

FLOOD RESILIENCE AND SUSTAINABLE DEVELOPMENT IN URBAN NIGERIA: INTEGRATING TRADITIONAL AND NON-STRUCTURAL METHODS OF MITIGATING AND ADAPTING TO FLOODING IN CROSS RIVER STATE, SOUTH-EASTERN NIGERIA (II)

RICHARD INGWE¹

Abstract. - **Flood resilience and sustainable development in urban Nigeria: integrating traditional and non-structural methods of mitigating and adapting to flooding in cross river state, south-eastern Nigeria.** We examined application of non-structural measures in addition to conventional structural approaches by Government Agency and community for flood management in Cross River State (Nigeria) at: regional-ambit and community levels. We used focus group discussion in depth interview, and observation methods to collect data from primary and secondary sources. Our findings include: emphasis on structural flood control measures by government agencies contrasted to use of rudimentary non-structural approaches by communities. Conceptual frames proposed for managing disasters include: emphasizing future climate change impacts based on multiple scales (temporal, spatial and societal) and emphasizing historical response to disasters without increasing the visibility of climate change. We conclude that community institutions, non-government/civil society organizations should lead public institutions in promoting flood resilience based on integrated non-structural to structural measures and show recent developments regarding civil society coalition committed towards promoting environmental governance in Nigeria. Frequent flooding associated with huge losses of lives and property in the study areas, as in most of urban Nigeria, persuade us to recommend that strategically placed civil society be supported by donor/funding organizations to promote integrated non-structural and traditional-structural measures to achieve urban flood resilience nationwide.

Keywords: flood, non-structural, structural, regional, community, Cross River State, Calabar.

¹ Institute of Public Policy and Administration (IPPA), University of Calabar, Calabar, Nigeria; and Centre for Research and Action on Developing Locales, Regions and the Environment (CRADLE), Calabar, Nigeria *emails: emails: cradle.africa@gmail.com ; Cc: ingwe.richard@gmail.com*

NON-STRUCTURAL APPROACHES OF CONTROLLING DISASTER RISKS

These do not necessarily involve construction of structures for controlling flood. Instead they might complement structural measures by developing and implementing some or all of the following: legal instruments (e.g. monitoring and enforcement of regulations), educational programmes management (e.g. awareness-raising on destructive potentials and impacts of disaster risks, provision of humanitarian services such as First Aid); behavioural changes by individuals (e.g. welding or fastening heavy furniture and appliances to the walls and floors of homes in earth-quake-prone areas) and so forth (Kelman, 2007: 2).

Other non-structural flood control measures, which have been proposed and documented by workers include: swift-water rescue evacuation of people with special needs, shelter development for disaster, community-based flood risk reduction, and flood disaster diplomacy and lessons from history (Kelman, 2008a, b). Recently, restatement of non-structural measures was compelled by devastation and huge losses arising from Hurricane Katrina, resulting from the tropical depression on 23rd August 2005, its movement northwards and transformation into the Category 1 hurricane called Katrina) on 24 August 2005, eventually making landfall on 29 August 2005 as categories 2 and 4 storms along the Louisiana-Mississippi border. Although the death toll resulting from the strong floods of the hurricane have been disputed, it was estimated that about 2,000 people were killed in the USA-the world's most economically and technologically powerful nation and largest democracy. However, the non-structural measures are useful for mitigation and adaptation to disasters generally i.e. whether they involve flooding or not. The frequency of their restatement by Kelman recently, twice in 2008 alone, is due to the lamentation that despite the knowledge about them before Katrina, they were ignored while the disaster was developing and making its round. Therefore, while the following definitions refer specifically to flooding, they were derived originally for disasters generally but are useful for flood management.

Local or community-based flood risk reduction

This refers to local level programmes that allow community members to participate in proactive preparation to cope with flooding and other disasters. It includes response, recovery as measures that are best suited to the locality or community. Its advantages include the fact that the community is better empowered to become independent instead of awaiting external assistance from higher tiers of government (such as provincial/state, central or national e.g. federal, and foreign, as well as donor agencies and organizations. The experience of most disaster-afflicted areas is that the external assistance has almost always arrived rather lately. It has been estimated that the arrival of external assistance has been

about seven to 14 days after announcement of the disaster. Contrastingly, community response is usually swifter: about three days i.e. 72 hours and provides a good basis for accessing external assistance, if necessary. It is becoming increasingly popular around the world including: Australia, Taiwan, Turkey, and USA. It has been described variously. Liseli-Bull-Kamanga and his colleagues have described it as locally-owned process of risk identification and priority setting for remediative action ((Bull-Kamanga Diagne, Lavell, Lerise, MacGregor, Maskrey, Meshack, Pelling, Reid, Satterthwaite, Songsore, Westgate, and Yitambe, 2003; Handmer and Wisner, 1999 and Hardoy and Satherthwaite, 1989).

