Role of Communication in the Process of a Good Cultivation Technique Around Open-Air Works in Burkina Faso: Case of the Mogtedo-Zam Dam in the Ganzourgou Province in the Central Plateau Region

Jérôme Compaore and Joachim Bonkoungou

ABSTRACT

In the municipality of Mogtedo and Zam, climatic conditions are unfavorable and influence the availability of water resources. Thus, water resources are becoming increasingly valuable for human activities, particularly market gardening and pastoral production. Indeed, the dam located in the village of Talembika in the municipality of Zam and the agricultural plain in Mogtedo are threatened by advanced siltation of the watercourse. This has an impact on the standard of living of the local populations. Can the cause of the silting be linked to a lack of communication on the management of water reservoirs? The main objective is to analyze the perceptions of the users of the dam on silting and the contribution of communication in the process of a good farming technique around the water reservoir of Mogtedo-Zam in the province of Ganzourgou in the Central Plateau region. To do this, quantitative and qualitative methods were used for the collection, processing and analysis of data using appropriate tools. The results of the study reveal rapid siltation of the dam, which is confirmed by 86.96% of the respondents. This situation is due to soil erosion, the deposition of solid materials from the watershed, high pressure from users, and low rainfall. Thus, communication is an important factor in the fight against silting. The technical services are the first communicators of the users of the dam. Users lack information and awareness on the management of the dam and good farming practices to avoid its rapid siltation.

Keywords: communication, cultures, Ganzourgou, Mogtedo-Zam dams, siltation, water.

I. INTRODUCTION

The countries of the Sahelian zone, including Burkina Faso, were deeply marked by the effects of the drought of the 1970s, which revealed the vulnerability of the countries of the Sahel to a largely deficient and irregular rainfall in space and time. The extent of the harmful effects of these successive droughts, combined with the importance and acuteness of the water needs to be met, has led to a situation of national disaster. This era marks the decisive turning point from which all successive governments have prioritized water control as an important axis of the country’s development policy. Hence the need to develop a better communication strategy to support this policy and management around dams or water reservoirs. Located inside the bend of the Niger between 10° and 15° north latitude, 2° east longitude and 5° 30’ west longitude, Burkina Faso is a Sahelian country which covers an area of 274,000 km².

From the hydrological point of view, the territory of Burkina Faso straddles three international watersheds which are the watershed of the Comoe, the watershed of the Volta (Nakanbe and Mouhoun) and that of Niger [1]. In the context of the Sahelian countries and particularly that of Burkina Faso, the continuous growth of the demand for water in quantity and quality due to the development of the country in an environment of degradation of the resource, will inevitably lead to medium and long term on competitions, even conflicts in the uses of water. Irrigation remains the largest sector in terms of water consumption demand (more than 60%), followed by the domestic use sector and the livestock sector. With regard to the uses of water resources, the problems are different from one use to another, and it is important to note that agriculture remains the largest consumer of water resources at the national level (more than 60%). Over the past ten years, several major challenges have emerged in connection with the exploitation of water resources. These worrying challenges are called: (1) Pollution resulting from the development of agricultural and mining activity poles; (2) Overexploitation of water resources; (3) The degradation of the banks and the silting up of the country’s water bodies and rivers; (4) The increasing degradation of existing water infrastructure; and (5) The urgent need to recover the financial resources necessary for the sustainable management of the country’s water resources, under the financial contribution to water (CFE). According to G. Ndanga Kouali [2], the resource of the Mogtedo-Zam dam is shared between the breeders of the communes of Zam and Mogtedo, the
fishermen and the farmers (rice growers and market gardeners), the dolotières and the restaurateurs of these same communes. Indeed, the productions at the level of the banks, the sedimentation by the deposits of the wind and erosive particles contribute to a rapid degradation of the dam.

This is why this article aims to understand the role of communication in the process of good cultural practice around open-air structures in Burkina Faso, the case of the Mogtedo-Zam dam in the province of Ganzourgou in the region of central tray. This article is structured in two parts: the first part describes the geographical framework of the research and exposes the methodology adopted; the second part presents the results obtained.

II. GEOGRAPHICAL AND METHODOLOGICAL FRAMEWORK

A. Geographic Framework

This study was carried out in Zam and Mogtedo, two rural communes in the province of Ganzourgou located in the Central Plateau Region. As the dam is shared between the two municipalities and the dam downstream of Zam and the rice-growing developments upstream of Mogtedo. Thus, it is the location of the municipality of Zam which is represented for the location of the dam. Zam is located between 12° 20' 32” north latitude, and 0° 49’ 56” west longitude. It is located 87 km from the capital Ouagadougou, 72 km from Zimiare (capital of the Region) and 35 km from the town of Zorgho (capital of the province of Ganzourgou). The municipality of Zam covers an area of 786 km². The commune of Zam is bounded to the north by the commune of Absouya, to the east by the communes of Meguet and Zorgho, to the southeast by the communes of Mogtedo and Boudry, to the west by the commune of Nagreongo.

