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THE ROLE OF LANDSLIDE EDUCATION IN PREVENTING ENVIRONMENTAL HAZARDS AND PROMOTING HEALTH IN NIGER DELTA REGION OF NIGERIA

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Abstract: Landslide is the downward and outward movement of the soil, rock and artificial fills resulting from natural, physical or human factors. It can also be referred to as earth movement. Landslides are naturally occurring environmental hazards but the frequency of it in some areas is increased by human activity. Natural factors include earthquakes, water, heavy storms and volcanic eruptions. Physical factors such as water can trigger up a landslide. A heavy rain for a period in the absence of adequate drainage system increases the susceptibility to landslides. This makes Niger Delta Region of Nigeria more vulnerable to landslides because of the already high water table. Human factors include indiscriminate deforestations due to the search for firewood, timber harvesting, cultivation, vibrations from machinery or traffic, blasting, negligence of road repairs and maintenance. These actions reduce the stability of slopes. Human factors contributing to landslides can be reduced but this requires creation of awareness and education on the hazards which range from homelessness, severe injuries, massive destruction of farmlands, hunger to outright loss of lives. There have been incidences of landslides in different parts of Niger Delta region of Nigeria. This paper focuses on the contributory factors to landslides, health hazards associated with landslides and the role of education in preventing landslides and promoting health. Relevant literature was reviewed and secondary data collected. The paper concludes with suggestions on how to control the human contributory factors to landslides.
Keywords: landslides, education, hazards, prevention, health promotion, Niger Delta Nigeria.

Introduction

Landslides have caused several catastrophes every year in Nigeria (Davies & Solomon, 2008). Poverty induced activities can increase the vulnerability to landslides which are capable of unquantifiable threats to human life and natural environment (World Bank, 2001). It becomes a challenging issue because about 70 percent (105million) of Nigerians are now living below the poverty line (CIAWorld Fact Book, 2012, Sanusi, 2011).

Landslide involves downward slope movement of soil, rock mass or slipping of the earth's surface due to weakened stability (Varnes, 1996). In the general term "landslide," involves many types of movements such as falls, topples, flows, spreads and other complex movements (Cruden &Varnes,1996). The most restrictive use of the term refers only to

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movement at the area of weakness that separates the slide material from more stable underlying material. Niger Delta covers low-lying plain areas which make it very vulnerable to landslides as they lay only a few metres above sea level. It is one of the world's largest wetlands and largest in Africa (Rural Africa Water Development Project, 2009-2012). Cases of landslides, coastal erosion, and earth tremors have been recorded in Nigeria. The history of earth tremors in Nigeria dates back to 1939 (Akpan et al, 2009). The most recent Niger Delta landslide occurred in Bayelsa community in September 2011 and two persons were killed. The Landslide was attributed to continuous dredging activities: (http://www.vanguardngr.com/2011/09/two-feared-dead-as-landslide-hit-bayelsa-community).

The case of Nigeria can be likened to Haiti's which has been wrecked by poverty induced deforestations leading to environmental degradation due to gross mismanagement of natural resources (Claudius-Adeniyi,2010). Similarly, though Nigeria is blessed with crude oil, poor management of this natural resource has made it unaffordable for the common man. The proceeds of the massive oil wealth have only succeeded in enriching some selected few in governance. Kerosene and gas are not within the reach of the common man for cooking. Due to this, numerous people affected resort to indiscriminate felling of trees as firewood for cooking. This is in line with the position of United Nations Environment Programme & Cleveland (2010) that environmental degradation and resource depletion are problems in Africa. At the end of the day, mountains, hills and even valleys are stripped bare increasing the tendency to flooding, erosions and subsequent landslides and mudslides.

