

Linking School Environment to Geo Disaster Risk Reduction for Sustainable Development in Tanzania

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Abstract: *The paper reflects on the need for linking Disaster Risk Reduction (DRR) and school environment which is necessary for preparing students to relate disasters to development. The study was based on a review of school curriculum, questionnaire monitoring, focus group discussions and observation. Data were analysed by content and SPSS software. Findings revealed that Education Development Plans overlooked earthquake risk in designs and locations of buildings while the curricula inadequately internalise DRR approaches. In conclusion DRR is not intimately linked to school environment and hence the need for strategically developing comprehensive curricula and enhance participatory schools management for sustainable development.*

1. GENESIS OF THE ROLE OF SCHOOL ENVIRONMENT AND DISASTER RISK REDUCTION

In 2002 the United Nations adopted resolution 57/ 254 declaring 2005-2014 a decade for education for sustainable development (DESD) and designated UNESCO to lead the decade (UNESCO 2004). It is in this context that in all societies, our children represent hope for the future and so does the schools, because of their direct link to the youth. Schools are universally regarded as institutions for learning, both for instilling cultural values and for passing on traditional and convectional knowledge to young generations. Therefore protecting children during natural disasters requires two distinct, yet inseparable priorities for action namely. Disaster risk reduction and school safety. Further, according to the United Nation International Strategy for Disaster Reduction (UNISDR) making disaster risk reduction education part of national primary and secondary curricula fosters awareness and better understanding of the immediate environment in which children and their families live and work (UNISDR 2006). This paradigm shift from disaster relief to disaster mitigations and management was coupled with institutional changes. This was witnessed, among other developments by the establishment of the United Nations Office of Humanitarian Affairs (UNOCHA) after the demise of the United Nations Disaster Relief Office (UNDRO).

In ensuring a meaningful shift and hence implementation of disaster risk reduction, the United Nations World Conference for Disaster Risk Reduction (UNWCDR) set five priority actions (UNWCDR 2005). These were, first, disaster risk reduction be given local and national priority with strong institutional basis for implementation. Second, to identify asses and monitor disaster risks and enhance early warning. Third, the use of knowledge, innovation and education to build a culture of safety and resilience at all levels. Fourth, the understanding risk factors prioritized. And last strengthening disaster preparedness for effective response at all levels.

UNOCHA through ISDR organizes campaigns for DRR globally each year designed to raise awareness among all professionals regarding protection of the communities from adverse impacts of disasters. The 2006- 2008 period was declared a UN a biennial campaign known as “disaster risk reduction begins at school”. According to Wisner (2006), Cuba is leading for having all institution in place to provide school safety from disasters while having a comprehensive DRR study in curricula. Pupils in Cuba have been equipped with all mitigation measures, well prepared to rescue themselves and others through drills and other preparedness measures. The other two countries which have put school environment under great safety are UK and China where DRR is a must read subject (Wisner 2006). Each student has a compressive text book on DRR on the desk right from a day one in school.

At national level, education system in the United Republic of Tanzania (URT), is conceived as a strategic agent for mindset transformation and for the creation of a well educated nation, sufficiently

equipped with the knowledge needed to competently and competitively solve the development challenges facing the nation (URT 1998). The education that is provided to the citizens seeks to inherit wisdom, knowledge, skills and culture to the present and future generations (URT 1996). The ultimate aim is to prepare citizens to overcome, conserve and properly manage the environment in order to enhance life, realize the life and attain sustainable development. In this light, the education system was restructured and transformed qualitatively, with a focus on promoting a science and technological culture from its lowest levels, giving a high standard education to all (URT 1998). The vision emphasizes the need to ensure that science and technology education and their application for promoting and enhancing productivity permeate the whole society through continuous learning and publicity campaigns.

