
**STREAMBANK CULTIVATION ALONG CHIREDDI RIVER IN ZAKA DISTRICT,
ZIMBABWE: AN ACTIVITY WIDELY PRACTICED BUT INSTITUTIONALLY
CONDEMNED**

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ABSTRACT

The use of agricultural marginal lands like riparian areas for arable cropping is now rampant and fast spreading across global communities. Ironically, stream bank cultivation is institutionally illegal but it is practically condoned among local people thereby raising controversy over its sustainability. The study assessed the environmental costs and benefits of riverbank cultivation along a middle section of Chiredzi river in Zimbabwe. Riparian buffer zones were created along the middle section of Chiredzi river satellite image and transect walks were done for ground truthing during the period 10 – 24 August 2016. This data was corroborated with responses from 84 questionnaire respondents, participatory rural appraisal and 8 key informants interviews. Both qualitative and quantitative data analyses yielded informative results. Cultivation of riparian areas was attributed to local land pressures, fertile alluvial soils with higher and longer moisture regimes, higher agricultural productivity, recurrent drought mitigation and closeness to a constant water source among other pressures and benefits. However, river and dam siltation and their subsequent drying up, were among noted environmental challenges. The paper recommends that traditional and government institutions should collaborate to avail and buttress adaptive and sustainable conservation agriculture to rural farmers to minimize riparian environmental degradation and guarantee secure livelihoods for the rural poor.

Keywords: Agricultural productivity, Chiredzi river, conservation agriculture, riverine gardens, river siltation, safe cropping, stream bank cultivation

Introduction

Rivers and their valleys offer a natural resource of enormous value and people in different areas have come to depend upon them very heavily. The land along the Nile River and the Tigris-Euphrates area are major zones of rich floodplain soil (Shahin 2002). The fertile soils along the river banks are created by seasonal flooding that leaves mineral-rich silt, particles of soil (mud), alluvial soil deposits upon receding back in the river. The Nile River has been known as the ‘creator of all good’ because of the black fertile alluvial soil deposits, affectionately termed

'black gold', which farmers easily subject to double or treble cropping each year (Hart 1985; Hugget, Lindley, Gavin & Richardson 2004, <http://library.thinkquest.org>). The early, great Egyptian civilization developed and prospered in North Africa solely based on sophisticated irrigation methods of the alluvial soil deposits along the Nile River valley (Postel 1999). In Malawi, river banks (like along Lilongwe and Linthipe rivers) have long been cultivated due to fertility from sediments deposited by regular flooding as well as residual moisture ([Zidana, Kaunda, Phiri, Khalil- Edriss, Matiya and Jamu](#) 2007). The flood brings fertile silt and inundates the banks with water, making river bank cultivation possible. Stream bank cultivation is now rampant around southern African cities and towns as people seek to counter the effects of poverty (Mandava 2000). The cultivation of marginal areas is practiced in most densely populated communal areas of Zimbabwe such as Buhera, Bikita, Mutema, Zaka and many others. A number of pressures are identified as contributors to this poor land management and seemingly unsustainable practice. The World Bank (2006) identifies population pressure, disparities in access to the more productive lands and civil strife as pushing farmers into cultivating ever-steeper slopes for small-scale food crop production. However, other factors should also be at play too.

The practice of cultivating riverside land is viewed differently by varied groups of people. Local communities, who own gardens, crop plots and fields along river banks claim to be operating in harmony with nature and see nothing at variance with continued cultivation (one may ask: Is it foolish optimism?). The Egyptian cultivation of the Nile River floodplain is the world's record, as there has been no other place on Earth in continuous cultivation for so long (some 5,000 years) (Postel 1999). The success of the Nile River valley cultivation, while attesting to the human adaptation to scarcity of fertile and moisture ridden arable land, this story also confirms the value of integrating land and water resources management. A developmental agency, Practical Action Nepal's Sustainable Agriculture with Bazaar for Advancing Livelihoods of Conflict Affected Poor People (SABAL) Project, even worked hard to convince the landless to start vegetable farming on the river banks of Charela River because the locals did not believe that a river bank could be fertile enough for vegetables farming. It was after they started growing water melons, squash, cucumber and bottle gourd that they realized the high produce and they grew confident that they can survive by farming the river banks too. They were earning significant amount of money by selling the vegetables (<http://practicalaction.org>). The Daily Star (2012) reports that cultivation of boro paddy (*Oryza sativa*), maize (*Zea mays*), nut and summer vegetables along river banks was gaining popularity among the farmers of three upazilas in Shariatpur district in the Dhaka division of Central Bangladesh. United Nations Education and Scientific Organisation (UNESCO) World Heritage Centre (2007) records that the diverse peoples along the lower Omo river of southern [Ethiopia](#), which include the Turkana,

