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Post-dam construction and livelihood revitalization of affected communities at Ghana's Bui dam

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Abstract

Evidence around dam building worldwide has revealed that the impacts of dam projects can make the livelihoods of the project-affected people worse off several years after the dam is commissioned. Despite six decades of Ghana's dam building experience, there is paucity of information on the impact of new programs implemented during post-dam construction on local livelihoods. This study filled in the gap by examining whether the new livelihood enhancement programs introduced by the Bui Power Authority (BPA) at the Bui dam have revitalized local livelihood activities that had been disrupted by the dam construction and resettlement processes. Explorative qualitative data were collected through key informant interviews (KIIs), focus group discussions (FGDs), and field observation in the seven resettled communities at Bui and Jama Resettlement Townships and in three non-resettled communities at the Bui dam area, including the host community. Purposive sampling was used to select a total of 130 participants for the KIIs and FGDs. Data were analyzed using thematic analysis approach. Results showed that, in general, the new livelihood support programs in the resettled communities such as cage aquaculture production, weaving, and pottery have positively impacted the socioeconomic livelihood activities of the resettlers in recent years compared to the period soon after resettlement. However, low crop yields due to poor soil fertility and small size of farmlands, lack of appropriate equipment to fish on the open water, and land compensation delays were

reported to be undermining the livelihood revitalization efforts of the BPA. For effective revitalization of socioeconomic livelihood activities, the new programs should be more inclusive to cover the elderly, the host community, and possibly the neighboring communities instead of its current tilt toward the youth and the resettled communities. The findings showed the persistent impacts of dams on local population and highlighted how livelihood programs could revitalize local socioeconomic livelihood activities. The study contributed to addressing the conceptual question on whether it is possible for livelihood activities of project-affected people to be reconstructed several years after disruption.

KEYWORDS
dam-induced displacement and resettlement, host community, impoverishment risk and reconstruction, land compensation delay, livelihood enhancement programs

1 | INTRODUCTION

Infrastructure development projects such as highways, oil and gas pipelines, irrigation canals, and hydropower plants generally require the acquisition of large tract of land for construction, which often leads to involuntary displacement[1] of the project-affected people[2] (European Bank for Reconstruction and Development, 2017; Singh, 2020). It is not surprising that resettlement[3] challenges due to development-induced displacement[4] is a major problem occurring in many regions worldwide, affecting millions of people (Terminski, 2013, pp. 32–36). According to the World Commission on Dams (2000), development projects can induce both physical and livelihood displacements because the resettlers could be deprived of their means of production for sustenance and sociocultural place of attachment.

Since the second half of the twentieth century, dam construction has become an integral part of the development agenda in low- and middle-income countries. In Africa, there has been renewed interest in dam construction since the mid-2000s (Dye, 2019). Many new dam projects are underway or planned across the continent to address several development objectives such as hydropower for domestic and industrial use, for irrigation, and in some instances, flood control and water supply, all within the Water-Energy-Food-Environment nexus. Despite the numerous benefits, it is well known that like other infrastructural projects, development-induced displacement that often accompanies dam construction results in livelihood disruptions, which bring significant hardship to the dam-displaced people. The reason is because in most cases, harnessing resettlement programs as opportunities is rarely achieved leading to impoverishment among the project-affected people (Cernea, 1997). This raises the question whether the development of infrastructural projects such as dams improves local livelihood activities (Wilmsen & van Hulten, 2017). Several studies have shown that the dam construction projects can induce diverse adverse effects on the local population during and soon after completion. For instance, loss of essential environmental resources and the disruption of socioeconomic and sociocultural activities can increase the risk of dam-induced impoverishment (Wilmsen et al., 2011). Richter et al. (2010) argued that the impact of dam construction on socioeconomic activities and ecosystems can persist many years after construction is completed. The authors recommended the need to consider the potential impacts of dam projects during planning, siting, designing, operation, and re-operation of dams to avoid their adverse impacts in the short term (soon after completion) and in the long term (several years after the

completion). Scudder (1997) reported that even though longitudinal studies on involuntary resettlement programs are critical to understanding the cumulative impacts of projects, such studies are generally limited. Consequently, the long-term impact of dam-induced displacement is poorly understood (Wilmsen & van Hulten, 2017). A key question largely left unexplored in the literature of dam studies is can programs implemented during post-dam construction ameliorate the persistent adverse impacts of dam projects on socioeconomic livelihood activities? Addressing the question is relevant to understanding the conceptual puzzle on how livelihoods activities of project-affected people can be reconstructed several years after disruption. In addition, such information can be useful for designing policy support and programs to strengthen the resilience of dam-affected communities.

The present study attempts to fill in the empirical gap on the medium-term impact of dams on local population and to highlight whether the implementation of new initiatives and programs years after construction is completed can ameliorate disrupted livelihood activities by drawing on Ghana's Bui dam commissioned on December 19, 2013. The dam has an installed capacity of 404 MW, and it is managed by the Bui Power Authority (BPA). The construction and management of resettlement and related issues at the Bui dam was expected to have learnt from the implementation drawbacks of the two existing dam projects in Ghana, the Akosombo and Kpong dams commissioned in 1965 and 1982, respectively (Siakwah & Torto, 2022; Yankson et al., 2018). The Bui dam is unique from the previous dams because it was the first time in Ghana's dam building history that an Environmental and Social Impact Assessment was conducted, and a Resettlement Planning Framework (RPF) was prepared to quantify property losses and compensations (Hausermann, 2018). Furthermore, proponents of the dam emphasized its potentials to modernize rural population in the country (Hausermann, 2018). Despite the improved compensation and RPF to avert livelihood challenges caused by the dam, studies during and soon after the resettlement showed that the dam-affected communities reported impoverishment and lacked livelihood sustainability (Obour et al., 2016; Owusu et al., 2017). In addition, some studies on the dam have highlighted the changes in power dynamics across the dam area. For examples, Hausermann (2018) found that the transformation of farming and fishing has contributed to food insecurity and psychological stress. The dam project has also dispossessed people of their properties and intensified power struggle in the Bui dam area (Gocking, 2020; Hausermann, 2018).