The URT, for instance, is a signatory to several initiatives and has put in place proper institutions that focus on contemporary global issues. The Disaster Relief Coordination Act No. 9 of 1990 that insists on rescue and relief was immediately established as a response to UNDR0 (URT 2002). In the light of the above stated paradigm shift the Republic established a disaster management policy of 2004 that focuses on the disaster management cycle (URT 2004).

2. LINKAGES BETWEEN SCHOOL ENVIRONMENT AND DISASTER RISK REDUCTION

To link up the campaign and the Hyogo framework of action, Tanzania's education system embarked on two programmes namely Primary Education Development Plan (PEDP) and Secondary Education Development Plan (SEDP) with, among other major innovations, a disaster management component. It aimed at improving primary and secondary education that fosters increasing enrolment coupled with rapid construction of schools in order to improve education status of the country as a whole (URT 2003; 2004a). The effective planning of the school projects sought as Wisner et al. (2005) advises, aimed at understanding disasters as progression of vulnerability from underlying societal factors to on-site unsafe conditions. It may be conceptualized that in trying to combat one disaster in an improperly planned manner including lack of involvement of stakeholders and the community in general, there is a probability of the occurrence of yet unforeseen disasters impacts and consequences (Tearfund 2006). This situation, a function of lack of knowledge, is by all standards undesirable to policy makers, planners and the community in general.

In attempting to examine the implementation of the disaster risk reduction begins at school campaign, a study was conducted in Rungwe Volcanic Province (RVP) a part of the Great East Africa Rift Valley System (GEARVS) in South-western Tanzania. RVP is located at the triple junction of Usangu, Rukwa and Livingstone boulder fault of GRARVS and covers about 1500 Km² (Fontijn *et al.*, 2012). The area is mainly characterised by three major volcanic centres of Ngozi, Rungwe and Kyejo which are also late Cenozoic volcanoes. RVP is frequently experiencing earthquakes that claim human lives, property and destroy environmental resources (Rugumamu et al. 2009). Occurrence of the quake is, of course, due to the plate boundary location where tectonic earthquake is recurring and indeed difficult to predict. The most recently episode occurred in 2000/ 2001 that caused severe malfunctioning of the society that necessitated the external assistance (Rugumamu et al. 2006). Children are the most vulnerable population group. As in Pakistan, the October 2005 earthquake disaster, over 16,000 children died while attending classes when schools collapsed, a case which calls for more concerted actions to be taken to protect children before disasters strike (UNISDR 2006). It may be postulated here that pupils are at great risk when not imparted with proper knowledge on how to behave before, during and after a disastrous events. On the other hand the pupils when well prepared may bring a great trickledown effect and save the lives of the communities as they act as a bridge between theories and practices (UNICEF 2007).

The integration of DRR into school curricula has been a critical issue in the building of community resilience to disasters. It is postulated that with integration of DRR in school curricula, disaster knowledge will have a trickledown effect and have long term influence in managing disaster risks (Wisner 2006; UNISDR 2006). Through time schools have been centres for instilling knowledge culture and values, they are a base of development. These centres bring a lot of children together thus requiring safe environment for their learning process. However, villages as well as the centres have been located in the fragile environment coupled with design of school structures which are vulnerable and at hence at risk.

3. APPROACHES FOR DATA AND INFORMATION COLLECTION AND ANALYSIS

Geographically the study area extends from $33^{\circ} 10'E - 33^{\circ}58'$ to $06^{\circ}40'S - 07^{\circ}36'S$ (URT 1957). Administratively the area is located in Rungwe district which is one of the 8 districts of Mbeya region, south west of Tanzania, East Africa. RVP is part of the GEARVS which is 4000 kilometer long and 30-100 kilometer wide. GEARVS is a rare example of active continental rift system that stretches from the Red sea and Gulf of Aden to Beira, Mozambique (Haulle 2014). RVP lies between eastern and western arms of GEARVS.

