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Flooding and Its Impact on Education

Edson Munsaka and Sebia Mutasa

Abstract

Within academia there is ongoing discussion over what constitutes natural disaster or what does not. Floods, which in recent years have taken the world by surprise, come into the discussion too. While that is the case, its impact on education systems is least discussed, if ever, yet literature acknowledges floods as one of the most devastating disasters ever recorded in human history. This Chapter, while attempting to examine the impact flooding has on education systems in Africa, it also explores whether flood sits well in the category of natural disaster. Furthermore, the writers also critically examine and interrogates adequacy of states responses to prevent flooding affecting education systems. The Chapter further explores whether flooding and its related impact on the education system is a disaster risk governance failure.

Keywords: flooding, education, governance, hazards

1. Introduction

Within academia there is ongoing discussion over what constitutes natural disaster or what does not. Floods, which in recent years have taken the world by surprise, come into the discussion too. While that is the case, its impact on education systems is least discussed, if ever, yet literature acknowledges floods as one of the most devastating disasters ever recorded in human history globally. This Chapter, while attempting to examine the impact flooding has on education systems in Africa, it also explores whether flood sits well in the category of natural disaster. Furthermore, the writers also critically examine and interrogates adequacy of states responses to prevent flooding affecting education systems. The Chapter further explores whether flooding and its related impact on the education system is a disaster risk governance failure prior the conclusion section.

2. The hazard: floods and its invention

Floods come in various forms and are living testimonies of the conflict between urban development and weather-related vulnerabilities. According to Van Niekerk and Nemaconde [1], fluvial floods, flash floods and glacial lake outburst floods make the list. For Sub-Saharan Africa the main floods that inflict the region come from periods of high intensity rainfall emanating from tropical cyclones and storm surges [2]. For instance, the 2018 to 2019 South Indian cyclone was a fluvial flood

that resulted in flood damage of exponential levels in Africa [3]. This was caused mainly by cyclone Idai which affected Zimbabwe, Malawi and Mozambique leaving a trail of destructions and deaths [4]. As for flash floods, these are of a short duration caused by high intensity rainfall that quickly floods the smaller basins. Africa is overwhelmed with periods of extreme rainfall and recurrent floods which may be associated with El Nino events which leave a lot of destructions in all sectors of the economies [5]. However, it is a misnomer to suggest that it is only the African continent that is prone to floods. In his article titled, 'The Floods: a man-made disaster?', [6] warns the Army Corps of Engineers in America that its concrete navigation structures in the Mississippi River were intensifying floods, and that its plans to build more wingdikes and weirs would exacerbate a severe and growing problem. Grunwald [6] clearly shows the human hand in the creation of flooding condition. It therefore follows that, while there are naturally caused floods that would have occurred from time to time that natural systems could mostly handle, our development of a lot of the world's landscape and our consumptive lifestyles have led to not only in the increase in flood occurrences, but also cause floods. Flood as natural event, relates to God's venting of anger and flood as man-made implies man's failure to mitigate and prepare adequately for hazard to reduce its impact on infrastructure on which livelihoods depend on.

3. Associated flood benefits

Tockner and Stanford [7] opine that floods have always been an important part of nature's regeneration process providing several benefits to countries in the developing world. To that end, some people choose to live in flood hazard prone areas and accept the high levels of risks because of the benefits they access from such areas [8]. The benefits of living in flood prone areas outweigh the risks involved for the vulnerable communities as the floods bring silt to nourish the deltas and to fertilise crops and seasonal fisheries [9]. Studies on floods in Tanzania's Rufiji River Delta by Sandberg found out that it allowed for post flood agriculture which is of benefits to the community in that area as they grow cotton, peas and maize [10]. In case of Bangladesh, flood has noted to be necessary for fertilising, irrigating the fields and enabling fish to spawn [9]. In such scenarios, and as the populations grow, governments are obliged to provide services such as education infrastructure to the inhabitants despite the threat posed by flooding.

The value of flooding to mankind is not only limited to soil enrichment for agricultural purposes. Flood water absorbed underground recharges the underground aquifers to supply fresh water to rivers, wells, dams, and lakes from flood water to the extent that many countries are dependent on aquifers for fresh water. Floods are an alternating source of that fresh water supply [11]. Ecosystems also depend on flood water which carries and deposits nutrients rich in sediments that support both the plant and animal life of wetlands [12]. In this way, floods become a pull factor incentivising communities to choose to live in flood hazard prone areas, and accept the high levels of risks because of the economic benefits they access from such areas [8].