Disaster diplomacy

This term suggests that flood, like other disasters, offers an opportunity for forging diplomatic relationships and cooperation with other nations or regions (e.g. governments at various levels: local councils, state, national and regional). It is suggested that friendly and beneficial relationships could be established with other states or political entities, which are capable of offering assistance and expressing sympathy over disaster occurrence in various ways. It is recommended that planning of disaster response strategies should include provisions for accepting external assistance for rehabilitation and reconstruction purposes (<http://www.disasterdiplomacy.org> cited by Kelman, 2008: 42).

Employment of shelter (structure) as a process rather than final solution

This refers to the use of a structural measure in a way that stresses that “shelter” (i.e. the structure), ought to be better applied as a process and one of several parts within the wide spectrum of actions required in flood control instead of its use as an object, which has attained the status of perfection in disaster management within the community endorsing the use of structural measures alone. Therefore, construction of buildings for all socio-economic and political purposes should proactively create facilities for serving as promoter of: health, weather-climate, in addition to conventional services. The Hurricane Katrina tragedy revealed that most houses that were devastated in the affected parts of the USA were those that were improperly planned and constructed (Kelman, 2008: 42-3).

People with special needs

During disasters, people who are emotionally attached to their relatives (including children, the ill or sick and physically challenged, pets and so forth) require special services and products. Their special needs deserve to be incorporated into community-based flood control measures. It has been reported that most deaths during previous disasters affected these category of people and creatures (Kelman, 2008a: 43 and 2008b).

Swift water rescue

This refers to technically complex measures involving salvaging people at risk of flooding or recovery of their bodies if they drowned. Community-based flood control programmes require this service in order to be more effective (Kelman, 2008a: 43-4). Although property recovery has been omitted this is an important aspect of flood control in very poor countries where the practice of insurance of property is by and large under-developed.

Applying instead of downplaying of historical knowledge and experience

There has been a repeated failure of human beings to learn from history of disaster response. This happened during the Hurricane Katrina to the extent that it has been suggested that it is wrong to speak in terms of natural disasters instead of human disasters arising from downplaying historical knowledge and experience thereby increasing peoples' vulnerability to disasters. Myths were created to explain the Katrina tragedy instead of acknowledging the human failure to proactively anticipate and plan towards the disaster (Kelman, 2008a: 44). This point has been documented by several workers (e.g. Hewitt 1983, Lewis 1999, Milleti 1999, O'Keefe 1976, Oliver-Smith, Blackie, Canon and Davis, 2004).

Flood control scholarship and literature has ignored frequent defiance of flood by poverty-stricken people in developing nations including Nigeria. Lack of alternative housing (i.e. buildings lacking necessary housing services and facilities) compels 'core poor' people to defy and live with flood. Owing to the practice of this form of response or circumstances in Nigeria and the study area, we included it (as one of the variables) in this study. The problem of poor housing in Nigeria has been profusely documented by scholars including 'Poku Onibokun and Richard O. Sule among others. The foregoing review shows that both measures of flood control have contributions to make. Therefore, flood resilience is achievable anywhere, including Nigeria, through integrating non-structural and structural methods.

Some factors that cause frequent urban flooding disaster

The literature has shown how several factors contribute towards worsening disasters (including frequent of flooding) in developing countries' urban centres. Frequent occurrence of disasters in the Third World have been attributed to several interrelated and complex processes including urban poverty, building of poor quality structures for use as residential purposes by the urban poor, exclusion of urban poor neighbourhoods from basic housing infrastructure and services (safe water, sanitation such as garbage disposal, proper drainage). Others are the exclusion of the urban poor from political and civil rights further extending the distance between them and privileged elite thereby making them more incapable of

demanding for improved economic and social conditions required for building better housing. Particular urban characteristics that cause frequent disasters (including flooding) include: concentration of large non-agricultural populations in cities and towns; operation of land pricing mechanisms in urban centres that pressurizes the poor agricultural population to involve in difficult quests for alternative livelihoods (different from agriculture) and increasingly building poor human settlements from their meager incomes; production and accumulation of large quantities of wastes by the increased and increasing density of concentrated human population; and construction of vast artificial urban surface areas-with concrete and sancrete- that are impermeable to surface waters (Bull-Kamanga et al, 2003; Handmer and Wisner, 1999 and Hardoy and Satherthwaite, 1989).