Dassanach, Hamer, Nyangatom, Karo, Kwegu, Mursi, Bodi, and Me'en, derive a great portion of their food supply from flood retreat cultivation. In some communities, like urban suburbs for low income residents, stream bank cultivation is either as a result of innocent desperation for a piece of land to cultivate or the role of ignorance of the practice's detriment to environmental integrity (Matiza and Crafter 1994, The Chronicle 2011).

On the contrary, environmentalists, environmental scientists, conservationists, different government boards and agencies, and other such groups, are working tirelessly to ensure that the practice is abandoned forthwith (once more, it may be asked: Is it wise pessimism?). The practice is considered an 'absolute unforgivable illegal act' and there are environmental legislations to prohibit it. This is precipitated by observations and fears that the cultivation of agriculturally marginal lands is environmentally catastrophic. There has been substantive research output to confirm that most of the environmental woes of natural water courses and ecosystems are induced by this wicked agricultural practice (NIWA 2013, UN (OCHA) Zimbabwe 2008, Chimwanza, Mumba, Moyo and Kadewa 2006, Vigiak, Ribolzi, Pierret, Valentin, Sengtaheuanghoung and Noble 2006). In Zimbabwe, there are rivers that have been victims of stream bank cultivation and are threatened with extinction. These rivers are heavily silted and include but not limited to Save, Mazowe, Runde, Mwenezi and Bubi (Matiza and Crafter 1994, The Chronicle 2011, Gandiwa and Zisadza-Gadniwa 2015).

These mixed feelings are a pointer that the practice is both regarded a blessing and a blight. In Bangladesh, a farmer in Palarchar village reported to be getting good yield of Boro paddy from the Padma riverside land, while others confirmed the same yields in maize, nut and vegetables (<http://www.unbconnect.com>). However, a study by Zidana et al. (2007) on cultivation along Lilongwe and Linthipe rivers concluded that though riverbank cultivation improves household food security and income, it nonetheless results in pronounced environmental degradation.

It was crucial for this study to explore if riverbank cultivation could be practiced safely, resulting in the sustainable utilization of these supposedly agricultural marginal lands. The Bulawayo City Council (BCC), the second largest city from Harare, in Zimbabwe, in 2011 recommended that urban cultivators could practice safe cropping by cultivating crops like carrots and beans to minimize damage to these fragile environments (Jaspers-Focks and Algera 2006, The Chronicle 2011). This position appears to be supported by Zimbabwe's environmental 'watchdog', the Environmental Management Agency (EMA). The EMA of Zimbabwe warns that streams are fragile and should not be used for farming unless a conservation plan is in place (Government of Zimbabwe (GoZ) 2007,

The Herald 2011). Educating local residents by embarking on awareness campaigns on conservation cultivation is the most sensible and pragmatic approach (Helfrich, Weigmann and Neves 1998). Prohibiting the practice using legislation (often imposed on communities) is often fiercely resisted and fought against by farmers. When local communities and key stakeholders are involved in participatory rural appraisals for any programmer, there are great chances for adoption of the recommended strategies.

The practice of cultivating riparian areas is as old as arable agriculture itself and has been viewed with mixed feelings ever since (Queensland Government 2006). This is because stream bank cultivation has both costs and benefits to the biophysical environment (riverine ecosystem) and human communities. Some extensive research and publications have been done to expose the detriments of this practice, and some legislations enacted to discourage, if not to outrightly prohibit the practice, yet it seems to continue unabated at all (GoZ 2002 and 2007). Ironically, the powers that ought to ensure the demise of the practice seem to be incapacitated to deal with, or are turning a blind eye on offenders. It is therefore intriguing to note that apart from being regarded a destructive engagement, riverbank cultivation is a practice we may not do without. This paper sought to strike a balance on the costs and benefits of stream bank cultivation, and by displaying a positive outlook, the study proposes some cultivation and management strategies that farmers may adopt to sustainably utilize riparian lands. The study sought to assess the pros and cons of stream bank cultivation by focusing on Chiredzi River in Zaka district, Zimbabwe. The following specific objectives were satisfied in order to meet the demands of this aim:

- Examine factors influencing cultivation along the banks of Chiredzi River
- Assess the environmental costs and benefits of stream bank cultivation
- Recommend cultivation strategies that might be adopted by farmers to sustainably utilize riparian areas.