4. Flood as a destroyer

In view of the context of the here and now benefits of floods, the negative impact of floods on education, despite being real, tend to be masked and yet have

a terrible impact on the same. A survey by the Asian Disaster Preparedness Center in 2002, in Cambodia speaks to this observation. The survey in question sought to identify the impacts of disasters on the education sector and the findings revealed that floods were one of the factors disrupting study program accomplishment and thus affecting the quality of current education, particularly in provinces which are prone to floods and where schools were constructed without proper flood resilience [13]. In the context of Zimbabwe, soon after gaining political independence in 1980, the introduced reforms in the education system that focused on the principle of 'Education for all' were adopted. Education for all principle embraced the practical principle of increasing the number of schools by building schools in marginalised areas and disadvantaged urban centres [14]. Incidentally some of the marginalised areas were in flood prone areas. As [14] further argues, the government involved local communities to help support schools through providing labour for moulding bricks and other resources. The emphasis was not so much on quality and cost effectiveness of the education system, but on accessibility to education. The Fast land reform programme in Zimbabwe did not help the situation either. People settled themselves under the disguise of black empowerment through access to land and they settled where ever they felt like. Some communities settled in flood prone areas. Owing to the population expansion in those places illegally occupied, the government had no option but to follow up with the construction of schools, commonly known as satellite schools. By allowing people to settle in such fragile spaces, in one way or the other, it helped to ease political tension that had started building in the country due to socio-economic hardships. However, like in the post-independence era quality of infrastructure in the context of resilience to shocks such as floods is not a priority. When floods eventually strike, because they impact communities in different degrees depending on the vulnerability of that community, the impact on education is least to be acknowledged.

The extent floods affect livelihoods and human life is well documented in literature. In fact, quantifying such loss has been the responders' priority. While that is the case, literature has it that one's political, social and economic status plays a significant role when it comes to exposure to risk of flooding. Poorest communities are the most vulnerable as they live in the most threatened locations [15] they lack the means to live in less vulnerable communities [16]. This construction of flooding implies that one's exposure to flooding is a social construction, thus in a way implying that if it is socially constructed, then flood fits well in the discussion of it as being man-made. Cann *et al.*, [17] are quick to remind us that floods affect the quality of drinking water thereby bringing with them water related infectious diseases such as cholera and hepatitis which will be compounded by damaged or overwhelmed sanitation system. Flood as destroyer has also been noted by other authors such as [18] who argue that it destroy agriculture, transport infrastructure, communication infrastructure, service buildings, and social facilities. Such loss compounds the deterioration of the social and economic lives of people as well as harming the national economy. While literature envisage an increase in flood threats due to various reasons and creations both natural and man-made [19], the extent to which it affects education systems globally has not received favourable attention. More often, after a floods we hear and read about the level of the impact on the socio-economic well-being of children if not mainly on economic related benefits of floods; As [13] have observed, the impacts on children's access and right to quality education have received little attention This has resulted in a lack of studies on the effects of floods on school children and infrastructure in most countries including in Zimbabwe.

5. Floods and its impact on education systems

In the education sector floods leave a trail of destructions which may result in children's education getting to a level where it cannot be salvaged. Schooling may be cancelled, children may drop out of school and school absenteeism may occur if school buildings are used as evacuation centres. A case in point is on Cambodia floods that happen at the beginning of the academic year from July–December, and children and teachers fail to go to school because of damaged roads and having to travel across rivers becomes dangerous. Using boats increases the cost of getting to schools which parents fail to meet [20]. This is supported by [21] who argued that the most depressing effects of floods is to be found in the affected areas, as the students have to wade through the flooded fields or board canoes that are dangerously rowed through the floating water. Living conditions in evacuation centres, limited space in schools having taken in more students and limited teaching resources for teachers also have a psychological effect on children [22]. The destruction of school infrastructure by cyclone Idai in Zimbabwe in Chimanimani district bears testimony.

There has also been recognition in practice that schools are normally designated as evacuation centres by government authorities. While classrooms offer relatively large space for the multitude in need, evacuees bring their animals into the evacuation centres and use the buildings to house their animals. In a situation where the evacuation centre is a school, as was the case in Cambodia [20], animals destroy the school infrastructure. This leaves the schools in pathetic situations and disheartens educationists. Such an outcome tends to lead to brain drain as teachers may find it difficult to take up teaching jobs in the affected areas thus causing shortages of qualified teaching personnel [21]. In the absence of qualified teaching personnel, coupled with unattractive and dilapidated learning infrastructure, impedes the quality of education offered to students which in turn affects the performance of students. When schools are closed and stay closed longer to flood disturbances, female learners are further exposed to other risks such as early marriages.