FLOODING: CONSEQUENCES AND MANAGEMENT IN NIGERIA

Catastrophic flooding in Nigeria and its adverse effects on large populations annually has been severally documented. For example, Ujah O. Chinedu reported that the number of people displaced and killed by flooding recently was as follows. Flooding in the north-central state of Kano in 1988 led to the displacement of over 300, 000 people. Similarly; flooding of Niger State (another north-central region) in 1999, led to displacement of over 200,000 people. In 2007, flooding displaced 5,650, killed 34 and contaminated open water sources used by poor people who cannot afford to protect their water sources. This disaster increased the vulnerability of the poor to affliction of other post-flood risks such as water-borne diseases, caused crop harvest losses due to damage it caused small peasant farm holdings and disruption of the planting season. The flood disrupted communication (movement of people) between people in the affected areas with others thereby preventing children from attending school to receive education, which is a well known means of reducing vulnerability to joining the membership of unemployment and poverty in future. Moreover, it was suggested that about a million people living in the nation's low lying plains of the River Niger are at risk. Flooding occurs annually and afflicts people living in parts of the country that are located in within the basin and adjoin areas including the tributaries of the River Niger including two thirds of Bayelsa state and half of Delta state. This leads to huge losses of lives and property.

Similarly, a large part of the southern coastal part of Nigeria is also within the low lying belt and therefore susceptible to the risk of flooding, This is the case with densely populated areas along the basin of the River Niger and its tributaries such as Bayelsa and Delta states, where two-thirds and half of the areas are routinely and regularly afflicted by devastating flooding for prolonged durations of as long as a quarter of every year. The resulting inundation of low-lying areas has

been associated with huge socio-economic and environmental costs: prolonged closure of educational institutions, markets, and other institutional activities for weeks in a row (Chinedu 2008: 37 citing the Emergency Events Database (EM-DAT), www.emdat.be, www.unisdr.org/eng/hfa).

Ogunpa River flood

Frequent flooding of areas around Ogunpa River, near Ibadan, one of West Africa's largest cities in south western Nigeria is the most notorious and well known in the country. The Ogunpa flood disaster has been reported to have occurred to various degrees of severity in several years (1956, 1960, 1963, 1978, 1980 and 1981). In pressuring Nigeria's Government to intervene, the Oyo State Government argued about its recurrence and pointed to the Ogunpa flood of 1980 as the most serious because it killed over 100 people, destroyed over 500 houses, and displaced over 50,000 people. It resulted from 10 hours torrential rain which exceeded the episode of 1978 (This Day News, 2004 cited in www.biafranigeriaworld.com).

Therefore, the disaster left a legacy of fear in residents around sectors of Ibadan city that are liable to flooding during the rains (www.allafrica.com). The Ogunpa flood of 1980 and 1981 destroyed forest along the river Ogunpa (Oguntalla and Oguntoyibo, 1982). The flood of April 1978 attracted public interest in assessing the effectiveness of the channel (a structural measure) constructed by Oyo state government) to control the disaster. A study of the flood revealed that the disaster affected 75 %of respondents while 41 %of them each lost property valued at =N=2,960.00. The flood was attributed to poor drainage, heavy rains, poor waste disposal involving dumping of refuse into the river basin and faulty design, construction of the drainage channel that was reportedly shallower that required and building of houses, structures and roads in violation of standard town planning regulations (Areola and Akintola, 1980). Nigeria's Government assisted the Oyo State Government in 1999 by awarding contracts worth =N=10 Billion for constructing another channel but the project completion scheduled for February 2003 was not achieved due to contractors abandonment of the project. Other losses arising from Ogunpa floods are as follows: displacement of over 1,000 residents, destruction of over 500 houses in the 1960 episode; killing of about 32 people and destruction of over 100 houses in 1978 (www.wikipedia.org).

Richard O. Sule attributes the frequent flood in most of urban Nigeria to the way owners of urban land and houses violate town planning regulations thereby undermining "master planning" and mocks master planning of towns. The violation results in poor housing, poor urban conditions resulting from unauthorized building of extensions to existing houses to accommodate increasing household population or for renting out to commercial operators thereby combining residential and other uses within one house, coexistence of houses that are not approved by town planning authorities with approved ones in cities. Others are building of houses on

drainage channels, areas susceptible to flood. These combine with heavy rains in southern Nigerian cities including Lagos, Ibadan, Calabar, Port Harcourt, Warri etc. Owing to these reasons especially rampant conversion of residential houses into commercial (and services) uses, he estimates that about 70% of southern Nigerian cities suffer flooding and inundation. His recent study of a sample showed that there was a high rate (74.5% of the total sample) of illegal conversion of residential land uses into mixed uses in Calabar city with the following equally high rates in different parts of the city ranging from 60 %on Chamley street, 72 %on Calabar Road, 80 %on Garden street and 85 %on Egerton street. There was also a high rate of illegal extension of existing houses by building additional rooms and/or structures for various uses: 53.3 %for strip accommodation, and 9.7 %for office spaces (Sule, 2008).

