COMMUNITY-LED INDEPENDENT REPORTING

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UPDATING BIODIVERSITY CONSERVATION BASELINES; TOOLS, PRACTICES AND OPPORTUNITIES FOR LEVERAGING COMMUNITY MONITORING AND REPORTING CAPACITIES TOWARDS THE POST-2020 BIODIVERSITY FRAMEWORK

FIDEP FOUNDATION
Communities Matter

Updating Biodiversity Conservation Baselines; Tools, Practices And Opportunities For Leveraging Community Monitoring And Reporting Capacities Towards The Post-2020 Biodiversity Framework

Contributors:

Amos Nkpeebo Yesutanbul: Research Director, FIDEP Foundation
Anthony Opiyo Ogutu, PhD: Full Time Lecturer, South Eastern Kenya University
Mr. Peter Ossei-Wusu, Programme Coordinator, Forest and Biodiversity, Southern Zone, FIDEP Foundation
Mr. Peter Offosu: Project Coordinator, Community—based Independent Reporting, Lake Bosomtwe Biosphere Reserve, FIDEP Foundation

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FIDEP Foundation Ghana
Spiritan University Avenue, Ejisu, Kumasi, Ghana
www.fidepfoundation.org
Email: Fidepfoundation@gmail.com/hello.fidep@gmail.com

BACKGROUND

Monitoring schemes provide an important source of information on biodiversity change, guiding further research, conservation assessment and planning[1]. Monitoring schemes are typically used to document changes in biodiversity over time, making the implicit assumption that the state of biodiversity when the scheme started is an appropriate temporal baseline against which to measure that change. However, one major stakeholder that can contribute much to biodiversity monitoring is local communities who serve as the grass-root stakeholders and can contribute to restoring or reversing biodiversity losses. Until now, local communities have not had much involvement in biodiversity monitoring or reporting due to low capacity and knowledge. They could however be very effective in detecting current drivers of biodiversity decline, such as habitat loss and fragmentation, exploitation, pollution, climate change or species introductions if they are given the requisite training and capacity. This capacity is urgently required as it would help in capturing the full impact of anthropogenic pressures on key biodiversity areas including the Keta Lagoon Ramsar Complex Site, the Mole National Park and Lake Bosomtwe Biosphere Reserve.

The once evergreen Mole National Park in Damongo in the Northern Region is under threat of illegal loggers and poachers who are said to be taking advantage of the inadequacy of staff and security at the facility. In 2021, government granted mining exploration rights to a mining company to explore gold near the Mole National Park despite banning prospecting activities in forest reserves. Mining gold near the Mole National Park will degrade the land after the minerals are extracted with toxic materials.
The Keta Lagoon Complex Ramsar Site was designated based on its ecological, economic and social importance. Yet, the threat of a new oil and gas project called the Keta Delta Oil Block has become a massive threat to the ecologically or biologically significant values within the Keta Ramsar Complex Site and a livelihood threat for about 600,000 people within the affected districts. In Lake Bosomtwe Biosphere reserve, the 2021 research indicated that from the period 1st March to 30th August, 2021, there were 32 reports of harmful farming activities (clearing vegetation less than 30 meters from the water body) and 16 reports of charcoal burning around the riparian vegetation. Both of these activities have serious negative externalities on the riparian vegetation of the biosphere reserve.

After successfully pilot testing a community-based independent reporting platform with the TIMBY mobile app link in Lake Bosomtwe Biosphere Reserve in 2021, this project paper seeks to assess the scalability of the tools, practices and opportunities for leveraging community monitoring and reporting capacities towards updating temporal biodiversity baselines, in biodiversity conservation and the post-2020 biodiversity framework. It relies both on practical experiences from the pilot stage in Lake Bosomtwe Biosphere Reserve, in-coming data and field observations from community-led biodiversity monitoring of anthropogenic pressures in the Mole National Park/landscape and the Keta Lagoon Ramsar Complex Site.

[1] Schmeller, D. et al. Bird-monitoring in Europe – a first overview of practices, motivations and aims. *Nat. Cons*. **2**, 41–57 (2012).

EXISTING LITERATURE ON SETTING BASELINES for BIODIVERSITY MONITORING; EMERGING TOOLS AND PRACTICES

From existing literature, it is evident that the general paucity and inadequacy of data about biodiversity states prior to the rise of harmful anthropogenic activities in geographic area is a critical limitation for understanding and implementing appropriate conservation goals and strategies (Mihoub et al., 2017). Monitoring schemes have proven to be an important tool to document changes in biodiversity over time, making the implicit assumption that the state of biodiversity when the scheme started is an appropriate temporal baseline against which to measure that change. Recently, major efforts are being made to mobilize and standardize biodiversity data globally. The recently proposed Essential Biodiversity Variables (EBVs), including genetic composition, species populations, species traits, community composition, ecosystem function, and ecosystem structure has established a broader basis for measuring changes the different components of biodiversity over time and space (Brummitt et al., 2014; Geijzendorffer et al, 2015). At the local level, some new approaches are also being experimented (see box 1).

REPORTS FROM THE LAKE BOSOMTWE RESIDENT SUSTAINABILITY TEAMS

From the period 1st March to 30th August, 2021, there were 32 reports of harmful farming activities (clearing vegetation less than 30 meters from the water body) and 16 reports of charcoal burning around the riparian vegetation. Both of these activities have serious negative externalities on the riparian vegetation. From these reports, it was noted that the pressure on the land has been largely the result of a combination of factors. Firstly, the nature of the Bosomtwe terrain is such that it is naturally not suitable for cultivation. Part of the reason is also the result of increasing population as a result of immigration into the Basin. Field observations suggest that harmful farming activities and charcoal burning is intensifying in at least 7 out of the 21 communities monitored between 1st March to 30th August, 2021. The highest number of reports on harmful farming activities came from Anyinatease and Koninyaw (recording 19% each). The highest number of reports on charcoal burning activities came from Gyemasu-Anweaso and Pipie, both recording 19% (figure 1.2 and 1.3).

