The Influence of Osborne Dam on the Socio–Economic Development of Ward 23 Makoni District, Zimbabwe

Symphathy Makururu, Thabani Nyoni, Wellington. G. Bonga, Munyaradzi Nyoni, Kenneth. A. Nyathi

1Bindura University of Science Education, 2University of Zimbabwe, 3Great Zimbabwe University,
4Ministry of Primary & Secondary Education, University of Zimbabwe

Corresponding Author: Mr. S. Makururu; Email: smakururu@gmail.com

Abstract: The study aimed at empirically investigating the influence of Osborne dam on the socio-economic development of ward 23, Makoni District. The research was carried out in three villages Kawadza, Nyatito and Dumba, using both qualitative and quantitative methods. Questionnaire, interviews guide, focus group discussion (FGD) and an observation guide were used as research tools for data collection purposes from 72 households in three villages. Interview schedules were used to collect data from eight key informants. Simple random sampling was used to select the respondents and purposive sampling on the selection of key informants. The results showed that there was no positive relationship between nature and intensity of socio-economic development in relation to distance from the dam. It is also evident that the dam improved small-scale irrigation schemes, food productivity, fishing activities, easy access for domestic use, gardening, and the income of the local people. The socio-economic activities transformed the standards of living of the local people in Ward 23. However socio-economic gains from the dam did not outweigh the socio-economic negative impacts it imposed on the local people. Osborne dam socio-economic gains and benefits accrued more to non-locals and those downstream and at the expense of the local people despite the effect of distance from the dam. Locals had minimum usage of the resource despite of their closeness to the dam due to their poor socio-economic base, decreased water levels in the dam, management restrictions and financial constraints. In order to ensure that local people benefit from Osborne dam, the study suggested four main policy prescriptions.

Keywords: Community, Development, Indigenous people, Livelihoods, Local people, Osborne Dam, Rural development, Socio – economic development, Zimbabwe

JEL Codes: I15, O10, O11, O12, O13, O17, O18, O20, O22, Q01, Q32, Q34, Q56, Q57

I. INTRODUCTION

Introduction & Background to the Study

Dams have been constructed for the past thousands of years to manage flood waters and supply water for drinking, irrigation, and hydropower and, more recently, for industrial purposes. Economic benefits of dams have been assumed to outweigh costs, thus providing rationale for construction of dams around the world (McCully, 2001; Singh 2002). One of the efficient ways to manage water resources for human needs is by construction of dams (Adams, 1992). However, in relation to other local dams in Zimbabwe like Kariba, dams are failing to yield substantial socio-economic benefits to the local people a development which led to the loss of faith in large dam projects locally and world-wide (Hirsch & Wilson, 2011).

Water is one of the most important a factors of production in industry and numerous other forms of economic activity, including both small and large-scale activities. Water is also important for home-based activities especially where the poor are themselves entrepreneurs, in food processing for vending in markets. Access to main factors of production, including water, is key to the viability of activities that can act as a ladder out of poverty. To invest in water infrastructure such as dams and irrigation schemes is a noticeable catalyst for local and regional development. Based on these benefits, dam projects are being implemented to foster development mostly in rural areas in Zimbabwe. With many other projects and welfare services implemented like crafting, in the environment with prolonged periods of droughts, and scarce water resource the livelihoods of ward 23 Makoni district has been affected. The dam associated with its livelihoods activities like recreation, irrigation, fishing, livestock production, and other domestic activities, was constructed in the society to foster socio-economic of both local people and beyond. However, its usage to improve the living standards of the people in the local area is not clearly manifested. To uncover the true story behind this paradox, the present study assesses the influence of the dam to enhance socio-economic development for rural livelihoods in ward 23 Makoni district.
Statement of the Problem

Dam projects have been initiated in a bid to enhance rural development in most developing nations since time immemorial. Such projects attracted Non-Governmental Organizations (NGOs) as well as National governments to invest in dam projects. As a result more than 45000 functional dams were constructed worldwide (DiFrancesco & Woodruff, 2007), with almost half of them built or are under construction in China (Fuggle & Smith, 2000). In Zimbabwe most dam projects targeted rural development through enhancing food security, poverty eradication as well as increasing income sources (like fishing, recreational activities and market gardening through irrigation schemes) but however they are rarely used to do so (Bond & Manyanya, 2002). Therefore, an empirical examination of the influence of Osborne dam on the socio-economic development of the local people in ward 23 Makoni district was made. Some studies have shown that many governments’ institutions lack the necessary experience in capacity to foster public participation in developmental projects. Instead such institutions inhibit local and often the illiterate from participating in dam projects. For instance community participation in the Osborne Dam project in Zimbabwe and Lesotho Highlands Water Project (LHWP) lacked full stakeholder participation, and thus inhibiting the locals from using dams for their welfare (Bond & Manyanya, 2002).

Significance of the Study

The research is envisioned to benefit both the government of Zimbabwe and developmental organizations targeting water retention projects. The variation and relationship between the intensity, the nature/type of socio-economic development activities and the distance from the dam can help the government together with Non-Government Organisations (NGOs) partners to maintain equity in access to water between both the local people and the affected through strategically constructing productive infrastructure for irrigation purposes like irrigation canals, pipelines and roads. The government can be guided by the results of the study to provide complementary resources like irrigation schemes, small hydro power stations, and micro eco-tourism industries to utilize the dam for the benefit of the local people. In this sense the study results shall provide necessary information for effective and efficient usage of the dam. This will help shrink the effect of distance from the dam site.

Additionally the relationship between the dam and socio-economic development will help the community members to apply land use zonation system which can help the local people to maximise land close to the dam. This can be done through concentrating most viable projects close to the dam and/or rather diversify into other non-dam related livelihoods activities to land/fields located furthest from the dam. The findings from the study will help to ensure that Osborne dam improves in terms of intra-generational socio-economic equity, inter-generational socio-economic equity and ecological integrity, which targets the rural poor and the local people. The nature of the beneficiaries and victims of Osborne dam projects who benefit and who pay the costs are unknown at present, except in an anecdotal fashion. This is due to little efforts made to assess the influence of local dams on socio-economic development particularly in the context of communal areas which are reserved for the indigenous people in Zimbabwe. This study will therefore play a critical role in stimulating empirical assessments of the role of other dams countrywide and how best they can be used to improve the standards of living of the people surrounding the resource.

Last, but not least; it is the intention of this study to advocate for the adoption of sustainable means in using the dam to ensure maximum socio-economic benefits for both local and non-local people for example through canal and drip irrigation, eco-tourism, recreation, fishing and domestic purposes. The study will also find out whether if there are any changes in livelihood activities in the area and whether the dam has been an effective tool in poverty alleviation and socio-economic development. The information can be used by government parliamentarians in diverting Constituency Development Funds (CDF) to areas in need for development. Also developmental NGOs like World Vision can utilise the findings of this study in order to initiate pro-poor projects either by training and equipping people with knowledge on how to extract water from the dam to ensure better agricultural productivity.

Objectives

1. To determine the contribution of Osborne Dam on the socio-economic development of Ward 23 in Makoni District.
2. To determine challenges imposed by the dam on the local people.

Hypotheses

1. There is a positive relationship between the concentration and nature of dam related socio-economic development and the distance from the dam.
2. Osborne dam increased socio-economic challenges on the local people.
Scope of the study

The study area is Makoni District ward 23 in Manicaland Province. The study assessed the influence of Osborne dam on the socio-economic development of the Ward 23 Makoni district, in three villages (Kawadza, Nyatito & Dumba villages) which are within the sphere of three kilometres from the dam. Three kilometres from the dam site shall be the demarcation of the study area. There is high probability that the closer to the dam the people are the higher the usage of the dam and the increase in socio-economic activities than those away from the dam. So for this reason the three kilometres spatial limit covering Kawadza, Nyatito and Dumba villages was purposively selected. The study assessed the influence of the dam on socio-economic development by considering changes on components of socio-economic development which are employment/job creation, health, income, infrastructure development and standards of living. The main socio-economic activities of the dam like fishing, irrigation, gardening and domestic uses were critically assessed in relation to distance from the dam. The research also considered type of jobs both formal and informal provided by the dam to the local area. Primary data was the main source of data to the research. Secondary data was drawn from both local and international secondary data sources, journals and case studies.

Organization of the study

The study consists of seven sections and these are: Introduction; Literature Review; Materials & Methods; Data Presentation, Analysis & Discussion; Conclusion, Recommendations and Appendices; in their chronological order.

II. LITERATURE REVIEW

History of Dam Projects

Dams have been constructed for the past thousands of years to manage flood waters and supply water for drinking, irrigation, and hydropower and, more recently, for industrial purposes. Economic benefits of dams have been assumed to outweigh costs, thus providing rationale for construction of dams around the world (McCully, 2001; Singh 2002). However, in relation to other local dams in Zimbabwe like Kariba, dams are failing to yield substantial socio-economic benefits to the local people (Bond & Manyanya, 2002). This led to the loss of faith in large dam projects locally and world-wide (Hirsch & Wilson, 2011).

Between the 1930s and the 1970s, when the construction of large dams peaked, dams were viewed as synonymous with development and economic progress (WCD, 2002). Hydropower, irrigation, water supply and flood control services were widely seen as sufficient justification for the huge investments required; while other benefits, such as the economic prosperity brought to a region by multiple cropping, the installation of electricity in rural areas, and the expansion of physical and social infrastructures, such as roads and schools, were used to justify dams as the most economically and financially competitive option (WCD, 2002). However in the case of Ward 23 Makoni District, Osborne dam is rarely used to uplift or improve the socio-economic development of the local people since its operation due to politics on the use of the resource and the perceptions of the local people towards the dam (Bond & Manyanya, 2002).

World Wide View of Dams

Construction of dams since time immemorial primarily focused on socio-economic development. This led to an increase in the number of dams either large or small, in both developed and developing nations (Billington et al, 2005). However the benefits that dams do provide are frequently overstated. According to Goldsmith & Hildyard (1984), those who stand to gain politically and financially from construction of large dams are willing to go to inordinate lengths to ensure that they are built. This gave the elites or dam proponents the platform to dictate and control the use of the dam at the expense of the locals the supposed immediate beneficiaries. As a result in most cases local communities have rarely used the resource to uplift their standards of living.

