



INITIATIVE ON  
Aquatic Foods



# Characteristics, multi-functionality, and water quality of reservoirs in North-East Ghana

## FIELD SURVEY REPORT

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## Abbreviations

NA	No Answer
ROSCA	Rotating Savings and Credit Association

## 1. BACKGROUND

This field study was executed as part of the activities for the WP3 of the Aquatic Foods Initiative under the Resilient Aquatic Food and Systems for Healthy People and Planet project, to support the multi-functionality of the water bodies and strengthen food security, poverty reduction, women and youth empowerment.

The goals of the field survey were to collect data along three thematic areas: the characteristics of the reservoir, the reservoir uses and users, and the water quality of the reservoirs. The results will support the final selection of the pilot sites for the project.

## 2. METHODOLOGY

From the preliminary results from mapping the monthly extent of small reservoirs in the North East region of Ghana using Sentinel 2 satellite imagery in the Google Earth Engine Environment, eight (8) out of seventeen (17) reservoirs presented by the CSIR Water Research Institute were selected for field observation and their suitability for possible fish cage culture.

The reservoirs were selected based on the area and availability of water in the dry seasons (November to April). Data for the periods, November 2021 to February 2022 were used for the selection for the field survey. The reservoirs ranged from 3 to 27 in size hectares through the seasons specified.

The locations of the eight reservoirs within the North East region are shown in Figure 1 and the information on their area dynamic is in Table 1.

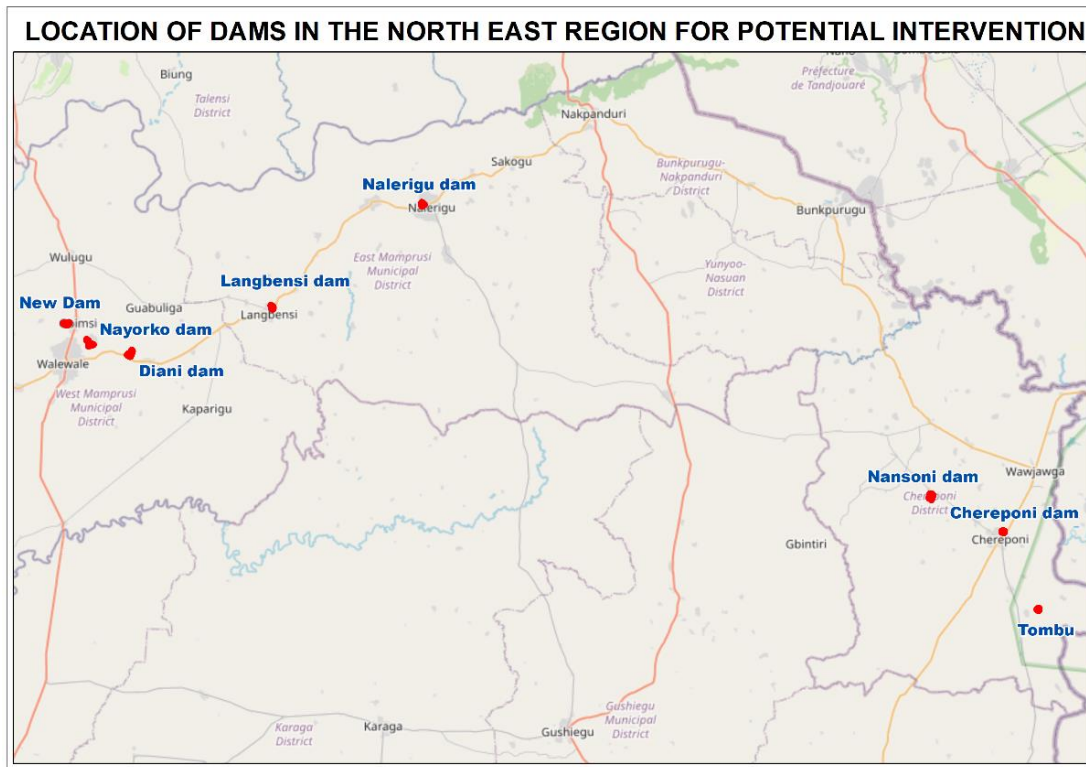


Figure 1. Selected reservoirs for the field survey.

**Table 1. Reservoirs and dams are presented for possible fish cage culture.**

RESERVOIR_NAME	REMARKS	FIELD VISIT	SIZE (HECTARES)			
			NOV	DEC	JAN	FEB
Chereponi dam	high potential	YES	10.30	9.14	10.63	7.46
Diani dam	may fall dry, field validatin necessary	YES	24.09	14.74	10.33	5.68
Langbensi dam	may fall dry, field validatin necessary	YES	10.07	8.63	7.71	6.34
Nalerigu dam	high potential	YES	12.13	11.65	11.34	9.36
Nansoni dam	may fall dry, field validatin necessary	YES	27.20	21.68	19.16	8.06
Nayorko dam	may fall dry, field validatin necessary	YES	21.25	17.23	14.09	9.23
New Dam	may fall dry, field validatin necessary	YES	15.58	10.78	7.77	4.84
Tombu	may fall dry, field validatin necessary	YES	7.60	5.97	5.30	2.46
Barasi	falls dry, not to be selected	NO	1.24	0.00	0.00	0.00
Bunkurugu dam	falls dry, not to be selected	NO	13.42	3.38	1.48	0.00
Gbani dam	falls dry, not to be selected	NO	5.43	3.77	1.76	0.00
Kwame Nansoni dam	falls dry, not to be selected	NO	4.64	3.36	2.70	0.00
Mayamam dam	falls dry, not to be selected	NO	3.13	1.75	1.16	0.00
Najong dam	falls dry, not to be selected	NO	1.76	0.00	0.00	0.00
New Dam	falls dry, not to be selected	NO	2.06	1.73	1.65	0.00
Tachegu dugout	falls dry, not to be selected	NO	2.58	1.67	1.33	0.00
Wunkyike dam	falls dry, not to be selected	NO	2.31	1.80	1.10	0.00