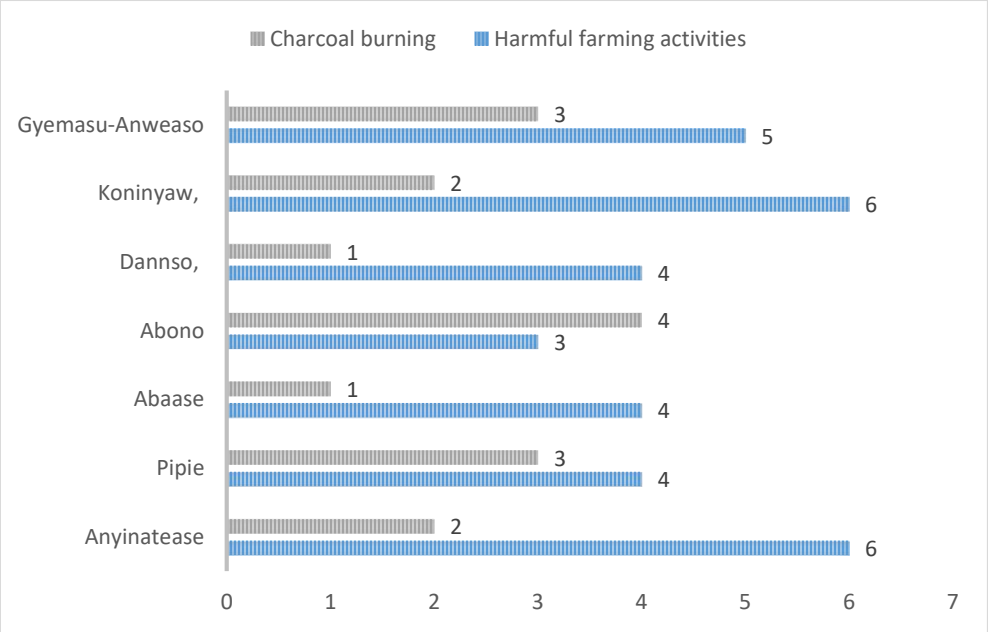


Figure 2: Reports of harmful farming activities and charcoal burning activities for the period, 1st March to 30th August, 2021

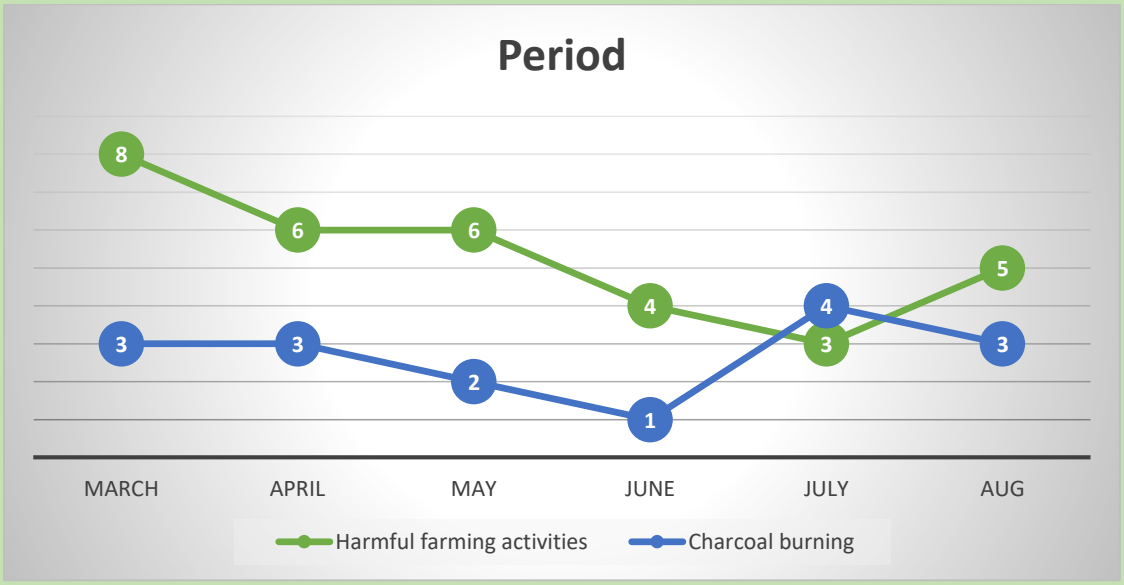


Figure 3: Trend of harmful farming activities and charcoal burning activities for the period, 1st March to 30th August, 2021

Figure 1.3 is a trend illustration of harmful farming activities and charcoal burning as reported in 7 out of the 21 communities monitored between 1st March to 30th August, 2021 the reports suggest that both harmful farming activities and charcoal burning were carried through out this 6 month period. It also suggest that both activities tend to decline