6. Flood: governance inaptitude

It is important for the different stakeholders in a country to mobilise each other in order to develop different tools to manage floods. UNDP [23] in [24] defines governance as 'the different ways in which governments, private sector and in general all individuals and institutions in a society organise themselves to manage their common affairs'. In relation to floods risk governance, governance then refers to the structural context in which various actors with a role in the development and implementation of flood risk management policies act and interact [24]. The level

Case 1: Flood risk governance Cyclone Idai

The 2018–2019 Indian Ocean cyclone resulted in a level of flood damage previously unseen in Africa [3]. The main cause was cyclone Idai which affected Mozambique and Zimbabwe. It commenced in March 2019 as a tropical depression over Malawi which caused widespread flooding affecting almost a million people. This moved back out to sea forming cyclone Idai which hit the east coast of Mozambique before dissipating in the eastern Zimbabwe which is 200 km from away on the 14th of March and slowly moved to hit Chimanimani at about 7 pm the following day on a Friday.

Zimbabwe had more lead time to prepare for the cyclone and reduce the potential damage compared to Mozambique. Despite this relative advantage, it was hit the hardest when compared to Mozambique that had far less casualties, environmental and infrastructure destruction. Indeed, security favours those who are prepared. The Meteorological Service in Zimbabwe had warned of the impending threat two (2) days before the cyclone landed. Chimanimani District was severely punished, with losses amounting to millions of US dollars, unimagined environmental damage and loss of lives.

Case 2: Mozambique Floods in 2000 and 2007

Mozambique has a total of ninety three rivers of various sizes, and seasonal regimes cross Mozambique coastal plain [25]. The flooding of the Zambezi in 2000 affected 4.5 million people and approximately 800 died [26]. However, in the major flood of 2007 no more than 300,000 people were affected though water levels were as high as they were in 2000. This showed that lessons learned by the government, national and international NGOs from the 2000 flood disaster had paid off. It had led to improved warning system, establishment of protocols for disaster response, awareness-raising campaigns among the population, training of local government institutions and improved coordination among all stakeholders. Many of those that had been affected in the 2000 floods had been relocated to higher and safer areas.

Vyas-Doorgapersad and Lukamba [27] gave the same sentiments on how Mozambique has improved in its flood risk management from 2000 floods citing the 2010 floods. According to [28] in [27], 'the Mozambique government had gone to great lengths to implement disaster risk reduction measures in the aftermath of the floods in 2000–2001. It had updated the contingency plans, prepared emergency site plans, conducted simulation exercises and pre-positioned supplies. The efforts paid as shown in the level of destruction during cyclone Idai which was not as bad as that inflicted in Zimbabwe, yet it still had higher destructive power from the Indian ocean when it made landfall in Mozambique. This shows the power of the flood risk reduction measures that have been put in place so far by the Mozambique government and its partners.

and trail of destruction caused by a hazard is largely defined type of governance in existence.

While the two case studies of two neighbourly countries do not detail the trail of destruction related to the school infrastructure and holistic education system, it has relevance to the discussion in place. Literature has identified a lot of weakness and some strength in governance issues pertaining to flood risks in countries in Africa, particularly Sub-Sahara Africa. Van Niekerk and Nemaconde [1, 27] identified that a number of countries have governance challenges to effectively respond to disasters and manage risk reduction measures because they lack pro-active measures from the government side. This is attested by Zimbabwe's response to cyclone Idai as penned by [29, 30] who identified capacity and policy gaps around coordinating response, civil and social protection, humanitarian assistance, development planning and management and land policies. This could have affected the proper dissemination of educational information on disaster as well as the threat that was posed by the cyclone Idai. A lot could have been done by the countries involved judging by the time-lines of the events, which gave ample time to alert the communities of the impending threat.

7. Flood risk management and education continuity

A number of frameworks have been devised to understand how flood impact education systems as giving directions on initiatives for the protection of children during disasters and for education continuity. The Hyogo Framework for Action [31] which recognised the necessity for including disaster risk assessment, disaster preparedness programs and activities that minimise disaster impacts in schools clearly comes to mind. The Hyogo Framework for Action (HFA) 2005–2015 was adopted in 2005 by 168 member states including Zimbabwe, to build resilient nations and communities through substantial reduction in disaster losses by 2015 [32, 33]. It was the primary global framework for DRR to give critical guidance to all nations in their efforts to reduce risk [34]. As such, five key indicators were formulated to guide nations towards a more disaster resilient society. Closely related to disaster risk reduction (DRR) education integration is Priority 3 which reads "Use knowledge, innovation and education to build a culture of safety and resilience at all levels" [35], p. 8. This was to be implemented by integrating DRR knowledge in relevant sections of school curriculum, including local risk assessment and disaster