It is emerging that new developments and programs are being introduced by the BPA, which has the potential to revitalize socioeconomic livelihood activities of the dam-affected people. For instance, as part of the government flagship program to promote the renewable energy component of Ghana's energy mix to 10% by 2030, a solar component is being developed to generate 250 MW of power to augment the power generated from the Bui dam. In addition, as part of its corporate social responsibilities, the BPA has introduced livelihood programs and physical infrastructure development in the resettled communities. A recent study by Adjei et al. (2022) examined the impact of services and development provided by the BPA on education, employment, and poverty alleviation in the resettled communities. However, a more encompassing study focusing on different livelihood programs and covering both the resettled and non-resettled populations is crucial to provide a better understanding of the differential impacts of the new services and developments. This study examines the potential of the new livelihood programs and infrastructure development introduced by the BPA in the last 5 years to revitalize socioeconomic livelihood activities of the dam-affected people in the resettled and non-resettled communities.

The rest of the paper is structured as follows: Section 2 presents an overview of the analytical framework used in the study. A description of the study area and the Bui dam project, data collection procedures, and data analysis are presented in Section 3. Section 4 constitutes the results and discussion of the key findings. Finally, the conclusions and implications of the findings are outlined in Section 5.

2 | OVERVIEW OF IMPACT ASSESSMENT FRAMEWORKS

Frameworks such as the relocation framework (Scudder & Colson, 1982), the sustainable livelihoods framework (DFID, 1999), and the matrix framework (Kirchherr & Charles, 2016) have been proposed for assessing, monitoring,

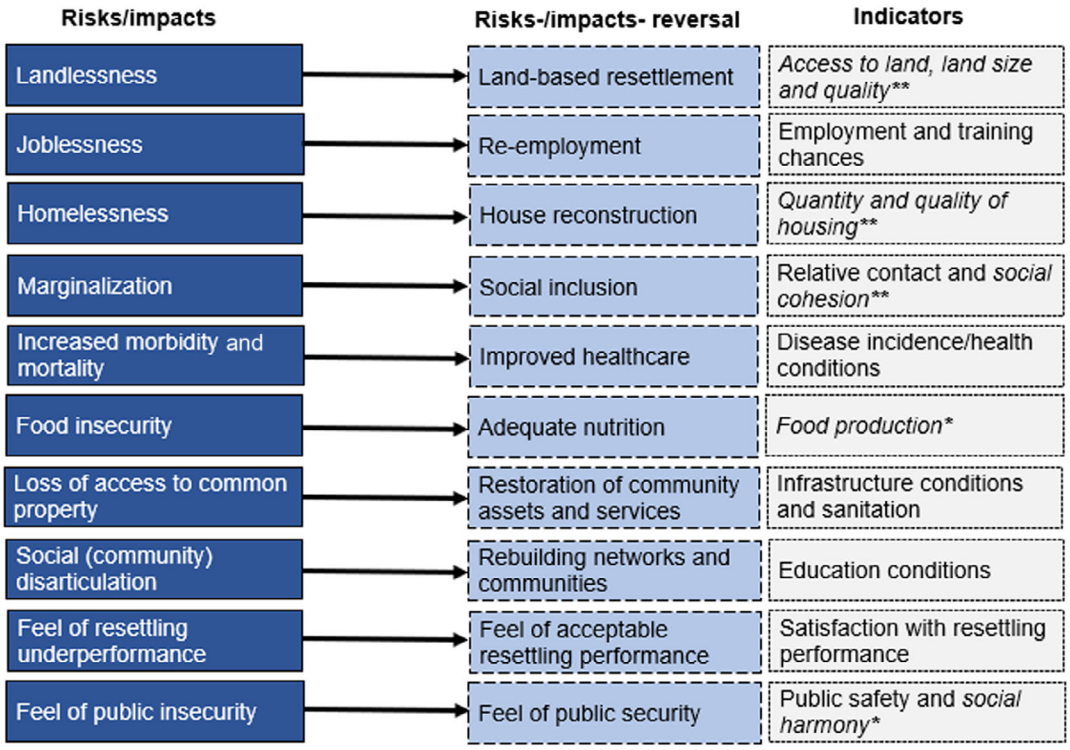

FIGURE 1 Schematic representation of the conceptual model for impoverishment risk and reconstruction by Cernea (1997) and Cernea and McDowell (2000). Asterisk and italicized is a modified indicator, and double asterisks and italicized is a newly added indicator. *Source:* Adapted from Xiao et al. (2018).

and addressing the negative consequences of development infrastructure on livelihoods. The impoverishment risk and reconstruction (IRR) model developed by Cernea (1997) and Cernea and McDowell (2000) is one of the most influential models and widely used tools for assessing risks of impoverishment and mitigation in resettlement. The model identified eight key risk factors that contribute to resettlement impoverishment, namely, (1) landlessness, (2) joblessness, (3) homelessness, (4) marginalization, (5) increased morbidity and mortality, (6) food insecurity, (7) loss of access to common property, and (8) social (community) disarticulation. Cernea (1997) argued that mitigating resettlement impoverishment requires counter-risk activities and reconstruction of livelihoods by reversing from (1) landlessness to land-based resettlement, (2) joblessness to reemployment, (3) homelessness to house reconstruction, (4) marginalization to social inclusion, (5) increased morbidity to improved health care, (6) from food insecurity to adequate nutrition, (7) from loss of access to restoration of community assets and services, and (8) from social disarticulation to rebuilding networks and communities. Despite limitations of the IRR framework such as primarily focusing on resettlements than spatial impacts and its inability to provide quantitative assessment (Xiao et al., 2018), it provides a powerful analytical tool for diagnosing risks and strategies for reconstructing livelihoods of development-induced displaced people (Cernea, 2021).