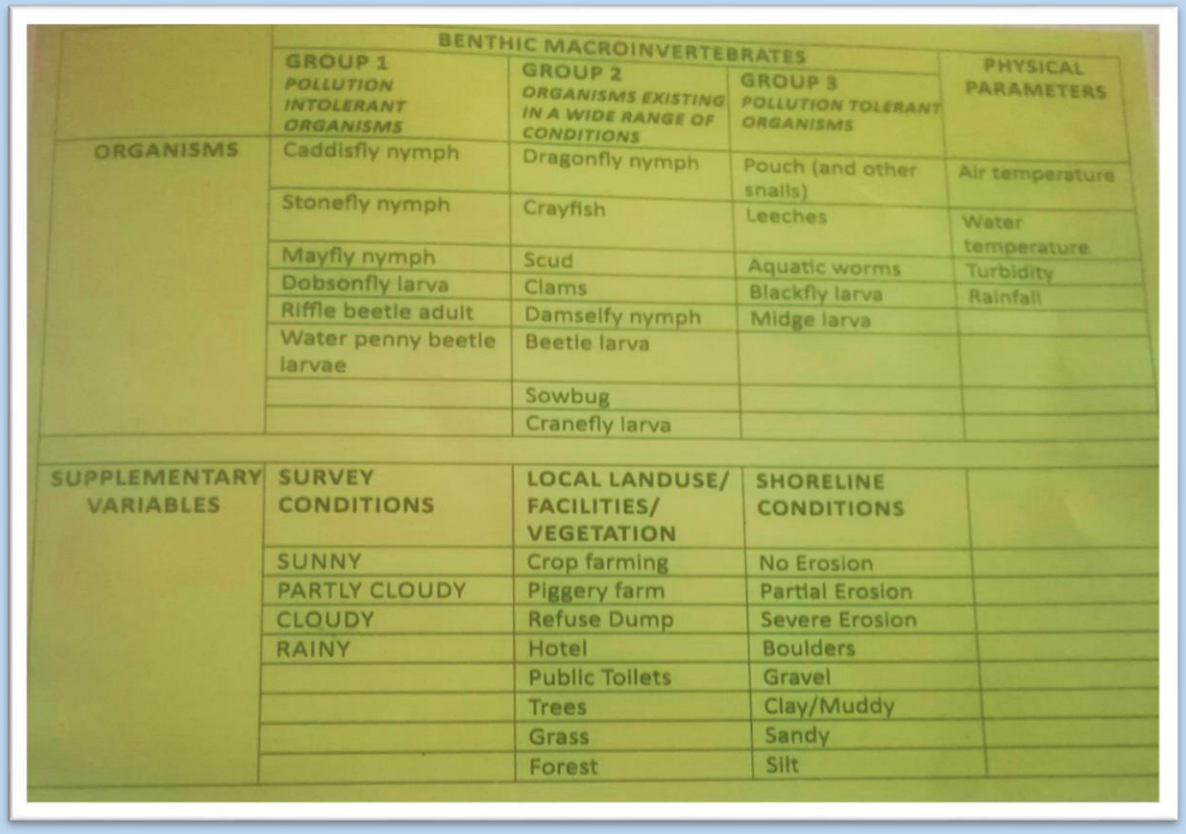
from June to July but both activities increase again very rapidly between July and August. Harmful farming activities decline to its lowest between June and July while charcoal burning is at its lowest between May and June but rises to its highest in August.

Source: FIDEP (2021). Pilot testing a community-based independent reporting platform with the TIMBY mobile app link, Lake Bosomtwe Biosphere Reserve. FIDEP Foundation, Kumasi, Ghana.

Recent studies have proven that the sharp increase in the number of monitoring schemes from the 1990's likely reflecting a response to the reporting commitments outlined in the European Nature Directives or similar obligations from international conventions, such as the Convention on Biological Diversity or the Convention for Migratory Species (European Commision (EEC), 2009; UN (United Nation, 1971). This is in line with previous studies showing that structured biodiversity monitoring schemes have been recently implemented and that accurate biodiversity data for major realms is not available before the 1960's (marine, terrestrial or freshwater (Costello et al., 2010); Schmeller et al., 2012).

Despite biodiversity monitoring schemes contributing to an increased understanding of recent anthropogenic impacts, the changing states of biodiversity since the rise of these pressures are mostly unknown and might be seriously underestimated (Pimm, et al., 2014). In most developing countries like Ghana, a lot of stakeholders are still excluded from biodiversity monitoring. At the same time, the data from these monitoring schemes remain scattered, suffer from geographic and taxonomic bias (Costello et al., 2010); Hoffmann, A. et al., 2014), making biodiversity data difficult to access, to assemble and to analyze over large spatial and temporal scales. The majority of biodiversity monitoring schemes are conducted at small geographical scales (Schmeller et al., 2012), so that opportunities to assess past states of biodiversity at global, regional or even national scales remain limited. In addition to limited spatial and temporal coverage, inconsistencies and biases in taxonomic coverage are known limitations that also inhibit comprehensive assessment of the biodiversity status (Costello et al., 2010). Research shows that both the inconsistencies and biases in taxonomic coverage or biological organisation levels that are the focus of monitoring schemes are much less frequently reported. Also, data collected in biodiversity monitoring schemes disproportionately document only two EBV classes ('Species Populations' and 'Community Composition') (see Box 2, for instance).

Recognising the importance of local communities in the conservation efforts, CSOs like Friends of the Earth-Ghana (FoE-Ghana) initiated a project with the aim of conserving the globally significant flora and fauna of the lake's basin by supporting traditional conservation practices and a community based conservation. This project included a *Community-based Biodiversity Assessment and Monitoring element. In this project,* school children from 24 schools were trained in assessment and monitoring of biodiversity in and around the lake, including water quality monitoring. They were given portable science kits and computers to help collect and store the data. Two manuals on assessment and monitoring protocols were written. The school children met regularly to discuss results and share findings with their communities. The schools also benefited from a programme of local environmental management studies to complement their science studies. While the FOE monitoring was considered most novel and community-based, it was largely based on the prevalence of benthic macroinvertibrates.



