

The Perception of Natural Hazards: The Need for Local Education in Riverine Communities.

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Abstract

The organized human settlement patterns can be threatened by natural hazards as their incidence is often unpredictable in time and space. Riverine communities in Bayelsa State, Nigeria, are often at risk of flood and erosion hazards. There is, therefore, a dire need for local natural hazard education in the communities. The aim of this paper is to examine how riverine community dwellers improve their awareness and perception of the natural hazards in their local environments through experience and education, by the examination of the residents' perception of the prevalent hazards, the adequacy of hazards education programs, and the government's role in improving hazards awareness in the communities. To achieve the aim of the survey, a sample size of 360 respondents drawn from eight communities critically prone to flooding and erosion were systematically sampled. The survey schedules included field observations, interviews and questionnaire administration. The results showed that the residents were deficient in their knowledge of the local hazards, and were unfamiliar with the schools' curricula on same to assess the adequacy of hazards education in schools and among resource users. The general public was also unfamiliar with the functions of the government's agencies for hazards management, information and education in the riverine communities and the state in general.

Key word: Perception, Natural hazards, Local education, Riverine communities.

Introduction

The deaths and injuries caused by natural disasters such as hurricanes, typhoons, earthquakes, mudslides, tsunamis, droughts, floods and famines grab our attention and squeeze our emotions and send such emotional responses as fear, trauma, depression, despair, frustration, anxiety, loneliness, worry and hopelessness, but in addition, there are the economic losses. The destruction and disabling of buildings, bridges and roads, of power-generating plants, of transmission systems for electricity, natural gas, and water, plus all the other built works of our societies add up to a huge financial and social cost. Economic losses are even greater than just damaged structures; there are the industries and businesses knocked out of operation; causing losses in productivity and resulting in lost wages for employees left without places to work.

Many sites on earth have not had a natural disaster in recent times, nevertheless, they show clear signs of danger; they have natural hazards (Abbott, 2000:6-9). People migrate and build next to rivers that will have a big flood, on the shoreline of the sea awaiting powerful storms, and on the slopes of volcanoes that will erupt. Decades, or even centuries may pass with no great disasters, but the hazards remain. The toll in deaths and destruction rises in hazardous areas annually. Rising losses can be attributed to an increase in the population exposed to risk, the magnitude of natural events, economic development in hazardous areas, inflation and better reporting of global events. Burton, Kates and White (1993:1) concluded that the natural environment is becoming more hazardous in a number of very complex ways that defy immediate or easy reversal. Fortunately, the type, frequency and magnitude of hazards vary so that some places are not as hazardous as others.

According to Vitek and Berta (1982:225-228), to avoid or minimize possible losses, and even to aid survival, the inhabitants of hazardous environments must acquire accurate perceptions of the natural hazards in their local areas. Hazards perception is acquired by means of experience and education.

A population's experience with natural hazards usually is deficient however, because hazardous events occur infrequently and may be extremely dangerous, knowledge of their mode of occurrence is necessarily important. Consequently, education is the most reliable means of gaining information about natural hazards and how to react during emergencies.

The aim of this paper is to examine how residents of riverine communities in Bayelsa State of the Niger Delta Basin, Nigeria, improve their awareness and perception of the natural hazards in their local environments through experience and education. The following objectives were set out to achieve the aim:

1. To examine the adequacy of natural hazards education program in the local schools and among riverine community resource users.
2. To examine the government's role in improving the awareness of natural hazards in riverine communities of the state.

The scope of this paper focuses on improving the awareness and perception of local natural hazards education in schools and among resource users in riverine communities in Bayelsa State. It is important to note that natural hazards are an integral part of human interactions with the physical environment; therefore, this survey was designed to ascertain the riverine community residents' perception of natural hazards education in schools, and the views of the students and resource users on the role of government in improving the awareness of natural hazards. The paper is therefore organized into five sections. The introduction is followed by the study area. The third section is the methodology. Results and discussion of findings form the fourth section, and conclusion and recommendations end the paper.

The Study Area

Bayelsa State is a special area, being the core of the Niger Delta Basin. The state is situated in the southern part of Nigeria. It is bordered to the west by Delta State, to the east by Rivers State, and to the south by the Gulf of Guinea. The topography here is generally flat and is criss-crossed by several rivers and creeks and about 80 percent of the entire state is liable to flooding. Located approximately within Latitudes 4° and $5^{\circ}30'$ North, and Longitudes $5^{\circ}15'$ and $6^{\circ}30'$ East, the state occupies a surface area of about 11,007sq.Km within the Equatorial Climatic zone. According to the Niger Delta Regional Development Master Plan (NDRDMP, 2001) estimates, the state has a population of about 1,992,000.