Lastly, it was the goal of this study to demonstrate that both traditional and modern institutions could collaborate and solemnize their environmental protection activities and efforts to maintain a balance between resource exploitation and conservation thereby ensuring environmental integrity.

THE STUDY AREA

Zaka district is one of the seven districts of Masvingo province. It lies 87 km southeast from Masvingo city. It has a population of 181 301, total area of 3 125.95 km², giving a population density of 58 inhabitants/km² and the smallest amounts of arable land per capita in the province (Zimbabwe National Statistics Agency (ZimStat 2012). It is the most densely populated rural district in the province and probably in the whole country

(<http://www.districtsofmasvingoprovince>). Subsistence farming is the main economic activity for this mountainous communal land. The majority of the residents are mainly poor dryland farmers, with limited alternative livelihoods. The crops grown are mainly drought resistant strains of maize (*Zea Mays*), groundnuts (*Arachis hypogaea*), cotton (*Gossypium*), sorghum (*Sorghum bicolour*), finger millet (*Eleusine coracana*), sunflower (*Helianthus*), pumpkins (*Cucurbita*) and other small grains. Rainfall is quite erratic, averaging 600 – 800 mm/annum, and as of the early 21st century, the average annual amounts have declined. Highest percentage of the area is drought prone and the dry season extends up to nine (9) months (March stretching to November). In winter evapotranspiration exceeds precipitation consequently salinization takes place leading to sodic soils. Soils in the area tend to be highly erodible, particularly in areas which border the granitic domes, where surface runoff is higher. These soils are generally poor, after having been subjected to continuous seasonal cultivation since 1923, when the communal lands here were established (<http://www.districtsofmasvingoprovince>). Vegetation is generally thorny bushes and scrub savannah type of vegetation (scattered trees and tall grasses). Big rivers which flow through this part of the Runde catchment basin include Chivaka, Mushavhukwi, Chiredzi, Turwi, Nyatare, Fube and several other small subsequent streams are found in this drainage basin. There are many small dams that include Nyatare, Mabvute, Bangala, Siya, with Manjirenji (on Chiredzi River) as the most prominent one (Figure 1).