### 3. SURVEY DESIGN

The consultant designed a questionnaire which was presented for review to the project team members for their comments and suggestions. This was to ensure the questionnaire covered all the relevant details and was suitable and easy to implement in the field.

The questionnaire covered three main thematic areas: the characteristics of the reservoir, the reservoir uses, and users, and the water quality of the reservoirs. The questions covered are described in Table 2.

The finalized survey forms were uploaded to the KoboToolbox server and the application was installed on tablets and tested.

**Table 2. Field survey design-based questions.**

<p><b>Reservoir Characteristics</b> Name and alias of the reservoir, location, size, depth and velocity, availability of water year-round, year of development, ownership, funders, management, accessibility to electricity and local markets, surrounding communities dependent on dams, existing community-level organizations, security measures, and the possibility of reservoirs flooding in the wet season.</p>
<p><b>Reservoir Use and Users</b> Multiple uses of the reservoir, number of users per day, existing or past aquaculture system and status, fishing activities, and type of fish species.</p>
<p><b>Reservoir Water Quality</b> Activities that affect the quality of water, quality issues experienced or reported by users, sanitation around and close to the reservoirs, use of detergent for washing in dams, sediment challenges, and access to historical water quality parameters.</p>

## 4. SURVEY IMPLEMENTATION

The field surveys were carried out from the 14th to the 18th of November 2022. The survey team was made up of eight members; the IWMI Consultant, a representative from IWMI, two representatives from CSIR – Water Research Institute, and two representatives from the Fisheries Commission. Two other staff from the Fisheries Commission in Walewale joined the team for the exercise.

The team in Walewale contacted the officers in the various communities where these dams were situated to inform the chiefs and community overlords about our intended visits and seek permission to carry out the surveys.

Upon arrival at the communities, the team met with the chiefs or overlords and the elders of the community. A brief of the project background and objectives was shared and permission was sought to interview some members of the community.

The interview was intended to be gender balanced, looking at interviewing a minimum of six persons per community, three males and three females. Four team members were in charge of collecting the data and the team from Walewale helped with the language interpretation. The KoboCollect application was used for collecting the survey data.

## 5. RESULTS

The team interviewed a total of forty-seven (47) respondents, of which 26 were males, and 21 were females in seven (7) communities where the reservoirs are located. The New Dam reservoir located in Gbemsai in the West Mamprusi district was not visited due to the inaccessibility of the road to the reservoir and community.

The occupations of the respondents included fishermen, farmers, fishmongers, traders, politicians, teachers, brickmakers, carpenters, electricians, teachers, hairdressers, seamstresses, housewives, and students.

For the dams visited, the chiefs and the elders of the communities warn the team of the presence of crocodiles in all the dams.

The results of the seven dams are summarized below.

## 5.1 NALERIGU DAM

The Nalerigu dam is located in Nalerigu in the East Mamprusi district of the North East region of Ghana. A total of 8 respondents, 6 males, and 2 females were interviewed. The community refers to the reservoir as 'Birimi' which means 'river water' in their local dialect.

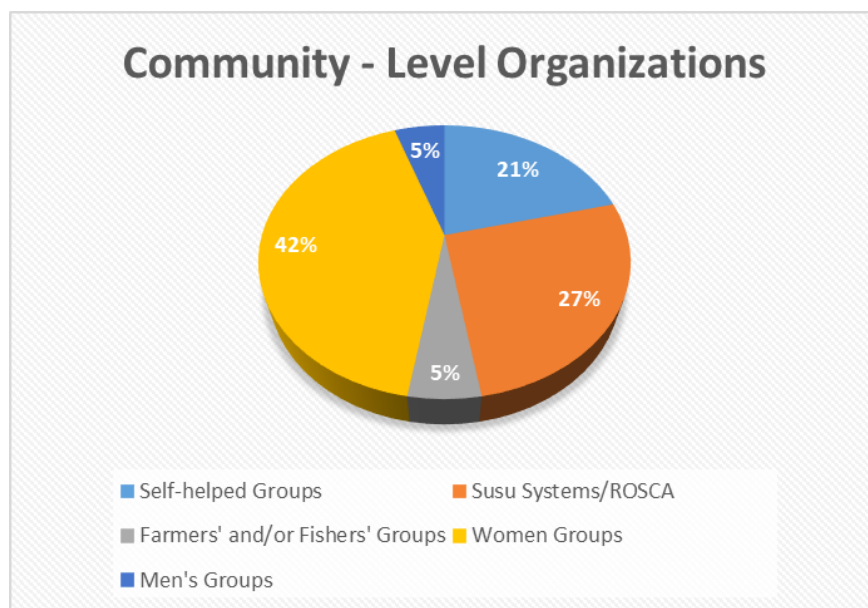
Surrounding communities that also benefit from the dam include, Gambaga, Zarantina, Nagbo, Buipere, Dentege, Namore, Atabia, and Kuligudori.