Methodology

In this study, riverine communities critically prone to flooding and erosion were purposively selected for the survey and the employed study schedules included secondary and primary data. While the secondary sources of data involves obtaining information from books and journals, the primary sources of information included field observations, interviews and questionnaire administration on resident household heads and students. For adequate representation and uniformity in sampling, the respondents were selected using the systematic random sampling technique in the designated towns and schools therein. For economy of time and resources, a sample size of three hundred and sixty respondents participated in the survey and these were drawn from eight communities on the basis of one community per Local Government Area; and forty five respondents per community with students inclusive. Structurally, the questionnaire was designed to gather information on the location, awareness, experience with and perception of natural hazards and related matters in the riverine communities.

The data sourced was qualitatively and quantitatively analyzed. Thus, appropriate descriptive statistical tools such as percentages and frequency expressed in tables was used to analyze the quantitative data. This involve the counting of number of responses to a particular question that brings to the fore the relative differences in options and that asserts the number of respondents that are for or against a given statement. The use of these statistical techniques helps us to summarize and describe our data (Baridam, 2001:123; Obikeze, 1986:6) in a manner that we would understand better their characteristics, similarities, variation, trends etc (Obasi, 1999:197).

Results and Discussion

Awareness and Perception of Natural Hazards

On the awareness of natural hazards in the riverine communities, the three hundred and sixty respondents who participated in the survey indicated awareness of the incidence of natural hazards as they were able to mention the occurrence floods, rainstorms, landslides, river-bank erosion,

tidal events and wave action along the coast. 85 percent of the respondents indicated a very high level of awareness of flooding and flood events as well as erosion in their communities. Besides personal experience of floods and erosion, the respondents and indeed the residents of the communities had also learnt about floods and erosion through the news media, the residents of the area and the local authorities.

The inquiry on how the residents viewed natural hazards revealed that 80 percent of the respondents in the survey opined that natural hazards are attributable to the acts of God as they are elements of the physical environment that are harmful to man but caused by forces extraneous to him. They were however, inconsistent in their identification of the most devastating events. In general, a small proportion of the respondents viewed the 1999 and 2010 flood events and the associated river-bank erosion as more devastating in recent times (Table 1). They also anticipated future floods and tidal events of greater magnitudes to prepare for.

Table 1: Residents' Perception of the Most Devastating Natural Disasters

Natural Disasters	Respondents	Percentage (%)
Floods	126	35.0
Rainstorms	81	22.5
Landslides	11	3.0
River bank Erosion	35	9.7
Tidal Effects	76	21.1
Wave Action	31	8.7
Total	360	100.0

From Table 1 it is evident that floods, rainstorms, river-bank erosion and tidal events are the most prevalent hazards experienced in the study area which have the potentials to be disastrous. All the events, however, have the propensity to cause inundation floods depending on their frequency, magnitude, speed of on-set and the extent of coverage. The mass media also emphasized flood hazards more than landslides and river-bank erosion in the riverine communities in Bayelsa State. The residents, as a consequent, perceive the state as flood-prone and an area with a very difficult terrain that impedes socio-economic developments.

A greater awareness of rainstorms and tidal events was particularly noticed among the coastal dwellers and this was further confirmed in the survey via oral interviews and observations. The residents indicated that rainstorms, tidal events and the associated wave actions erode the shoreline and the river banks rapidly in the coast and the tidal creeks in the area. The results of the survey may be related to the tendency of the mass media to emphasize flood hazards more than the other environmental hazards and risks in the area. Indeed, the mass media in the area reinforces the public's perception of flood hazards by frequently comparing observed floods repeatedly in the news with the 1999 flood events. The residents have therefore apparently developed a keener perception of floods in the study area.

In order to ascertain the residents' perception of natural hazards, the survey was extended to schools; and students of the senior secondary schools in particular, tertiary and vocational institutions were interviewed. Questions regarding the curricular were asked during the survey. The responses indicated that the residents' familiarity with natural hazards education programs in the schools were meager. When asked if programs on natural hazards in schools were adequate, 156 of the respondents in absolute terms (i.e. 43.3%) stated that they do not know; indicating the inadequacy of natural hazards education in schools.

Table 2: Perceived Adequacy of Natural Hazards Education in Schools.

Educational Status of Respondents	Adequacy of Natural Hazards Education in Schools			Total
	Yes	No	I Don't Know	
Informal	20	51	56	127
Secondary	18	30	45	93
Tertiary	40	45	93	85
Vocational	10	15	30	55
Total	88	116	156	360
Percentage	24.5	32.2	43.3	100

Several reasons could be further deduced to explain the wide spread lack of familiarities with natural hazards education in schools in the study area.