Disaster management by Nigeria's national government and its limitations

The recent establishment of a national agency for managing disasters by the name National Emergency Management Agency (NEMA) in has been hailed as an improvement over the previous public attitude of doing nothing about the annual recurrence of disasters. However, deficiencies in disaster management at the national level leading to its weakening include exclusion of issues related to disasters and emergency from Nigeria's supreme laws packaged as the 1999 Constitution of the Federal Republic of Nigeria, and the failure to allocate specific roles in the laws for the 774 Local Government Areas (i.e. local councils) as a means of providing some structure and direction for them to be involved in disaster management (Chinedu 2008: 37).

Flooding in Cross River State

Flooding has been frequent in Cross River State due to a combination of climatic, environmental, social and economic factors. Specifically, the poor human settlement (housing and urban) characteristics combine with heavy rainfall to cause frequent and damaging flooding in the state's urban and non-urban areas. In Calabar South Local Government Area, an area forming part of the capital city of the state, frequent and enormous flooding has been occurring around the staff quarters of the Cross River University of Technology (CRUTECH) and has been attributed by M.A. Isong, a surveyor, to the construction of a flood-control structure in form of a channel of dimension: width of 9 metres to 10 metres and 2m depth, stretching from Calabar Municipality in the north to Calabar South Local Government Areas. He adds that the disaster results from incompatibility between the large flood water volume accumulated over the long distance traversed within the structure and its rather small dimensions is the result of poor design planning without professional feasibility studies (Isong (1999: 34).

The Calabar urban region including two Local Government Areas (Calabar South and Calabar Municipality) is located adjacent the Atlantic Ocean and creeks and comprise low lying areas which are unsuitable for residential areas due to the susceptibility to flooding. Owing to high demographic rhythms, and rapid urbanization, poor urban characteristics residential areas created by mostly poor people who are seldom assisted by government with site and services designed to fill up the low lying areas in order to make them withstand the frequent flood. The recent climatic conditions of Calabar region include: high rainfall of 3,424.8mm in 1997 and humidity of 233.1mm in 2002 (National Bureau of Statistics 2006: 2-4) lasting several (frequently about four to 12) hours in a day translates into flood. Owing the disproportionately high proportion (about 79 per cent) of Nigeria's urban residents in slums, most of the Calabar urban region is under the category of slums. This adds to the coastal location of the city, high intensity of rainfall to cause frequent flooding which is almost always reported in both academic and popular literature. In conformity with the views documented in the literature (e.g. UNEP 2007, (Bull-Kamanga et al, 2003), public enlightenment programmes of the Calabar Urban Development Authority (CUDA), i.e. the state government agency responsible for managing urban environmental sanitation constantly attribute the frequent flooding to obstruction of several open (road) drainage channels due to the way people fill them up with non-floatable, immovable waste matter leading to overflow of the water and flood. Residents of these low lying areas seem to experience flooding almost every time it rains and the cultural features of the urban areas block free flow of flood waters (CUDA, 2007).

Methods and data

We used the method of descriptive case study. This method of description has been considered suitable for a study of this type. It is good for investigating relatively new and/or ignored issues. It is a means of providing initial findings generate hypotheses that could employ more sophisticated quantitative methods (Oguniyi, 1991). The methods of gathering data that were used include focused (group) discussion, in-depth interview, observation and desk research in Cross River State. The subjects of our focused group discussion and in depth interview of residents of frequently flooded residential area and functionaries of the Emergency Management (Response) Agency of the Cross River State Government (CRS-EMA) based in Calabar (the capital city) but working through out the state. The type of flood control measures used was studied both at the public sector and community settings or sectors and at the regional-ambit-level of the Cross River State and localized level of the Calabar city-region. To study the community level use of integrated non-structural and structural measures, we selected the most flooded part of Cross River State for studying the application of integrated non-structural and structural measures of controlling flood because the higher intensity

of flooding disaster in such an area should naturally challenge the various stakeholders (residents, public authorities e.g. Cross River State Emergency Management Agency (CRS-EMA) and so forth) to find the most effective solutions to the challenging disaster. Moreover, Nigeria's public agencies including the CRS-EMA, habitually report claims of implementing effective programmes such as disaster responses only in the media without actually and practically doing so. Our use of desk research and review of the literature on environmental management assisted us to find the most frequently flooded part of the region from, which highlighted the most frequently flooded area to be: Palm Street and staff quarters of the Cross River University of Technology (CRUTECH), in Calabar South Local Government Area, Cross River State.