Recently, Xiao et al. (2018) adjusted and expanded the risk factors and corresponding risk-reversals of the IRR model from 8 to 11 (Figure 1) to quantitatively assess the livelihood reconstruction in resettlement program for disaster prevention in China. Xiao et al. (2018) further proposed indicators for assessing the risk factors of impoverishment (Figure 1). However, both the original IRR model and the extension focus largely on interventions to mitigate risk factors of impoverishment caused by resettlement.

Often, what pertains in practice is that the adverse impacts of infrastructure development projects such as dams may be transient. Thus, the impacts of dams on livelihood activities soon after displacement and resettlement could change over time due to post-construction management interventions. For instance, livelihood programs, self-help projects, and local development initiatives could revitalize once devastated livelihood activities in dam-affected communities (Xu et al., 2022). We adapted the IRR model to investigate whether livelihood programs and infrastructure projects introduced by the BPA have revitalized livelihood activities of the local population at Ghana's Bui dam.

3 | METHODS

3.1 | Description of study area and the Bui dam project

The Bui dam is located on the Black Volt River in Ghana at the Bui Gorge near Bui National Park. The construction of the dam inundated 444 km^2, displacing 1216 people from seven communities who were resettled in two resettlement towns between 2008 and 2011. Brewohodi, Lucene, Agbegikuro, and Dam Site were resettled at Jama Resettlement Township while Bui, Bator/Akanyakrom, and Dokokyina were resettled at Bui Resettlement Township. The two neighboring non-resettled communities are Jama (a host community) and Bongase (Figure 2). The people in the Jama and Bongase are predominantly farmers.

Before resettlement, the economic livelihoods of the people in the displaced communities revolved around fishing and farming. Those in Agbegikuro and Bator/Akanyakrom were predominantly fisherfolk (for males) and fish mongers (for females), while farming (for both genders) was the main source of economic sustenance in the remaining communities. Lands in the Bui dam area are either skin/stool lands[5] or family-owned lands. For the latter, family members have customary freehold in the land. Non-natives accessed land through traditional methods such as renting or through the *abunu* and *abusa*[6] share-cropping systems (ERM, 2007). The main farming system prior to resettlement was the traditional practice of shifting cultivation with bush fallow. It involved the use of simple tools and equipment such as a hoe, cutlass, axe, and earth chisel (ERM, 2007). In addition to fishing and farming, the dam-affected/dam-displaced people used to highly engage in non-timber forest product (NTFP) enterprise. Men and women utilized different resources from the Bui National Park, which has been partially inundated by the dam's reservoir. Men mostly benefitted from hunting and the collection of medicinal plants, while women used to pick shea-nuts from the shea tree (*Vitellaria paradoxa*, C.F Gaertn.) and collected firewood for domestic fuel or processed it into charcoal for sale. Although NTFPs were not the main income-generating products for the people, they contributed substantially to household food, income security, and health care. NTFPs also served as safety nets that cushioned households in times of failure of agricultural production or in times of emergencies.

The development of RPF resulted in a Resettlement Action Plan, implemented by the BPA to minimize the potential impacts of the dam on the affected communities. The resettlement packages were (i) full resettlement and rehabilitation schemes for resettled households; (ii) compensation for loss of assets, including land and crops due to inundation, and (iii) rehabilitation schemes relating to pressure on natural resources, public infrastructure, and social services (ERM, 2007). In addition to the schemes, BPA was expected to establish livelihood enhancement programs (LEPs),[7] including agriculture, fishing, trading, and collection of forest products to help rehabilitate the communities (BPA, 2023).

3.2 | Study design and data collection

The study was conducted in the resettled communities and in Jama, Bongase Nsuoano, and Bongase. Bongase Nsuoano is a unique community compared to the other study communities because it is a fishing community that sprung up after the Bui dam reservoir was created. Including both resettled and non-resettled communities and