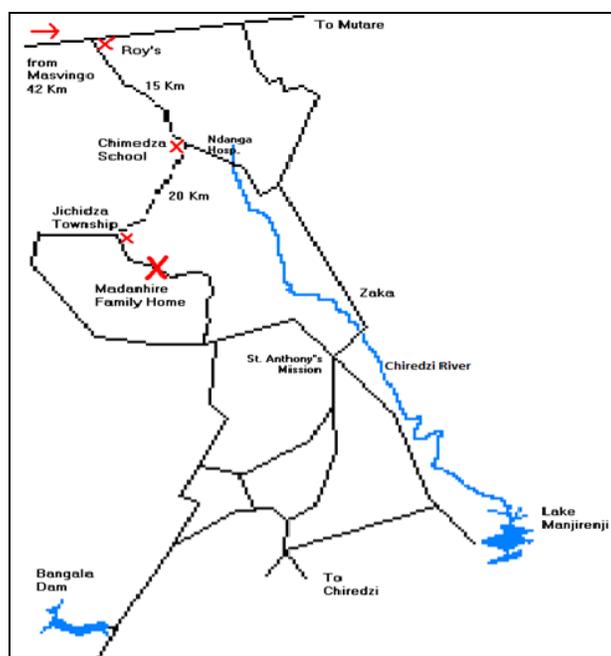


Figure 1: Study area map

METHODS AND MATERIALS

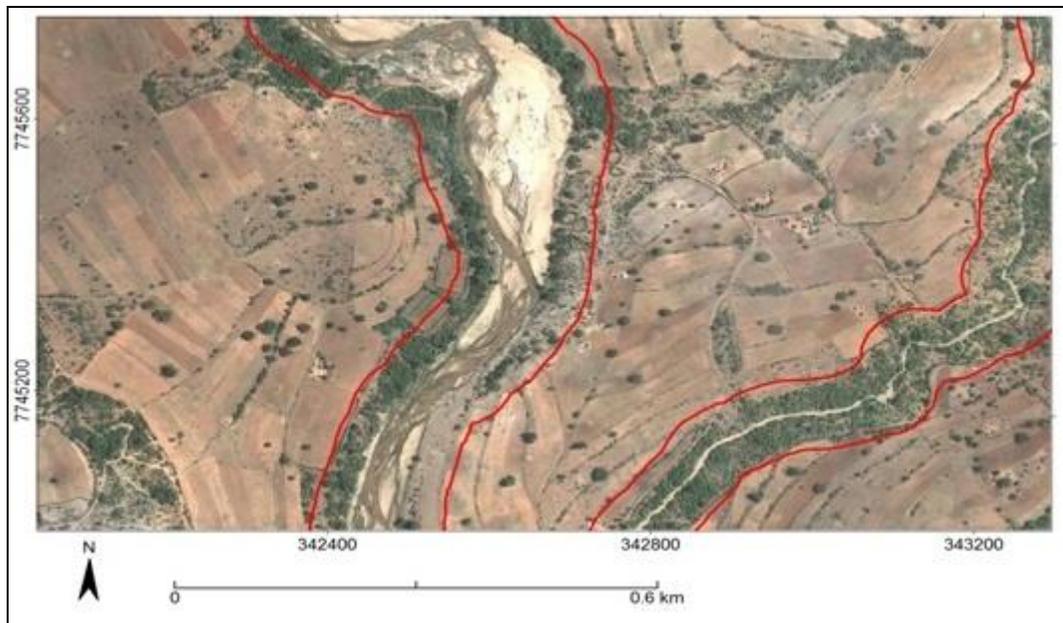
The study was informed from quite a number of primary as well as secondary sources of data. A satellite imagery of the middle section of Chiredzi river and its riparian zone was downloaded from Google Earth (2010). A closer analysis of the imagery clearly revealed that some unplanned home gardens, crop fields and plots were within 30 meters riparian buffer zones. Creation of riparian buffer zones with widths measuring 30 meters either side of river banks of the active channel served to ascertain the prevalence and intensity of the practice. The riparian buffer zones of 30 meters width were considered standard for streams and rivers in Zimbabwe following the specifications of the Water Act (CAP 20:24 of 1998) and the Environmental Management Act (EMA, CAP 20:27 of 2002) Section 20 of the Environmental Management (EIA and Ecosystems Protection) Regulations, Statutory Instrument 7 of 2007. Both Acts prohibit and/or restrict the cultivation of land within thirty (30) meters of the naturally defined banks or highest flood level of a stream or wetland without a license issued by the agency (GoZ 2007). It was therefore evident from the imagery that indeed stream bank cultivation is prevalent along the river (Figure 2).

Direct field surveys were carried out concurrently with questionnaire and interviews administration during the period 10 July to 24 August 2016. The questionnaire and livelihoods surveys offered an opportunity for the research team to directly observe farming activities done, crop strains cultivated, state of the riverine ecosystem, alternative livelihood activities outside riparian ecosystem, and other data. The field surveys were also used for ground truthing. With the aid of hand-held global positioning systems (GPS), the research team verified data obtained from the satellite imagery. Questionnaire survey for 84 farmers on either side of the river valley was administered from 10 July to 24 August 2016. The respondents included both farmers cultivating riversides and those not directly involved in the practice. Key informant interviews were authorized by the District Administrator and were administered during the same period as questionnaire surveys. The interviewees included Zaka Rural District Environmental official, Environmental Management Agency (EMA) district environmental officer, Zimbabwe National Water Authority (ZINWA) district officer, Agriculture Extension Services (Agritex) district officer, local councilor, chief, headman and an official with a local environmental nongovernmental organization.

RESULTS

The buffered middle section of Chiredzi river and its tributary shows that farmers cultivate within the legally prohibited thirty (30) meters zone from stream banks (Figure 2). There are

vegetable gardens, arable plots and crop fields sited within the riparian zone. The local chief, headman, councilor and villagers reported that they have had problems and confrontations with government officials from EMA, ZINWA, Agritex and Zimbabwe Republic Police (ZRP) who descend upon them for contravening Part IV of the Statutory Instrument 7 of 2007 that prohibits stream bank cultivation. The transect walks confirmed that indeed most traditional gardens, farm plots and crop fields extend well beyond the mandatory 30 meters buffer zone. The natural riparian vegetation has been cleared and replaced by selected and preferred cultural plants, and at times (especially during the dry season) leaving the soil absolutely bare.