### 5.1.1 RESERVOIR CHARACTERISTICS

From the survey, the community headed by the Overlord oversees the Nalerigu dam and it is managed by the Overlord or Chief and his elders. The estimated depth of the dam ranges between 23 – 42 feet. The dam does not dry up throughout the year and 62% of the respondents acknowledged to dams not flooding in the rainy season. The community has access to electricity and there is a local market within the community. The majority 42% of the respondent acknowledged the existence of Women's groups in the community. Other community-level groups are shown in Figure 2.

**Table 3. Sample results on the characteristics of the Nalerigu reservoir.**

Respondent	Year of development	Ownership	Funder	Manager/Operator	Possibility of dryness	Estimated Depth (ft)	Electricity access	Local market access	Flooding possibility in rainy season
1	NA	Community	NA	NA	No	26	Yes	Yes	Yes
2	NA	Community	NA	Overlord	No	23	Yes	Yes	Yes
3	NA	Over Lord	Government	Overlord	No	23	Yes	Yes	Yes
4	1960	Community	Government	Chief and Elders	No	42	Yes	Yes	No
5	NA	Community	NA	The chief	No	NA	Yes	Yes	No
6	NA	Community	NA	Chief	No	NA	Yes	Yes	No
7	1960	Over Lord	Government	The chief	No	30	Yes	Yes	No
8	1973	Over Lord	Government	Chief and his subjects	No	30	No	Yes	No



**Figure 2. Percentage of responses to the community-level organization in Nalerigu.**

### 5.1.2 RESERVOIR USES AND USERS

The reservoir serves the following purposes to the community; aquaculture practices, construction purposes, domestic uses, source of water for drinking, fishing, irrigation, and brick making. Approximately, 50 to 300 users access the reservoir per day. There is active fish cage farming in the reservoir. From time to time, fishermen within the community and neighboring communities are given authorization by the chief or overlord to fish in the reservoir. Some of the fishes harvested include Tilapia, Catfish, Citharinus, Synodontis, Mormyrus, Bricinus nurse, Small Clupeids, Mormyridae, and Tilapia Zilli. Per the survey, the level of security is high and safe for fish farming.



**Figure 3. Fish cage farming in the Nalerigu reservoir.**

### 5.1.3 RESERVOIR WATER QUALITY

From the survey, the community discourages indigenes from washing especially with detergents in the dams as it serves as a source of drinking water for the communities. The presence of upstream water, agriculture activities, brick-making close to the reservoir, and construction causes the reservoir to be silted especially at the edges. Surface runoffs from rainfall are the major cause of sedimentation. Open defecation and disposal of rubbish close to the reservoir are some of the sanitation challenges faced.



## 5.2 LANGBENSI DAM

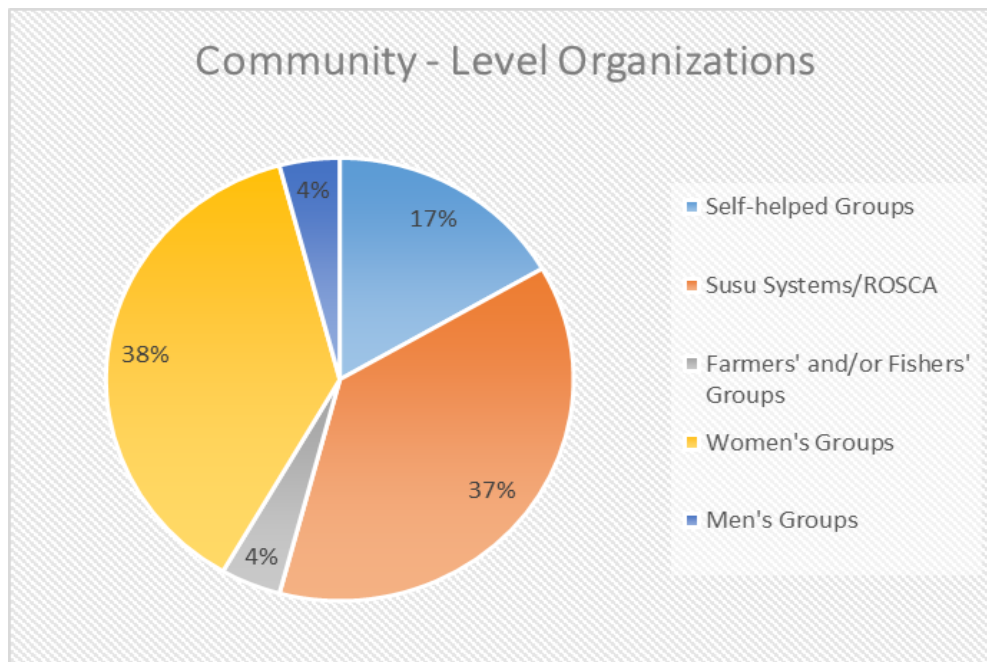
The Langbensi dam is situated in Langbensi in the East Mamprusi district, North East region. Five males and five females, making up to 10 people, were interviewed from this community. The dam is generally referred to as ‘Langbensi moare or Langbensi dam’. Bunbuazio, Tangbini, Bawku, and Kasaphe communities also benefit from the dam.