These human actions increase the vulnerability of Nigeria to landslides. They also impact negatively on human health and lives at the long run. The scenario can be attributed to poverty which falls in line with the assertion of Debarati Guha Sapir's statement and World Bank (2001) that vulnerability to natural disasters is almost a direct function of poverty. This implies that poverty in Nigeria has given rise to environmental degradation thereby making the country vulnerable to natural disasters**.** According to 2007 estimate, 70% of Nigerians are still below the poverty line **(**Central Intelligence Agency: The World Fact Book: https://www.cia.gov/library/publications/the-world-factbook/geos/ha.html). The paper reiterates the need to work towards forestalling the occurrence of Haitian like natural disaster in Nigeria.

Incidence of Landslides in Nigeria

A mild earth tremor was experienced in Southwestern Nigeria in 2006. Cases of landslides, coastal erosions, and earth tremors have been recorded in Nigeria. The history of earth tremors in Nigeria dates as far back to 1939 and was first reported in Lagos, Ibadan and Ile-Ife, all in the southwestern part of the country (Akpan et al). In 1988 a major landslide occurred in Nanka in Anambra State, Nigeria. More than 50 families were evacuated from the town.

Landslide took place in Esa-Oke in Obokun Local Government area of Osun State. The slide was down the slope and the mountains stretched for about 5kilometers. The entire community was thrown into perpetual fear of imminent earthquake. The Landslide destroyed over 5 hectares of farmland which includes, yams, maize, cassava, cocoa, kola nut, plantain farms and other valuable farm produce (http://www.newsdiaryonline.com/landslide.htm).

Landslides which occurred in Umuchiani community of Anambra state led to the displacement of about 250 families in December 2005. Landslide occurred in Bayelsa community in September 2011 and two persons were killed. The Landslide was attributed to continuous dredging activities (http://www.vanguardngr.com/2011/09/two-feared-dead-as-landslide-hit-bayelsa-community).

Twenty communities in Awgu and Oji-River Local Government Areas of Enugu State were thrown into serious difficulties by landslides which cut off a portion of the Awgu-Achi-Oji River road in October 2011.

Contributory Factors to landslides

Several factors involving human activities contribute to land sliding. Such factors include clear cut timber harvesting, vegetation, previous use of land, poverty, timber harvesting operations, blasts, vibrations from machinery or traffic and water (Wikipedia, the free encyclopedia 2012). Other contributory factors to land sliding include building on weak foundations, choatic planning, infrastructural inadequacies, bad governance, lack of understanding of landslide hazards, lack of warning systems and blocking of drainage by artificial fills. Wetly (2011) posited that human activities increase the frequency of landslides.

Indiscriminate clear cut timber harvesting for burning as firewood due to inability to afford gas and kerosene for cooking and ignorance is a very common practice in Nigeria. Different research studies reveal that clear-cut timber harvesting increases the likelihood of land sliding on steep and unstable hillsides from 2 to 31 times.

Constant removal of vegetation is a common practice in Nigeria due to ignorance and poverty. Poor vegetation allows easy penetration of rain drops directly into the soil with subsequent loosening of the soil and smaller pieces of rock. This further increases the vulnerability to land sliding (Heiken, 1997). Root cohesion is also a risk factor in landslide. The looser the soil, the more likely it will move if trees are not there to hold it down.

Yearly land clearance for agricultural purposes is a common practice in Nigeria due to poverty. According to researchers at the H.J. Andrews Experimental Forest, previous land use is a risk factor in landslides. Other factors include staking of heaps of materials such as mine tailings and dirt from road cuts on hill slopes, building of houses in landslide prone areas. Most of the activities or practices described above emanate from poverty in developing countries such as Nigeria. United Nations (1990) opined that human poverty is more than income poverty.

Timber harvesting operations accelerate land sliding processes by destroying the stabilizing influence of vegetation. When the roots of dead trees lose their strength and water saturates the ground and runs off in higher quantities, the risk of land sliding increases. This corroborates the position of Skaugset that timber harvesting has serious implications. Some trees and shrubs may be planted after the house is finished, but these cannot replace the root cohesion of the removed vegetation. According to Robertson (1985) human activities are capable of increasing soil movement.