Its altitude is between 500m and 2960m above mean sea level, the highest point being Rungwe Mountain. It is also characterised by volcanic activities such as hot springs namely Kalambo, Kajala, Nanyara and Moffate. Following the building of main volcanic cones of Kiejo and Rungwe a period of explosive activities in the RVP gave rise to numerous explosive craters, some of which now hold lakes such as Ngozi, Masoko, Itende, Itamba, Ilamba, Kingiri, Ikapu, Chungururu and Nzumbwe.

A critical review of school curricula for primary and secondary education was first conducted in order to decipher linkage with DRR. The sampling unit was a school, the primary player in development and disaster reduction (UNESCO 2006). A multi-stage sampling technique was used to obtain the number of pupils in a school as well as heads of the households in each village for interviews. A structured and semi structured questionnaire was employed for guiding and conducting interviews. Semi structured questionnaire items are capable of capturing qualitative information and reveal more useful information because of respondent's freedom of self-expression and more creativity in providing detailed answers (Blalock 1979). Structured questionnaire items were used because of efficiency in terms of providing answers which are rapidly coded and analyzed.

Focus group discussions (FGDs) were employed to obtain special knowledge on earthquakes and coping mechanisms. The technique was subjected to teachers, education officials, District Disaster Management Committee members (DDMAC), Regional Disaster Management Committee members (REDMAC), Non Governmental Organizations officials (NGOs). A public hearing was conducted on pupils and on villagers in selected schools and villages respectively. Observation and measurement techniques were employed throughout the field study for collecting non-verbal behaviours. Observation and measurement tools were useful because they are on-site data captures revealing the environment and events in their natural setting (Kothari 2004). The technique was vital for observing the location, design and types of structures and material used in construction. Geographical Positioning System (GPS) was used to locate the schools that later were linked to geologic maps. The data and information was analyzed qualitatively and quantitatively. The data was coded, entered and verified by using the Statistical Package for Social Sciences (SPSS) software. The data was later summarized and presented by using frequencies, percentages and distribution, tables, graphs and photographs.

4. RESEARCH FINDINGS AND SYNTHESIS

4.1. Curricula and Disaster Risk Reduction for Sustainable Development

Field survey revealed that pupils in RVP conceived deforestation, land degradation, pollution, drought and earthquake to be disasters. These environmental problems were taught in several subjects at different levels. The subjects include geography, civics, social studies, general studies and science. Environmental problems were mainly taught in standard VI and VII, Form III and V. Of all these, geography took the lead in imparting environmental education to pupils. This is in line with the one of the geography subject objective that aims at imparting skills for combating of environmental problems through environmental conservation and management (URT 1997; 2005; 2006). This is reflected in the official government statement below:

“More than any other subject in the curriculum, the geography skills are intended to prepare pupils who will be rich in constructive attitudes towards environment, understanding its problems, providing possible solutions and therefore getting involved in actual social and economic development of the country”- (URT 1997).

It is in this light that we delve in reviewing the geography syllabi in primary and secondary school levels in Tanzania.

Through the public hearing conducted to pupils in primary and secondary schools in Rungwe district, it was noted that very little was taught relating to environmental problems and environmental disasters in particular. These findings clearly showed that the pupils were only taught about causes and effects of these disasters. FGDs with teachers and education officials added that solution and remedies towards the disasters were also taught.

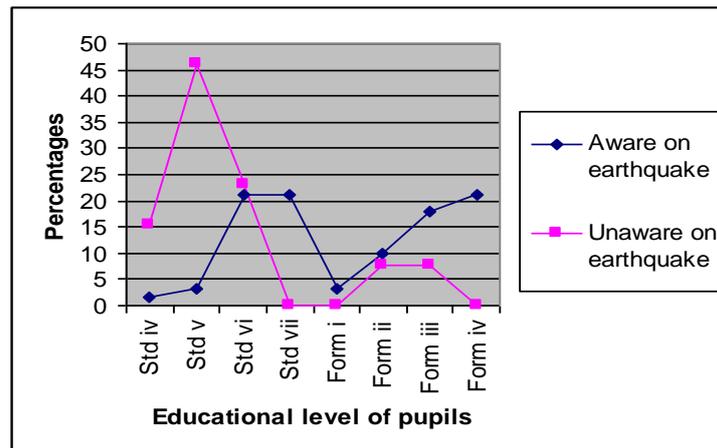


Fig1. Relationship between awareness and the education levels.