![Fig. 1. Geographical location of the Municipalities of Mogtedo and Zam in the Provincial space.](image)

The municipality of Zam includes 35 villages. It has 62,518 inhabitants, divided into 10,090 households according to the INSD survey in 2020 of the 5th RGPH 2019. The municipality of Zam remains accessible by three roads: the national road n°4, Nagreongo-Zam-Mogtedo paved, the Meguet-Zam departmental road and an Absouya-Zam track; the latter which are degraded and impassable in the rainy season. The municipality of Zam remains more or less landlocked compared to neighboring municipalities (Absouya, Zorgho, Mogtedo, Nagreongo, Meguet) and the intra-municipal road network made up of rural tracks is also very degraded. Some villages remain inaccessible in the rainy season. The population of the commune is mainly composed of farmers, breeders, craftsmen, fishermen and gold miners. Consequently, map n°1 below better presents the situation of the two municipalities (Mogtedo and Zam).

B. Methodological Framework

In order to assess the level of siltation and the process that contributes to the degradation of the Mogtedo-Zam water reservoir, the systemic approach was used. It allowed the collection of quantitative and qualitative data in order to make the results communicable and to understand the evolution of the phenomena and the processes that drive them. This method is made first, around documentary research and field surveys for data collection, then by processing and finally by data analysis. The tools that were used for the collection are, among others, the digital questionnaire, the GPS, the interview guide, and the camera. The survey involved 22 users of the Mogtedo-Zam dam, and the choice was made randomly. Also, interviews are made with resource persons, in particular the administrative authorities, the technical agents of agriculture and livestock in the municipalities of Mogtedo and Zam.

The processing of this information is done from the tools. These are the QGIS software, version 2.18.7 for the creation of maps; Microsoft Office Excel 2013 software, KoBo for statistics, tables and graphs and Microsoft Office Word 2013 software for writing the article. The siltation of a dam results from the sedimentation that occurs there and from the pressure exerted on the dam. In this, its identification is the subject of various methods which require, for the most part, specific means, and knowledge [3]. Such a study requires a long observation time and a rigorous and quantitative methodology which consists of starting from the apparent consequences observed in the field for the evaluation of the level of siltation. However, in this study on the Mogtedo-Zam dam, it consists in collecting the perceptions of the users of the dam and the local authorities on the level of siltation of the dam. The results obtained revolve around four points, namely: the presentation and users of the dam, cultural practices, and perceptions of users on siltation and the role of communication on the phenomenon of siltation.

III. RESULTS AND DISCUSSIONS

A. Presentation and Users of the Dam

1) Presentation of the dam

The watershed of the Mogtedo-Zam reservoir, located at the level of the Nakambe sub-basin, was created in 1963. At that time, the dam had a sectoral, agricultural vocation by...
irrigating the rice-growing area downstream [2]. The specificity of the Zam-Mogtedo water reservoir is that the dam is located in the municipality of Zam, more precisely in the village of Talembika and the developed plain in the municipality of Mogtedo. It should be noted that the Zam-Mogtedo water reservoir is built on the Bombore. The Bombore is a tributary of the left bank of the Nakambé. The map below shows the Mogtedo-Zam dam.

The Talembika dam is located about a few km between the two municipalities that share the dam. The users around the dam make it possible to define the existing relations between these users, in particular breeders, farmers, and other users. Water retention and surrounding landscaping face numerous constraints. According to the results of the survey, we can cite among others: the problems of water availability, rapid drying up and irrigation problems which are confirmed by one hundred percent of the respondents. This corroborates with the work of G. Ndanga Kouali [2] which shows that the management of irrigation around dams is subject to many constraints in particular the concept of IWRM which is not well known; an imbalance between the needs expressed and the availability of the resource; uncoordinated management of resource users or sectoral management; a lack of technical support in human resources; which is characterized by a lack of consumption planning given the volume of water stored; conflicts identified between users; non-compliance with the irrigation schedule; Poorly known reservoir capacity (volume of water available) and declining due to siltation; An uncontrolled siltation rate. However, these constraints also emerged in interviews with the technical services of the two municipalities.