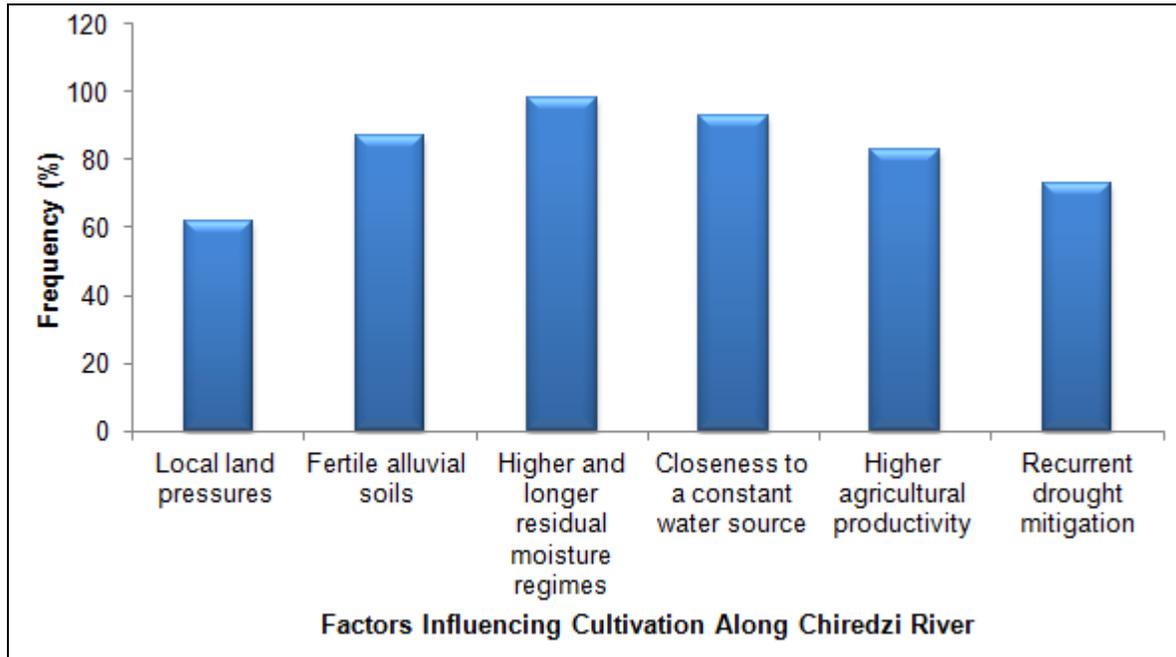
(Source: Google Earth Imagery, 2010)

Figure 2: Buffered middle section of Chiredzi river and its tributary

Factors influencing cultivation along Chiredzi river banks

There are a number of factors that motivates local residents in Zaka district to take traditional gardens, farm plots and crop fields to the rivers. There are both push and pull factors at play, with the latter being more prevalent (Figure 3). About 60% of the respondents claimed that landlessness compels cultivators to seek livelihood from riverine fields. The local political and traditional leadership indicated that local land pressure, which has its roots in the land imbalances of the colonial era (1880 – 1980), drive desperate cultivators to marginal lands.

However, local residents have, through experience, learnt of the many advantages of taking their crops to the water. Figure 3 shows that most farmers in Zaka district practice stream bank cultivation in order to draw benefits from the natural advantages presented by the river system.



