areas in the Black Volta Basin. The issues include

- Illegal felling of trees especially rosewood within and around the CREMA
- Illegal mining (galamsey) within and around the CREMA
- Bush burning is another major threat to the sustainability of the CREMA
- Inadequate alternative livelihood activities in the CREMA communities to ensure that communities do not exploit resources from the CREMA for their sustenance.

6. The status of past and / or ongoing ecosystem interventions and management measures

Specific activities like sensitization programmes, among others, have been outlined and implementation initiated. Further, there is opportunity for development and implementation of buffer zone protection and other interventions in the Zukpiri area for the protection of the Black Volta River against degradation.

7. Prospects for ecosystem interventions and management at the site and in the national portion of the Volta Basin

The work of CREMA fits into the overall framework of the Black Volta Basin IWRM Plan. Some gains made over the period include the following:

- Eco tourism is being developed in the CREMA to serve as a source of income for the locals.
- Alternative livelihood activities like soap making and bee keeping is being promoted in the CREMA communities to also serve as a source of income for the locals.
- The CREMA has helped to conserve a lot of medicinal plants which are being used by traditional healers for curing a wide range of illnesses.
- Shea and other economic trees in the CREMA are well protected not only for their economic value but also for their ecosystem services.

Further, the CREMA is mobilising support to draw plans to solve the challenges identified towards enhancing the integrity of the ecosystem.

The experiences and lessons learnt from the engagement processes are critical in terms of efforts to replicate the successes in other parts of the basin, and beyond.

8. Methodology

The participants will leave Wa at 08:00 am and envisage to arrive at Zukpiri Community at 09:30 am.
The main phases of the field visit are as follows:

Phase 0: Participants arrival at Nuoyong……(07:00 – 07:45)

Phase 1: Arrival and Community welcoming/exchanges……(09:30 – 10:00)

Phase 2: Ecosystems' visit (Transect Walk)……..(10:00 – 11:00)

Phase 3: Snack break……(11:00 – 11:30)

Phase 4: Focused group discussion……(11:30 – 13:00)

Phase 5: Debriefing……(13:00 – 13:30)

LUNCH BREAK

Departure from the field is scheduled for 15:00.

Annex 7: Terms of reference for the identification and planning of interventions for contributing to the management of ecosystems in the Volta Basin in Ghana

Working groups

1. Identify three (3) sensitive ecosystems to be protected and/or restored

Table 1: Ecosystems

Ecosystem to be protected/restored	Ecosystem services and functions provided by the ecosystem	Major degradation problems	Level of the ecosystem degradation (slight, moderate, high, very high)

2. Identification of actions and implementation framework

- Briefly describe the ecosystem (to be done)
- Develop a budgeted action plan

Table 2: Actions

Action to be implemented	Positive expected results/changes	Activities	By whom?	With Whom	Timeframe of implementation	Resources (physical, material and financial budget)