The study further revealed that generally the pupils’ awareness towards disasters increased with the increasing level of education. (Refer figure 1). The findings suggested that what is taught in school about natural phenomena (hazards/disasters) that is pegged on the assumption that human beings have no powers on them or cannot be mitigated. This observation indeed correctly underscores the subject content and class specific objectives of syllabus of secondary education that concentrates on definitions, causes and effects (URT 1997; 2005; 2006). This is similar to what Wisner (2006), revealed when he remarked that most pupils are taught earth sciences. More than half of the world countries teach hazard/disaster related subjects especially in geography but some of the remarkable countries like Uganda, Algeria, Bolivia, Russia, Czech, India and Tonga though teaching earth sciences is important should ensure that it is taught in a comprehensive way – addressing DRR issues and concerns (Wisner et al. 2005; Tearfund 2006; Haulle in press).

Though the study revealed that the level of awareness of disaster/hazard increased with the increase of education level, the maximum levels of awareness were found in standard VII and in form IV. These are the classes that are to sit for the relevant national examinations. For example in testing the pupils’ awareness on disasters, 83% were able to identify at least two causes of quake. 86% of these who were able to identify at least two causes of tremors were studying in form IV and standard VII. It may be suggested that these pupils study to pass the examinations. This might not be a problem of a pupil per se but the syllabus and curricula in general (UNISDR 2006 and Wisner, 2006). Wisner (2006) reported a similar case in the United States where those who completed primary or secondary education levels were not able to use that knowledge to reduce risk and save lives though in examinations they performed well.

On the part of teachers the study revealed that they even were not certain on the syllabi content relating to hazards/disasters. For example in FGDs one of the teachers remarked

“I think there is such a topic (disaster topic) in the syllabus but the problem lies on the emphasis put during the teaching process.”

The education system has a power to provide a way towards sustainable development by providing an opportunity for mindset change through improving one’s understanding, income and thus overcome the persistent vulnerabilities (Wisner at al. 2005; Rugumamu 2000). It is also in this context that Mwalimu Nyerere (1967) warned Tanzania that when a system of education does not provide knowledge for development which can save life and improve the wellbeing of the society that system is meaningless. Before establishing an education system, he went on to remark, a society should answer the question ‘what type of a society, that we are trying to build’ and only when the society is clear about the kind of society they are trying to build can they then design their education service to serve the goals and hence achieve development.

It was pointed out that the education goals on this matter are not identified clearly by the current education system. The objectives, for instance, in 1997, were, first, to inculcate the principles of national ethics and integrity, international cooperation, peace and justice (URT 1997). Second, ensuring rational use and management of the environment. These two objectives were omitted in 2005, apart from of being the signatories of Rio Earth summit. The two objectives of education were accommodated again in 2006 (URT 2005; 2006). This shows that there is no clear structure on what is needed by the society.

These policy problems were also revealed in the field. It was clear that with good curricula it will be easier to attain quality education and hence sustainable development through DRR. However in the light of FGDs there was a contention that ‘*there is no need to mainstream DRR in school curricula because a lot of issues have been mainstreamed and so loading the syllabi*’. This observation makes sense! The situation however justifies that the key question on education was yet to be tackled properly. All these may be a result of centralization of power.