As observed by Sachs (2010), the pursuit of dam projects development has led many Third World governments to sacrifice the vital interests of half of their populations for instance the case of Mekong basin dam construction. National and international interests are privileged over the interests of the local people who bear the costs of large dams and not the benefits (Pearse-Smith, 2012). This was due to exclusion of the local people from dam development planning, even from decisions that affect them directly (Lauridsen, 2004). This greatly inhibited the Mekong Basin’s population from harnessing the water resource for their socio-economic development.

Dams world-wide, have been supported as an important means of meeting water and energy demands and as a long-term, strategic investment with the ability to provide various benefits, some of which are typical of all large infrastructure projects, while some are unique to dams and specific to particular projects. According to WCD (2002), regional development, job creation and fostering an industrial base with export capability are
often cited as additional considerations when constructing large dams, while other goals include the generation of income from export earnings, either through direct sales of electricity or by selling cash crops or processed products from electricity-intensive industries.

Local Context of Dam Impacts: Zimbabwe

Most of the dams were constructed in response to poverty and droughts which haunted mostly the rural communities in Zimbabwe (Bond & Manyanya, 2002). However as noted by Tonah (1993) precarious household income levels inhibits most locals close to the dam to harness the water resource for their own benefit. For example the hydroelectric Kariba Dam which was built to provide power for the Zambian copper belt and the rest of Zimbabwe displaced more than 57,000 people of the Tonga ethnic group living along the Zambezi, destroying their livelihoods and their social fabric without compensation. In this case the positive and negative impacts of dams on socio-economic development were very selective both spatially and socially and this has failed to bring into terms the benefits to the local people as the dam is restricted. As a result the Tonga people did not benefit from the hydropower project. In this regard, while the Kariba Dam provide hydro-electric power to the industries of Zimbabwe it cost the Tonga people most aspects of their traditional riverside domestic economy, and caused devastating disease and loss of livelihoods (Bond & Manyanya, 2002). Furthermore, top down planning and management of most dam projects, lacked appreciation of local needs, priorities and constraints and as a result they had unfortunate, harmful and costly consequences. Some studies have shown that many governments’ institutions lack the necessary experience and capacity to foster public participation in development projects (WCD, 2002). Instead such institutions inhibit local and often the illiterate from participating in dam projects. For instance community participation in the Osborne Dam project in Zimbabwe and Lesotho Highlands Water Project (LHWP) lacked full stakeholder participation, and this inhibited the local people from using dams for their welfare (Bond & Manyanya, 2002).

Dams & Socio-economic Development

Dams are key vehicles and a source of social and economic development in many societies through irrigation farming, recreation, tourism, hydropower generation, fishing, infrastructure development and industrial purposes. However, in relation to this study the literature consulted presented gaps of dam projects in driving socio-economic development of local communities in which they are constructed.

Positive Impacts

Dams play a key developmental role in sustaining the social as well as the economic wellbeing of many people. They presents numerous benefits which include income, water for domestic purposes, plenty water for irrigation, infrastructure development, electricity generation, flood control and fishing projects, as well as industrial supply.

Irrigation and Food Security

Dams have an array of benefits which include constant supply of water for irrigation purposes (ICOLD, 2010). ICOLD (2010) also noted that in 2010 irrigated land covered about 277 million hectares, about 18% of world’s arable land but was responsible for around 40% of crop output. This clearly indicates that dams play an important role in improving food productivity and food security. In Zimbabwe dams like Mutirikwe, Manjirenji, Siya and Bangala provide irrigation water to the Zimbabwean South-East Lowveld Plantations (Chenje et al, 1998). Newson (1997) noted that the benefit of irrigation is stable yields, since weather conditions are largely controlled. However, to some rural people who lack the capacity to harness water from the dam for irrigation purposes, the dam has remained an idle resource (ICOLD, 2010). As highlighted by UNDP (2012), the problem of low productivity, low income and poor standards of living on smallholder farms is prevailing regardless of the dam due to lack of adequate knowledge, skills and resources (inputs such as fertilizer, labour, equipment and seed) to enable them adopt and efficiently utilize existing technologies to enhance production and earning from irrigation. According to Adams (1992), dam construction disrupts agricultural activities and this adversely affects household food security leading to undernourishment. According to World Commission on Dams (2000) between 500 000 and 800 000 people suffered losses in terms of productive floodplains that provided most or part of their means of survival when Manantali dam was constructed in Senegal. Adam (1985), highlighted that as a result of the Bakolori dam in Northwest of Nigeria the flooded level was reduced by 50% leading to a drop in the cropped area by 53% and a quarter of the households dropping dry season cultivation as a component of their livelihood strategy. As a result local people found it necessary to opt for non-agriculture activities as irrigable and productive land was engulfed by the dam, thus making the dam an idle resource for their own sustenance.
Additionally Auret (1990) stated that the need for irrigation development in Zimbabwe communal areas is vitally necessary to supplement dry land cropping and to provide food security in grain deficient areas. Irrigation development is of great significance in the face of climate change and the associated increased frequencies of extreme climatic events, particularly El Nino and related droughts (Auret, 1990). However as noted by the WCD (2010), large dams designed to deliver irrigation services have been less profitable in socio-economic terms than expected to the local people.

The Indian Water Resources Ministry estimated that roughly one-tenth of the area irrigated by dams suffered from either water-logging or salinity/alkalinity by 1991. Water-logging can happen both around the canal and the reservoir and can thus affect the command area. This implies that irrigation in the catchment area is less sustainable and less profitable to the local people (World Commission on Dams, 2000), thus may result in low usage of the dam. UNDP (2012) highlighted limited government support to promote and aid farmers and communities to use the dam for their sustenance as a major problem in dams’ relevance and validity in addressing poverty.

**Hydropower Generation**

According to Yuksel (2009), 1.6 billion people were without access to electricity and 1.1 billion people were without a reliable drinking water supply. Therefore, water and electricity are both necessary resources for economic development, and dams can increase access to both (water and electricity), through irrigation, flood control, water supply, and electricity production (Yuksel, 2009). As noted by Hildyard (2008), climate change causes unpredictable fluctuations in rainfall and hydrology which result in little benefits of dams to hydropower generation. The results are either increased stream flow leading to floods and devastation, or decreased stream flow leading to unviable electricity production, energy shortages, or drought (Hildyard, 2008). The WCD (2010) discovered that large hydropower dams tend to perform closer to, but still below, targets for power generation, generally meet their financial targets but demonstrate variable economic performance relative to targets, with a number of notable under and over-performers. With the prevailing poverty in most parts of the world electricity consumption is low particularly in the local areas in which dams are constructed (Yuksel, 2009). This presents a gap to the effectiveness of hydropower dams in socio-economic development of the local people. In some cases due to intensified demand for energy, solar energy is increasingly becoming the best alternative instead of hydropower, thus reducing dependency on dam projects for electricity provision and also their use for socio-economic development by local people hosting the resource.

**Improvement in Infrastructure**

Dam projects have also numerous potential benefits which result in improved infrastructure. Frequently, irrigation development also implies more general infrastructural improvements: better roads, rural electrification and sometimes housing improvements (Service, 1991). Some dam projects have also impacted positively on road development. For example road network as many communities that were hitherto not accessible previously are now accessible by road. Shiroro now has a tarred road and this has facilitated transportation of goods and movement of people in the region (Brabdt, 2000). In the same vein, it has also imparted positive on some development projects, like market gardening and piggery (Brabdt, 2000). Hama Mavhaire scheme design report (1999), indicated that Chilonga irrigation scheme failed due to lack of proper local community engagement. This resulted in Canals breached, roads eroded, fences broke and the few irrigators would wait for the government to repair its scheme.

**Creation of Employment**

Dam usage often results in employment creation in many ways. Dam water usage across the globe had employed nearly 30% of population spread over rural areas (ICOLD, 2010). But however poorly planned and implemented dams had devastating impacts on the local socio-economic systems without replacing them with comparable and acceptable alternative systems (Devarajan et al, 2005).

**Fishing**

Zimbabwean dams like Kariba, Mutirikwe, Manyame, Chivero, Mazvikadei and Mayfair are used as fishing, recreational and tourist resources (Chenje et al, 1998). With large endowments of fish in most Zimbabwe dams, fish has provided a source of proteins. In Ghana, fishing industry has significantly benefited from the dam projects precipitating enormous benefits to the economy (Adams, 1992). Fishing and aquaculture also provide food and livelihoods for millions of resource-poor people in Southern Africa, and is becoming more important to regional food security as the climate changes and other sources of food increasingly become less reliable (Makungwa, 2010).
According to the WCD (2001) dams have made an important and significant contribution to human development, and the benefits derived from them have been considerable. But however dam construction has greatly affected fish production and indirectly the incomes of the fishmongers. For instance the altered Mekong hydrology degraded or diminished a number of the basin’s natural resources, such as fish stocks, natural nutrients, agricultural land and forested land, all of which are crucial inputs to either agriculture or fishing (Wyatt & Baird, 2007).

ZimCOLD (2001) purported that one reason why most local people are not fully benefiting from the dam was poverty. Citing Kariba as an example the dam has stimulated tourism and fishing, however the Kapenta industry has not benefited the locals because of its capital intensive nature. In addition, dams can affect the physical stability of river channel, such that riverbed degradation downstream can lead to the loss of important in-stream spawning grounds for fish (Adams, 1992). For example study of the Urra Dam in Columbia revealed that 60000 fishing families were affected by reduced fish population due to dam construction (WCD, 2000).

**Drought Relief**

Many Dams including Aswan Low Dam has resulted in protection of people from floods and droughts, an increase in agricultural production and employment, electricity production and improved navigation that benefits tourism (Bhatia et al, 2008). However dam projects have been inequitable because the poor, other vulnerable groups and future generations are likely to bear a disproportionate share of the social and environmental costs without gaining a commensurate share of the socio-economic benefits (Bhatia et al, 2008). Therefore there is an urgent need to develop policies that minimize the negative impacts of these projects so that they can be implemented fairly and cautiously for the benefit of everyone involved (Bhatia et al, 2008). According to Bhatia et al, (2008) dams also protected Egypt from droughts in 1972–1973 and 1983–1987 that devastated East and West Africa. The High Dam allowed Egypt to reclaim about 2 million feddan (840,000 hectares) in the Delta and along the Nile Valley, increasing the country's irrigated area by a third (Bhatia et al, 2008). This was brought about by irrigating what used to be the desert. In addition, about 420,000 hectares, mostly in Upper Egypt, were converted from flood irrigation with only one crop per year to perennial irrigation allowing two or more crops per year (Bhatia et al, 2008). However the dam flooded a large area, causing the relocation of over 100,000 people and submerged archaeological sites, some of which were relocated as well (Bhatia et al, 2008).