Our decision to use a combination of data from primary and secondary sources was a strategy designed to appropriately address various subjects, stakeholders and issues, which could not be tackled by homogenous data or approaches. To study community flood resilience measures, we collected primary data comprised our undertaking of in-depth interview of residents of the study area was conducted soon after the recent (7 July 2009) flooding of some parts of the city, when flood frequently submerged residential buildings up to their windows thereby destroying property valued at several millions of US Dollars (Nigerian Chronicle 7-10 July, 2009). While this recent flooding provided an opportune time for our data collection because it aroused the willingness of the respondents (people most afflicted and affected by the disaster) to respond to our questions and requests for discussion, our data collection instruments were purposely designed to elicit historical data covering floods of the current rain-flood season to those that occurred previously up to about 20 years as long as the respondent could recollect.

Secondary data use involved review of multiple-source literature on flood control by government agencies established and mandated by Federal and State Governments to respond to flooding and disasters in the study area. They include: the Emergency Management Agency of the Cross River State Government and the Cross River Basin Development Authority of the Federal Government of Nigeria. As stated earlier, this study assessed integrative use of structural and non-structural flood management measures in Cross River State. Under "non-structural measures, we assessed the following issues: development of community-based flood risk reduction; development and use of 'disaster diplomacy'; application and implementation of flood shelter; programmes for evacuation of flood victims generally and people with special needs and swift water rescue. Regarding 'structural measures', we assessed: the use of awareness-raising programmes on flood disasters; humanitarian programmes (e.g. First Aid); and behavioural changes (e.g. protection of household property in houses using locally improvised or devised techniques and so forth).

Issues emphasized in data collection

The subjects of interest of our data collection from primary (focused group discussion and in depth interview) and secondary sources included two broad measures of strengthening flood resilience:

First, the nature of community-based flood resilience programmes and institutions: questioned the nature or characteristics of community flood mitigation and adaptation programmes and institutions that have been in existence and have been used in the area, and their degree of emphasis of structural or non-structural approaches. Second, the extent of application of non-structural measures by government, community, civil society) were explored. Under the broad category of the integration of non-structural measures, we emphasized in the study of the community measures, we explored the following aspects including their underlying temporal, operational, spatial characteristics.

To what extent has flood disaster diplomacy been applied by vulnerable /affected community?

Has flood shelter been undertaken by any of the stakeholders? Where? When? How? Have flood shelter been practiced?

Do “special strata” of the population of communities vulnerable to flood get evacuated when the disaster occurs? Where? When? How?

Has Swift-water rescue measure ever been applied to save lives and property in the most vulnerable areas?

Have formal educational (awareness-raising) programmes designed to strengthen flood resilience ever been organized or implemented? When? Where? How?

Have humanitarian services ever been undertaken to enhance flood resilience? Where, when and how and who implemented it/them?

What behavioural changes have been undertaken as part of flood resilience in the study area? What are specific features of the behaviour change? Who plans and implements them? Where (outdoors or indoors (?)) and how are they implemented?

Have legal instruments been developed and applied as means of protecting victims of flood disasters?

To what extent has extreme poverty compelled people most vulnerable to flood to defy the disasters? How does this happen? Who (what are the characteristics) of the people involved?

Government agencies’ emphasis on structural flood control measures

Emphatic reliance on structural defences against flood has characterized flood management in Cross River State generally and in Calabar city in particular. Evidence of this includes construction of open channels designed to drain flood

waters from various parts of the region. In Calabar city, one of the largest the channels stretches from Calabar Municipality in the northern part of the city-region to the south. The failure of these structural defences due to poor design-planning, construction and the adverse impacts on residents of the staff quarters in the Cross River University of Technology (CRUTECH) in Calabar South Local Government Area has been documented. They include: destruction of several lives and property valued at millions of US Dollars since the construction of the largest channels about 18 years ago (Isong, 1999: 30-37). Additionally, construction of structural measures to control flooding is one of the five actions or responses of the Cross River Basin Development Authority (CRBDA), one of the 12 of Nigeria's public agencies for river resources environmental management responsible for the region. The CRBDA does not employ non-structural measures. Recent reports of the CRBDA shows that only structures for flood (and erosion) control were constructed in about nine locations in the state and environs (neighbouring Akwa Ibom State). They include: Federal Inland Revenue office, Calabar; Ikot Effanga, Ikot Omin and CR Basin town, Calabar. In Akwa Ibom state, they include: Ikot Edeor Flood and Erosion Control Works in Onna, and Ikot Mbiet Ukpom Ikono Soil Erosion and Flood Control Works (Cross River Basin Development Authority, CRBDA (CRBDA, 2007: 12 and 24). Nowhere in the above report was the use of non-structural measures stated. This is evidence to show that they were ignored by the CRBDA.