4.2. Extra-Mural and Extra-Curricula Activities in Enhancing DRR

In strengthening the teaching-learning process, the UNESCO National Commission of the United Republic of Tanzania (UNCURT) underscores the importance of extra-mural activities to consolidate the school curricula (UNCURT 2008). Extramural activities are important and should be embedded in education planning in order to link theories to practice. It suggested that even if the theories or the curricula are well contented, should pupils lack extramural activities, the applicability of knowledge will be stalled. This position is similar to what Wisner (2006) appraised on practical school safety which emphasizes theory and practice. In practice the pupils should also be familiar with the best practices before, during and after a disaster. Emergence drills are also prioritized in preparedness for rescue and relief to reduce adverse impacts and consequences of disasters.

Like the above process, extra-curricula activities are the activities performed by students/pupils outside the realm of normal curriculum (UNCURT 2008). They are voluntary as opposed to mandatory and are non-paying. The underlying idea is that it is the result of individual interest and falls within peer groups. The field survey revealed that several school clubs were available in schools in Rungwe district. The clubs include debate, *malihai* (literally translated as living wealth meaning Environmental wealth), safety, HIV/AIDS and Scout clubs. Scout and debate clubs showed up to be dominant and active in the surveyed schools. It was also found out that within such clubs the knowledge imparted was important advancing knowledge imparted during classes.

It was noted that cleanliness competitions, for example, were geared to encourage pupils to participate in tidying up schools thus enhancing a healthy and attractive environment. Among the clubs observed, Scout club was noted to directly deal with disaster rescue and relief because it is the only club that practised drills for fire rescue, school security and self-protection from the potential emergences. The club members were trained on how to protect themselves and rescue others in time of emergences. It was evident that the club was concentrating on the pre- and post-disaster phases key to proactive in the mitigation sub- phase. It was also learned that all clubs are provided by the law and no any new club could be instituted without the permit from the relevant ministerial authority.

4.3. Planning and Management of a School's Physical Environment

As stated above the study area as characterized by the RVP earthquake disaster profile in the recent past dates back to 1919, 1950, 1966 and 2000/01 (The Tanganyika standard, 1950 and Rugumamu et al. 2006). In this paper, the 2000/01 earthquake event is employed for further discussion and analysis.

A key question guiding school safety in Cuba as reported by Wisner, (2006) asks “*Is a school itself a safe place to be?*” By and large, this issue is a pertinent starting point here. It is advanced that DRR in school will not be effective if it is only based on content and pedagogy competences in operationalising the curricula.

In essence, assessing the physical school environment, calls for the evaluation of the structural and non-structural measures in place (Tearfund 2006; Wisner 2006). These measures dominate the mitigation sub-phase of pre-disaster phase (URT 2004). Basically, structural measures refer, among others, to building code (both national and international) including architectural designs while non-

structural measures refer to spatial planning, policies and laws, customs, traditions and taboos that govern life and vulnerability and risk reduction (Tearfund 2006). As increased pupil/student enrolment continues, safe construction of buildings has to be a prerequisite for functioning as a guarantee for the safety of the school community (Wisner 2006). It has been found out that the government in setting up PEDP and SEDP recognizes this important and noble role as the two plans spell out clearly that in order to attain a conducive teaching–learning environment, the management of schools should be put under the local authority (URT 2001; 2004a).

The survey showed that the need for schools in any administrative region was influenced by the community itself and be translated into an issue by politicians. The process involves reviewing the catchments area of possible school children and current distance covered by children to reach the existing school. Through public hearing, it was found out that the area for locating a school is decided by the local community yet subject to the verification by district officials especially engineering and education departments. FGDs with education and engineering officials revealed that in locating a school, the characteristics and qualities of soil and wind directions were the determining factors. They noted that at times slope is also considered given that the countryside is hilly or mountainous.

Field observations however revealed that some of the schools were located on steep slopes. On-site measurements and interpretation revealed that Mbafwa, Nditu and Ndala schools which were badly damaged by the 2000/01 quake episode were located on areas of intensive shears and nearby or along active fault lines. This provided a proof that seismicity was not a key criterion in locating a school in RVP.