### 5.2.1 RESERVOIR CHARACTERISTICS

The dam constructed by the government under Kwame Nkrumah’s regime is managed by the chief and the elders of the community as given by the majority of the respondents. The dam does not dry up completely in the dry season. Six out of ten respondents acknowledged the flooding of the dam in the rainy season. It was added that, though the dam floods, the communities are not affected by the flooding of the dam. The estimated depth ranged from 20 to 60 feet. The community has access to electricity and a local market. Susu systems and women’s groups had the highest tally. Other community-level organizations mentioned were the self-helped groups, men’s groups, and farmers’ and fishermen’s groups.

**Table 4. Sample results on the characteristics of the Langbensi dam.**

Respondent	Year of development	Ownership	Funder	Manager/Operator	Possibility of dryness	Estimated Depth (ft)	Electricity access	Local market access	Flooding possibility in rainy season
1	1942	The Government	Government	Community and District assembly	No	39	Yes	Yes	No
2	1960	Over Lord	Government	Chief and elders	No	40	Yes	Yes	Yes
3	NA	Over Lord	Government	Chief and elders	No	NA	Yes	Yes	Yes
4	NA	Over Lord	Government	Chief and elders	No	NA	Yes	Yes	Yes
5	NA	Community	The government under Nkrumah's regime	Chief	No	20	Yes	Yes	No
6	NA	Community	The government under Nkrumah's regime	Chief	No	30	Yes	Yes	No
7	1958	The Government	Government	Community	No	60	Yes	Yes	Yes
8	NA	Community	Government	Chief of the town	No	20	Yes	Yes	No
9	NA	Community	Government	The Community	No	20	Yes	Yes	Yes
10	NA	Community	Government	Chief of Langbinsi	No	20	Yes	Yes	Yes



**Figure 4. Percentage of responses to the community–level organization in Langbensi.**

### 5.2.2 RESERVOIR USES AND USERS

With approximately 30 to 100 users per day, the water from the dam is mainly used for Irrigation, Fishing, Domestic Uses, Construction, and Watering of animals such as cattle. There has not been any initiative of aquaculture practices in the dam but fishermen from other communities are given authorization from time to time by the chief or overlord to harvest fish from the dam. Some common fish harvested are, Catfish, Tilapia, Mormyridae, Synodontis, Mudfish, and Crabs, amongst others. Figure 5 describes the level of security in the community.

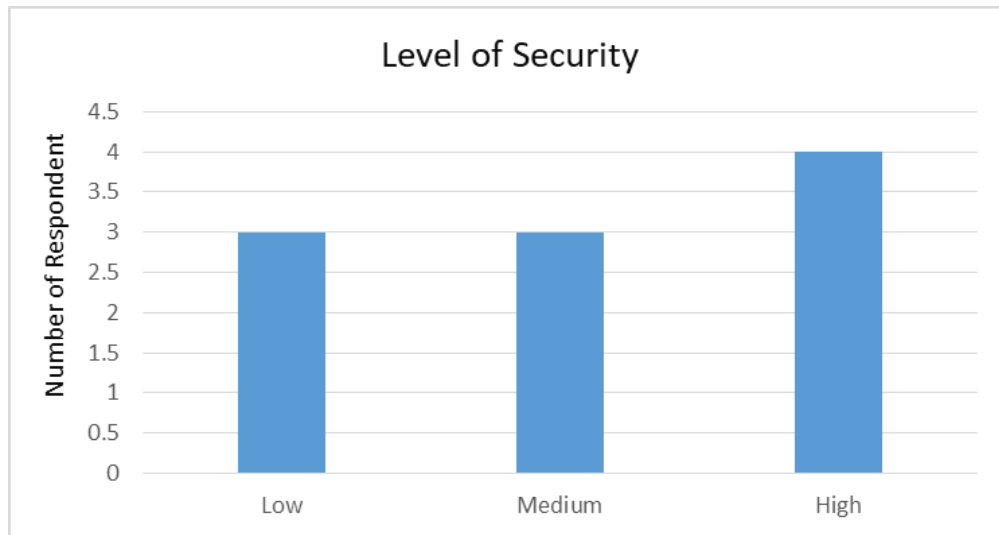


Figure 5. Response on the level of security in the Langbenshi community.

### 5.2.3 RESERVOIR WATER QUALITY

Washing in the dams with detergent is a common practice in the community. Some mentioned natives leaving worn-out clothes around the dam after washing. There are farms close to the dam that use the water for irrigation. The presence of upstream water, agriculture activities, and construction activities close to the dam causes the dam to be silted. Surface runoffs from rainfall are the major cause of sedimentation. Domestic waste, defecation, disposal of rubbish, fertilizer containers, and washing products close to the dam are some of the sanitation challenges faced. The water is said to be turbid during rainy seasons from surface runoff and the construction of bricks and blocks along the dam.