**Constant Supply of Water for Domestic and Industrial Purposes**

According to UNDP (2004), water is also a factor of production in industry and many other types of economic activity, including both large and small-scale activities, often home-based activities where the poor are themselves entrepreneurs, such as food processing for vending in markets. Access to key factors of production, including water, is critical to the viability of activities that can act as a ladder out of poverty. In some cases, investments in water infrastructure such as dams and irrigation schemes can act as a catalyst for local and regional development (ICEA, 1989). Lack of EIA among dam projects led to information asymmetry among the community members, which resulted in limited participation by locals and the usage of the dam (World Bank, 1991). This was the case for example with Osborne Dam in Zimbabwe (ICEA, 1989) and the Lesotho Highlands water project (LHWP) in Lesotho (World Bank, 1991).

Dams ensure a constant supply of water for domestic, industrial, energy production and irrigation purposes. Dams provide a balanced supply of water for all seasons and conditions (World Bank, 1991). In Zimbabwe a number of dams were built mainly to provide cities and towns with domestic and industrial water. These dams include Chivero and Manyame for Harare water supply, Mayfair for Bulawayo water supply, Gwenoro for Gweru water supply, Sebakwe for Kwekwe water supply and Mutirikwe for Masvingo water supply (Chenge, Sola and Paleczny, 1998). As noted by International Commission for Environmental Assessment (ICEA, 1989) the EIA process for major projects lacks adequate provision for informing the public, and therefore creates challenges and resentment by the public in using it. Moreover, lack of transparency fosters mistrust and misunderstanding between project authorities and communities (ICEA, 1989). But the extent and magnitude of dam impacts on the local people was greatly determined by the income levels or the ability to harness the water resource to their benefit. As a result little benefits trickled down to the local people particularly those with less or living below the poverty datum line (ICEA, 1989).

**Recreation**

The operation of the dam and reservoir can enhance recreational opportunities. Hydroelectric dams provide recreational opportunities for fishing, boating, swimming and bird watching, etc. This is due to the increased habitat for water fowl, fish, and water sports (WCD, 2000). These activities support local economies
by increasing tourism. However according to the World Commission on Dams Secretariat (2000), recreational benefits from Kariba dam are collected and used by dam officials rather than the local people. As a result very few local people use the dam for recreational purposes due to charges levied by management to use the dam.

**Negative Impacts**

Besides numerous benefits of dams, many communities are facing a cocktail of challenges which are anti-developmental in nature. In many cases these negative effects have often exceeded the benefits. These include health hazards, flooding, disease outbreak, displacement, destruction of cultural sites and social and communication disruption. Osborne dam is not exceptional amongst the dams which have caused socio-economic outcry amongst the local people.

This has sparked debates between the proponents and opponents of dam projects whether dams could continue to be socio-economic development vehicles particularly in rural areas. Furthermore conflicts within communities between the immediate users, dams’ proponents and non-locals shows that dams are widely condemned for being politicised and their little benefits to the locals. Dams were viewed as vehicles of development until recently when they have become more anti-development than before. Due to negative consequences of large dams and dam politics, dams are rarely used to uplift the living standards of the local communities (Nusser, 2003). This is witnessed by strong resistance and conflicts by both local communities and dam opponents. For instance lack of consultation and community participation by the local communities in the Osborne Dam project in Zimbabwe attracted local resistance which affected the effectiveness of the dam in upgrading their standards of living (Bond & Manyanya, 2002). This was also the case in Thailand, following the controversy surrounding the Pak Mun dam (Middleton et al, 2009; Hirsch & Wilson, 2011). These supports the statement made by Goldsmith & Hildyard (1984) that those who stand to gain politically and financially from construction and operation of large dams are willing to go to inordinate lengths to ensure that they are built. This gives the elites or dam proponents’ political power and total control over the resource to exclude local communities from benefiting and assuming ownership to the project (Goldsmith & Hildyard, 1984).

**Health Hazard**

Large dam projects often lead to the spread of schistosomiasis, yellow fever, malaria, river blindness and river fluke infections (Newson, 1997). Furthermore, Newson (1997) argues that dams have reduced the quality of drinking water for hundreds of millions of people. Lack of access to clean water increases the incidences of diseases constraining the achievement of the Millennium Development Goals (MDGs).

Clarke (1991) highlighted that when large new volumes of water are created, the risk of disease in tropical countries rises sharply. Adams (1992) argues that although water-borne diseases are widespread in African floodplains, dam construction can increase their prevalence. More than one million people die every year from the direct causes of malaria, with children less than five years of age living in sub-Saharan Africa at highest risk (ICOLD, 2010). This means that people’s ability to work is usurped by the diseases and livelihood outcomes are
affected negatively. Therefore water borne diseases related to dam usage had social impact which increase social malaise and circumscribe livelihood opportunities (Goldsmith & Hildyard, 1984). In this regard dams are regarded as a self-defeat program which instead of uplifting people’s livelihoods downgraded it. According to Tucker (1983) water resource development projects create additional habitats for disease vectors beyond those already present which lead to debilitation and vulnerability to other diseases. This results in working hours being lost due to illness and medical costs increasing (Clarke, 1991). Kariba Dam caused devastating diseases among the Tonga people (Bond & Manyanya, 2002). The Gezira Irrigation Scheme in Sudan increased the prevalence of schistosomiasis, malaria and yellow fever in the region (Canter, 1985). Moreover, Clarke (1991) noted that a survey after the construction of the dam to create Lake Volta showed that the incidence of infection with schistosomiasis among children under 16 years in the resettled areas rose from 3 – 37% in just one year.

Dams are also coupled with demographic changes, and thus alter human-vector-parasite contact patterns (ICOLD, 2010). The potential for negative health impacts of water projects must also be juxtaposed with the positive effect that dams and irrigation schemes contribute substantially to renewable energy production, food security, and social and economic development (ADB & Dams Report, 2000). This can provide local people with greater capacity to purchase essential commodities, including drugs and Insecticide-Treated Nets (ITNs), as well as improved access to health care services and education (Asit, 2002). However, according to ADB and Dams Report (2000), rural villagers of Laos who relied on wild fisheries as their major income and protein source, were considered so vulnerable to the effects of the Theun-Hinboun Dam Project which invariably lead to significant reduction in food and income for the villagers. Stagnant water in irrigation canals also acted as breeding grounds for snails carrying the parasite bilharzia (ADB and Dams Report, 2000). For example the Aswan High Dam inhibited the natural fluctuations in water levels leading to increased incidence of Bilharzia (Asit, 2002). This greatly crippled the economic performance as finances budgeted for development was diverted towards Disaster Risk Reduction (DRR) and, medication in major hospitals and clinics (Asit, 2002). As a result, locals feared to use dams within their localities due to rise in bilharzia cases.

There is also evidence in the medical literature of increased malaria incidence among children living near dam reservoirs in Africa (Lautze et al, 2007). Despite this there are however benefits from increased economic activity around the dam while it is being constructed (Asit, 2002). Large numbers of locals are often employed in the construction of these dams, creating a short-lived but large spurt in incomes that may have more sustained impacts in the both local and regional economy via increased demand for goods and services (Lautze et al, 2007). This increased economic activity often leads to the creation of informal settlements around dam sites, with in-migration of people looking to provide goods and services to dam labourers (Lautze et al, 2007). On the other hand there are documented harmful impacts on health due to the sudden influx of workers and migrants, such as increased incidence of HIV and AIDS as well as diseases related to poor sanitary conditions (WCD 2000). There are therefore potential impacts of dams on infant mortality within their vicinity through both household income as well as direct exposure to disease (Lautze et al, 2007). The net effect of these various impacts is however ambiguous.

Inundation of Settled Areas and Productive Land

Existence of dams can actually lead to the rise to the natural levels of rivers, and consequently resulting in inundation of the once settled areas and loss of agricultural land beneath the reservoir (Adams, 1992). Among the largest reservoirs which were created as a result of dam construction in Africa include the Volta Lake formed behind the Akosombo Dam, which covers 8 500 square kilometres, flooding a substantial area of Central Ghana (Canter,1985). The Kainji Dam in Nigeria impounded 1 200 square kilometres, including 15 000 hectares of farmland while the Lagdo Dam on the Benue flooded 70 000 hectares, including floodplain land stretching 2-5 kilometres on both banks of the river (Adams, 1992). More than 400,000 km² have been inundated by reservoirs worldwide.

Destruction of Natural Habitats

Large tracts of land now covered by dams led to destruction of both flora and fauna (Canter, 1985). This also led to extinction of rare flora and fauna species. Decreased woodland due to dam construction adversely affected wildlife communities and thus leading to decreased hunting spaces and medicinal herbs which the local communities depended on (Adams, 1992). Furthermore, decreased forest plant communities lead to decreased timber production and attractiveness of an area to recreationists (Canter, 1985).

Population Displacement

Development-induced displacement is problematic at best, even when a state has the best interests of the entire population at heart. Large numbers of people have been relocated due to dam construction in Africa and globally (Adams, 1992). Among the major dams which displaced large number of people in Africa are the
The Influence of Osborne Dam on the Socio – Economic Development of Ward 23 Makoni District, Zimbabwe

Kossou Dam in the Ivory Coast which displaced 85 000 people, the Akosombo Dam 84 000, the Kariba Dam in Zimbabwe 57 000, the Kainji Dam 55 000 and the Lagdo Dam 35 000 people. The Aswan High Dam on the Nile displaced an even greater number of people, 120 000 Nubians, both in Egypt and Sudan (Adams, 1992). These displacements have greatly compromised the social life of the displaced population. On the case of Kariba, the displaced Tonga people were never viewed as stakeholders in the dam or potential owners of the dam (WCD, 2000). As a result the dam developers and the government did not attempt to find ways to ensure that the Tonga could maximise their benefits from the dam. According to the WCD, (2000) the Tonga people were settled as far as 50km and 120km from the dam where they could not easily access the dam for fishing or irrigation. It is not feasible, from these distances, for the displaced people to take advantage of the dam (WCD, 2000). Kariba dam was constructed for electricity generation but however very few of the Tonga settlement areas are connected to the national electricity grid. In addition the construction of Osborne Dam in Manicaland Province resulted in the displacement of 700 families to areas more than 100 km away in Headlands Makoni District and was not in a position to benefit from the dam (Musundire, 1994).