	BENTHIC MACROINVERTEBRATES			PHYSICAL PARAMETERS
	GROUP 1 *POLLUTION INTOLERANT ORGANISMS*	GROUP 2 *ORGANISMS EXISTING IN A WIDE RANGE OF CONDITIONS*	GROUP 3 *POLLUTION TOLERANT ORGANISMS*	
ORGANISMS	Caddisfly nymph	Dragonfly nymph	Pouch (and other snails)	Air temperature
	Stonefly nymph	Crayfish	Leeches	Water temperature
	Mayfly nymph	Scud	Aquatic worms	Turbidity
	Dobsonfly larva	Clams	Blackfly larva	Rainfall
	Riffle beetle adult	Damselfy nymph	Midge larva	
	Water penny beetle larvae	Beetle larva		
		Sowbug		
		Cranefly larva		

SUPPLEMENTARY VARIABLES	SURVEY CONDITIONS	LOCAL LANDUSE/ FACILITIES/ VEGETATION	SHORELINE CONDITIONS	
	SUNNY	Crop farming	No Erosion	
	PARTLY CLOUDY	Piggery farm	Partial Erosion	
	CLOUDY	Refuse Dump	Severe Erosion	
	RAINY	Hotel	Boulders	
		Public Toilets	Gravel	
		Trees	Clay/Muddy	
		Grass	Sandy	
		Forest	Silt	

Figure 4: Monitoring framework illustrating the core and supplementary variables for a *Community-based Biodiversity Assessment and Monitoring by* school children

Source: FoE-Ghana, 2014

Ultimately, research points to the fact that limited temporal coverage only allows a limited subset of the changing state of biodiversity needed to represent the full impact of anthropogenic pressures to be documented (Butchart, S. H. M. et al., 2010). Besides, the majority of available biodiversity information remains inconsistent and incomplete for accurate and consistent estimates of past impacts (Lotze & Worm, 2009), or in some cases for present understanding of intensity of anthropogenic pressures.

Therefore, additional mobilization and digitization of biodiversity data is recommended to ensure consistent available data over large spatial extents (Edwards, 2004). At the same time, a consistent integration of fragmentary information across disciplines is critical in setting temporal and/or spatial baselines for biodiversity that reflect past states of biodiversity before the rise of major anthropogenic pressures.

MATERIALS AND METHOD

Owing to the multi-level nature of biodiversity management and the associated multi-level actions undertaken by various stakeholders, a deconstructed[2] outcome mapping methodology (Figure 1) was adopted for this study. This involved a review of biodiversity monitoring by conducting quantitative and qualitative evaluation of the historical, recent and current baselines.

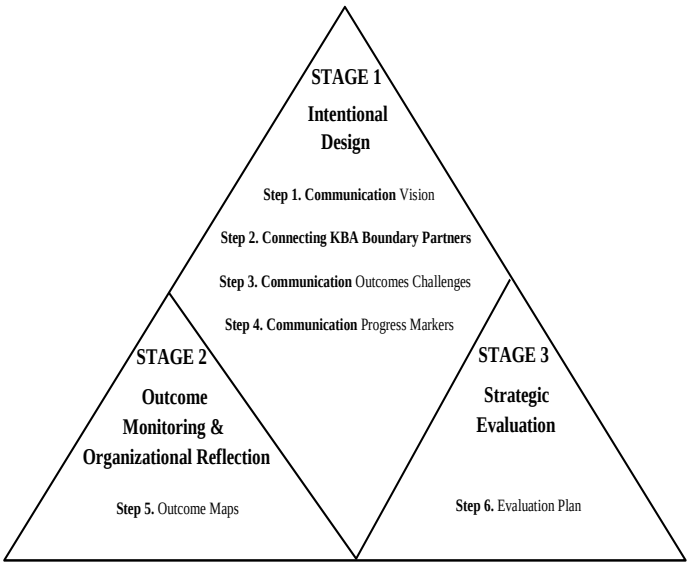


Figure 1: Outcome Mapping – an approach developed by the International Development Research Centre's (IDRC) Evaluation Unit, in Ottawa, Canada.[3]

First, two stakeholder workshops with direct boundary partners were organized in Keta Ramsar Site and Lake Bosomtwe to clarified the macro-level factors that directly correlate with a long term capacity required for real-time monitoring of the full impact of anthropogenic pressures, and feeding such capacity into the Post-2020 Biodiversity Framework of the Convention on Biological Diversity by 2030; the to achieving the strategic objectives 1 and 4 of Ghana's National Biodiversity Strategy and Action Plan as well as the SDGs (particularly goals 14 and 15) by 2030. The Intentional Design process allowed for the breaking down existing monitoring processes, establishing conservation priorities and understanding assumptions of wetland and ecosystem governance processes in Ghana. A total of 30 in-depth interviews in the Keta Ramsar Complex Site, the Mole National Park and Lake Bosomtwe Biosphere Reserve (10 participants from each site) with randomly selected households on long term capacity required for real-time monitoring of the full impact of anthropogenic pressures, ensuring 50%+ representation of women to ensure gender equity. The combination of these processes created a community-led base for strategic evaluation of long term capacity required for real-time monitoring of Ramsar Sites in Ghana.

[2] Deconstruction is an approach to understanding the relationship between text and meaning. It was originated by the philosopher Jacques Derrida (1930–2004), who defined the term variously throughout his career

[3] IDRC 2005b. Facilitation manual and facilitator summary sheets: http://www.idrc.ca/en/ev-62236-201-1-DO_TOPIC.html

PRACTICAL CONSIDERATIONS FOR ESTABLISHING LONG-TERM CAPACITY COMMUNITY-LED BIODIVERSITY MONITORING AND REPORTING

The following observations were made and can be recommended with a high degree of confidence with respect to establishing long term capacity required for real-time monitoring of the full impact of anthropogenic pressures:

I. Access to Relevant, time-sensitive Co-generated data on habitat loss

Currently, Remote Sensing/GIS technology has been used widely for Spatial and Temporal Change Detection Analysis. However, GIS tools still require ground verification and validation in order to make the Change Detection Analysis relevant for on-the-ground decision making. Mobile applications like TIMBY provides a cost effective fit to addressing this gap. TIMBY provides various functionalities that enables stakeholders to instantly search various issues/reports and filter by date, sector, company and person and verification status. TIMBY also enables stakeholders to triage important issues and track until a solution is reached and communicate back with monitors on the ground. We discovered that in Ghana, about 200 trained monitors collect evidence about compliance with social responsibility agreements, logging in forests, compensation and other aspects through community-based real-time monitoring of forestry activities and governance by means of smartphones. The monitoring system exists in approximately 150 communities in five regions. However, so far the focus has been only on forest illegalities in the High Forest Zone. Savannah areas such as the Mole National Park and Wetlands such as the Lake Bosomtwe Biosphere Reserve and Keta Ramsar Complex Site have so far been neglected.