**Figure 6. Washing activities and irrigation using a water pump at the Langbensi dam.**

### 5.3 NANSONI DAM

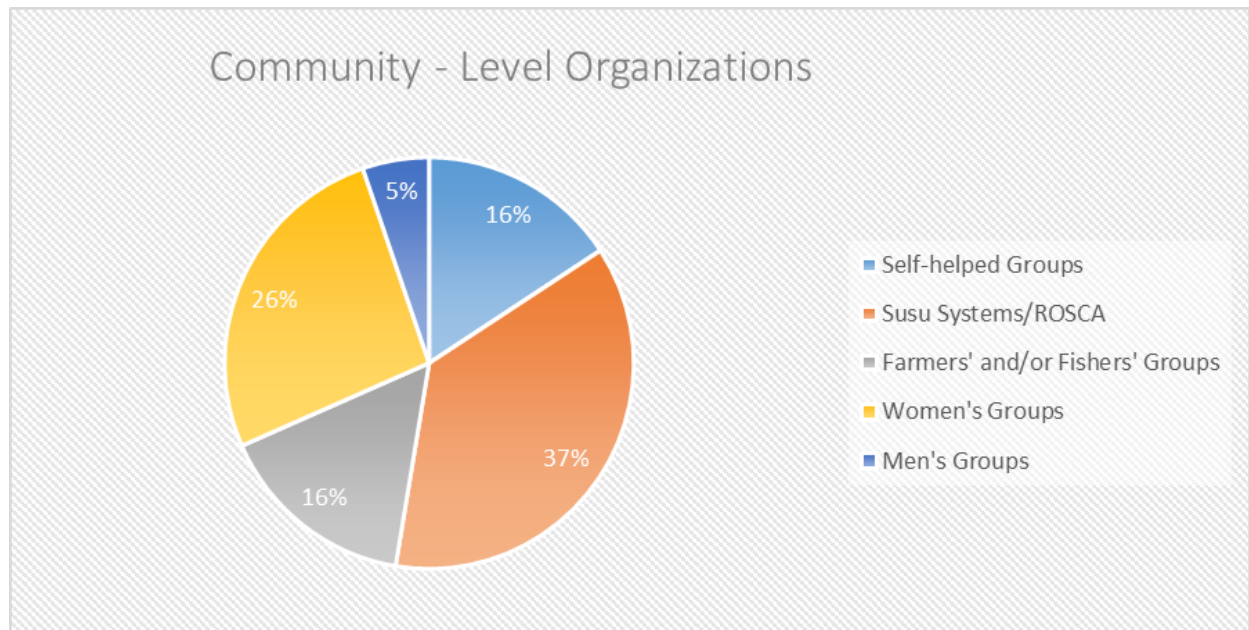
The Nansoni dam is found in the Nansoni in the Chereponi district. A total of 7 seven people were interviewed. This comprised 4 females and 3 males. Other nearby communities that benefit from water from this dam are, Akromabila, Nandere, Kpenchi, Angor, Etehi, Tumpondi, and about 25 other communities.

#### 5.3.1 RESERVOIR CHARACTERISTICS

The construction of the dam was funded by Action Aid in the year 1998. It is owned by the community and managed by the chief, the elders, and the water management committee. Since its construction, the dam has not dried up completely and is liable to flooding in the rainy season but does not overflow its abutment. The estimated depth of the dam ranged from 7 to 60 feet. There is access to electricity but no local market in the community. The nearest market is in the Chereponi Township. Susu systems and women’s groups had the highest tally. Other community-level organizations mentioned were the self-helped groups, men’s groups, and farmers' and fishermen’s groups.

**Table 5. Sample results on the characteristics of the Nansoni dam.**

Respondent	Year of development	Ownership	Funder	Manager/Operator	Possibility of dryness	Estimated Depth (ft)	Electricity access	Local market access	Flooding possibility in rainy season
1	1998	Community	Action Aid	Elders	No	NA	Yes	Yes	Yes
2	1998	Community	Action Aid	Head of the community	No	40	Yes	No	Yes
3	1998	Community	Action Aid	Peace water management committee	No	60	Yes	No	Yes
4	1998	Community	NGO	Overlord	No	7	Yes	No	No
5	1998	Community	NA	Chief and old men of the community	No	7	Yes	No	No
6	1999	Community	Action aid	Community	No	15	Yes	No	Yes
7	1990	Community	Action Aid	Community	No	20	No	No	No



**Figure 7. Percentage of responses to the community–level organization in Nansoni.**

### 5.3.2 RESERVOIR USES AND USERS

Irrigation of farms during the dry season, fishing, domestic uses, drinking of water from the dam, animal watering, construction purposes, and pure water business are the main uses of the Nansoni dam. Approximately 70 – 200 people visit the dam daily. Aquaculture activities have not been introduced to the dam yet. Permission is given to fishermen from the Chereponi Township and the communities to fish in the dam occasionally. Fish harvested are Catfish, Tilapia, Synodontis, Electric fish, Herrings, and Redfish. The level of security in the community is described as high.

### 5.3.3 RESERVOIR WATER QUALITY

Since the water serves as a source of drinking water for the communities, measures are put in place to ensure that the dam and its surroundings are kept as clean as possible. There are no sanitation challenges and washing especially the use of detergents is prohibited. Upstream water sources, agriculture practices, and domestic uses affect siltation, and runoff from surfaces during heavy rainfall causes sedimentation.