Loss of Sites of Historical, Archaeological and Religious Importance

Dam construction in Africa results in the loss of African historical, archaeological, cultural and religious sites. These sites played an important role in tourism industry both locally and international (Brokensha & Scudder, 1968). Community survival strategies were destroyed in the name of dam projects, and this instilled strong resistance to future dam projects. More-so the culture of the local people is also affected by dams, as many of the masquerades and cultural fairs are no more existence, many festivals has been cancelled, many of the shrines are permanently impounded, for example the case of Shiroro dam in Nigeria (Brabdt, 2000). In addition, several artefacts and burial ground are now permanently covered with water. A case in point is Galadima Kogo where as much as 15 traditional festivals have been cancelled (Brabdt, 2000). Little form of trading impact has been observed (Brabdt, 2000).

Social and Cultural Disruption

Canter (1985) noted that during the dam construction phase there can be social conflict between the local villagers and some dam construction workers that maybe foreign. People who are displaced by dam construction maybe relocated to land claimed by others. Because of such movements, friction can occur, arising from the resentment felt by the original owners of the land towards the newcomers who have been foisted on them (Canter, 1985). The resettled people may also be angry over leaving their old lands and their livelihoods (Brokensha & Scudder, 1968). Dams have significant negative impacts on the human society. As argued by Cullather (2010) dam construction requires the state to displace individual people in the name of the common good to ensure a win-win result. In Egypt for example; the majority of the 50,000 Nubians were deprived from using the Aswan dam after being moved 45 kilometres downstream from Aswan Dam (Cullather, 2010).

III. MATERIALS & METHODS

The focus of this research is contextual, meaning that its methods are applied to a specific locality, case or social setting. It does not intend to create a broader generalisation, but rather to assess the socio-economic effects of Osborne Dam. Data on the influence of Osborne dam on the socio-economic development of Ward 23 was collected using both quantitative and qualitative methods. Questionnaires were used to collect quantitative data on the changes brought by the dam on the welfare and livelihoods of the local people. Observation guide, interviews, and focus group discussions were employed to collect qualitative data, which complemented quantitative methods in order to reinforce data validity, relevance and usefulness. Socio-economic data collected was coded and analyzed using Statistical Package for Social Sciences (SPSS) version 21 and Microsoft Excel 2013. The results were presented on graphs, pie charts and tables.

Study Area

The research was carried out in three selected villages namely Nyatito, Dumba and Kawadza in Ward 23, Makoni district. The study area is under Manicaland Province, in northeastern Zimbabwe under Rusape. Ward 23 has a total population of 8 711 and 2 064 households (ZIMSTATS, 2012). It is primarily a farming district the chief crops being tobacco and maize. Due to its agricultural based economy the villagers close to the dam were selected in order to assess the influence of the dam on their livelihoods. Up to 75% of the rural population in Ward 23 is considered small-scale farmers, with between 1 and 3 hectares of land per household, on which they carry out a combination of crop farming and livestock rearing (Symphorian et al, 2003). Since the area is in ecological region three (3) they face harsh ecological conditions with limited and erratic rainfall ranging between (600 &700 mm p.a.) coupled with declining water resources, increasing land degradation and
The Influence of Osborne Dam on the Socio-Economic Development of Ward 23 Makoni District, Zimbabwe

High erodibility of soils (Symphorian et al., 2003). An average amount of 650mm rainfall per annum does not suffice a normal agricultural season, and this justifies why Osborne dam was constructed.

Osborne dam is the largest and one of the major inland lakes in Manicaland region and in Zimbabwe respectively. It was constructed in the period between 1989 and 1994 mainly for downstream irrigation purposes in the Southeast Lowveld. The dam is located on the Nyatande and Odzi confluence and it stretches 16 kilometers up the Odzi River and fifteen kilometers along Nyatande tributary. The dam is over a kilometer wide and sixty-six meters deep (Zimbabwe Parks and Wildlife Management, 2005). The area has a moderate climate with an average temperature of twenty-four degrees Celsius. These climatic conditions favor tobacco and maize crops and micro-livestock keeping projects and therefore Osborne dam is seen as a source of water for these projects. There are also numerous non-agriculture livelihood activities in the area like fishing, casual jobs, crafting and mukando or peer to peer lending. The area comprises of many women and children below 15 years than man. The population is also characterized by low income earners and the non-employed. Roads and building infrastructure are poor and un-serviced dust roads. The settlements are linear in nature and it constitutes round huts with few corrugated roofed houses.

A Map Showing the Location of Ward 23 in Makoni District.

Figure 2: Map of Ward 23 in Makoni District (Source: Drawn by Authors using QGIS v2.6.1).

Figure 2 shows the location of Kawadza, Dumba and Nyatito villages in Ward 23 Makoni District. These villages use the dam for their irrigation agriculture, livestock rearing, domestic purposes, recreation and fishing activities and other livelihoods activities. The information was gathered using interviews, observations and focus group discussions. The method allowed the researcher to collect data on the natural setting of the communities. The method allowed people to express their beliefs, opinions and their feelings pertaining to the influence dam. The illiterate people of the community were also allowed to participate in the research and thus breaks the cross cutting issues which were likely to affect data collection. Hence using the research design, a sample size of 72 respondents using the simple random sampling method was used. The study targeted the adults both women, man, children and the elderly. Key informants from ZINWA, Dam officials, Zimbabwe Parks and Wildlife management, clinic, Councilor, village heads were consulted first before consulting the villagers. Information from key informants helped in securing permission and authority, demarcating the study area boundary, gathering population disaggregated data, understanding the livelihoods and nature of development in the area. The research design had an advantage of gathering relatively large number of cases at a particular time and also the fact that it is cross sectional was also another advantage.

Target Population

Ward 23 in Makoni district is the target area. Makoni district has a total population of 272340 and 6358 households. Ward 23 has 8711 people with 2064 households (ZIMSTATS 2012). From the 2064 households in the entire ward; 150 households from three villages (Dumba, Kawadza and Nyatito) falling within the three kilometer spatial limit from the dam was used as the target population. Forty eight percent (48%) of 150 households which is 72 was used as the sample size. This was done in accordance to Burgess (1982), who envisaged that for research findings to be generalized to the population with limited degrees of errors, a sample should comprise a minimum of a ten percent (10%) of the population under study. The sample was large enough to make some generalizations since the respondents were selected from different spaced villages within the three kilometer spatial extent from the dam. The researcher took advantage of the Village Development Committee (VIDCO) predetermined population clusters used by political leaders in national household surveys and planning.
Sampling Procedure

Using simple random sampling method three villages (Dumba, Nyatito and Kawadza) among the total of 19 villages were selected to represent the whole. The researcher took advantage of the VIDCOs which already existed formerly used for household surveys and planning. To ensure more generalized and representational findings, the researcher engaged 48% of 150 households 72 households to represent three villages Kawadza, Dumba and Nyatito with 150 households. Eight key informants from ZINWA (1), Zimbabwe Parks and Wildlife management (1), Dam officials (1), Mt Jenya Clinic (1), the Councilor (1) and village heads (3) were interviewed. Village registers from village heads were used to randomly select samples of 24 households from each village (Table 1).

Table 1: Sample size at Village level

<table>
<thead>
<tr>
<th>No</th>
<th>Village name</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nyatito</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>Dumba</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>Kawadza</td>
<td>24</td>
</tr>
<tr>
<td>Total respondents</td>
<td>72</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Primary data)

The study used both qualitative and quantitative methods. Interviews, field observations, and focus group discussion schedules were used as qualitative methods to collect data. On the other hand, questionnaires both closed and open ended were used as a quantitative method. Interview guides were used to collect data from ZINWA manager, Mt Jenya Clinic Matron, Zimbabwe Parks and Wildlife management staff, dam officials, village heads and the councilor. Triangulation was used to ensure that the flaws of one method are covered by another.

Research Instruments

A number of research instruments were used to obtain relevant information on the influence of Osborne dam on the socio-economic development of Ward 23 Makoni District. The research instruments used are questionnaires, observations, focus group discussion and interviews.

Questionnaire

Questionnaires (Appendix 1) were administered in Shona to 72 households within the villages. Some of the questionnaires were administered on a one on one criterion to ensure 100% response from the respondents, while others were administered through large villages meetings. This was in line with Best & Khan (1993) who postulated that questionnaires administered by the researcher have an advantage that the researcher has the opportunity to develop a good rapport with the respondents. The researcher used face to face structured and unstructured questionnaire with the help of village heads and the Councilor in order to break cultural barriers on women, not to communicate with man without the consent of the husband. To ensure high response rate the researcher orally interpreted questionnaires from English to Shona. The influence of Osborne dam on major socio-economic development variables which include health, employment, infrastructure development, living standards, assets ownership and income levels were assessed using the questionnaire. The researcher used both structured and unstructured questionnaires to collect data. The respondents constituted 72 households from the three villages selected from ward 23 and 8 key informants. Closed ended questionnaires were used to guide the respondents and to probe further responses. Open ended questions were also used to facilitate a wider exploration and in-depth study. Questionnaires have the ability to gather rich, thick, and meaningful data, although they run the risk of having some of their sections left unanswered. The questionnaires were administered on different occasions starting with the village close to the dam.