This ranges from the respondents' status of formal education in natural hazards in the local environment, and the respondents' occupation. Table 2 shows that the respondents with secondary, tertiary and vocational education were largely unaware of the adequacy of natural hazards education in schools in Bayelsa State. 32.2 percent of the respondents were unequivocally firm in their opinion of inadequacy of natural hazards education in schools while 43.3 percent simply stated, "I Don't know", indicating unfamiliarity with local education on natural hazards in schools and the general public. Similarly, about 317 (88.1%) of the 360 respondents who participated in the survey indicated having had personal experience with natural hazards; and in this case with floods, wave action and river-bank and shoreline erosion, were only slightly more familiar with natural hazards education than those who had not experienced extreme natural hazards. From the foregoing, it is quite evident that neither formal education nor experience (direct exposure to risk) impelled the respondents to become adequately familiar with natural hazards education programs in the survey.

The respondents were further asked, why, in their own opinion, instructions on natural hazards was lacking in the curricula in schools in the area. The responses ranged from, "I don't know, not important enough, inadequate staff, cost of training, cultural adaptation, to superstition". In all these responses, the "I don't know" response was the most common (Table 3). While some respondents assumed that the schools' curricular contained material on natural hazards, others feel that livelihood patterns and location in hazardous areas induced people to make incidental and purposeful adjustments to natural hazards, therefore, curricular development to this effect was not particularly necessary in the senior secondary schools. The responses further indicated that riverine and coastal communities in Bayelsa State experiences a very low incidence of very disastrous natural hazards and this has prompted a feeling that natural hazards are not important in the local environment. The residents were therefore apathetic about natural hazards education in schools in the area.

Table 3: Respondents' Explanation for Lack of Natural Hazards Training in Schools

Responses	Frequency	Percentage (%)
I don't know	141	39.2
Not important enough	34	9.4
Inadequate Staff	42	11.7
Cost of training	49	13.6
Cultural adaptation to land	68	18.9
Superstition	26	7.2
Total	360	100.0

The Role of Government

In order to assess the role of government in promoting natural hazards awareness and the development of educational programs in riverine and coastal communities, the respondents were asked for their opinion on the action the government should take to improve natural hazards awareness.

Table 4: Expected Governments' Action to Improve Natural Hazards Awareness

Responses	Frequency	Percentage (%)
Early warnings	61	16.9
Development of Educational Programs	125	34.7
Awareness Campaigns	40	11.2
Legislation/Policies	21	5.8
Land-use Planning	24	6.7
Nothing	38	10.6
Dredging/Shore Protection	21	2.8
Drainage Construction	30	8.3
Total	360	100.0

The responses on the perceived role of government in promoting natural hazards awareness in the riverine communities showed different expectations among the residents and this is presented in table 4. Expectations and suggestions on the development of educational programs on natural hazards and the methods of mitigation of same was by far the most common response as 125 respondents (34.7%) indicated this. Early warnings (16.9%) and awareness campaigns (11.2%) by radio, television and the print media were also suggested. 10.6 percent of the respondents however indicated that nothing should be done. These respondents were quite oblivious of the risk of the future hazardousness of their environment and the damage potentials of their locations, as proper assessments of their present location choices were not embarked upon.

Despite the expectations and suggestions made on the perceived role of government in promoting natural hazards awareness via education, the respondents were vague when asked to cite specific examples of what should be done in the face of natural hazards in their communities. The riverine and coastal community dwellers were unfamiliar with the existence of the National Emergency Management Agency (NEMA) as a leading federal agency for responding to natural disasters and planning to minimize damage from natural hazards. NEMA was formed in 2001; to reduce loss of life and property and to protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery. NEMA is mostly thought of in its role of providing financial and material relief to victims of federally declared disaster areas. However, as important as disaster relief is, NEMA also operates several programs to improve state and local planning efforts to prepare for disasters and minimize the loss of property and lives. In this survey, only 6.4 percent of the respondents identified NEMA as a government agency saddled with the responsibility to educate, inform and plan for disasters while 38.9 percent were unfamiliar with NEMA and her functions (Table 5).

Table 5: Perceived Functions of NEMA in Riverine Communities

Perceived Function	Frequency	Percentages (%)
Formulation of Hazard Mitigation Programmers	67	18.6
To educate, Inform and plan for Disaster	23	6.4
I Don't know	140	38.9
Identification of Hazardous Areas	50	13.9
Risk Assessment	60	16.6
Coordinate Local Agencies	20	5.6
Total	360	100.0

The fact that human settlement on hazard-prone areas is unrestricted in Bayelsa State and that the risk to lives and property remain, solutions must be proffered which must necessarily include educational programs adaptable to the communities in the riverine areas of the state. NEMA should, therefore, proceed to develop a general plan to encourage communities and businesses to co-operate in preparing for natural disasters and thus reduce property losses and loss of lives. NEMA should also co-operate with environmental organizations such as the Nigerian Environmental Study and Action Team (NEST), and the Ministry of Environment; and draw upon the Civil Defense Corps, the military and other organizations such as the National Orientation Agency (NOA), the Urban Development Authorities and other officials to educate residents of hazard-prone areas about natural hazards that may occur in their localities. To accomplish this, it is expedient that NEMA commits at least 2 percent of its annual budgetary allocation for training and education.