The data generated will be shared on the TIMBY online database (in the form of geo-referenced pictures, video alerts, audio alerts or written reports) which will be accessed and used by all stakeholders especially the Environmental Protection Agency, Forestry Commission, Water Resources Commission, sector ministries (Ministry of Environment Science, Technology and Innovation, Ministry of Lands and Natural Resources), District Assemblies, Development Partners and Civil Society Organisations who work to translate policies into action. The data will be co-generated by 30 trained community-based Monitors working in collaboration with Park Managers, Range Officers and Agricultural Extension Service Officers to verify, validate and share the data in the form of written report, video or audio reports.

Government Designated Authorities such as Environmental Protection Agency, Forestry Commission, Water Resources Commission and District Assemblies will also be able to receive the geo-referenced pictures, video alerts, audio alerts in real time, i.e., immediately the communities identify any incident. Following the alert, our team will work with the Park Managers, Range Officers and Agricultural Extension Service Officers to verify and validate the incident and determine the necessary remedial actions.

It was further noted that, time sensitive data is essential for reliably measuring changes in biodiversity over time. Also, ground verified data helps to frame conservation objectives, identifying the biodiversity priorities in time and mapping the feasibility and efforts required to reach the Post-2020 Biodiversity Framework of the Convention on Biological Diversity by 2030; to achieving the strategic objectives 1 and 4 of Ghana's National Biodiversity Strategy and Action Plan as well as the SDGs - goals 14 and 15 by 2030. However, a Rapid Response Mechanism (RRM) equipped to

provide urgent assistance to communities if an emergency situation is reported by the monitors which require immediate response is essential to this process.

II. Community-Based Monitoring And Reporting Toolkit

Based on the recommendations from the outcome mapping stage, it is essential to design and deploy community-based monitoring and reporting toolkit outlining a grid of anthropogenic factors and their impact dimensions (ecological, social, economic), as well as the *"dos and don'ts"* of community-based monitoring. The monitoring and reporting toolkit needs to equip communities with the adequate information on current drivers of biodiversity decline including poor agricultural practices, illegal activities (poaching, bush burning, charcoal burning) habitat loss, pollution, invasive alien species introduction and the tools and platforms that they can use to properly mobilize, negotiate and advocate for systems change.

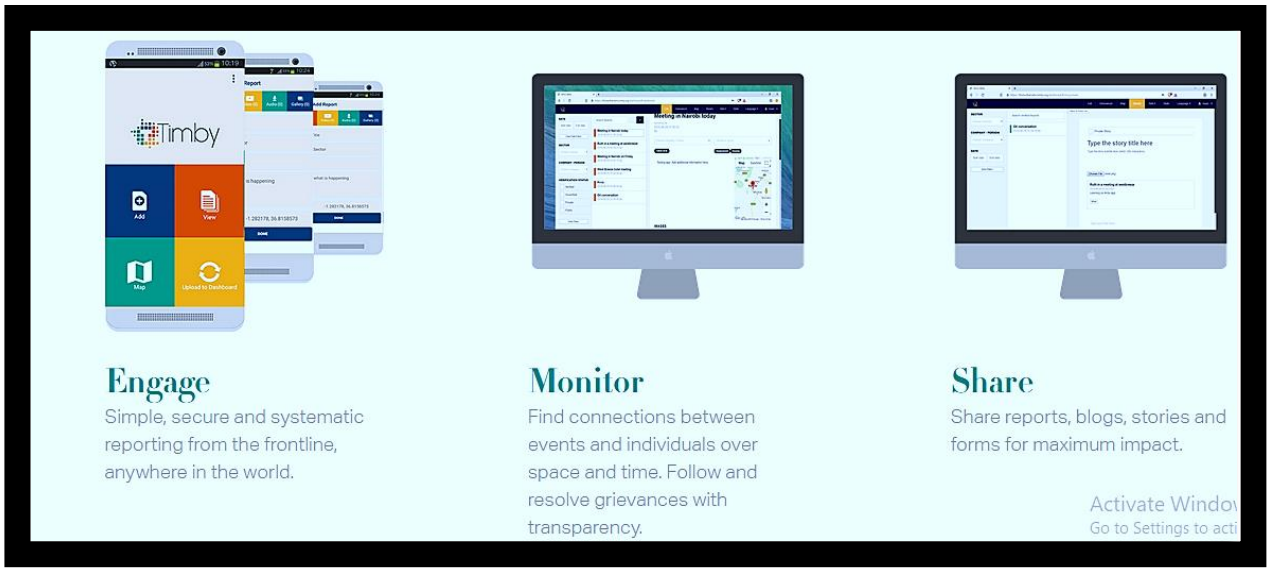


Figure 5: Illustration of the TIMBY Mobile application monitoring and reporting toolkit

Organizing community learning workshops to train resident community members to capture, store and share current drivers of biodiversity decline including unsustainable agricultural practices, illegal activities (poaching, bush burning, charcoal burning) habitat loss, pollution, invasive alien species introduction and the tools and platforms that they can use to properly mobilize, negotiate and advocate for systems change. These workshops must make use of the community learning workshops or the grid of anthropogenic factors and their impact dimensions (ecological, social, economic), as well as the *"dos and don'ts"* of community-based monitoring.