**Figure 8. A picture of the Nansoni dam.**

## 5.4 TOMBU DAM

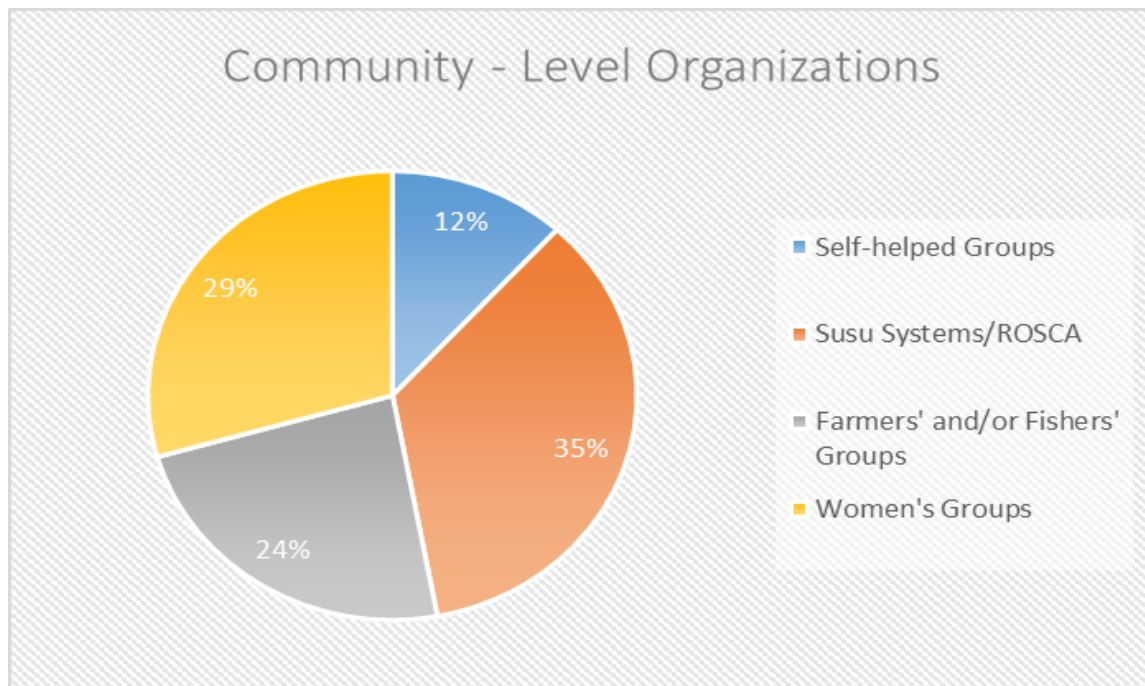
The Tombu dam is found in the Tombu in the Chereponi district. Four males and two females, summing 6 respondents were interviewed. The dam is locally referred to as ‘Kuma’. Tinchuandu, Nakaku, Tiekasu, Chombosu, and Angor communities rely on the dam.

### 5.4.1 RESERVOIR CHARACTERISTICS

The dam was constructed in 2003. This was funded by the government, and Action Aid. The overlord and the village committee members oversee the management of the Tombu dam. The estimated depth ranges from 30 to 65 feet. The dam since its construction has not dried up completely at any point and it does not get flooded in the rainy season. There is electricity in the community. Half of the respondents interviewed replied ‘YES’ to the availability of a local market and the other half ‘NO’ to the same question. Susu systems and women’s groups had the highest tally. Other community-level organizations mentioned were the self-helped groups and farmers and fishermen’s groups.

**Table 6. Sample results on the characteristics of the Tombu dam.**

Respondent	Year of development	Ownership	Funder	Manager/Operator	Possibility of dryness	Estimated Depth (ft)	Electricity access	Local market access	Flooding possibility in rainy season
1	2003	Community	Action Aid and government	Community	No	50	Yes	No	No
2	2003	Community	Action Aid and government	Village committee	No	40	Yes	No	No
3	2003	The Government	Government and Action Aid	Community	No	60	Yes	Yes	No
4	2000	The Government	Government	Chairman Martinja	No	60	Yes	Yes	No
5	2003	Community	The government under Kuffour’s regime	Chief/ Landlord	No	65	Yes	Yes	No
6	2003	Action Aid	Action Aid	Village committee	No	30	No	No	No



**Figure 9. Percentage of responses to the community-level organization in Tombu.**

#### 5.4.2 RESERVOIR USES AND USERS

With a minimum of 50 and a maximum of 120 daily, the dam is used for fishing, irrigation, construction, and domestic activities. There have not been any aquaculture initiatives in the dam. The community has a dam management committee that gives authorization to fishermen to fish from the dam seasonally. Fishes mostly caught from the dam include, tilapia, catfish, and mudfish. The average security level in this community is medium.

#### 5.4.3 RESERVOIR WATER QUALITY

There are no sanitation challenges or reports and the community does not wash clothes in the dam. Some activities that cause the dam to be silted are water from upstream sources, agriculture and domestic activities, and animal water watering. Sedimentation results from surface runoff during heavy rainfalls.