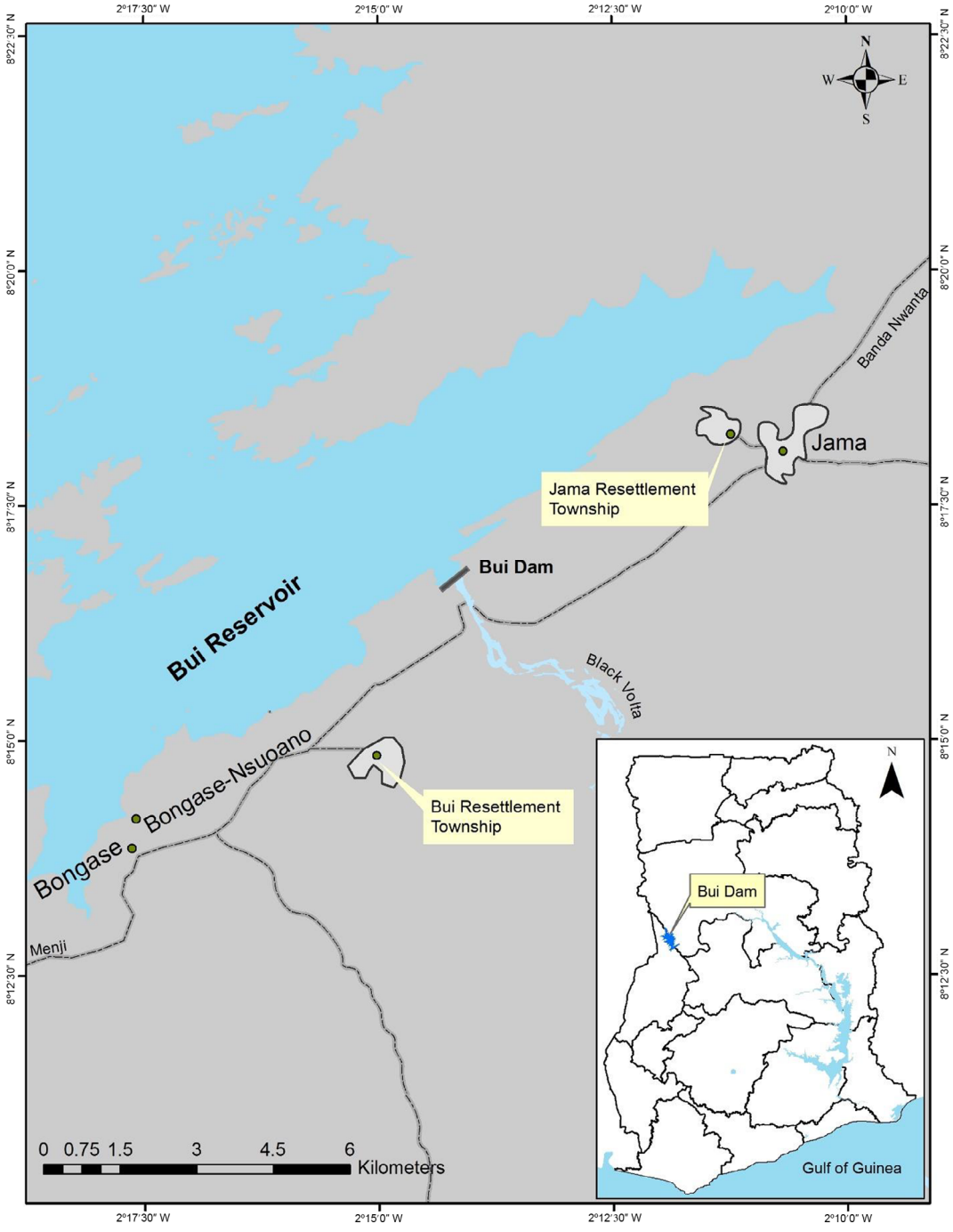

FIGURE 2 Map of the study area.

people involved in farming and fishing allowed the research team to solicit in-depth information on the research objectives from different perspectives. We adopted the exploratory qualitative research approach to solicit the views of the selected respondents in the study communities. The research approach was selected because it provided a

TABLE 1 Overview of interviews conducted during fieldwork.

Community/location	Interview type	Composition	Number of participants
Bui resettled community	KII	Chief	1
	FGD	Male group	6
	FGD	Female group	7
Dokokyina resettled community	KII	Community representative	1
	FGD	Male group	14
	FGD	Female group	12
Battor/Akanyakrom resettled community	KII	Representatives from traditional council	3
	FGD	Male group	5
	FGD	Female group	6
Banda District Assembly	KII	Personnel from the Development Unit	1
Bui Wildlife Division	KII	Wildlife officer	1
Jama community	KII	Community representative	1
	FGD	Male group	8
	FGD	Female group	5
Bongase	KII	Council of elders	5
	FGD	Male group	12
	FGD	Female group	12
Bongase Nsuoano	FGD	Male group	6
	FGD	Female group	10
Jama Resettlement	FGD	Male group	8
	FGD	Female group	5
Bui Power Authority	KII	Personnel from Bui Dam Resettlement Program	1

Abbreviations: FGD, focus group discussion; KII, key informant interview.

holistic understanding of factors driving development-induced impoverishment in the study area. In addition, it was useful for exploring the research question, can LEPs prevent dam-induced impoverishment at Ghana's Bui dam?

Prior to the fieldwork, the research team interacted with key informants (KIs) such as assemblymen and chiefs in the study communities and the staff from local government units (district assemblies) in whose jurisdictions the dam is located. This was to inform them about the present study which is a follow-up on the previous studies conducted on the Bui dam 5 years ago and reported by Owusu et al. (2017) and Yankson et al. (2018). The interaction with the KIs facilitated the research team's accessibility to the study communities and the targeted institutions. The actual fieldwork was conducted between June 27 and July 2, 2021. Data collection involved interviews with KIs and focus group discussions (FGDs) and field observation of physical changes in the communities. Purposive sampling technique was used to select the KIs. The criteria for selection were based on either their involvement in the project development and/or their knowledge of resettlement and compensation issues. To ensure that diversity in terms of sociodemographic characteristics was met in the groups, the focus group participants were selected purposively in consultation with stakeholders such as assemblymen or traditional leaders who were very knowledgeable about their respective communities. Owusu et al. (2017) reported that gender-based and small focus groups in communities at the Bui dam area ensured free and active participation and discussion. Therefore, a male and a female FGD was held in each community. The groups comprised 8–10 participants. A total of seven key informant interviews (KIIs) and 14 FGDs were conducted. The number of participants for the KIIs and FGDs was 130 (Table 1). The youngest and oldest ages of the participants were 25 and 80 years, respectively.

All the interviews were conducted face-to-face following strict COVID-19 recommended protocols. The issues discussed in the interviews included recent developments in the communities toward enhancement of their livelihoods and the role of BPA management. The interviews were conducted in Twi (local language) and English, voice recorded, and subsequently transcribed. The transcribed data were organized in themes manually. To minimize bias, the transcribed data were reviewed several times to summarize and regroup as described by Hausermann (2018). The themes and trends emerging from the analysis were used in the write-up of the results and discussion. Quotes from the interviews were extracted and used, where necessary, to support case assertions. Photographs taken of the new infrastructure in the study area during the fieldwork are included in the manuscript for illustrations.