About 95% of the respondents reported that they were aware of building codes. Some of the codes include the use of baked bricks or concrete bricks, wall width about 23cm, assessment of gradient and soil type. However the building inspection in improving teaching-learning environment was not carried out as PEDP and SEDP in the study area simply embarked on intensive construction of classrooms, teachers' houses and toilets.

Further study found out that the architectural designs of building structures were provided by the Ministry of Education headquarters. These were but country-wide models. A study of building plans during the FGDs revealed that only two criteria were employed in structural design and location classroom. The considered elements of weather included temperature and sun-shine. The former criterion allowed variation of structures according to temperature of the area. The classrooms design for the cool areas was different from those in the warm ones. Basically all classroom structures were oriented in such a manner that sun rise and sun set directions should not hinder children from learning while in a classroom.

It was further noted that the classroom windows were designed to be fixed with iron bars which shows again that the plans paid no attention to the onsite condition of tremors as pupils would not readily escape in time in the event of emergence (URT 2001, 2004a). It was also observed that the classroom walls were 18 cm wide instead of 23 cm as recommended by the plans. It was again discovered that during brick laying concrete bricks were positioned contrary to the safety standards.

In the aftermath of 2000/01 tragic event, it was found out that building standards were not properly adhered to in the RVP. Mbafwa primary school, for example, was among the reconstructed schools but with a difference. Contrary to other reconstructed classrooms, Mbafwa classrooms in Rungwe district were wooden structures (Refer figure 2). Such structures are capable of withstanding tremors. However during the survey, it was discovered that the project/structures were not replicated elsewhere. This is because in practice the education planning is centralized at the ministerial level as opposed to what was planned in SEDP and PEDP (URT 2001; 2004a). As emphasized by Wisner (2006), if the DRR plans are concrete to make a school a safe place for children, this knowledge may be extended to the community through a trickle-down effect. Based on the Mbafwa experience, it may be postulated that when there is effective involvement of all key stakeholders right from planning to implementation then sustainable development is viable. Fontijn and others (2012) have shown that there is also likelihood of the tragic eruption of volcano in the area without association with earthquakes. This also provides the great risk which is not under the community preparedness. However, the next eruption is expected to occur 500 years to come, that cannot be experienced by this generation, but predictions sometimes fail and may face the existing population unprepared.



Fig2. Mbafwa primary school buildings: On the top stands a damaged school building after the earthquake episode in 2000/01. At the bottom stand wooden classrooms reconstructed after the quake episode.

5. CONCLUSIONS AND RECOMMENDATIONS

It is evident from this paper that the school curricula are not well developed to adequately impart DRR knowledge to pupils. The little which is learned on hazards and disasters is directed towards passing examinations and not being agents of mindset change in promoting increased awareness for minimizing impacts. To this end, one may question the real genesis of the current education objectives in Tanzania with respect to ensuring that each level is complete in and by itself. Further, the school physical environment in RVP and in Tanzania in general has not been taken into account in designing and locating the structures - a strategy to reduce the vulnerability of the on-site conditions and achievement of sustainable development. This anomaly clearly reflects power relations in participatory decision-making – an issue which should be addressed and redressed. The architectural designs need to consider onsite hazard condition and be supported by risk and vulnerability mapping.

In this regard, it is imperative to initiate a debate on the system of education needed in Tanzania in order to solve the problem of policy that might alter, ignore or add and sometimes act incongruently to popular needs and aspirations. The debate would then call for school curricula review to integrate all aspects of human life enhancement and sustainable development where DRR is inclusive.

To this end, there is an urgent need for enhancing teachers' content and pedagogical competences on DRR as well as introducing pupils' disaster management clubs in school as a measure to harmonise theory and practice which constitute real learning. It is also prudent to establish country-wide a disaster profile, enforce building codes, as well as establish monitoring and early-warning systems as a prelude to linking the school environment to disaster risk reduction for sustainable development.

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