Studies in hazard perception (Smith, 1996; Burton, Kates and White, 1993; Saarinen, 1966; and Burton and Kates, 1964) in the 'Great Plains' has revealed that greater experience leads to heightened hazard perception. Acquiring experience with natural hazards, however, does not eliminate bias in risk-taking behavior (Slovic, Kunreuthier, and White, 1974). Furthermore reliance on experience as the means of acquiring valid hazard perception is risky because hazardous events may be widely separated in time.

Perception of natural hazards can perhaps be best acquired through education. According to Vitek and Berta (1982), although one's level of awareness of hazards can be raised by the mass media and interpersonal communication networks, hazard education in the senior secondary schools should be made mandatory. Without formal hazard education, a person is unlikely to acquire a little accurate perception of the extreme natural events in his local environment. Burton and Kates (1964) stated that faulty hazard perception is a function of human ignorance – ignorance developed over decades as human contact with knowledge of nature has gradually diminished. This ignorance can be expected to persist until the population is educated about hazardous aspect of the environment. Unfortunately, earth sciences and related subjects, the disciplines in which natural hazards are most likely to be taught, are usually only minor components of the curricula in the senior secondary schools in Bayelsa State, and Nigeria generally.

Conclusion and Recommendations

The interviews in the riverine communities indicated that the residents generally were deficient in their knowledge of the local natural hazards and were not familiar enough with the schools' curriculum to have an opinion on the adequacy of hazard education in the senior secondary schools.

Furthermore, although most respondents suggested that the government should develop educational programs to improve the public's awareness of the local natural hazards, they were, however, unfamiliar with the functions of the National Emergency Management Agency (NEMA) to educate, inform and plan for disasters. These findings agreeably support the conclusions reported by Vitek and Berta (1982) and Burton, Kates and White (1993). The organized human settlement patterns can be threatened by natural hazards, many of which are unpredictable in time or space. Since the interaction between people and the physical environment is inevitable, we need effective educational programs that will inform residents of hazardous areas on how to respond to emergencies in order to minimize losses and deaths. According to Smith (1996), reliance upon experience for information about hazardous events is unacceptably risky as they usually occur infrequently. As observed by Vitek and Berta (1982), instructions on natural hazards should be made mandatory in senior secondary schools. Adult education programs focused on natural hazards are needed as well for the post-school age population. Co-ordination of an adult education program on the local natural hazards prevalent in Bayelsa State and other flood-prone areas would seem to be a logical and worthwhile activity for the government's established National Emergency Management Agency.

Bayelsa State is largely a flood-prone environment. Though floods do not necessarily need to have disastrous consequences; local flooding sometimes disturb traffic or retains water for several days in yards and basements. However, in many homes or communities the water does not just stay in yards and basements but also inundate farmlands, and thus becomes a nuisance to the communities. This fact may be used to attract the local people to support proposed storm water drainage programs. Thus, every community in a flood-prone environment should be "flood-adapted", based on the acceptance of the fact that living in a floodplain must inevitably bring the consequences of sporadic flooding. Flooding adaptation necessarily requires public information and education. One of the most useful activities of public information is an active participation of the general public, officials and planners in information campaigns, tailored to the needs of the community. A variety of media can be used, such as the local radio and television stations, the Internet, newspapers, pamphlets and posters, schools and exhibitions. In local communities, the use of warning boards and different illustrations placed or distributed at community centers or main road intersections may prove to be the most efficient communication medium.

The messages are more easily believed when they are repeated on a regular basis and transferred to community members through channels they trust. According to Andjelkovic (2001), by disseminating the risk information, confidence and a sense of security among the people is established. The following messages should be included for effective information on local environmental hazards:

- ❖ What are the hazards?
- ❖ How will the hazards affect the communities?
- ❖ What are the vulnerabilities of the communities?
- ❖ How can the vulnerabilities be reduced?
- ❖ What damages can be expected?
- ❖ What actions are to be taken immediately after the disasters?
- ❖ How can the residents protect themselves in the face of disasters?
- ❖ Where are buildings in less vulnerable locations?
- ❖ Where are alternative food and water supplies if normal sources of supplies are disrupted or interrupted?

On education, while the public can be conveniently and efficiently educated on the magnitude, frequency, areal extent, the recurrence interval and mode of occurrence of the local natural hazards through workshops, hearings and seminars, the teaching and learning of the earth sciences and the development of appropriate academic curricula on natural hazards in the senior secondary schools will greatly enhance the correct perception of natural hazards in the local riverine communities in Bayelsa State if this is also strengthened by appropriate and necessary legislations.

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