4 | RESULTS AND DISCUSSIONS

4.1 | Livelihood sources and income

Hitchcock (2015) argued that undoubtedly the construction of large-scale water infrastructural project has a significant effect on the dam-affected people. The author reported that many of the households who were resettled by the Lesotho Highland Water Project had difficulties in adapting in the new resettlement because they had limited access to land and natural resources in the new location. In the case of Bui dam, previous studies have shown that fishing and farming, which were used to be the major livelihood activities in the dam area, were affected by the dam, particularly in the resettled communities. Some of the reasons cited for the observed decline in crop yield in the new location was that land for farming in the resettled area is scarce and generally infertile. For fishing, the decline was attributed to limited accessibility to fishing sites and disruption of downstream river flow (Obour et al., 2016; Owusu et al., 2017). Results from the present study showed that the situation does not seem to have seen any improvement from the initial period of resettlement as reported by Yeboah et al. (2022) and Yankson et al. (2018) that the fisherfolk lacked the skills and equipment to fish on the large expanse of water. In Battor/Akanyakrom, a female fisherfolk said

> … when we first moved to this place (the new settlement), our husbands could get something small when they go fishing, but now the water (the dam's reservoir) level has become really high… As at now the volume of water has increased, so they (the fishermen) are not able go there for fishing. Because of the level of the water, now if you want to go fishing you must use an engine boat. If you get that you can go on the water…

A common theme that ran in all the fishing communities was that "fishermen were becoming farmers." It was reported that fisherfolk who were frustrated with the challenges facing fishing have shifted from fishing to farming or doing both to sustain their households. Both the KI and FGD interviews revealed that about 20% of fisherfolk have abandoned fishing and have shifted to farming, while about 60% were now engaged in both fishing and farming. The "new farmers," however, are constrained by the challenges facing farming in the study area as emphasized by a male FGD participant at Jama community:

> …some of people in the community who were fishermen before and just after the dam was constructed are no longer fishermen because of the harsh conditions caused by the impoundment and resettlement … They have shifted to a different occupation; conditions have forced them into farming despite the challenges faced with farming in this area, but they are still doing it because they have no option…

On the positive side, to help improve the traditional economic activities disrupted by the dam, including fishing, the BPA introduced LEPs mainly in the resettled communities. As part of the implementation process, the dam-affected

PLATE 1 Fishponds by Bui Power Authority constructed at Bui Resettlement Township as part of the livelihood revitalization efforts.

people in the seven resettled communities have been constituted into groups of cooperatives to undertake livelihood enhancement jobs. At the time of the fieldwork, about 60% of people (personal communication with KIs), predominantly the middle aged, were members of the cooperatives, which included aquaculture[8] production and fish mongering, vulcanizing sanitation, fumigation, weeding/landscaping/fire control, and other skills training (http://buipower.com/livelihood-enhancement-programme/). An estimated amount of GHS 200,000 (∼USD 18,200) is spent monthly as payments to the groups within the resettlement townships for services rendered to the BPA (http://buipower.com/livelihood-enhancement-programme/).

BPA has been facilitating and supporting cage aquaculture production since 2019, an initiative to revitalize fishing activities in the resettled communities. At the time of the fieldwork, the program had been implemented in Bui Resettlement Township but yet to start in the Jama Resettlement Township. It was reported that the BPA funded the construction of the fishponds and provided the first stock of fingerlings and feed for the cage owners. Examples of the fishponds are shown in Plate 1.

A total of 40 fishponds were planned to be constructed in the two resettlement townships (KII with personnel from BPA). At the time of the fieldwork, 15 fishponds were already in operation and about eight others were under construction at the Bui Resettlement Township. According to a KI from BPA, the aquaculture production was to ensure all-year-round fishing and improve the availability of fish for household consumption and for sale. The cage aquaculture production was also intended to reduce the resettlers' overdependence on the Black Volta River for fishing, which was reported to have drastically declined since the dam was impounded.

Interviews with the cage owners revealed that each fishpond was shared by three people, who co-pay for the cost of fingerlings (after the first stocking supported by the BPA), feed, and all other expenses. The fishponds were managed by a caretaker from the local community. The caretaker was trained in fish rearing through the support of BPA. After harvest and sale of the fish, the income was used to pay for the cost of production (mainly fingerlings and feed). Ten percent of the total income is paid to the caretaker as a service charge. The profit/debt is then equally shared among the three fishpond owners. Despite challenges such as high cost of fish-feed and occasional frequent power outages affecting the operations of the ponds, the pond owners reported that the aquaculture initiative has been useful to safeguard fishing activities, which was contributing to household food and income security.

In terms of farming, in all the communities, it was reported that low crop yield is and continues to be a major problem since they were relocated 12 years ago. The respondents cited fixed farmland size of 0.8 ha that the BPA allocated regardless of what they owned in their respective previous settlements. The farmers' narrations indicated that the new farmlands were infertile, hence cannot support crop growth. The respondents (both male and female farmers) recounted that the availability of land at the previous settlement enabled them to make large farms (average of 2 hectares) compared to the new location where land is scarce. Land availability at the previous settlement allowed the farmers to practice the traditional fallow system on a piece of land after years of successive cultivation, which guaranteed good soil fertility, but the small size of farmlands in the new settlement made the fallow system non-practicable, resulting in farming on poor soils. Furthermore, the farmers reported that the proximity of the previous farmlands to the fringes of the Bui National Park made them fertile to support the growth of variety of crops, but the same is not what the new farmlands offer them.

The farmers also reported that in recent years, as is the case elsewhere in Ghana, climatic factors, particularly unreliable rainfall pattern, have added another layer of challenge to rain-fed farming, which is predominantly practiced before and after resettlement. The results from the Bui dam are consistent with Mavhura (2020) who found that food insecurity among smallholder farm households affected by the Tokwe-Mukorsi Dam project in Zimbabwe worsened due to a reduction in land holding and low rainfall and prolonged drought in the new settlements. River regulation due to dam construction has been reported to induce changes in agricultural land use in terms of farming systems. Annys et al. (2020) reported that the construction of the Ribb Dam and levee banks in Ethiopia reduced seasonal flooding of the Ribb River along its banks, which in turn changed riparian farming. As a result, farmers in the dam area adapted to the changes by shifting from rice to millet production, which required less water. In the case of the Bui dam area, the notable changes over the last 5 years pertained to occupational shifting (fishing to farming) as discussed already. Nevertheless, the challenges faced with farming have been exacerbated by the inability of the BPA to establish the proposed 30,000 ha irrigation scheme. The respondents were of the view that even if the scheme were to be realized, its impacts on local agriculture may be minimal because there is not enough land available for farmers in the area to operate large-scale farming that can earn them higher profits.