**Figure 10. A picture of the Tombu dam.**

## 5.5 DIANI DAM

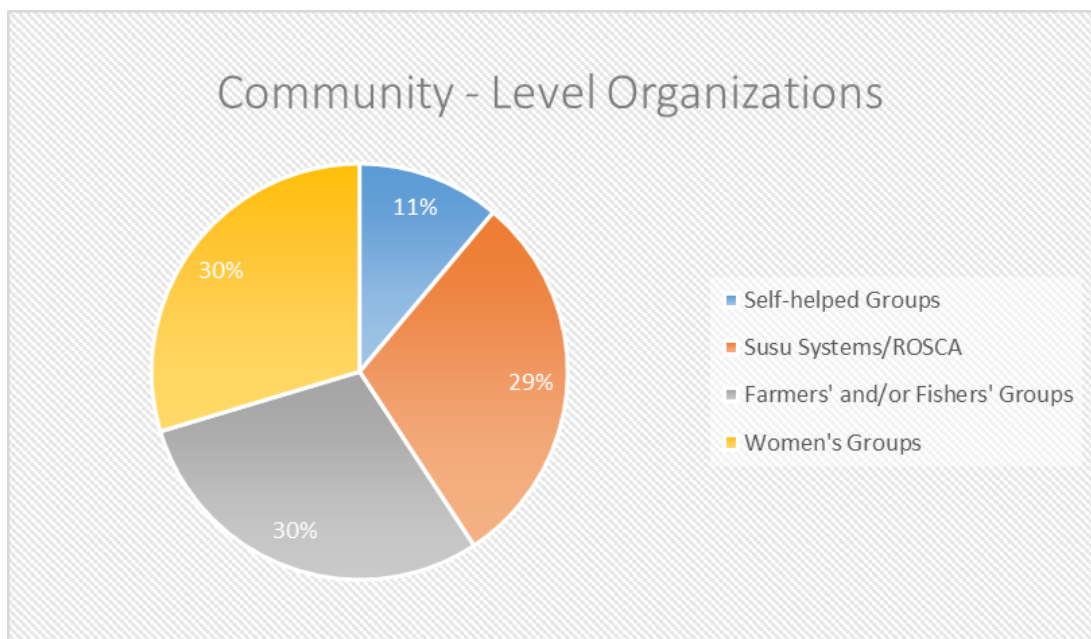
Diani dam is sited in Diani, a community in the West Mamprusi district. The community refers to the dam as “Diani moari” which translates to Diani River. Including the Diani community, the dam serves the Dimia, Tinkaya, Guabuliga, and Tinguri communities. A total of 5 males and 5 females were interviewed from the Diani community.

### 5.5.1 RESERVOIR CHARACTERISTICS

The Diani dam constructed in the 1960s by the government is owned by the community and managed by the chief and elders of the community. The dam with an estimated depth of 20 – 40 feet does not dry up completely anytime within the year. The dam is flooded in the rainy season but not beyond its dike. There is an electricity supply in the community and the nearest local market can be found in Walewale. Community-level organizations that exist in the community are self-helped groups, Susu systems/ROSCA groups, farmers and fishermen groups, and women’s groups.

**Table 7. Sample results on the characteristics of the Diani dam.**

Respondent	Year of development	Ownership	Funder	Manager/Operator	Possibility of dryness	Estimated Depth (ft)	Electricity access	Local market access	Flooding possibility in rainy season
1	70	Over Lord	Government	Chief, elders and assembly	No	40	Yes	Yes	Yes
2	1966	Community	Government	Chief	No	NA	Yes	Yes	Yes
3	1966	Over Lord	Government	Chief and elders	No	NA	Yes	Yes	Yes
4	NA	Community	NA	Chief	No	30	Yes	No	Yes
5	NA	Community	NA	Chief	No	6	Yes	No	No
6	1960	Community	Government	Chief	No	30	Yes	No	Yes
7	1960	The Government	Government	Chief and Elders	No	45	Yes	No	Yes
8	1960	Over Lord	Government	Not sure	No	42	Yes	Yes	No
9	NA	Community	Government	Chief and his children	No	20	Yes	Yes	Yes
10	NA	Community	Government	Community	No	15	Yes	No	Yes



**Figure 11. Percentage of responses to the community–level organization in Diani.**



### 5.5.2 RESERVOIR USES AND USERS

The major uses of the dam are fishing, domestic uses, irrigation, construction purposes, and animal watering. Several 20 – 200 users visit the dam in a day. For fishing activities, fishermen from other communities are contracted by the chief to fish from the dam during certain seasons of the year. There has been an initiative for adapting an aquaculture system but it is currently inactive. Security is averagely high in the community.

### 5.5.3 RESERVOIR WATER QUALITY

Water quality challenges faced are the turbidity of the water from sediments and contamination of the water from animal excreta left after animals are watered. Sediments from surface runoff from heavy rainfall and soil residues from the brick construction cause sedimentation. Siltation is mainly caused by upstream water sources, brick construction, and domestic, and agricultural activities. The community of prohibited from washing close to the dam.



**Figure 12. A picture of the Diani dam**

## 5.6 NAYORKO DAM

The Nayorko dam is situated in Nayorko, a town in the West Mamprusi district of the North East region. The dam is generally called ‘Bogbla’ or ‘Moari’ by the community. Neighboring communities, Banewa, Gbimsi, Gagbine, Kata, and Walewale benefit from the dam.