III. Periodic Updates And Maintenance Of An Online Database

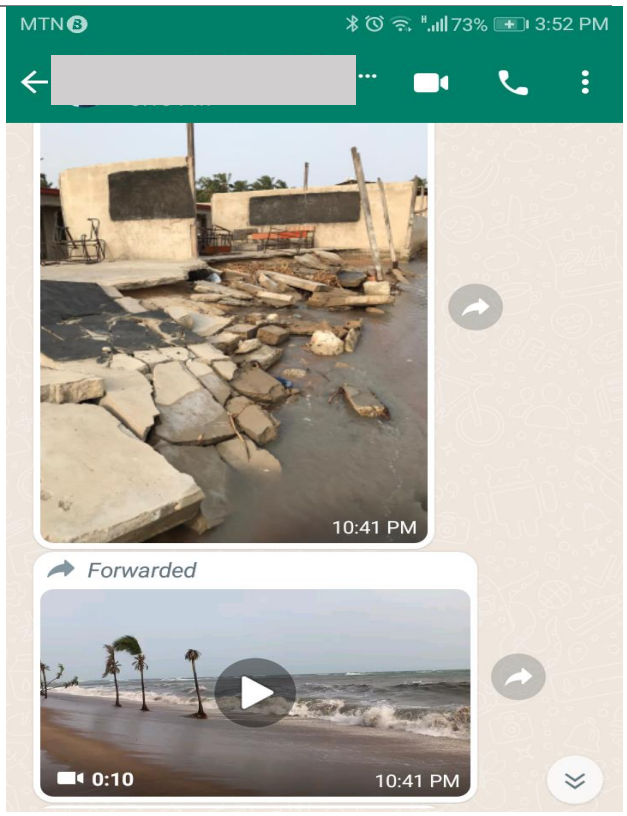
Working together with the team, it is essential to organize monthly updates with the Community Manager of the TIMBY mobile application to ensure consistency of the alert system and the online portal as well as ensure consistent reporting of all data shared by communities.

IV. Coordinated Community Learning Workshops; Using Learning-By Doing Approach

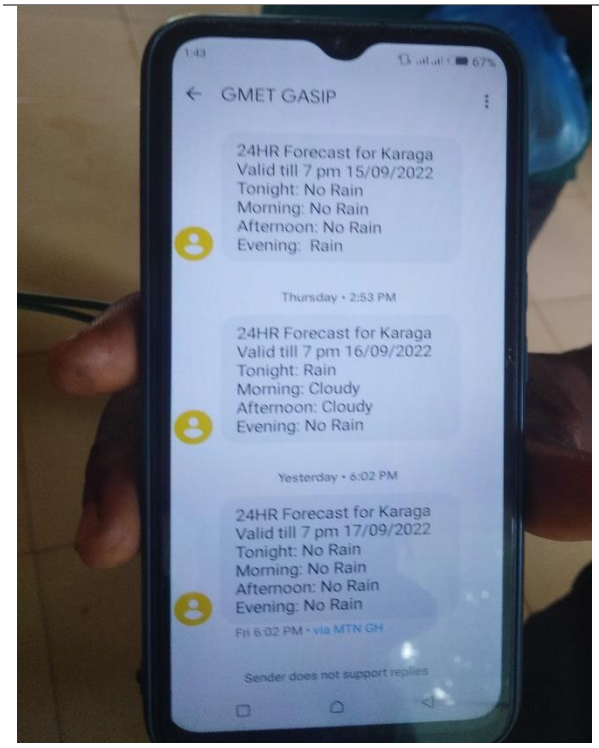
Community learning workshops must be designed to test the data collection techniques of community members after the community members have been trained on community-based monitoring protocols and monitoring processes. This stage require a field-based experimental workshop involving field observation walks through areas of interest to observe, identify and ask questions for explanations. Community learning workshops will involve transect walks on the field to identify, capture, describe and share various drivers of biodiversity decline including unsustainable agricultural practices, illegal activities (poaching, bush burning, charcoal burning) habitat loss, pollution, invasive alien species introduction, etc.

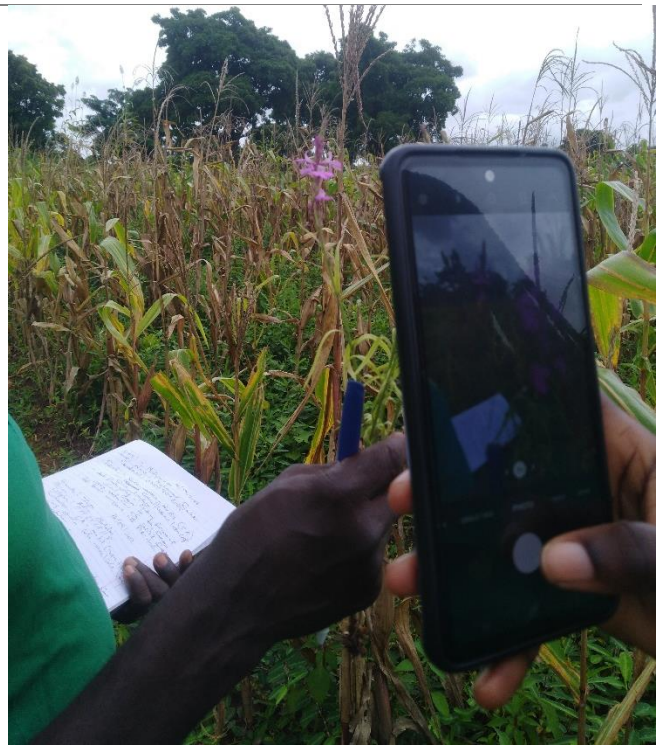
Community learning workshops can also be used to agriculture extension service officers to use TIMBY application to provide remote field advice agroecological practices. This activity is designed also based on the dual-functionality of TIMBY mobile application, i.e., for sending and receiving information either in image, audio or video form. It was noted that some agriculture extension service officer in the Mole landscape are already exposed to a mobile based weather advisory tool called GMET-GASIP.