Flood management in Cross River State

Implementation of flood resilience by the public sector (contrasted to community) management and control of flood and related disasters in Cross River State is the responsibility of specialized government agencies. First, Cross River Basin Development Authority, an agency established and funded by Nigeria's Federal Government is concerned with physical implementation of construction works and structural measures. This is elaborated elsewhere in this paper. Second, the Emergency Management Agency (EMA-CRS), an agency established and funded by the Cross River State Government is concerned with responding to distress calls and reports of disaster occurrence in the state. Its features are similar to those of the national counterpart (EMA) funded by the Federal Government of Nigeria. The EMA-CRS mostly provides material and financial assistance to victims of disasters including flood after a report of the disaster has been received or the event is observed/noticed by staff of the agency. The Cross River State Government has complemented the efforts of the Federal Government (represented by the Cross River Basin Development Authority) by creating and deploying flood control agencies (frequently on ad hoc basis) to undertake specific projects and programmes designed to respond to flood disaster.

Application of rudimentary non-structural measures by communities

The findings of our in-depth interview of residents of the most flooded area of the state (Cross River University of Technology staff quarters) showed as follows:

Community-based flood management programmes have involved undertaking of non-structural measures but in a rather rudimentary ways. It involved building of structures such as smaller channels and balconies designed to convey floodwaters out of residential areas that are submerged in order to prevent flood from encroaching into them.

Flood disaster diplomacy has also been undertaken in rudimentary ways in form of appeals by CRUTECH staff including administrators of the institution to functionaries of the State Emergency Agency (CRSEMA).

Flood shelter has not been undertaken in a satisfactory way because building of new houses in the flood-afflicted areas seems to have stopped as new buildings are being increasingly constructed elsewhere without the intensity of flooding experienced in the old staff quarters. This is because more suitable land (i.e. without serious flooding) seems to be found elsewhere for new buildings that bear the same designs as those that have been allowing flood to devastate them in the quarters and environs.

Evacuation of flood-afflicted people out of flood susceptible or prone areas occurred through abandonment of houses in the flood susceptible areas thereby leaving some houses to be uninhabited since 1991.

Swift-water rescue is, by and large, unknown or practiced in rudimentary and informal ways. Informal practice of swift water rescue is performed by outstandingly courageous and agile individuals (artisanal fisher-people, traditional swimmers/divers and so forth) who may rarely possess/receive formal training in “amphibious” techniques.

Formal educational (awareness-raising) programmes have never been organized or implemented.

Humanitarian services have been rather informal, small-scale, restricted to sympathetic and empathetic gestures, visits and donations by persons and organizations with close ties (family friendship, religious and other forms of relationship) with people who are affected by flooding.

Behavioural changes have manifested in form of adjustment to housing furnishing and equipment. For example, in the bid to avoid destruction of property, residents of flood afflicted areas have resorted to removing or displacing house furniture and equipment (carpets, mattresses, water-absorbing items, and so forth) to places of high elevation within (e.g. shelves, cupboards, etc) or without residential buildings. A very interesting innovative-solution is sand-filling of frequently over-flooded and submerged water closets, with sand-bags.

Legal instruments for protecting victims of flood disasters seem to be inexistent or poor designed and implemented nationally and in the study area. This reflects the generally low level of development and practice of the rule of law and legal protection of citizens (apart from the elite) in Nigeria and the state. The seriousness of inequality, injustice to the poor majority (about 70-90 percent) of Nigerians has been profusely documented (e.g. Aguda, 1988).

Defying flood by poverty-stricken people was common in the areas studied. In CRUTECH quarters, there have been several cases of people (including families) who are compelled to remain in flooded apartments and buildings and actually continue to sleep on raised or adjusted “beds”, cooking and other household facilities because of lack of alternative houses or buildings. Flooding happens to be one out of several adversities (e.g. lack of housing services: electricity, safe water, sanitation, police security, space, among others) that these poor people have to defy. One of the respondents, who has been a victim of series of flood events in CRUTECH residential quarters, described the incredible defiance exhibited by a woman working as a junior staff of CRUTECH, whose salary was below the poverty line (about US\$50 per month). Owing to the poor salary earned by the woman, she had to share the domestic staff part of the senior staff residential buildings that had to be abandoned by the senior staff who was to reside in it due to recurrent and serious floods. Irrespective of the rising of flood waters to submerge the floor of the abandoned building, the poor woman and her daughter defied the dangers and continued living in the building! To move around the building, the poor woman and her child placed indissoluble materials (wood, waste metals and rubber) at various points on which they stepped!