Interview Guide

An in-depth interview guide (Appendix 3) was used for capturing data from people who were considered knowledgeable about the dam to ensure a high response rate. The interviews were conducted with 7 different groups of people and organizations which include National Parks and Wildlife Authority, dam officials, Mt Jenya clinic, ZINWA, Councilor and village heads. Interviewing leaders of these institutions enabled the researcher to harvest a high spectrum of information on how the dam is affecting the social and economic development of the local people. People were interviewed at their work places, in the process of using the dam and some at their homes. Interviews had an advantage of flexibility as they provided a chance to restructure questions. Interviews had also a platform which allows the researcher and the interviewee to have a far wide ranging discussion than questionnaire would allow. Most importantly it allowed for plain language and an immediate response. A major setback of the method was the reservations held by some of the key informants.
on the information to and not to release, due to confidentiality. Village heads and the councillor gave information on the total population per village and how the community uses the dam for and the jurisdiction of different village heads. Dam officials provided information on management measures and the problems faced in management the dam as well as dam related livelihood activities engaged by the locals. ZINWA provided information on the trends of the dam capacity and how they manage water use from the dam. Mt Jenya clinic matron provided information on the influence of the dam related diseases like malaria and bilharzia on local people’s health. However there was also unwillingness by some interviewees in giving information as they quote it confidential. But however the researcher managed to acquire a lot of useful information which amounted to this study.

Focus Group Discussions (FGDs)

The objective of focus group discussions (Appendix 2) is to collect views about the dam from the household heads. A household is defined as including those members normally living and eating together at the same home site. This included resident household members who were more or less permanently in the area, as well as other members who worked or resided away most of the time. This was an open approach aimed at maintaining maximum flexibility so as to obtain as much information as possible.

FGDs were conducted on 3 selected households in three villages, one in each village. Each FGD consisted of seven to ten persons. Each was organised as a mixed group of men and women based on their specific characteristics including age, sex, social class and experiences. During those activities, villagers were invited to identify their key constraints and challenges and benefits in water utilisation, irrigation management and socio-economic development. Discussions with farmers, fishmongers, recreationists, women, men, water control committees and village heads was also held in each village.

Observation

An observation guide (Appendix 6, 7 and 8) was used in order to compliment information from questionnaires and interviews. The researcher used transects walks to observe the general nature of socio-economic development of the area. In each village two quadrats (500*200m$^2$) were demarcated targeting 10 households. Observations were made starting from the dam site reaching the 3 kilometres spatial extent from the dam where the three villages lie. Using the systematic approach the researcher observed every 5th household. Direct observation method, which does not interfere with the people’s behaviour, was used to avoid biased behaviour from the observed. This helped to get rid of the intensity and the nature of socio-economic development with distance from the dam.

The researchers recorded all the variables noted in the observation guide in relation to households as well as distance from the dam. Observations improved precision of the research results and it also decreases the problems and biases of depending on respondents. However observations had shortcomings that they cannot study or indicate problems of the past. The researchers also took advantage of interviews and questionnaire time to carry out some observations. The information gathered was noted down in the observation guide (Appendix 6, 7 and 8).

Ethical Consideration

The researchers obtained the permission through formal letters and oral communication from the local authority, the councillor and village heads to conduct the research. Villagers were later informed by their respective village heads through community meetings about the research. Participation was voluntary and the participants were well informed that they could withdraw at any stage if they so wished. The respondents were assured of high confidentiality of data collected. The researchers treated individuals as autonomous agents through disclosing fully the nature of the study, the risks, benefits, and alternatives with an extended opportunity to ask questions. The researchers also highlighted the beneficence of the project to their lives if adopted by relevant authorities in dam management. To avoid inaccessibility and exclusion among the community members the researchers interpreted the questionnaire in Shona.

Data Presentation & Data Analysis Techniques

Data from the questionnaires was coded in order for it to be computer readable. This was done by first entering the variables and their codes. This was followed by analysing the data using SPSS version 21 and Microsoft excel 2013, and then presented in tables, graphs and charts. SPSS version 21 was chosen for data analysis because it provided with capabilities for making easy analysis of numeric and categorical data, which would be difficult and time consuming if manually done. Hypothesis testing was done to determine if there is a positive relationship between the concentration and nature of dam related socio-economic development and the distance from the dam and whether Osborne dam presents significant socio-economic challenges to the local
people. Significance testing was also done to assess the influence of the dam project to the socio-economic development variables like infrastructure development, health, employment, income and standard of living of the people in Ward 23 Makoni area.

IV. DATA PRESENTATION, ANALYSIS & DISCUSSION

Demographic Characteristics of Respondents

Sex of Respondents

Sex of respondents is shown in Figure 3. Large population of females’ respondents used Osborne dam for their own welfare and for their households than males.

![Figure 3: Sex of Respondents](Source: Primary Data)

| Table 2: Participation of both Females and Males in dam related Socio-economic Activities |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| **Participation in socio-economic activities** | **Females (N=42)** | **Males (N=30)** |
| Fishing | 55% | 45% |
| Gardening | 56% | 44% |
| Small scale Irrigation | 59% | 41% |
| Domestic use | 75% | 25% |

(Source: Primary Data)

Table 2 shows the role of sex in the use of the dam for socio-economic development. Women and man played different roles in socio-economic development related to dam usage as highlighted (Table 2). Women have remained major players in dam related socio-economic development activities like fishing, gardening and irrigation activities since Osborne dam became operational. Women participated more in small scale irrigation, domestic use, fishing and gardening, while men tend to provide technical input and final (household and community) decision-making.

Age of Respondents

The age character of the respondents is shown on Figure 3. The economically active population, 18 years and 64 years, used Osborne dam more than any other age group to sustain their wellbeing (Figure 3). Those below 18 years are not the direct users of the dam; while those above 65 years had limited access to the dam due to age.

![Figure 3: Age of Respondents](Source: Primary data)

Table 3 gives the relationship between age characters and its influence in the participation in dam related socio-economic development activities. Participation of the respondents in Ward 23 was determined by the age. Youth (75%) participated much in income generating activities than any other group as highlighted by their incomes at USD150 in fishing and USD80 in irrigation as indicated (Figure 3 and table 3).
Table 3: Age Characters and Socio-economic gains from the Dam

<table>
<thead>
<tr>
<th>Livelihoods</th>
<th>Below 18 (N=15)</th>
<th>19-64 Years (N=53)</th>
<th>65 and above (N=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Benefits</td>
<td>% Benefits</td>
<td>% Benefits</td>
</tr>
<tr>
<td>Irrigation</td>
<td>Direct</td>
<td>Indirect</td>
<td>Direct</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Fishing</td>
<td>5</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>Gardening</td>
<td>10</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Domestic use</td>
<td>0</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Non-dam</td>
<td>60</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

(Source: Primary source)

Among the 19 to 64 age group 35% of the youths confirmed that they generated more than USD150 per month from fishing while 25% confirmed that they generated USD80 per month directly from small scale irrigation farming, whilst the 25% used the dam for domestic uses and none income generating activities (Table 3). Those below 18 years did not substantially benefited from the dam directly since 60% of them engaged in non-dam related livelihoods, while 10% engaged in gardening and benefited in the form of food security. Since the age group involve the school going age they used the dam mainly for domestic purposes and thence no direct income. Due to limitations of age 75% of those above 65 years did not use the dam for any particular livelihood whilst the remaining 25% was involved in fishing and generated USD90 per month.

The Relationship Between Distance from the Dam, Nature and Intensity of Socio –Economic Activities

The relationship between distance from the dam, and nature of socio-economic development is shown in Table 4. Distance of villages from the dam affected the socio-economic development both in nature and intensity since the construction of the dam. Food productivity in particular maize through irrigation decreased with distance from the dam that is from the closest village which is Nyatito to Kawadza village the furthest. From the data presented in Table 4, since 2008 up until 2011 the villagers experienced high food productivity through irrigation. This data was used to test the hypothesis on the relationship between intensity and nature of dam related socio-economic development and the distance from the dam.

Table 4: The Relationship between Villages, Distance from the Dam and maize productivity

<table>
<thead>
<tr>
<th>Village</th>
<th>Distance from the Dam</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nyatito</td>
<td>1 km</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Dumba</td>
<td>2 km</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Kawadza</td>
<td>3 km</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

(Source: Rural District Council Village Records)

Maize is the chief crop grown in these three villages. Average food productivity per household in these three villages Kawadza, Dumba and Nyatito decreased since 2008, this being the result of climate change, tight restrictions to use the dam by dam officials and ZINWA management, and decreased water volume in the dam. The trends show that the effect of distance on productivity decreased with time since 2008. The trend however decreased sharply starting in 2014 through 2015. The Chi-square test results of the relationship between socio – economic development and distance from the dam are shown in Table 5.

Table 5. Relationship between Socio-economic Development and Distance from the Dam

<table>
<thead>
<tr>
<th>Distance from the Dam</th>
<th>Fishing</th>
<th>Gardening</th>
<th>Irrigation</th>
<th>Domestic use</th>
<th>Livestock rearing</th>
<th>Recreation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1km</td>
<td>12</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>2km</td>
<td>7</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>3km</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>24</td>
</tr>
<tr>
<td>TOTALS</td>
<td>20</td>
<td>17</td>
<td>7</td>
<td>17</td>
<td>5</td>
<td>6</td>
<td>72</td>
</tr>
</tbody>
</table>

(Source: Primary data)
Distance in this instance did not explain the nature and intensity of socio-economic development activities as they were not in concordance with the hypothesis. This depicted that all these villagers benefited in one socio-economic activity than the other without distance being a contributing factor.

Table 6: Pearson Chi-Square Cross Tabulation 1 (p<0.001)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson Chi – Square where N=72.</th>
<th>Significance (2-sided) (p&lt;0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from the dam</td>
<td>40.638⁸</td>
<td>.251</td>
</tr>
<tr>
<td>Nature and intensity of</td>
<td>46.278⁸</td>
<td>.341</td>
</tr>
<tr>
<td>Socioeconomic Activities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Primary data)

There is no statistical evidence to accept the hypotheses that there is a positive relationship between the nature and intensity of socio-economic development and distance from the dam. This portrayed that there is an insignificant relationship between the distance from the dam and the concentration and the nature of dam related socio-economic development. This reveals that dam related socioeconomic development does not relate with distance from the dam, due to a number of factors which include restriction by management, lack of capacity to harness the resource, low water level in the dam, relocation to a distance from the dam as well as lack of interest in using the dam.

The Influence of the Osborne Dam on the Socio-economic Development

This section highlights the influence of Osborne dam on the socio-economic development of Ward 23 Makoni District. The dam presented both opportunities (fishing, income sources, and employment opportunities) and threats (disease outbreak, flooding of pastures and agriculture land, displacement and communication and transport disruption) of the dam on the welfare of the local people.