Practical Training on the use of TIMBY mobile application in the Keta Landscape



Monitoring reports sent by trained Resident Susutainability Teams *in Keta Ramsar site*





Field demonstration of mobile-based weather advisory tool (GMET-GASIP) in the Mole landscape

Field demonstration of the TIMBY mobile application in the Mole landscape

Figure 5: Illustration of field demonstration and use of TIMBY Mobile application monitoring and reporting toolkit and other instant Messaging packages

This capacity can be upgrade with on-the app training. Given this capacity, data will then be sent to the TIMBY online database or portal. From the portal, the extension service officers will observe each data set and make recommendations to farmers based on the physical characteristics of the soil. Using TIMBY, each farmer will receive personalized advice from the extension service officers. The recommendations can also be given in video or audio and in a local language where the farmers can easily understand and follow.

THE CASE OF KETA LAGOON RAMSAR COMPLEX SITE

Between 01/08/2022 – 30/10/2022, following community learning workshops, community monitors have sent 48 reports on observed incidents including poor agricultural practices, illegal activities (poaching, bush burning, charcoal burning) habitat loss, pollution, invasive alien species introduction. Leading among these were observations related to coastal erosion within the Keta Lagoon Ramsar Complex Site. Figures 6-8 illustrate the recorded reports or incidents in the Keta Lagoon Ramsar Complex Site.

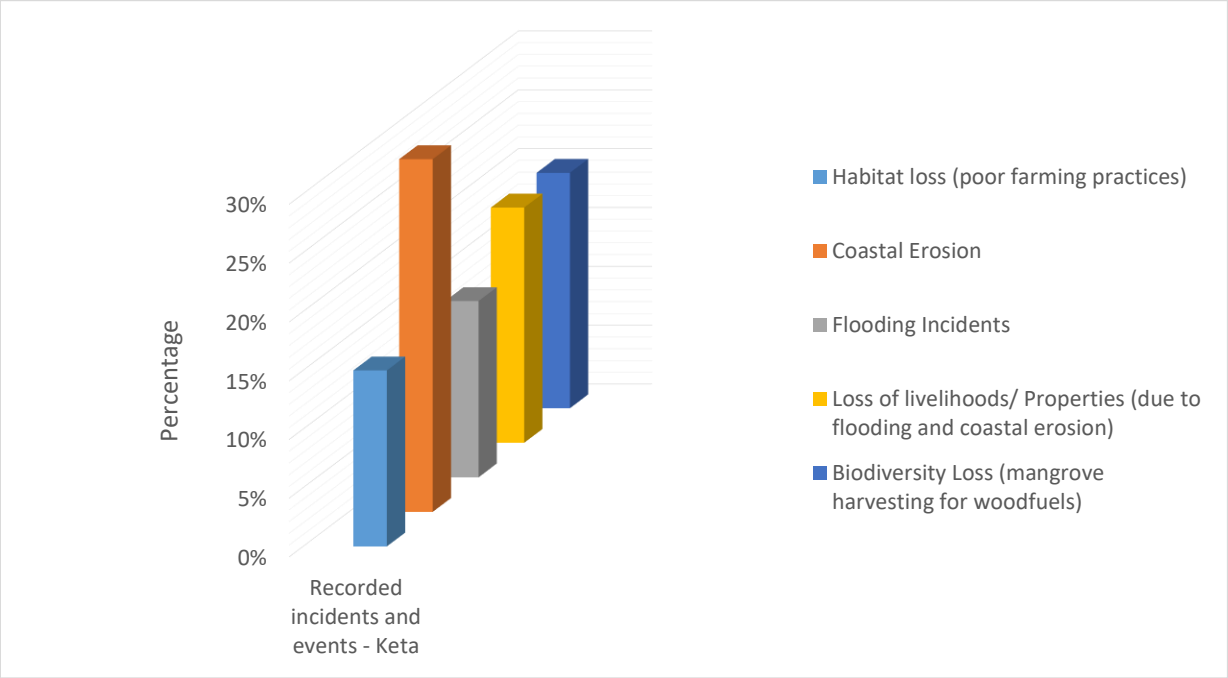


Figure 6: Recorded and reported incidents in Keta Lagoon Ramsar Complex Site (Keta Community)

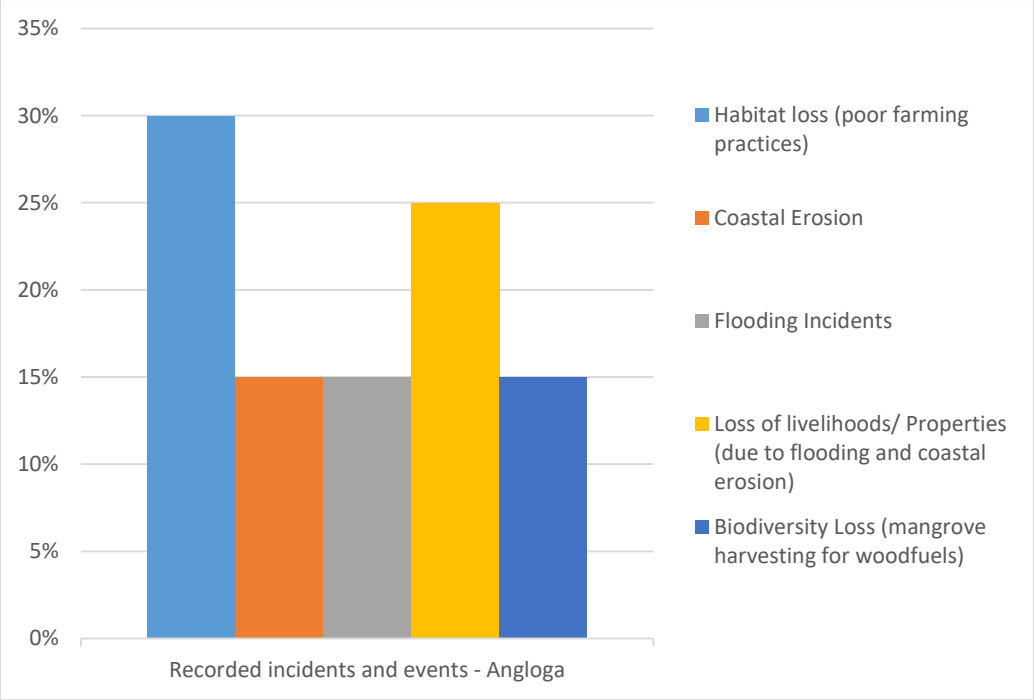


Figure 7: Recorded and reported incidents in Keta Lagoon Ramsar Complex Site (Angloga Community)