2) Dam users–Pastoral users

The breeders encountered around the dam practice extensive livestock farming because the main concerns of the breeders are limited to the search for pasture and water for the livestock. The cattle move according to the presence of the water resource. We can then realize that the cattle drink around the dam. However, the general observation observed is the often-difficult access to these watering points for animals due to the obstruction of certain tracks by farms. The results of the herders’ focus group confirm that access to the dam for watering animals is confronted with the lack of cattle tracks. And this sometimes leads to conflicts between herder and farmer. The latter use the cattle tracks for their farming. “With the rapid silting up of the dam, watering becomes difficult, and we are forced to make boulis in search of water for the livestock.” (Comments by K. A. of 26.03.2022). The photographic plate below presents the livestock for watering.

Fig. 3. Pastoral users for animal watering.

Fig. 3 a and b show pastoral users grazing animals. The breeder who is grazing on the agricultural plots around the dam Fig. 3a. Fig. 3b) shows a small shepherd filling the water tank from the water source in the bouli for the watering of his herd. This technique, which is practiced by most users, is due to the rapid drying up of the dam.

3) Usagers agricoles

Agricultural users are the most affected by the surveys because they are present on the site for their market gardening activities. Indeed, 87% of the respondents concerned by the study are all farmers. About 86% of the farmers are users of the dam’s resources. Among these agricultural irrigators, 56.52% are farm owners. They are mostly helped in their activities by their family (47.83%) and by agricultural employees (9%). Access to agricultural plots is mainly by donation and by loan. Agricultural irrigators mostly practice market gardening. These vegetable productions are, among others, the cultivation of onions, tomato carrots, cabbage and sorrels and other leaves. Cereal crops grown around the dam include rice and maize. The following graph shows the different products practiced around the dam.

Fig. 4. Types of crops grown around the perimeter of the Mogtedo-Zam dam.
Analysis of Fig. 4 shows that the most cultivated products around the dam include cabbage, carrot, lettuce, onion, and tomato and respectively practiced by 78.26%, 56.52%, 39.13%, 30.40% and 17.39% of respondents. According to respondents, peppers and eggplants are not grown much around the dam. Other products (corn, rice, etc.) are grown by 47.83% of agricultural users. Thus, the following photographic plate presents the products grown by the users of the dam.

Fig. 5. The different agricultural practices downstream of the dam.

The products grown by agricultural users are shown in Fig. 5. Fig. 5a shows a maize crop plot and Fig. 5b shows farm workers harvesting in carrot production plots.

4) Other users

These are mainly the manufacturers of mud bricks. They grow during the dry season near the waters of the dam to draw the water needed for molding bricks. They take the necessary earth near the basin of the dam. These bricks are used in the construction of dwelling houses. Although there are boreholes and modern wells in each of the respective villages of these users, a good number still go to the waters of the dam, to the wells dug by the breeders to supply water to the cattle, to the water from the irrigation canals and even in the tributaries of the Bombore which communicate with the drainage canals to take their drinking or cooking water, which is confirmed in the work of G. Ndanga Kouali [2].

B. Cultural Practices around the Dam

Cultivation practices around the dam are carried out in two stages, particularly during the rainy season and the dry season. At the level of the developed plain, there are two cropping systems, namely the irrigated cropping system and the rainfed cropping system. They are practiced respectively by 100% and 62.81% of respondents.

1) Rainfed cropping system

The calendar of rainfed cultivation is dependent on the vagaries of the weather. Rainfed crops are characterized by the smallness of the cultivated areas despite the availability of land, the use of traditional working instruments which consist of the daba, the axe, the machete, and the hoe. There is also the practice of intercropping where the quality of the seeds used, and the density of sowing or planting are not taken into account. Farmers who practice these systems face pockets of drought. This means that the returns are below expectations. Indeed, the construction of the dam should help increase yields across its rice plain. The developments around the dam are mostly reserved for rice cultivation, especially the developed plain located in the commune of Mogtedo. Hence the interest of the irrigated perimeters established in the area, finally to cope with the vagaries of the weather and to compensate for any deficits in rainfed cereal production. According to the results of the survey, almost all the respondents practicing cultivation during the dry season practice rainfed cultivation. The tools used for rainfed cultivation are rudimentary. They boil down to the daba (100%), the machete (100%) and other tools (78.26%).

2) The irrigated cropping system

In Mogtedo, the surroundings of the perimeter are exploited, and the areas exploited in these areas are about 15 ha in wet season rice cultivation. They vary between 30 and 35 ha for dry season market gardening [4]. The degradation of irrigation facilities in the plains, which prevents producers around the dam from cultivating rice during the dry season. There is strong pressure on the agricultural plots and the banks of the dam which is at a high level of siltation. In addition to this pressure, the use of chemicals in market gardening during the off-season should be noted. Indeed, these chemicals are transported by rain and wind erosion in waterways which cause degradation and pollution. However, all the agricultural users concerned by the survey use chemical products. Thus, the graph below shows the different chemicals used by market gardeners.