preparedness programs in schools and institutions of higher learning, and implementing programs and activities in schools, that teach learners how to minimise the effects of hazards [5, 36]. In response to that call countries like Zimbabwe have made some strides in integrating disaster education in school curriculum [37]. Hence although, HFA lifespan has ended, it remains the rock on which her successor the Sendai Framework for Disaster Risk Reduction (SFDRR) (2015–2030) [38] is built on. Unlike its predecessor which had a ten year life span, the SFDRR has duration of 15 years. Priority 2 of the framework guides the strengthening of disaster risk governance to manage disasters risk through education. This priority encourages member states to formulate policies and legal frameworks relating to DRR education that are within their capacity, of all facets of their government to address key elements of DRR education. Importantly, it acknowledges schools as critically important facilities and calls for the implementation of structural, non-structural and functional disaster risk prevention and reduction measures. All the itemised intentions of the framework in question speak to the value of the education system. The Comprehensive School Safety Framework (CSS) provides a structure that can enhance school safety, strengthen disaster risk education, identify priorities to enhance students safety at school and ensure continued access to primary education for students following a catastrophic disaster [39]. It also allows for collaboration among the different stakeholders with a focus on aligning the education sector and disaster management policy [40, 41]. Not to be outdone and noted by [34] the Sustainable Development Goals also speaks to the value of education. These initiatives advanced and prioritised children's continued access to education, the safety of school sites and using education to assist countries in improving disaster risk reduction efforts. However, where governance issues slake flood is one of the hazards proving to be a barrier of these efforts.

8. Education: a right in disaster situation?

A number of global forums have enacted policy framework to acknowledge the importance of education to children. Sustainable Development Goal 4 stresses the importance of education by promoting an inclusive and quality education for all and lifelong learning as sustainability goal [21]. Wisner et al. [26] sees education as Children's right and this is supported by Article 28 of the United Nations Children Act that recognises that a child has a right to education. While these global commitments need to be applauded, there is also need to appreciate that these have not kept pace with the huge numbers of children affected [21]. Anecdotal evidence indicates that floods have potential to slow down and hinder the progress towards the achievements of the MDGs.

9. Approaching flood

Educational continuity is being threatened by floods and other disasters due to the adverse effects of climate change on countries in Africa. It is expected that children will bear a disproportionate share of the impacts of floods both in the immediate and long-term as documented by many researches [42]. Floods impact on education sector in different ways which include destruction of buildings and infrastructure, function of institutional and organisational structures as well as the wellbeing of individuals and communities [43]. Chang et al. [21] penned that, damaged schools disrupt hard won education right, and when instructional time is lost, ultimately quality of education drops, when there are no plans for alternative

locations and students are denied continuous schooling, many will never be able to catch up and will drop out permanently [21]. The disruption of education due to flooding is common issues worldwide.

This is where governments and their development partners could make it priority to harness the capabilities of each community to respond to flood threats, since during a flood the first responders are active community members. Wisner et al. [26] penned that schools are more than just the site for educating students, there is more to a school than being classrooms that house the students for their lesson and these include recognising the symbolic, cultural, economic and political significance of the schools within communities [43].

10. Conclusion

Understanding floods as either natural or man-made is critical to not only intended interventions but also in locating education infrastructure. A number of studies around the world argue for the integration of DRR into education sector policy at multiple levels of government and stress importance of specific and strong local implementation based on national guidelines [44–46]. Post-flood educational continuity need to deeply engage with the physical, institutional and organisational context of the schools, as nuanced understanding of the vulnerabilities and capacities of school stakeholders must be central to strategic practice. Therefore, enabling environment and policy, strengthening communication and co-ordination between and among school stakeholders and governments as well as integrating DRR into education sector policies are key for averting flood induced school learning disruptions. Such an approach will ensure that building substandard and weak structures which are not resilient to flooding are eradicated. Such measures may include, raising the ground floor and adding floor levels, improving drainage systems and irrigation channels as well as promoting safe storage of teaching and learning equipment and supplies. A School disaster management framework that promotes standard the adoption of a flexible education calendar, taking cognisant of the need of adjusted exam schedules is paramount for promoting risk reduction and resilience education system. However, all may be seen to waste where flood is a disaster risk governance failure.

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Conflict of interests

The authors declare that they have no conflict of interests.

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