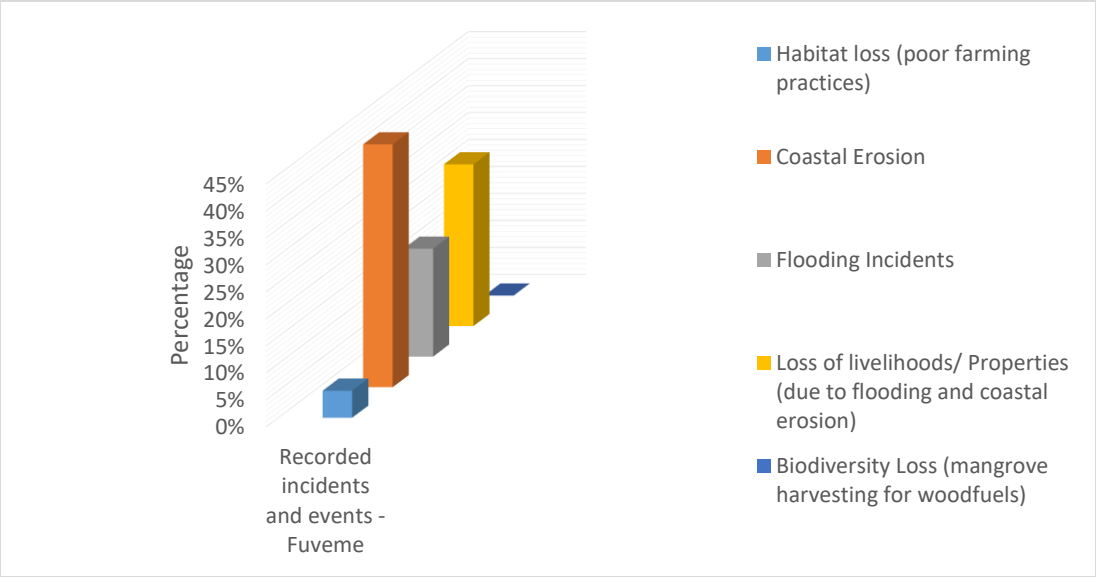


Figure 8: Recorded and reported incidents in Keta Lagoon Ramsar Complex Site (Fuveme Community)

Policy Decision Making

Existing research so far supports the premise of this project, that coordinated temporal baselines is essential to comprehensive understanding of changes in biodiversity status, composition and trends (species abundance and distribution) over time. We noticed that the National Biodiversity Policy (NBP) (2020), the Buffer Zone Policy (2013), the Forest and Wildlife Policy (2012) and the Water Policy (2007) all recognize the critical importance of community participation in the conservation of key biodiversity areas. Yet effort made so far to ensure effective community participation wetland management in Ghana is still rudimentary. This is evidenced by the general paucity and inadequacy of capacity at the community level. From recent experiences in Ghana, local communities are primary stakeholders who by their constant interaction with the environment have stored up valuable knowledge and experience that makes them the best managers and custodians of biodiversity and by extension, national biodiversity policy. Local communities can contribute to restoring or reversing biodiversity losses, especially in wetlands or Ramsar Sites. Figures 6-8 (above) are already illustrative evidence attesting to the role that local communities can play in monitoring and reporting on anthropogenic drivers of biodiversity decline.

Again, existing literature sustains our understanding and recommendation that mobilization and digitization of biodiversity data is needed to ensure consistent available data over large spatial extents. An online database with the capacity for a consistent integration of fragmentary information across disciplines is critical in order to actualize the National Biodiversity Policy (NBP) (2020), the Buffer Zone Policy (2013), the Forest and Wildlife Policy (2012) and the Water Policy (2007) and other biodiversity related policies in Ghana. It helps set and maintain consistent temporal

baselines for biodiversity that reflect past states of biodiversity before unsustainable anthropogenic pressures take root in a watershed, ecosystem or key biodiversity area.

With the advent of low-cost mobile technologies, communities can also become instrumental in detecting current drivers of biodiversity decline, such as habitat loss and fragmentation, exploitation, pollution, climate change or species introductions if they are given the requisite training and capacity. From past and recent tests, it is clear that the biodiversity data can be co-generated and stored and/or shared on the TIMBY online database (in the form of geo-referenced pictures, video alerts, audio alerts or written reports) which can be accessed and used by all stakeholders especially the Environmental Protection Agency, Forestry Commission, Water Resources Commission, sector ministries (Ministry of Environment Science, Technology and Innovation, Ministry of Lands and Natural Resources), District Assemblies, Development Partners and Civil Society Organisations who work to translate policies into action.

This capacity is urgently required as it would help in accelerating local action towards realizing the Post-2020 Biodiversity Framework of the Convention on Biological Diversity by 2030; the strategic objectives National Biodiversity Strategies and Action Plans and the SDGs (particularly goals 14 and 15) by 2030. Community-led independent monitoring, if successfully mainstreamed into national data capture and storage systems will ensure that policy implementation is based on timely, co-generated, verified, validated data.

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