Scudder (2012) reported that improving the living standards of resettlers who depended on rain-fed agriculture for livelihoods requires that the project authority adopts best practices during planning and implementation of resettlement programs. An illustrative example is the Rajjaprabha dam in Thailand, often cited as one of the most successful resettlement outcomes. Evidence showed that the selection of resettlement sites that supported agriculture increased net incomes of the resettlers 8 years after resettlement compared to the neighboring non-resettlers (Scudder, 2012). In the case of Bui dam, as part of the measures to revamp food crop farming, BPA introduced tractor and plow cooperative group. At the time of the fieldwork, the group was operational only in Bui Resettlement Township with plans underway to extend it to Jama Resettlement Township. Interview with personnel from BPA pointed out that the tractor cooperative group was introduced to promote mechanized farming and increase food production. The group comprised 40 people, mainly middle aged of both genders. It was reported that the tractor services played an important role in promoting mechanized agriculture in the local area. The services ensured timely land preparation and provided a source of economic sustenance to the cooperative members. However, the respondents emphasized that the skewed membership toward the middle aged and toward males compared to females combined with the overall large number of people per tractor must be addressed by the BPA to achieve the intended benefits of the cooperative. The respondents also highlighted that there were no opportunities to engage in irrigation farming along the shores of the reservoir because there was not enough farmland. They emphasized that public and private programs aimed at improving crop yield should be extended to the communities so that the farmers can take advantage of improved communication, and road networks and market in the dam area.

4.2 | Training and diversification of job opportunities

According to the IRR analytical framework (Cernea, 1997), dam building can increase short-term job opportunities due to the availability of project-related jobs. For the Bui dam, Obour et al. (2016) reported that it offered limited job opportunities for the local population during the construction and soon after completion. During the construction phase, local laborers were employed as security officers, carpenters, and masons who generally received poor salaries and working conditions because they were not highly skilled. Hitchcock (2015) found that the construction of the Lesotho Highlands Water Project created short-term jobs for households who worked at the construction site. However, due to the short-term nature of the jobs, unemployment levels increased drastically in the long term.

The IRR model (Cernea, 1997) pointed out the need for dam proponents to also facilitate long-term job creation rather than just focusing on vocational training. The reason is because providing skilled training unaccompanied by job opportunities increases the risks of dam-induced impoverishment. As part of the measures to improve peoples' livelihoods at the Bui dam, it was reported that in recent years, the BPA has recruited many of the youth in the resettled communities on long-term contracts to work as technicians and security officers at the dam site. At the time of fieldwork in Bui Resettlement Township, it was reported that at least 19 people (comprise male and female) have been employed from the three communities (namely, Battor/Akanyakrom, Bui, and Dokokyina) as cleaners and security officers. In addition, both the KIIs and FGDs revealed that apart from the employment at the dam site, since 2019, the BPA has facilitated and supported skill learning and artisans, including pottery, baking, and weaving as part of the LEP activities to improve the lives of the resettlers. It was also reported that the job training opportunities were mainly for the youth in the resettled communities. The procedure to get trained was reported to be transparent. In brief, any youth who is a native of the resettled communities and wants to learn a livelihood activity must apply to the BPA. The applicant must choose a livelihood activity they wish to be trained in. The applicant must also choose whether he/she wanted to be trained within or outside their local community. BPA then provided the required financial and material support during and after training. For instance, those who chose to learn dressmaking and hairdressing were given a startup capital and shelter. Same support was reported for those who chose to learn pottery and weaving: as highlighted by a female FGD participant, Battor/Akanyakrom "*With regards to job, our young men and women are being employed… they (BPA) have made the young women learn dressmaking, hairdressing, pottery and weaving. Some have gone to learn how to bake, and they have bought ovens for them*…."

About 45% of the youth in the resettled communities were reported to have been trained or undergoing job training during the fieldwork. Plate 2 shows the pottery-making center at the Bui Resettlement Township. However, the situation was different in the non-resettled communities where it was reported that there were no major changes in employment opportunities in the past 5 years. More so, they have not benefitted from the LEPs: "*The resettled people are those who have been given jobs and that this has brought changes in their lives but in this our town you do not see anything*" (FGD participant, Bongase). Changes in educational support in the resettled communities were also reported. As part of the measures to build human resources and reduce rural poverty, BPA has instituted a tertiary school scholarship scheme to support students from the resettled communities pursuing tertiary education in various educational institutions in Ghana. The KI from BPA reported that already, seven of such scholarships had been offered and the number is expected to increase with time.

Although the livelihood programs were reported to have positive impacts on the beneficiary communities at the Bui dam, evidence from the interviews showed that the programs were more focused on the youth compared to the aged. Consequently, this was reported to be contributing to disparities in living standards between the youth and the aged. The findings at the Bui dam consolidates Scudder's (2012) argument that although dam construction and subsequent resettlement could improve the livelihoods of a minority who are able to take advantage of new opportunities available, the overall impact of resettlement on living standards of the majority of the resettlers is often negative due the low adaptive capacity in the new settlements.

PLATE 2 Pottery-making center at Bui Resettlement Township built by Bui Power Authority to train local people.