Socio-economic Development Activities brought about by the Dam.

The socio-economic activities carried out by respondents using Osborne dam in Ward 23 are shown in Figure 4. Osborne dam presented numerous small scale livelihood activities which contributed to socio-economic development of Ward 23 Makoni District.

Figure 4: Socio-economic Development Activities of the Dam (Source: Primary data)

Socio-economic development activities of the dam are multi-dimensional and vary greatly in nature and in intensity. About 32% of the respondents engaged in fishing and cited it as their major livelihood activity and income generating activity. Irrigation farming decreased considerably to 13% as compared to previous 20ha irrigable land in 2014. This was done through small scale bucket irrigation system. Livestock rearing is mainly cattle, goats and chicken rearing, and is done for domestic consumption. 8% of the respondents kept cattle as their symbol of economic status rather than sheep and goats. But due to dam management water monitoring and restrictions to use the dam for irrigation purposes, lack of interests in irrigation and lack of finances to purchase irrigation implements, outbreak of diseases like malaria, bilharzia, anthrax and water fluke force some households to engage in non-dam related livelihoods. The situation was aggravated by the continuous decrease in water levels due to dysfunctional outlet valves and dry spells experienced in the country.

Major Dam related Socio-economic Livelihoods

Figure 5 highlights the major dam related socio-economic livelihoods within ward 23. Among the socio-economic activities engaged by the local people of Ward 23 fishing, gardening, irrigation, livestock rearing, recreation and domestic use were the major socio-economic livelihoods sustaining the welfare of some of the people in the Ward.
The Influence of Osborne Dam on the Socio – Economic Development of Ward 23 Makoni District, Zimbabwe

Figure 5. Major Livelihoods related to Dam usage (Source: Primary data)

Fishing and domestic use dominated as major livelihood with 32% all. Gardening is 14% an indication that most people are rarely using the resource to water their gardens either for commercial or for subsistence purposes. Unavailability of markets within and in the vicinity of the community has also greatly affected gardening activities.

As highlighted by Auret (1990) the need for irrigation development in Zimbabwean rural areas is vitally necessary to supplement dry land cropping and to provide food security in grain deficient areas. However in this case irrigation is 11% a clear indication that most of the community members are not involved in irrigation activities. This is supported by UNDP (2012), which postulated that the problem of low productivity, low income and poor standards of living in rural areas is prevailing regardless of the dam due to lack of adequate knowledge, skills and resources (inputs such as fertilizer, labour, equipment and seed) to enable them adopt and efficiently utilize existing technologies to enhance production and earning from irrigation.

Gains from the Dam

Socio-economic gains derived from the dam are shown on Table 7. Osborne dam had little benefits or gains to the residents of Ward 23. The operation of Osborne dam altered the livelihoods and the way local people used to do to fend for their wellbeing before the dam. Gains from different socio-economic activities were not equally spread within the community in Ward 23 (Table 7). This is the case due to differences in capabilities and capacities to use the dam as well as hindrances faced by the locals.

Table 7: Socio-economic gains from the Dam

<table>
<thead>
<tr>
<th>Socio-economic gains from the dam</th>
<th>Percentage of people who gained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in yields</td>
<td>5%</td>
</tr>
<tr>
<td>Affordable fish</td>
<td>29%</td>
</tr>
<tr>
<td>Increase in Income</td>
<td>4%</td>
</tr>
<tr>
<td>Employment</td>
<td>1%</td>
</tr>
<tr>
<td>Easy access to water for Domestic use</td>
<td>45%</td>
</tr>
<tr>
<td>Recreation</td>
<td>1%</td>
</tr>
<tr>
<td>Improved physical infrastructure</td>
<td>0%</td>
</tr>
<tr>
<td>Plantations</td>
<td>0%</td>
</tr>
<tr>
<td>Food security at household level</td>
<td>15%</td>
</tr>
</tbody>
</table>

(Source: Primary data)

According to (ICOLD, 2006) one of the fundamental requirements for socio-economic development throughout the world is the availability of adequate quantities of water with the appropriate quality and an adequate supply of energy. 45% of the respondents benefited through using the dam for domestic purposes either for laundry purposes, cooking and washing. Gum tree plantations existing were planted before the construction of the dam and are independent from the dam use. Therefore plantations did not change due to dam operation in their communities. On the other hand Osborne dam failed totally to develop or improve
infrastructure in the area besides the dam and dam walls. From the observation made by the researcher through transect walks Osborne dam did not yield physical infrastructure like irrigation pipes and canals, roads to and fro the dam, school, and clinics.

Yields increased by 1% to 5% of the respondents who engaged in bucket system irrigation practices in 2015 as compared to 5% increase in 2012, due to 68.7 percent decrease in dam water levels (Figure 6). This resulted in poor food security at household level as 15% of the respondents credited the dam for their stable food security, while 85% regretted and condemned the dam for disrupting their lines of survival.

**Use of the Dam for a specific Livelihood**

Data on the proportional use the dam for a specific use is shown in Figure 6 and the alternatives engaged by those who do not use the dam for a particular livelihood are shown in Figure 7. Depending on their strength and capabilities different households specialised on a particular livelihood related to the dam. The greatest proportion of the residents in the villages used the dam for a particular dam related livelihood though they did differ in their contribution to the welfare of them all.

**Figure 6: Trends in Osborne dam Water levels** (Source: ZINWA 2015)

Yields increased by 1% to 5% of the respondents who engaged in bucket system irrigation practices in 2015 as compared to 5% increase in 2012, due to 68.7 percent decrease in dam water levels (Figure 6). This resulted in poor food security at household level as 15% of the respondents credited the dam for their stable food security, while 85% regretted and condemned the dam for disrupting their lines of survival.

**Use of the Dam for a specific Livelihood**

Data on the proportional use the dam for a specific use is shown in Figure 6 and the alternatives engaged by those who do not use the dam for a particular livelihood are shown in Figure 7. Depending on their strength and capabilities different households specialised on a particular livelihood related to the dam. The greatest proportion of the residents in the villages used the dam for a particular dam related livelihood though they did differ in their contribution to the welfare of them all.

**Figure 7: Use of the Dam for a Particular Livelihood** (Source: Primary data)

Alternative livelihood strategies like societies/rounds, peer to peer lending (mukando), remittances from diaspora, rain fed agriculture and casual jobs have been employed by those who do not use the dam as a survival means. A considerable number (49%) of the villagers were not using the dam to sustain any livelihood. They relied on non-dam livelihoods like rain fed agriculture, remittances, casual/informal employment and peer to peer lending to uplift their welfare as illustrated in Figure 8.
All 35 households out of the 72 households which did not use the dam for any socio-economic livelihood activities engaged themselves in non-dam livelihoods as their alternative livelihoods. 71% of them mainly dependent on rain fed agriculture as their source of food and livelihood, so as to ensure that food security is maintained. This is supported by ICOLD, (2010), that most countries in the world depend primarily on rain fed agriculture for their grain food. According to WCD (2002) 70 % of the world’s poor live in rural areas and agriculture is their main source of income and employment. Remittances from relatives outside the country opened new livelihood opportunities for the local people particularly women who had limited livelihood options. Women relied on remittances to run small scale poultry and rabbit projects, the returns with which they used to play rounds/peer to peer lending or Mukando. One of the women responded testifying the role of remittances to their social and economic life: ‘‘My son we survive on remittances from our relatives in South Africa and overseas, this dam was not meant for us we are not using it at all’’.

Source of Income

Figure 9 shows dam related sources of income, and Figure 10 highlights types of crops under irrigation. The dam increased income sources to those who used the dam for a particular livelihood. These include fishing, irrigation and gardening. Quite a number of benefits were enjoyed by the residence of Nyatito, Dumba and Kawadza including income from fishing, gardening and irrigation farming. Most residence were involved in fishing as their main source of income.

Figure 9 Dam related Income sources (Source: Primary data)

Fifty six percent (46%) of those involved in fishing derived their income from selling both fresh and dried fish to local shopping centres, and local villages. Residents of Kawadza, Nyatito and Dumba who used the dam engaged in small scale irrigation at household level which substantially contributed to their welfare. Irrigation farming undertaken is mainly done on food crops (Figure 10) as compared to cash crops. This is due
to poor transportation facilities, dwindling dam water level, restriction by management, financial constraints to purchase irrigation implements and poor or an unpredictable market for their produces. Most households in these villages employed bucket irrigation system as they are not allowed to use water pumps to extract water for irrigation purposes. This explains why the residents of Ward 23 are not harnessing the dam for irrigation farming.

![Types of Crops under Irrigation](Source: Primary data)

As illustrated in Figure 10: 97% of the villagers used bucket system irrigation to grow food crops like vegetables, winter maize, beans, peas and pumpkins. This is due to lack of finances, management restriction, poor markets, whilst some are not interested in cash crops. This is the reason why 3% grow cash crops.

Table 8 shows the average income derived from the livelihood activities related to Osborne dam usage. Among all the socio-economic development activities spurred by Osborne dam fishing, gardening and irrigation were the major income generating activities. Recreation and livestock rearing are not income generating activities in the area.

<table>
<thead>
<tr>
<th>Table 8. Average Income from Dam related Socioeconomic Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishing</td>
</tr>
<tr>
<td>Gardening</td>
</tr>
<tr>
<td>Irrigation</td>
</tr>
<tr>
<td>Recreation</td>
</tr>
<tr>
<td>Livestock Rearing</td>
</tr>
</tbody>
</table>

(Source: Primary Data)

As argued by Musundire (1994) most dams in Zimbabwe have large endowments of fish, which has provided food and livelihoods for millions of resource-poor people in rural areas, and is becoming more important to food security as the climate changes. This is also the case with Osborne dam, with 56% of the fishermen both in cooperatives and individual at household level testifies the benefits they enjoyed from fishing which include income and fish proteins. The dam has dwindled from 400 million m$^3$ to 180 million m$^3$ and this greatly affected 70% of the fisherman and ultimately their income from fishing dwindled from USD$550 to USD$300/month. Decreasing water level had ripple effects on the fish prices charged to the general population by fisherman as they ranged between US$2 and US$3 per kg as compared to US$1 per kg which used to be.