Fig. 6. Types of chemical fertilizers used by producers the different crops around the dam.

C. Users’ Perception of Water Reservoir Siling

1) User perception

A dam is a set of devices by means of which a watercourse is blocked. The water thus retained accumulates behind the obstacle and constitutes a water retention. The accumulation of this water is sometimes accompanied by the deposition of sediments through natural phenomena (precipitation, deposition of solid sediments,) and or by anthropogenic activities (demographic pressure around the dam, production in the bed.). These sediment deposits often lead to the rapid silting up of water reservoirs. So, according to Boena [5], silting is therefore considered not only as the process of sediment deposition through the transport of rain and wind sediments. Indeed, the phenomenon of lake silting is characterized by waterlogging, a progressive invasion of the environments in which it occurs by sediments, leading inexorably to the complete filling of lake basins. Unfortunately, decision-makers have often forgotten or minimized the induced effects, one of the most important of which remains the phenomenon of siltation of water reservoirs. In its report on small earth dams in Burkina Faso, of which more than 300 are listed, the CIEH [6] underlined the lack of in-depth studies in the field of siltation of water reservoirs [7].
In general, it emerges from the interviews that in addition to the natural causes of silting, there is also the action of man which is at the origin of silting. This is the cause of the drop in the water level in the dams. Users are primarily responsible for the silting up of the dam. This is due to the pressure around, in particular the pressure of market gardeners and breeders. Market gardeners through cultivation in the beds of the dam by not respecting the standards of cultivation around a dam. These standards say that we must be 100 m from the banks of the dam for crops according to IWRM. In Mogtedo, the annual siltation rate is about 1% of the total capacity of the water reservoir. It can be seen that the bottom of the basin has reached and even exceeded, in places, the bottom of the irrigation intake orifice. These deposits cause, at the end of the campaign, a premature rupture of the supply of the irrigation intake [8]. Surveys of operators around the dam on siltation show that the Mogtedo-Zam dam is seriously silted up. 86.96% of respondents confirm that the dam has a high level of siltation. It should be noted that siltation is also due to cultural practices and population density around the dam. The causes are due in particular to the activities carried out around the dam, the low rainfall, the high rainfall. This corroborates with the results of the work of Ndanga Kouali [2] and Kara and Nemdili [9] on the siltation of dams respectively in Burkina Faso and Algeria. Thus, the photographic plate below shows the pressure of users on the dam.

The two photos (Fig. 7a and b) show the pressure on the dam. Fig. 7a shows a field of female sorrel on the bed of the dam and Fig. 7. A bouli also dug on the bed of the dam for watering animals. These pressures contribute to the rapid silting up of the dam.

One of the consequences of the silting up of a water reservoir is the reduction of its depth and therefore of its storage capacity. Thus, under the effect of evaporation, the dam is drying up faster than expected in recent years. Poor rainfall with early drying up. The silting up of the dam is to be credited to the first beneficiaries, the populations. The advanced deterioration of the structures (dikes and pipeline systems) also contributes to the silting up of the dam. The dam development work was not followed to the letter, which contributes to the rapid drying of the dam (early March no more water in the minor bed). The following photo shows a dry bed of the dam.

Fig. 8. Part of the dry bed of the Talembika dam. The desiccation cracks are due to the nature of the sediment deposit in the dam, which is of the clay type, and also to the action of the air. Sand encroachment can be aggravated by poor agricultural practices (crops on the banks of the dam), pastoral practices (overgrazing) and excessive water withdrawals (irrigators, fishermen, domestic use, etc.). The users of the dam are worried about the progressive silting up. Indeed, the deposit of sand around the reservoir, the filling of certain ravines are all telltale signs of a possible silting up of the water reservoir [2]. To this must be added the crops practiced around the structure without respecting the standards of crops around a dam.