4.3 | Access to NTFPs

The construction and subsequent creation of the Bui dam reservoir inundated greater parts of the areas where the people depended on for NTFPs. As a result, the communities' access to hunting and collection of medicinal plants, firewood, and shea-nuts around the dam reservoir area has been limited, which have adversely affected domestic source of fuel wood and income. Overall, vulnerable groups such as female-headed households and aged women were reported to have been largely affected due to the role NTFP collection played in supporting the incomes of these vulnerable groups, particularly in times of unforeseen shocks such as crop failure. According to a female respondent in Jama Resettlement Township, "*…everywhere is filled with water so how do you even go there? The trees (shea trees) have been submerged. We cannot even go there anymore to collect the shea-nuts*." Evidence from dams in Africa showed that maladjustment and coping following resettlement can lower the living standards of resettlers. Scudder (2012) pointed out that limited access to common property resources after the construction of the Aswan High dam contributed to low living standards in the dam-affected communities. Evidence from the Bui dam supports the IRR analytical framework. According to Cernea (1997), NTFPs such as fruits, firewood, and access to grazing areas contribute substantially to the incomes of dam-affected people. This suggests that loss of accessibility and utilization of such common properties can undermine livelihoods revitalization and reconstruction of especially the vulnerable groups such as female-headed households and the aged at the Bui dam.

4.4 | Land and building titles

Loss of land and housing following displacement and resettlement are key factors that lead to incapacitation of dam-displaced people (Cernea, 2000). Although land and building compensation schemes were designed to improve upon earlier dams in Ghana, recent study on the Bui dam showed that the dam-affected people reported land compensation delays and housing challenges (Yeboah et al., 2022). For issues on housing, the BPA compensated all households who owned a house or houses in the previous settlement with a new housing unit in the resettled community. A total of 185 housing units were built by the BPA for the households displaced from the seven communities (Daily Guide, January 11, 2018). The housing units consisted of bedrooms, a living room, a bathroom, and a kitchen.

Households received an additional bedroom more than the number of rooms they had before resettlement, what Obour et al. (2016) referred to as "plus-one principle." However, the households did not have documentation indicating ownership of the land and the building. Neither did BPA permit them to build new housing units until 2019 (KI interview, Bui). Thus, in 2019, BPA granted titles of the housing units and the piece of land on which the houses were built. The respondents have the feeling that the titles have given them full rights over the land and building. It was reported that the building permit granted to households to expand their housing units has now made it possible for households with the means to build additional rooms for rent, which gives them alternative incomes.

4.5 | Infrastructure

Changes in infrastructure in the resettled and the host community were reported during the interviews. At Bui Resettlement Township, a key change reported was the construction of an information, communication, and technology (ICT) center in 2017 by the recent past CEO of BPA to promote teaching and learning of ICT among school children in the communities. In addition, BPA has renovated the health center built at Bui Resettlement Township. According to the FGDs, the new infrastructure has given the Bui dam area a modern look. A similar report on infrastructure development was recorded at Jama Resettlement Township and Jama. The respondents reported that commercial activities have increased in the last 5 years.

Hensengerth (2013) argued that the construction of the Bui dam could lead to uneven development in the local area. For instance, Yankson et al. (2018) reported that the Jama Resettlement Township was not provided with school and health infrastructure. The resettlers depended on the existing facilities in Jama, which led to problems such as shortage of drugs in the health facility and congestions in classrooms. The present study showed the challenges previously reported have worsened due to population growth over the years. In Jama, it was reported that school and health center infrastructure was over-stretched due to natural population growth and immigration. A notable change that the participants, including those Bongase, reported to have positively impacted health care delivery is the ambulance services established by BPA since 2017. It was reported that the ambulance was available to anyone in the area who is sick and had to be transferred to a referral health facility.

The story was different in Bongase Nsuoano where it was reported that no major infrastructure development has occurred over the period of study. Interviews revealed that the community's hope that BPA will provide them with potable water and electricity has dwindled. Poor social amenities in the community have contributed to people out-migrating to other places where they can have access to basic social amenities. The KIIs revealed that BPA has not granted permit to the siting of Bongase Nsuoano. Hence, it is not officially recognized as a permanent community explaining why BPA is not willing to invest in any social amenities in the community.

Besides the physical development and livelihood programs that accompanied the Bui dam construction discussed above, Wilmsen and Adjartey (2020) argued that improved road and communication networks have contributed to opening the place for accessing gold deposits in the area. The authors reported that over 5000 miners composed of local people and itinerants are operating in the neighboring communities around the dam area. It is likely that the trickle-down effect of gold extraction is also contributing to improving the socioeconomic livelihoods of the local people, especially the youth.

4.6 | Barriers to livelihood revitalization in the dam-affected communities

The interviews revealed that those affected by the Bui dam considered land compensation delays, immigration of fisherfolk, and marginalization as the key issues hindering the BPA's efforts to rebuild the socioeconomic livelihood activities of the people. As part of the compensation packages, households whose land was affected by the dam were to receive economic compensation to the value estimated by the Lands Commission and Land Valuation Board

prior to commencement of the project (ERM, 2007). However, it was reported that the BPA has not been able to honor the payment due to competing land ownership claims. Stakeholders such as chiefs and assemblymen interviewed in the communities indicated that they have been pursuing the matter through legal means on behalf of their respective subjects, yet nothing has changed since the dam was commissioned.

Another livelihood challenge reported by the FGD participants in the resettled communities, Jama and Bongase, was the immigration fisherfolk primarily from the Volta Region in Ghana. It was reported that the influx of immigrant fisherfolk has increased in recent years. About 90% of the immigrants are lake-side dwellers living on the fringes of the Bui dam reservoir. The IRR framework (Cernea, 1997) posits that loss of common property due to project displacement can increase pressure on natural resources leading to social tension between resettlers and the host population. Findings at the Bui dam rather showed that the influx has led to competition between the immigrant fisherfolk and the few "native fishermen" for fishing sites. One of such immigrant fisherfolk settlements is Bongase Nsuoano. Interviews with the FGD participants in Bongase confirmed that the community was built because of the Bui dam reservoir. Findings here make important contribution to dam-induced livelihood changes and resource utilization competition studies by highlighting differences in resilience and innovation between the "native fisherfolk" who reported that fishing has generally been disrupted due to filling of the dam's reservoir versus the immigrant fisherfolk who perceived the filling of the Bui dam reservoir as opportunity rather than a barrier to fishing. The difference in the perception is probably due to the different fishing skills and equipment availability, which suggest that the BPA would have to train the local fisherfolk and supply them with appropriate equipment to enable them fish on the open water to complement the ongoing aquaculture production enterprise.