Infrastructure Development as a result of the Dam

The dam failed to develop infrastructure in the local area besides the dam and dam walls. The dam did not bring with it physical infrastructure like irrigation pipes and canals, roads to and fro the dam, schools or a clinic. Before Osborne dam construction there was a road leading to Mt Jenya clinic and houses. But during the construction all the infrastructure which lied within the one kilometre buffer zone were destroyed. Therefore Osborne dam instead of bringing new infrastructure it destroyed already developed infrastructure. In this regard Osborne dam scared away the supposed beneficiaries instead of nesting them for maximum socio-economic development.

Comparisons of benefits accrued to Local and Non-local

Proportions of benefits or gains accrued to both local and non-local are shown in Figure 11. There are inequalities in benefits-costs sharing among the local and the nonlocals. Local people tend to be the costs bearers while the non-locals enjoy the benefits. Besides benefiting downstream irrigation schemes and communities and Mutare Urban residents, better off people from the surrounding wards are the chief owners of running fish cooperatives.
Villagers or locals cited financial status and political power of the elites as the reason why they had little access and little benefits from the dam. This connects with Goldsmith and Hildyard (1984) findings that those who stand to gain politically and financially from large dams are willing to go to inordinate lengths to ensure that dams are built. This gave the elites or dam proponents the platform to dictate and control the use of the dam at the expense of the locals the supposed immediate beneficiaries. This explains why non-local (85%) benefits much as compared to the local (15%).

Projects Stimulated by the Dam

Table 9 shows the projects stimulated by Osborne dam. The operation of Osborne dam stimulated small scale or cottage industry projects which contributed to the welfare of the residents. Despite failure of many of these projects fishing, gardening and irrigation were successful. But however due to decreasing dam water level, these projects (fishing projects, irrigation farming and small scale gardening) faced challenges which also hindered their contribution towards socio-economic development of the area.

Table 9. New Projects brought by the Dam

<table>
<thead>
<tr>
<th>Project</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishing Cooperatives</td>
<td>15</td>
<td>50%</td>
</tr>
<tr>
<td>Gardening</td>
<td>10</td>
<td>30%</td>
</tr>
<tr>
<td>Irrigation</td>
<td>5</td>
<td>20%</td>
</tr>
</tbody>
</table>

(Source: Primary Data)

Osborne dam stimulated several projects though some failed before materialising. Fishing is the major one with 8 fishing cooperatives comprising both local people and the surrounding communities. The project received boats donation and financial support as a start-up from Danish International Development Agency (DANIDA), but unfortunately the project was not successful due to poor management of donated funds and infrastructure, and decreased water levels in the dam due to uncontrolled downstream flow of water.

Gardening was also funded by DANIDA in form of inputs but failed totally due to poor markets facilities and mismanagement of funds. Despite these hindrances local communities carried out gardening projects using bucket irrigation system method though not recommended by ZINWA. This acted as a hindrance for the local people to maximally use the resource to uplift their living standards. People close to the dam particularly the Jowani Masowe sect laid irrigation pipes downstream of the dam but however operations were halted by ZINWA.

Membership in the Fishing Cooperatives

Figure 12 shows the membership in fishing operatives operating in Ward 23 using Osborne dam. Fishing being the main socio-economic activity which was engaged by many constituted 70% non-local members and 30% locals. This gave non-local power to control the operation of cooperatives.
Regardless of being the main dam related project in the area, fishing is not fully benefiting the local people. All fishing cooperatives were controlled and operated by non-locals due to their financial status. 30% of the local respondents were members of the fishing cooperatives; this is due to lack of financial resources to subscribe membership and besides that non-local side-lined the local on the basis of socio-economic status. Membership charges and operating fees explain why few local people afforded to be members. This means that these projects marginalized the poor on the basis of their status. This also explains why local communities are complaining of shortages of fish and even when they are available they are not affordable.

Negative Impacts of the Dam on Socio-economic Development

Besides the socio-economic benefits of Osborne dam, local people faced a cocktail of challenges which greatly affected their welfare and livelihoods. These negative effects have often exceeded the benefits brought by the dam. These include health hazards, flooding, disease outbreak, displacement, destruction of cultural sites and social and communication disruption.

Socio-economic disruptions caused by the dam

Socio-economic disruptions caused by the dam are highlighted in Figure 13. Osborne dam caused a lot of problems which posed a threat on the socio-economic status of the local community. People close to Osborne dam were displaced 100km away from the dam in Headlands. Under no circumstances are these people are able to use the dam for their wellbeing, because of distance barrier.

![Figure 13. Problems posed by Osborne dam (Source: Primary data)](https://www.dynamicresearchjournals.org/jef)

Osborne dam imposed several negative impacts on the residents of Ward 23. 56% of the people were severely affected by displacement with 700 families resettled as far as 100km away in Headlands Makoni District from the dam while some are still awaiting displacement (Musundire, 1994). These people are not in a position to benefit from the dam and they are worse off because their livelihood base was destroyed (Musundire, 1994). As highlighted by World Commission on Dams (WCD) (2000), dams displaced millions of people to great distances compromising their social and economic life at large. This also explains why Osborne dam is rarely used to boost the socio-economic status of the local people of Ward 23 in Makoni District. All the cultural sites including graves were flooded and buried under the water while forests and sacred water sources which sustained the communities during drought periods dried up as a result of the dam. 49% of the respondents expressed their displeasure and show their concern on the graves and ritual ceremony sites which were destroyed as more important than the dam itself.

Communication and transport disruption affected Kawadza, Dumba and Nyatito villagers to access Mt Jenya clinic which was just 2km before the dam but now 4km. Women respondents were the most affected since they had the child bearing responsibilities of frequenting the hospital for children’s medication. Residents as well as Mt Jenya Clinic cited difficulties in accessing health services as a great challenge and a threat to the health of the villagers due to Osborne dam particularly the elderly. These negative influences of the dam
supported the statement by Hirsch & Wilson (2011) who postulated that due to negative consequences of large dams and dam politics, dams are rarely used to uplift the living standards of the local communities.

Osborne dam also resulted in outbreak of diseases which affected both people and livestock. According to Goldsmith and Hildyard (1984), water diseases related to dam usage had social impact which increase social malaise and circumscribe livelihood opportunities. In this regard dams become self-defeat programs which instead of uplifting people’s livelihoods downgrade it. Malaria and bilharzia cases increased by 100% and 25% respectively since 2000 (Figure 14). Malaria and bilharzia were less prevalent and hazardous during the 90s as they are now because of the dam. The Parks and Wildlife management official in the area was of the opinion that some of the people must be moved to new areas so that a manageable number is left in the area so that the effects of the dam are minimised. This notion contrasts the general belief that dams bring benefits to the local community and by large negates the need to put people at the centre of development projects (Musundire, 1994).

Greener pastures at the confluence of Nyatande and Odzi are flooded by the dam. Some people especially fisherman are also drowning in the dam whilst fishing especially during the night. Six were recorded missing and believed to have drowned in open and abandoned wells and toilets pits which were once covered by the dam but are now exposed due to decreased water volumes. Five cattle, twelve goats from Nyatito village drowned in the Dam in one week during the onset of the 2014/2015 rain season, and this affected the financial assets and socio-economic development of the people in Ward 23. These and other negative influence of the dam affected how the community use the resource to sustain their welfare.

Perceptions of the Local on the occurrence of Diseases in Ward 23

Table 10 and Figure 15 show the perceptions of the local on the occurrences of diseases in Ward 23. People in Kawadza, Dumba and Nyatito had different perceptions on the causes or the occurrence of diseases especially after the construction of the dam. Osborne dam presented a health hazard to the local people in Ward 23, this is supported by Clarke (1991) who stated that when large new volumes of water are created, the risk of disease rises sharply. Since 2011 malaria and bilharzia occurrences fluctuated between 10 and 30 people per month. The respondents had different perceptions on disease occurrences in relationship to distance from the dam (Table 10).

Table 10. Malaria incidence in Ward 23

<table>
<thead>
<tr>
<th>Village</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nyatito</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td>Dumba</td>
<td>27</td>
<td>16</td>
</tr>
<tr>
<td>Kawadza</td>
<td>25</td>
<td>8</td>
</tr>
</tbody>
</table>

(Source: Mt Jenya clinic data 2014)

Malaria caused 67% of illness and death in 2011 in Ward 23 according to Mt Jenya clinic records. Villages with high incidence of malaria are those close to the dam such as Nyatito and Dumba. As illustrated in Table 10 the age group mainly affected is the economically active population between 18 and 64 who frequently use the dam. This is in line with the findings of Clarke (1991) who noted that the construction of the dam to create Lake Volta showed that the incidence of infection with schistosomiasis among children less than 16 years in the resettled areas rose from 3 to 37 per cent in just one year.
Figure 15. Villagers Perception on diseases as a result of the dam (Source: Primary data)

Information in Figure 15 is based on villagers’ perceptions about the diseases as a result of the dam. 67% of the people believed malaria is high because of increased mosquitoes in the area. About 23% believed that there is bilharzia. The remaining 10% blamed the dam for hosting/harbouring Anthrax virus and River fluke from the animals in the Park which is killing livestock in the communities. Most people have reduced their working hours in their gardens due to high threats by mosquitoes. Distance of the dam from villages had an impact on malaria incidence in the Ward. It was noted that the establishment of the dam in Ward 23 Makoni District resulted in increased mosquito-borne disease incidence in the surrounding population. Mt Jenya clinic Matron was interviewed and she said: “Osborne has brought a health hazard to the local people since its operation, we can say since then we are mainly dealing with water borne diseases like malaria and bilharzia”.

Using the data collected on the negative and the benefits precipitated by Osborne dam the hypothesis that Osborne dam has increased socio-economic challenges to the local people was tested. Chi-square computations were done to find out if the dam increased socio-economic challenges on the local people in Ward 23. Assessments were made using the calculations to weigh if the villagers had more socio-economic gains in contrast to problems or negative impacts of the dam.