2) Origin of siltation

The siltation of water reservoirs is one of the main problems faced by many countries in the world. According to the international committee of large dams (CIGB), more than 50,000 existing large dams in the world with a very large storage capacity, their storage capacity is threatened by siltation which is a direct consequence of erosion and sedimentation [9]. In Burkina Faso, dams are also affected by the phenomenon of siltation. But lack of data to determine the actual level of siltation of water reservoirs. Thus, since the construction of the Mogtedo dam, the latter has undergone a very significant siltation of earth; almost half of its total volume. However, two main origins could be mentioned in particular:

1) The exploitation of nearby plots by producers from the municipality of Zam.
2) The deposition of solid elements transported on the catchment area. In addition to users, we note the decline in rainfall, demographic pressure, the degradation of basins and conflicts of use are the main factors degrading water resources. Thoo degrading factor such as conflicts of use is one of the elements that contributed to the rapid silting up of the Talembika dam. Being shared between two municipalities, management becomes difficult because the actors do not take responsibility for the maintenance of the structure. However, the dam benefits the inhabitants of the two municipalities in their socio-economic activities. What is supported by a retired agricultural agent “There is an ancestral squabble between the two municipalities for a common management of the water resource. This impacts the maintenance and proper management of the dam through a lack of communication with the various actors concerned”. What role can communication play in this process of silting up the dam in order to mitigate it?
D. Communication an Effective Way to Fight Against the Silting Up of Dams

Communication is a very effective tool in the fight against the silting up of dams. Thus, communication becomes essential between users of open-air structures. This communication makes it possible to set up units for awareness and good management of water resources. Nowadays, the Talembika dam is threatened with disappearance because the silting is advanced leading to the rapid drying up of the structure. This drying up impacts market gardening activities and the activities of other users. The technical services for the environment, water resources and agriculture are responsible for raising user awareness of good farming practices and the protection of the structure. Awareness is focused on users who are members of a group or cooperative. However, 73.91% of users are not part of a group or a cooperative against 26.09% who are part of a group/cooperative.

This leads to a lack of communication between users and technical services. Consequently, the use of chemical products contributes to the rapid siltation of the structure by the wind and rain transport of the residues of these products in the dam. Indeed, 82.61% affirm the existence of technical services that support them in the management of the dam. This intervention is summarized in particular on the rules and agreement of the management, the awareness of the maintenance of the work and the use of the chemicals. According to respondents, there are communication difficulties in the management of the dam. As a reminder, the dam is located between two municipalities whose communication does not go well between the two entities, resulting in an impact on the management of the structure. This is supported by respondents “Lack of means to motivate awareness-raising actors, because there are disputes between the two municipalities which do not allow the dam to be properly managed. We should also note the disputes between operators and breeders due to a lack of communication” (Comment by a retired agricultural officer on 03/23/2022).

For better management of the structure and to avoid its rapid siltation, it is imperative to find communication mechanisms through awareness and monitoring cells. These communication mechanisms that are proposed by the users of the structure are as follows:
1) Establishment of a management and monitoring committee.
2) Make producers aware of the respect of cultivable distances on the limits laid down by agricultural technicians or by water committees.
3) Take sanctions of all kinds (Pecuniary and material) the fraudulent.
4) Introduce taxes and raise awareness among users of the importance of these taxes.
5) Sensitize users to make grass strips that prevent soil erosion on water crossings.
6) Establishment of a water police for the protection and respect of management rules and agreements.
7) Raising awareness through workshops and training sessions on the protection of the structure and on farming techniques.
8) Training on the rules for protecting the banks of the dam.

IV. CONCLUSION

This study is part of a problem of the role of communication for a better cultural practice of open-air structures. This issue focuses on the role of communication on the phenomenon of siltation and farming practices at the Mogtedo-Zam dam. It is intended to be a contribution to the perception of farmers on the phenomenon of siltation and the importance of communication in the management of the dam. Thus, with natural disasters such as drought, floods, global warming, and climate change crowned by a level of poverty, have led to strong pressure on water reservoirs in rural areas and especially that of Mogtedo-Zam.

The data made it possible to show that the low rainfall, the high pressure from the operators and the deposit of solid materials transported by the water current of the catchment area are at the origin of the silting and silting up of the dam. It should also be noted that several users of the dam lack knowledge of certain agreements and rules on the management of the dam. However, the results obtained on the phenomenon of siltation made it possible to identify the complexity of the problem and the limits of the assessment of the level of siltation of the dam. This is confirmed by the authors Kara and Nemdili [9]; Da and Sanou. [7] and Boena [5].

The results of this study revealed the preponderant role of communication in the management of the Mogtedo-Zam dam in the Ganzourgou Province, Central Plateau Region. Indeed, the communication on the management of the Mogtedo-Zam dam presents flaws in these mechanisms of informing, training and sensitizing users on the strategies for the protection of the structure and also on the different cultural practices with a view to ‘avoid a silt on everything when you know that it dates from the years of independence (1961) of our country, Upper Volta and since August 4, 1987, Burkina Faso.

REFERENCES