The IRR framework (Cernea, 1997) highlighted that marginalization due to development-induced displacement can occur through loss of economic power and when the elderly folks who are displaced feel that conditions in the resettlement have dropped their social status. The World Commission on Dams (2000) strongly recommends the need for dam proponents to promote benefit sharing among resettlers. Haas (2009) emphasized the need to minimize complaints so that the dam-affected people do not harbor any feeling of marginalization. The author opined that addressing marginalization is crucial to developing a strong feel of joint ownership of dam projects at the local level. Findings at the Bui dam showed that despite the interventions introduced by the BPA, the adverse impacts that arose from the construction and operation of the dam on local livelihood activities have, to a large extent, eroded public confidence in the BPA. For example, the interviews showed that the study communities generally held low enthusiasm for the ongoing solar installation at the Bui dam site. The respondents were of the view that the solar project will benefit urban dwellers by providing them stable power compared to the local communities where power outages were very frequent. The non-resettled people, on the other hand, had the impression they have been sidelined by the BPA because all the infrastructure and livelihood programs were being carried out in the resettled communities as pointed out in the following statement during FGDs in Jama, the host community:

> With the Bui Power jobs, we are not saying they should employ all of us, but the job opportunities that should be available to the indigenes are not coming. The BPA is only focusing on enhancing livelihoods in the resettlements…they have even provided them (the resettlers) with dustbins without giving Jama (the host) any. Everything is concentrated in the resettlements, now they are building fishponds, everything is about the resettlements…

4.7 | Implications of findings for resettlement studies

Large dam projects constructed to control flood and store water for irrigation and for hydropower generation purposes have resulted in the displacement and resettlement of millions of people worldwide (World Commission on Dams, 2000). The resettlement issues associated with dam projects have been examined through snapshot and long-term studies (Hay et al., 2019). In general, the present study makes a significant contribution to building resilience of

project-affected people during resettlement programs. Findings from the study highlighting the impacts of the Bui dam on local livelihoods 10 years after commissioning contribute to our understanding of the persistent impact of dam projects on the local affected people. The findings also evidenced how livelihood programs and physical infrastructure implemented after the initial project can potentially revitalize socioeconomic activities disrupted by dam construction, displacement, and resettlement. In terms of conceptual relevance, the study contributes to answering the question whether it is possible for further actions or programs decade after the construction of infrastructure development projects such as dams to revitalize socioeconomic livelihood activities of development-induced displaced people.

5 | CONCLUSIONS AND PERSPECTIVES

This study investigated how new programs and physical infrastructure introduced by the BPA in the last 5 years have revitalized socioeconomic livelihood activities of people displaced and/or affected by Ghana's Bui dam commissioned in 2013.

Though the livelihood programs and infrastructural development were reported to have positively impacted livelihood activities in the resettled communities in recent years compared to during and soon after resettlement, some challenges were reported. Low crop yields due to poor soil fertility and unreliable rainfall patterns were reported as the key constraints to farming, while the lack of appropriate equipment among the local fisherfolk to fish on the open water and competition between local and immigrant fisherfolk for fishing sites were identified as the main constraints to fishing. In addition, land compensation delay was reported to have adverse economic impacts on households whose land was inundated by the dam. Furthermore, the livelihood support programs were implemented only in the resettled communities and mainly focused on the middle aged, while the aged, the host, and neighboring communities have benefitted least. Findings from the study highlighted that in general, the new LEPs and physical infrastructure implemented after the initial project are contributing to socioeconomic livelihood revitalization at the Bui dam area. However, the limited scope of the LEPs in terms of mainly focusing on the youth in the resettled communities with little or no attention to the aged and the non-resettled communities could lead to differential impoverishment in the dam area. The study makes a significant contribution to the discourse around dam building and local development and to the literature on dam studies by showing that interventions such as LEPs can help minimize or avert the risk of impoverishment among project-affected people. In addition, evidence at Ghana's Bui dam points out the need for more inclusive LEPs to prevent livelihood disparities between the youth and the aged. The present study did not examine the sustainability of BPA's LEPs. It is recommended that the sustainability of the LEPs and institutional efforts to promote inclusive benefit sharing at the Bui dam are considered in future studies to inform policies on building resilient livelihood of the dam people.

CONFLICT OF INTEREST STATEMENT

The authors declare no potential conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ENDNOTES

[1] Involuntary resettlement of people occurs when a state agency acquires a private property and/or undertakes a project, or natural/environmental disasters lead to physical displacement and/or loss of livelihood activities (Perera, 2014).

[2] Project-affected people include all those people impacted by a project, but not necessarily involuntarily displaced.

[3] Resettlement involves the process whereby individuals or communities are moved to a different place to live because they are unable or not allowed to stay in the area where they used to live before.

[4] Development-induced displacement refers to displacement caused by development projects such as dams, mines, and urban infrastructure (Randell, 2016).

[5] It is land that belongs to the whole community, past, present, and future generations. Tenure arrangements are governed by traditional and customary norms and practices. The titular heads of the traditional communities who own the land are known as skins or stools (Obour et al., 2016).

[6] Abunu is a system of share cropping on an equal basis (50:50) between the landowner and tenant, while abusa involves share cropping on a 1:2 basis between the landowner and tenant.

[7] Programs that seek to enhance productivity of individuals and communities generally through specific interventions aimed at developing skills and assets of individuals and communities for greater income-generating opportunities and improved livelihoods (Organization for the Development of People, 2023).

[8] The cultivation of fish in controlled aquatic environments for sale and consumption.

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