Water plays a big role in triggering landslides; it acts like WD-40 on a rusty screw. Water lubricates the surface between the soil (sometimes weathered rock) and the bedrock, and makes it easier for the soil to slide off the solid underlying hillside. If the soil is already saturated, a period of heavy rain can trigger a slide. Keith Mills, a geological specialist at the Oregon Department of Forestry, says that two to five inches of rainfall in six hours, after a few days of prior rain, is enough to trigger a debris flow. This has serious implications for Niger Delta region of Nigeria with high water table.

Health Hazards Associated with Landslides

Landslides go with health hazards such as outright loss of human lives thereby increasing mortality rate. Other health hazards include displacement of families, homelessness with associated hardships, damage to natural environment, loss of facilities, damage to farm lands, houses and roads. Interrupted power supply capable of causing many untold hardship on human lives is a common occurrence.

Landslides are capable of trapping people under collapsed buildings. Other characteristic features include the loss of several human lives, burying of villages, communities, houses on hilltops, sweeping of vehicles with human beings into ravines, destruction to lifelines with the associated effects and mental torture. Landslide can delay the actualisation of Millennium development goals especially along the aspect of maternal and child health. In line with this (UNDP, 2005; IPCC, 2007) opined that assessment of Nigeria alongside with other twenty three countries in Sub-Saharan Africa revealed the possibility of an illusion because of climate change and other stresses.

In Nigeria, landslide impacts more on women and children thereby increasing maternal and child mortality rate. This is so because women and children are the ones that go to the forests for firewood to roast their fishes. This corroborates recent studies (Folorunsho, 1992 and Ojo and Folorunsho, 1993) which found that 90% of women involved in fish processing in urban areas use firewood or wood products in their activities. Fuel wood is also used extensively in food processing, and in domestic activities that are dominated by women. Collection of firewood under conditions of heat stress could impact more on the health of women and children who are more involved in this activity than men.

Conclusion

Landslides produce health consequences such as outright loss of human lives thereby increasing mortality rate, displacement of families and homelessness with associated hardships, damage to natural environment, loss of facilities and damage to farm lands capable of causing many untold hardship on human lives. In Nigeria, landslides impact more on women and children than men thereby increasing maternal and child mortality. Women and children go to the forests for firewood, fish and also roast their fishes with firewood. This corroborates the studies of Folorunsho (1992) and Ojo & Folorunsho (1993) which found that 90% of women involved in fish processing even in urban areas use firewood or wood products in their activities. Fuel wood is also used extensively in food processing, and in domestic activities that are dominated by women.

Collection of firewood under conditions of heat stress could impact more on the health of women and children who are more involved in this activity than men. This explains why the realization of millennium development goals especially along the aspect of maternal and child health might be delayed in Nigeria. UNDP (2005) and IPCC (2007) opined that assessment of Nigeria alongside with other twenty three countries in Sub-Saharan Africa

revealed the possibility of missing the target because of climate change and other stresses. Human factors that contribute to landslides can be traced back to poverty and ignorance.

Role of Education in the Prevention of Landslides

Some actions stem out of ignorance so education and awareness will play a major role in the prevention, control of human contributory factors to landslides and health promotion. The Nigerian populace should be educated on the hazards of past landslide occurrences. Pro-active measures that will safeguard Nigeria from experiencing similar natural calamities as Haiti should be adopted. Education at all levels and monitoring will ensure compliance and rule out practices that result in exploitation of the natural environment. Government should put measures in place that will enhance the determination of landslide prone areas through proper land assessment using professionals with good conscience and integrity.

Failures of soil and rock materials are the common factors to all the causes of landslides (http://www.ga.gov.au). Soil conservation should be encouraged by planting trees, building terraces, no till farming, contour plowing, crop rotation and planting of indigenous crops (Oak, 2012). Land should be kept fallow to rest it. Grass should be planted on water ways and slopes. Unpleasant human activities such as excavation, deforestation and blocking of drainages by artificial fills should be put under the supervision of Municipal Authority. Government should adopt realistic measures that will reduce the level of poverty including provision of petroleum products such as gas and kerosene for the poor.

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