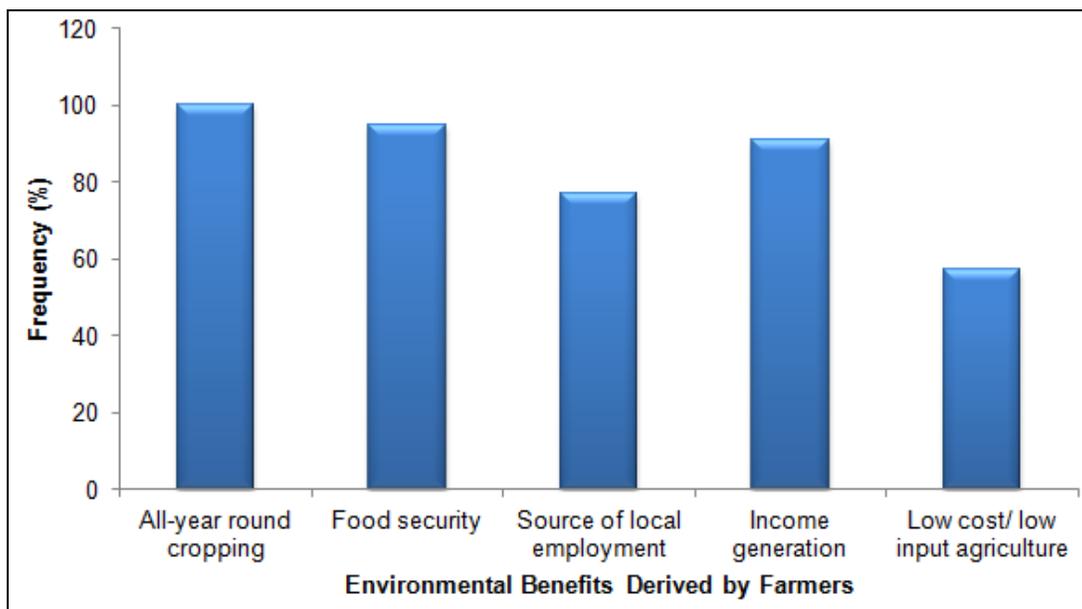
(Source: Research Data 2016) N = 84

Figure 3: Factors Influencing Stream Bank Cultivation

It is quite apparent that the river system presents many advantages that cultivators are tempted to exploit. More so, by acquiring these riparian crop fields, the poor landless residents have at least a piece of land to farm and earn a living.

Environmental benefits derived by farmers from river banks

Farmers derive some economic, social and ecological benefits by utilizing riparian lands as arable land (Figure 4).



(Source: Research Data 2016) N = 84

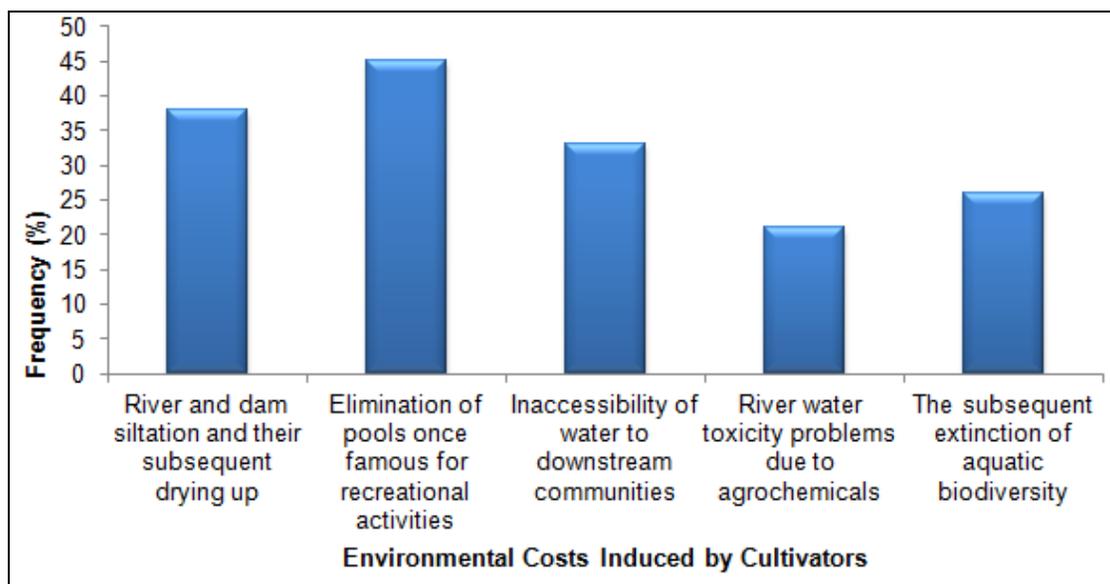
Figure 4: Environmental benefits derived by farmers

Among these are all year round cropping, local food security, income generation and utilizing naturally fertilized soils. The district Agritex official was eloquent in reiterating these benefits that accrue to local cultivators, adding that local species enrichment and diversity is also experienced leading to balanced diets for local residents. Both the traditional and political leadership concurred that cultivating riverine fields yielded the said benefits to both farmers and fellow villagers. The councilor noted that families with riverine fields were practically and adequately self-reliant, hence were mostly excluded from donor food handouts or other government drought relief programs.

Environmental costs induced by cultivators

The continued cultivation of Chiredzi river banks has induced some environmental costs that are borne by both the local and downstream communities (Figure 5). Chief among these are siltation of the river itself and Manjirenji dam, the main water reservoir on its course. This has resulted in the elimination of pools and river bed surface water flow, compounding the water abstraction problems especially for downstream communities. ZINWA and EMA officials were really dejected that the varied industrial chemicals (agricultural fertilizers and biocides) used by farmers close to the river channel are easily washed into nearby waters contributing to nutrient pollution and toxicity, thereby increasing the overall impact of sedimentation. These officials

blamed the stream bank cultivators for river water pollution and the subsequent extinction of aquatic biodiversity. EMA has officials at district level who often team up with ZRP officers and Agritex officials to arrest and fine farmers who continue to cultivate stream banks without permission. There are also some Ward Environment Committees set up to continuously monitor and apprehend environmental perpetrators.