Table 11: Pearson Chi–Square Cross Tabulation 2

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>PEARSON CHI–SQUARE WHERE (N=72)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from the dam</td>
<td>Value 40.638</td>
</tr>
<tr>
<td></td>
<td>Significance. (2-sided) (.001)</td>
</tr>
<tr>
<td>Dam related Socioeconomic development gains</td>
<td>46.278</td>
</tr>
<tr>
<td></td>
<td>Significance. (2-sided) (.001)</td>
</tr>
<tr>
<td>Negative impacts of dams</td>
<td>60.345</td>
</tr>
<tr>
<td></td>
<td>Significance. (2-sided) (.001)</td>
</tr>
</tbody>
</table>

(Source: Primary data)

From the statistical presentation there is evidence that Osborne dam has increased socio-economic challenges on the local people. This indicates that socio-economic gains from the dam do not outweigh the challenges imposed by the dam on the local people. This outcome contrasts the general belief that dams bring benefits to the local community and by large negates the need to put people at the centre of development projects (Musundire, 1994). This is supported by W.H.O (2003) which highlighted that the significant negative impacts of the dam far outweighs the benefits enjoyed by the local people. For example the displacement of people prior to the construction of Osborne Dam in Manicaland Province where 700 families were relocated to areas more than 100 km away in Headlands Makoni District are not in a position to benefit from the dam (Musundire, 1994), whilst those left are hardly using the dam to uplift their own standards of living.

Challenges in using the Dam

Challenges faced by the local people in using the dam are shown in Figure 16. Local people faced some challenges in using or harnessing the dam for their own survival. These include restriction by management, financial constraints, distance from the dam and some were not interested in using the dam.
As illustrated in Fig. 16, dam officials enforced stringent management measures which hindered 50% of local communities to utilise the dam for their own welfare. Members of the Johane Masowe eChishanu sects in Nyatito village were halted and denied to carry out irrigation farming by ZINWA officials during the pipe laying stage in 2008. 28% faced financial constraints to subscribe for membership in fishing cooperatives and to pay for a licence to carry out irrigation farming using water pumps. 10% of the male of the respondents admitted that they were committed to other businesses to engage in irrigation farming. Due to displacement 12% of the people did not utilise the dam for their own welfare. According to the WCD, (2000) the Tonga people were settled as far as 50km and 120km from the dam where they could not easily access the dam for fishing or irrigation. It is not feasible, from these distances, for the displaced people to take advantage of the dam (WCD, 2000). In this regard members of Kawadza, Dumba and Nyatito villages who were relocated further from their villages cited distance as a barrier to their desire to use the dam.

V. CONCLUSION

Findings from the study revealed that Osborne dam is rarely used by the local people for their socio-economic development. The overstated benefits and socio-economic rewards of dams failed to trickle down to the local communities but rather to non-local communities as well as downstream populations. Local people have carried the negative impacts of the dam regardless of the government intentions to uplift and upgrade the standards of living of the local people. In this case Osborne dam brought more costs than gains on the local people. The study also indicated that intensity and nature of socio-economic development from the dam has no direct relationship or linkage with distance from the dam. Concentration of dam related socio-economic activities like irrigation, fishing, gardening, livestock rearing and domestic use are not spatially justifiable to distance due to challenges faced by villagers. All the socio-economic activities practised close to the dam were on small scale and small quantities. This did not tally with the belief that the closer to the dam the village is the greater are the chances that it will maximally use the dam for greater socio-economic activities. This notion does not confirm the general belief that dams bring benefits to the local community and by large negates the need to put people at the centre of development projects.

VI. RECOMMENDATIONS

The study recommends that:

i. The government should calculate the benefits and costs of dams in order to resolve the costs caused by dams in order to relieve the locals from bearing these costs. Under this condition the government should therefore channel a portion of resources created by dams to displaced communities, ensuring local people gain directly from the dam related projects.

ii. Local people should contribute in dam projects execution and operation through consultations to ensure that all projects implemented in their rural areas must be in the context of existing livelihoods strategies and their socio-economic status to ensure that their livelihood base is not destroyed but rather enhanced.

iii. Local people need to push and contest for their recognition in all decisions about dam construction, management, compensation, relocations, use and sharing of the economic benefits derived from the dam. Local people must also advocate for their empowerment to ensure that they use the dam for their socio-economic prosperity. This should be done through establishment of local regulations in agreement with local stakeholders to enable fair and sustainable use of the dam.

iv. NGOs need to participate in spreading the socio-economic benefits of the dam through funding dam related projects to the local communities of Ward 23 Makoni District. This can be done in line with current economic policies such as Zimbabwe Agenda for Sustainable Socio-Economic Transformation.
REFERENCES


World Commission on Dams Secretariat (2000), Kariba Dam case study; Final scoping paper. Cape Town, South Africa.


APPENDICES

Appendix 1: Research Questionnaire for Kawadza, Nyatito and Dumba Villagers.

Instructions
Please DO NOT WRITE your name on the questionnaire.
Tick where applicable in the space provided.

| 1 Village |  |
| 2 Sex | Male | Female |
| 3 Age: Below 18 years | 18-64 | 65 and above |
| 4 How far is the dam from your home? | 0-1km | 2km | 3km |
| 5 Do you use the dam to sustain a particular livelihood? | Yes | No |
| (i) If yes indicate how you use the dam | Fishing | Irrigation farming | Domestic purposes |
| Livestock rearing | Gardening | Recreation |
| (ii) If No what are your alternative livelihood strategies? |  |

6 What are your major livelihoods activities that you carry out using the dam?
Irrigation Farming | Fishing | Gardening |
Livestock rearing | Recreation | Domestic use |

7 Which livelihood activity is your major source of income?
Gardening | Fishing | Agriculture |
Recreation | Irrigation Farming | Livestock rearing |

8 What is your average income from the dam related livelihoods activities?

<table>
<thead>
<tr>
<th>Activities</th>
<th>Per Week</th>
<th>Per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation farming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vending</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market gardening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock rearing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourism</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9 Has there been disruption of livelihoods by the dam? Yes | No |
| (i) If yes indicate how the dam disrupts your livelihoods? | |
| Loss of pastures | Loss of agriculture land | Destruction of cultural sites |
| Displacement | Diseases outbreak | Communication disruption |
| Flooding | | |
| (ii) If any other specify | |

10 (i) What are the socio-economic development gains brought about by the dam?
Increased crop yields from irrigation farming | Employment opportunities |
Availability of affordable fish on the market | Improved physical infrastructure |
Increased dam related income generating activities | Water for domestic purposes |
| (ii) If any other indicate | | |
11 Is there any physical infrastructure developed as a result of the dam?
- Schools
- Roads
- Clinics
- Dip tank
- Irrigation Canals

12 What are the challenges that you faced in using the dam?
- Financial constraints
- Not interested
- Distance from the Dam
- Restriction by Management

13 (i) Do you use the dam for irrigation purposes? Yes No
(ii) If yes which main crop do you grow using irrigation method?
- Cash crop
- Food crop
(iii) Indicate how do you benefit from irrigation farming?
- Income from selling surplus yields
- Employment from irrigation schemes
- Food security at household level
- Cheap agriculture produces on the market
(iv) If No what are the hindrances or reasons?
- Lack of finances
- Not interested in irrigation
- Decreased Dam water level
- Restriction by Management

14 (i) Are you involved in fishing activities? Yes No
(ii) If yes indicate how do you benefit from fishing activities?
- Income from selling fish
- Fish proteins
(iii) If No what are the reasons?
- Committed
- Cannot afford
- Not interested
- Restriction by Management
- Decreased Dam water level
(iii) Any other specify ...............................................................

15 What is your perception about the dam in relation to disease occurrence in the ward?
Before the dam.

<table>
<thead>
<tr>
<th>Disease</th>
<th>High</th>
<th>Low</th>
<th>Moderate</th>
<th>No change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilharzia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After dam construction.

<table>
<thead>
<tr>
<th>Disease</th>
<th>High</th>
<th>Low</th>
<th>Moderate</th>
<th>No change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilharzia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16 What other projects did the dam stimulated?

17 Does the dam help you to improve your academic progress? Yes No

18 (i) Whom do you think benefits more from the dam?
- Local
- Non-locals
(ii) If Non-locals what do you think is the reason?

19 Give any suggestions on how people can benefit more from the dam?

Appendix 2: Focus Group Discussion for Kawadza, Dumba and Nyatito villagers.
1. Does the local community use Osborne dam for any particular livelihood activity?
2. Outline the major livelihood activities derived from Osborne dam?
3. What are the socio-economic developments brought about by Osborne dam at household level?
4. What is the average household income generated from Osborne dam socio-economic activities?
5. How could the benefits derived from Osborne dam be enhanced?
6. How could the challenges from exploiting Osborne dam be eliminated?
7. What is your general comment on the benefits derived from Osborne dam?

Appendix 3: Interview Guide for Osborne Dam Officials
1. What are the socio-economic development activities engaged by the locals linked to dam usage?
2. What are the developments brought about by the dam to the community?
3. What are the contributions of the dam to the welfare and living standards of the locals?

Appendix 4: Interview Guide for ZINWA and Zimbabwe Parks and Wildlife Authority Staff.
1. Does the community use Osborne dam for their sustenance?
2. Is there any irrigation scheme or fishing cooperatives submerged by Osborne dam?
3. How do you manage and control their use of the Dam?

Appendix 5: Interview Guide for Mt Jenya Clinic Matron
1. Is there any diseases incidence as a result of Osborne Dam in local communities?
2. What are the implications of these diseases on the welfare of the local communities?

Appendix 6: Observation Guide

<table>
<thead>
<tr>
<th>Transect Walks</th>
<th>OBSERVATION GUIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAWADZA VILLAGE/DUMBA VILLAGE/NYATITO VILLAGE</td>
<td></td>
</tr>
<tr>
<td>Transect 1</td>
<td>Transect 2</td>
</tr>
<tr>
<td>HOUSEHOLDS</td>
<td>HOUSEHOLDS</td>
</tr>
<tr>
<td>Dam site</td>
<td>Dam Site</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
- Livestock Rearing
- Sheep projects
- Cattle projects
- Goats projects
- Agriculture Implements
- Ploughs
- Irrigation equipment
- Infrastructure Development
- Irrigation pipes and canals
- Roads to and from the Dam
- Nature & Intensity of Socio-Economic Development
- Fishing
- Irrigation Farming
- Gardening
- Recreation
- Livestock Rearing
- Type of Socio-eco Development Activities
- Irrigation farming
- Fishing
- Recreation
- Livestock rearing
- Gardening