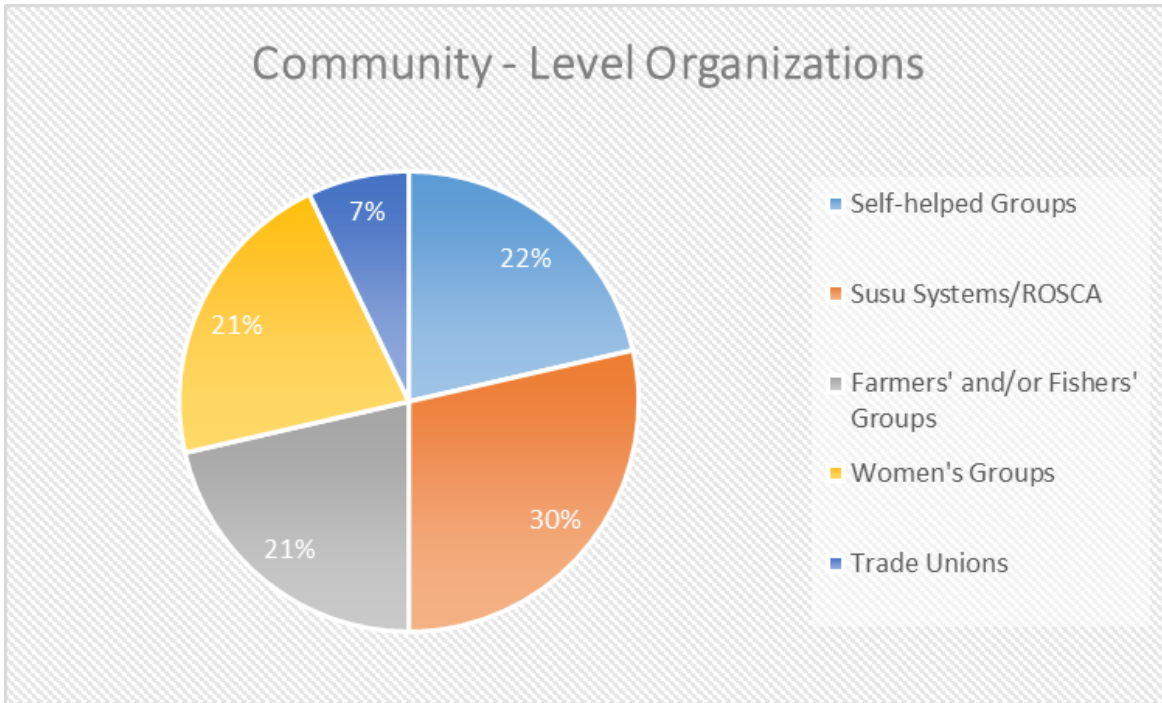
In the meeting with the chief and his elders, the team was informed of the unsuitability of the dam to be used for fish farming as the outlet of the dam is broken and the heavy siltation of the dam. Five respondents, three males, and two females were interviewed in this community.

### 5.6.1 RESERVOIR CHARACTERISTICS

The Nayorko dam per the response from the community engagement was established in the 1960s. It was funded and constructed by the community with full custodians given to the community overseen by the chief and the elders of the community. The community response to the estimated depth of the dam was 5 – 20 feet. Though the chief mentioned how heavily silted the dam was, the respondent mentioned the dam not drying up completely any time of the year. Three of the respondent said the dam does not get flooded whilst the other said it floods during the rainy season. At the same rate, three responded to having no access to a local market within the community whilst two attested to the availability of a local market. Community-level organizations present in this community are, Self-helped Groups, Susu Systems/ROSCA, Fishermen’s Groups, Women’s Groups, and Trade Unions.

**Table 8. Sample results on the characteristics of the Nayorko dam.**

Respondent	Year of development	Ownership	Funder	Manager/Operator	Possibility of dryness	Estimated Depth (ft)	Electricity access	Local market access	Flooding possibility in rainy season
1	60	Community	Government	Chief	No	15	Yes	Yes	No
2	50	Community	Government	Chief	No	15	Yes	Yes	No
3	NA	Community	NA	Chief	No	5	Yes	No	No
4	1958	Community	Government	Chief and his Elders	No	12	Yes	No	Yes
5	NA	The Government	Government	Chief in the community	No	20	Yes	No	Yes



**Figure 13: Percentage of responses to the community–level organization in Nayorko.**

### 5.6.2 RESERVOIR USES AND USERS

Several 20 – 120 people use the dam for irrigation, domestic uses, construction, fishing, and filling of water tankers for selling daily. There have not been any aquaculture practices introduced in the dam yet. The chief and the elders give authorization to fishermen groups for the community and neighboring communities to fish occasionally in the dam. Fishes normally harvested from the dam include; tilapia, catfish, Synodontis, mudfish, and others whose names are not known. The level of security in the community is on a medium scale.

### 5.6.3 RESERVOIR WATER QUALITY

Aside from the turbidity of the water as a result of surface runoff from heavy rainfall, there are no sanitation or water quality challenges. The surface runoff from the rains also causes the dam to be sediment. Activities such as farming activities such as vegetable and rice farming around the dam, upstream water flow, domestic uses, and surface runoff lead to the siltation of the dam. The community is prohibited from washing in the dam.



**Figure 14. A picture of the Nayorko dam**

## 5.7 CHEREPONI DAM

The Chereponi dam is located in Chereponi in the Chereponi district of the North East region. The officer in charge of the dam advised that the dam will not be suitable for fish farming due to the insecurity issues in the community. He added that the dam was not kept clean, and also the dependency ratio on the dam was too high as it was the major source of water for the community. An aquaculture initiative was not advisable.

Because of this reason, only one person was interviewed in this community.



**Figure 15. Pictures of the Chereponi dam**