Discussion

Recent reports of improvement in flood management in Nigeria at the national level occurred through the establishment of the National Emergency Management Agency (NEMA) for addressing disasters generally. NEMA is striving to adopt five priorities embedded in the Hyogo Framework for Action, HFA (www.unisdr.org/eng/hfa). Public disaster management at sub-national levels (i.e. 36 states, Federal Capital Territory, and 774 Local Councils) has been performing poorly in terms of managing flooding. Disaster victims are rarely adequately compensated or if they are, delays occur and conditionality (such as loyalty to the ruling political party, among other strenuous obstacles) is imposed on the suffering people in the process. Flood victims especially those with special needs are rarely evacuated. There are no facilities, programmes, infrastructure and services for implementing evacuation. Frequent disasters perpetuate poverty and problems pertaining to socio-economic development in the near absence of legal instruments for disaster management. The law establishing NEMA and Nigeria's 1999 Constitution failed to specify disaster management responsibilities for states, Federal territory and local councils (Chinedu 2008: 37). The disaster diplomacy

employed is not very participatory because it does not involve direct involvement of people affected by flood in the process of resolving their problem in ways that they best understand.

Why use of structural measures has achieved privileged status in the region

Our findings that structural measures have been emphasized in flood control in Cross River State suggests that it is also applied in most of Nigeria's 36 states afflicted by the disaster due to several reasons. The Federal Government agency (the Cross River Basin Development Authority, CRBDA), which applies structural measures in the state is one of 12 counterparts (River Basin Development Authorities) which were created almost simultaneously to address similar problems encountered by most of the nation's river basins. Second and arising from the foregoing, the ecological problems including flood disasters that have been afflicting Cross River State also applies to most of the nation's river basins especially those located in the southern and coastal Nigeria, where Cross River State is located. Third, the literature cited in this paper show that the application of structural measures for flood control has been predominant (a kind of the 'paradigm') in the fields of disaster management globally. Therefore, its emphatic use by one of the 12 River Basin Development Authorities responsible for flood management in the study area demonstrates that it is most likely to be applied by the others due to their training in similar institutions and during the same "era of knowledge" of structural measures. Fourth, national institutions in Nigeria are customarily created based on homogenous characteristics especially reflection of an officially recognized principle called "national character" involving people originating from all the tribal groups that form Nigeria as staff of government ministries, departments and agencies. Fifth, part of the application of the paradigm of structural measures of flood management is the sharing of the method, like others, among all institutions that are concerned with a specific problem. Therefore, the use of structural measures by the CRBDA in Cross River State is most likely shared among peers (other River Basin Development Authorities) in the country especially those operating within the Niger Delta covering nine states and Nigeria's southern coastal areas.

Nigeria's Minister of Environment recently attributed the cause of frequent flooding in Nigeria to the way people cause obstruction of open drainage systems by dumping refuse such as polyethylene bags remnants of potable water wrappers (sachets) that are commonly drunk by the poor people. This type of flooding was reported to occur across most of the coastal cities of southern Nigeria including Lagos in the south western, and Port Harcourt in the south eastern end, which is near Calabar (the study area) www.AllAfrica.com 2008). This confirms the results of flooding of other urban centres in Nigeria and Africa (South Africa, Ghana, and so forth) associated with health hazards (Bull-Kamanaga et al, 2003).

Conclusion

This study has drawn attention to the need for innovations including integration of non-structural measures to improve flood resilience in Nigeria. Urgently required are: policy change focusing on the integrative use of non-structural measures to complement traditional (structural) approaches and community empowerment with knowledge, ideas, material and funding to deepen their use of the non structural measures to achieve flood resilience. The result also show that flood resilience in Calabar urban region and its local councils, Cross River State, like most of Nigeria has been poor. This has happened despite frequent floods. Public sector flood management at the various regional levels over-relies on structural measures and ignores, downplays and misunderstands the huge benefits of non-structural approaches and performs below the Hyogo Framework for Action standard. The channel constructed to resolve flooding in Calabar city turns out to aggravate flooding due to its poor design-planning and construction. Contrastingly, community-based flood management employ non-structural measures but is hampered by inadequacy of resources (funding, skills/knowledge etc) due to the dominance of Nigeria's economy by the public sector, which over-relies on export of petroleum oil and gas for deriving national revenue. We recommend that there is ample scope for Nigeria's civil society to draw from its knowledge, skills, experience and networks to improve flood management in the study area and country. This should strive towards integration of structural measures with innovative non-structural approaches and partnerships among various sectors (governments, civil society, communities, faith-based organization among others). Flooding aggravates gross inadequacy of housing in the areas studied.