(Source: Research Data 2016) N = 84

Figure 5: Environmental costs induced by streambank cultivators

The local leadership hinted strongly that there are often hot conflicts that arise from allocation of vegetable gardens along riverbanks among villagers.

Strategies adopted by cultivators to enhance safe cultivation practices

The local cultivators have adopted quite a number of safe cultivation practices to prolong the cultivation of Chiredzi river banks (Table 1). Some of the strategies are traditional while others are learnt from other communities and workshops convened by government and/or non-governmental environmental protection agencies.

Table 1: Safe cultivation practices adopted by local farmers

Strategy	Popularity	Protection Mechanism	Realised Benefits
Cooperative gardening (Community Gardens)	Low. 29/84 respondents belonged to a cooperative garden	Properly sited by technical staff hence a safe distance from riverbanks	Conservation of riparian soil and vegetation.
Mixed cropping	High. 75/84 respondents grow different vegetables and/or crops on same land	Vegetation offer different protection to soil hence crop diversity offers high protection	Species diversity and soil protection from run-off, sun, wind and nutrients exhaustion.
Cultivating perennial crops	Very low. 14/84 have well fenced gardens to support annual crops	All-year round soil cover ensures reduced soil erosion	Mitigation of soil erosion and river siltation.
Use of live fences	Low. 21/84 have live fences around their gardens or fields	Live vegetation roots anchor the top soil	Mitigation or prevention of soil erosion and river siltation
The systematic practice of agro-forestry using hydrophytic plants to create buffer strips along the riverbanks	Very low. 18/84 grow sugar canes, bananas, pawpaw, oranges, natjies, lemons, avocados, water berries, etc	They provide shade, help stabilise riverbanks, introduce plant litter and insects to the stream	Reduce riverbank erosion and siltation.

(Source: Research Data 2016)

The study also noted that other safe cultivation strategies could still be practically adopted by local farmers to enhance environmental integrity (Table 2). The local non-governmental organisation and government officials were working on some pilot study to prepare for some

wider adoption of some of these strategies. Challenges are however encountered as cooperation, participation, adoption by locals is not always guaranteed. At times resources are reportedly scarce hence certain safe cultivation practices have to be forgone. Again it was regrettably noted that the river channel was quite at some lower gradient than the riparian land, rendering water diversion channels from the main river impracticable.

Table 2: Some recommended safe cropping strategies along river banks

Strategy	Promoter(s)	Protection Mechanisms	Intended Benefits
Use of traditional biocides	Traditional leaders, local herbalists	These are biodegradable and target specific	Safe water for aquatic biodiversity.
Cultivating root crops/planting deep rooted crops	Agritex department, NGOs	Anchor the top soil and hold it intact	Reduced soil erosion and river siltation.
Intercropping	Agritex department, NGOs	Top soil cover, nutrient enrichment and prolonged soil cover	Nutrient-rich top soil and reduced soil erosion.
Zero tillage	Agritex department, NGOs	Minimum top soil disturbance/loosening	Reduced soil erosion and river siltation
Leaving a riparian buffer of vegetation	EMA, ZINWA, NGOs, Agritex department, Forestry Commission	Vegetation fibrous root systems bind stream bank soils, and also intercept nitrates; tree canopy and leaves provide shade	Healthy river ecosystem - a river free of sediments and nitrates; also preserve water quality.
Use of stones and/or logs to support garden-riverbed paths	EMA, ZINWA, NGOs	Prevent top soil loosening and formation of gullies	Prevention of soil erosion and river siltation.

Terracing	Agritex department, EMA, NGOs	Levels-off the ground to reduce runoff speed and encourages infiltration	Mitigation of soil erosion and river siltation.
Adequate technical support	EMA, Agritex department, NGOs, ZINWA	Avails knowledge, equipment and skills for safe cropping	Skilled farmers who are environmentally conscious.

(Source: Research Data 2016)

DISCUSSION

Traditionally, the indigenes have learnt and mustered the science to live in harmony with nature. However, due to a combination of population growth and human greedy, many poor and marginalized population groups have resorted to some desperate and often environmentally unsustainable sources of livelihoods (<http://www.practicalaction.org>). It is upsetting and worrisome however that the unprecedented degradation and death of many riverine ecosystems is primarily attributed to the practice of stream bank cultivation. This study however acknowledges some of the problems bedeviling rivers have roots well beyond the boundaries of their courses. Stream or river banks are naturally conducive for exploitation and their cultivation has brought significant relief to local poor communities (Bell and Hotchkiss 1991, Dzvurumi 2008). As has been demonstrated by this study, local cultivators are motivated to cultivate riparian lands either due to the natural advantages that these banks present or it is due to their landlessness and poverty which drive them quite desperate. The factors leading to stream bank cultivation are varied and self-reinforcing. It is therefore important for both the local traditional and political leadership as well as the central government departments and agencies to clearly understand and appreciate these fundamental drivers. The cultivators are so happy that they are able to derive livelihoods from their riverine gardens, plots and fields. They enjoy a significant amount of environmental benefits and appear to be motivated to maintain the status quo. For them, as long as the local environment still provides, albeit in some decreasing rate, they are prepared to continue.

The central and local governments have pieces of environmental legislation and bylaws respectively to sustainably manage riverine ecosystems. Also, The Herald (2011) warns that wetlands and streams are fragile and should not be used for farming unless a conservation plan is in place. This is supported by the website <http://www.books.google.co.zw> which records that environmental legislation in Zimbabwe, dating back to the colonial era (late 1920s) prohibit the

cultivation of 'non-arable' land i.e. riverine fields, without permission. These pieces of environmental legislation include the Water Act (1998), EMA (2002) and Municipal Environmental By-laws. Again, the local traditional leadership has some values, beliefs and rules meant to protect fragile environments like stream banks. It therefore concerns this study to notice that despite these concerted efforts, environmental degradation ensues, being driven by the same factors that these institutions seek to curtail. We can only blame inadequate resources, staff incompetence or corruption, lack of political will, and other institutional ills or evils for these failures. These sentiments are echoed by the website <http://www.irinnews.org> which notes that EMA usually teams up with the police and carryout joint operations but their efforts often result to naught as the poor officers accept bribes from environmental offenders and turn a blind eye to their destructive engagements.

RECOMMENDATIONS

In light of the above, this study strongly recommends that all institutions mandated with environmental protection responsibilities be fully capacitated and strengthened to enable them to uncompromisingly discharge their legal duties. Politicians have usurped the powers of local and traditional leadership much to the detriment of local environmental protection. The Newsday (2013) reports that the Bulawayo City Council would tell residents not to practice stream-bank cultivation, but the problem lies with politicians who want to garner votes during election periods by telling people to practice stream-bank cultivation. As such, the politicians of the day are urged to assume power with total responsibility, otherwise the traditional institutions should be revamped and empowered for uncompromising stewardship of the environment. Local cultivators use their indigenous knowledge to exploit riverine edaphic resources, and they have traditionally and practically demonstrated sustainability of their activities. However, it is when central and local government as well as NGOs officials descend upon local communities that all hell breaks loose. There is need therefore, for carefully drafted plans for integrated traditional and scientific conservation programs rather than having one (often the latter) dominate and/or replace the other. Conservation agriculture is fundamental for integrated natural resources management along river courses, as such, should be advanced.

CONCLUSION

Stream bank cultivation is an old practice that is however facing a lot of resistance from modern environmental conservationists, environmentalists, environmental scientists and governing authorities. This is despite the numerous environmental benefits the practice yields to farmers and the local poor communities. There is strong contention that the derived benefits are more social and economic than ecological, hence unsustainable. The reasoning is thus, the

environment should remain productive, assimilative and regenerative. The practicing farmers claim that their activities are friendly to the environment and they strive to sustain it as the practice has proven to be their most reliable source of livelihood. Nevertheless, Chiredzi river is now heavily silted, more prone to flooding, experiences ephemeral surface water flow, there is dearth of water pools and aquatic biodiversity, whose environmental woes are blamed on riverine farmers and their activities. This is slowly but surely drying up livelihoods of communities heavily dependent on river ecosystem resources. The study, unequivocally recommends that the local traditional and government institutions collaborate to both avail and buttress safe cultivation strategies among local farmers as well as invoke their legal statutes to regulate activities of environmental perpetrators. Otherwise the study advocates for the safe cultivation of riverine fields as a sustainable livelihood strategy for the poor and marginalized communities.

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