Civil society's role in integrating non-structural measures to promote flood resilience in Nigeria

At global level, civil society has been credited with promoting environmental governance by increasing the number of stakeholders (community, private sector, in addition to governments-which dominated hitherto) participating in decision about environmental issues. Well documented are success stories of civil society's innovative resolution of problems of sustainable development generally, and environmental-ecological restoration in particular. A significant outcome of the civil society-engineered environmental governance is the increasing "voice" of the other stakeholders that have improved the quality and participation of stakeholders in environmental decision making (WRI, UNDP, UNEP, and World Bank, 2003: 65-88). While the role of Nigerian civil society in local environmental governance may not have increased as desired or commensurate with the enormity of problems afflicting the local environment, and the pioneering mass movement by the Ogoni's campaign against environmental degradation by petroleum oil producing companies (Handmer and Wisner), recent developments

indicate increasing appreciation of their role in improving flood resilience in the country. This was recently reflected in the coalition of civil society to increase their “voice” in environmental policy and decision making in form of a national coalition of civil society organizations committed to promoting environmental governance namely: The Access Initiative (TAI) Nigeria. The credibility of TAI-Nigeria is founded on its membership of global coalition of civil society called The Access Initiative (TAI-Worldwide) hosted by the Washington, D.C-based organization called the World Resources Institute (WRI). The TAI global network and their concentration on meritorious promoting environmental governance recommended for “adaptation to future climate change” concept of responding to disasters (Adger, Arnell and Tomkins, 2005) and also endorsed by international organizations (UNDP, UNEP, World Bank and WRI, 2005). The global network is currently operating in nearly 50 countries worldwide. The TAI Nigeria is also in the membership of the African Regional The Access Initiative (TAI-Africa) (www.theaccessinitiative.org, www.wri.org, www.acode.org). Moreover, TAI Nigeria’s leading civil society partner (the Centre for Research and Action on Developing Locales, Regions and the Environment, CRADLE) is experienced in disaster management partnership with the International Sociological Association, flood professionals and so forth. The Access Initiative (Nigeria) provides a sound foundation for promoting flood resilience under the ongoing environmental governance work in Nigeria. Moreover, the TAI methodology involves compelling Nigerian civil society organizations to work and engage with multiple stakeholders (local communities, publics, and so forth) provides a good basis for assisting the stakeholders through capacity building on non-structural flood management and their integration into existing structural flood management programmes.

The suitability of TAI Nigeria in promoting flood resilience in the country is the strategic placement of the civil society to draw skills, knowledge, experience, and human capital from its global partnership with local communities, and also learning from other continental regional coalitions which have in addressing flood and disasters. Moreover, the TAI methodology has been standardized to hold governments accountable for failure to promote publics’ access to information, justice (redress), public participation and capacity building. With these resources, TAI Nigeria holds promises to assist in coordinating efforts made by other stakeholders (government agencies, businesses and communities) to promote flood resilience as it has promoted environmental governance in nearly 50 countries around the world. The frequent flooding of CRUTECH staff quarters raises to high pedestal the urgent need for government ministries, departments and agencies to hearken to advice of civil society when a wrong choice is made of sites for development into residential areas. Promotion of flood resilience requires prompt engagement of civil society with government agencies to understand and assess the suitability and appropriateness of residential areas choices in order to avoid flooding in future.

Proposing the role of donor agencies in promoting flood resilience

The foregoing conditions especially the enormity of flooding and related disasters and the creation of a national civil society coalition (The Access Initiative) provide potentials on which donor and funding organizations should contribute towards promoting flood resilience in Nigeria, where flooding has historically devastated large vulnerable populations. Donor and funding organizations should appreciate and exploit the multi-stakeholder partnership provided by the TAI methodology and be assured that funds donated would be applied to flood resilience activities required by communities where the impacts are most acute. The enormous adverse consequences of flooding in Nigeria require the foregoing collaborative approach between civil society and various international governmental and funding organizations. For example, the United Nations agencies (HABITAT or United Nations Centre for Human Settlements, UNCHS, World Bank, among others) have mandates in improving residential areas and economic conditions.

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