Managing the Urban Environment in a Developing Country: The Ogunpa River Channelization Scheme in Ibadan City, Nigeria*

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A disastrous flood in Ibadan City, Nigeria in April 1978 aroused public interest in the Ogunpa river channelization scheme which had earlier been embarked upon by government. A questionnaire survey of 399 residents near the river was designed to examine three issues: (a) the losses sustained and the people's reaction to and perception of the causes of the flood; (b) their perception of the present and future uses of the river; and (c) their perception of the prospects of the channelization scheme.

The results show that about 75% of the respondents were affected by the flood; 41% each lost property worth about ₦2960.00. Yet, many could not hope to move out of the flood zone mainly because of shortage of residential accommodation in the city. The factors given as being responsible for the flood were poor drainage, heavy rains, refuse disposal in the river, shallowness of the river channel and the unplanned layout of streets and buildings. Indeed, the major use of the river has been as a refuse dump, so that it is heavily polluted. Many respondents would like the river to be reclaimed to alleviate some of the socioeconomic problems confronting them. Recreational use of the river was not much considered. Majority of respondents thought the channelization scheme would bring some benefit. But, they are sceptical about its lasting impact unless it is done within the framework of a comprehensive programme of urban land management and protection and the improvement of living conditions in the city.

Introduction

Ibadan City, the capital of Oyo State in south-western Nigeria, has experienced a series of floods in the last 20 yr. The Ogunpa and Kudeti streams which run through the city, overflowed their banks in 1955, 1960, 1961, 1963 and 1969; and have done so every year since 1970. The most diastrous flood, in terms of loss of life and property, occurred on April 22, 1978.

Ibadan City spreads over the strongly undulating plains and the quartzite hills and ridges of the Ogunpa river basin. The appreciable relative relief, the fairly steep gradients, the numerous drainage lines and the generally light sandy loam to sandy clay-loam soils, give the area a high potential for runoff generation and sediment yield (Areola and Ofomata, 1978). The city has expanded rapidly in recent years in apparent disregard of the physical conditions of the terrain. Indeed, one of the immediate causes of the April 1978 flood was the clogging and reduction in the hydraulic capacity of the Ogunpa river channel by the huge quantity of sediments washed down the Premier Hotel hill from the building site of the Cultural Centre (Fig. 1).

The response of the state government to the flood of April 1978 was to step up work on the channeling of the Ogunpa river which was already in progress. The

scheme had been recommended by consultants appointed by the World Health Organization to examine the problem of wastes disposal and drainage in Ibadan City (Maclaren International, 1971). The consultants noted that the capacity of the rivers in the city to contain flood flows had been decreasing over the years. The reasons given for this were:

1. The accumulation of solid wastes and debris increases the roughness of the channel and thereby reduces the hydraulic capacity. This also contributes to the occasional clogging of culverts and bridges.
2. The growth of grass and weeds in the channels also decreases the hydraulic capacity.
3. Some bridges and culverts built over the streams have insufficient hydraulic capacity.
4. There has continued to be considerable construction of buildings within the flood plains.

The Ogunpa channelization scheme involves, primarily, the deepening of the channel, the strengthening (concreting) of the channel walls, the construction of bridges and culverts of sufficient hydraulic capacity and the clearance of the flood plain of buildings and other structures which may obstruct the smooth flow of runoff. The project was embarked upon by government without public participation. But, since the flood of April 1978, the project has generated considerable interest among the people. Hence, a questionnaire survey was designed to sample people's opinion, not only about the channelization, but also, about the use of the river within the city.
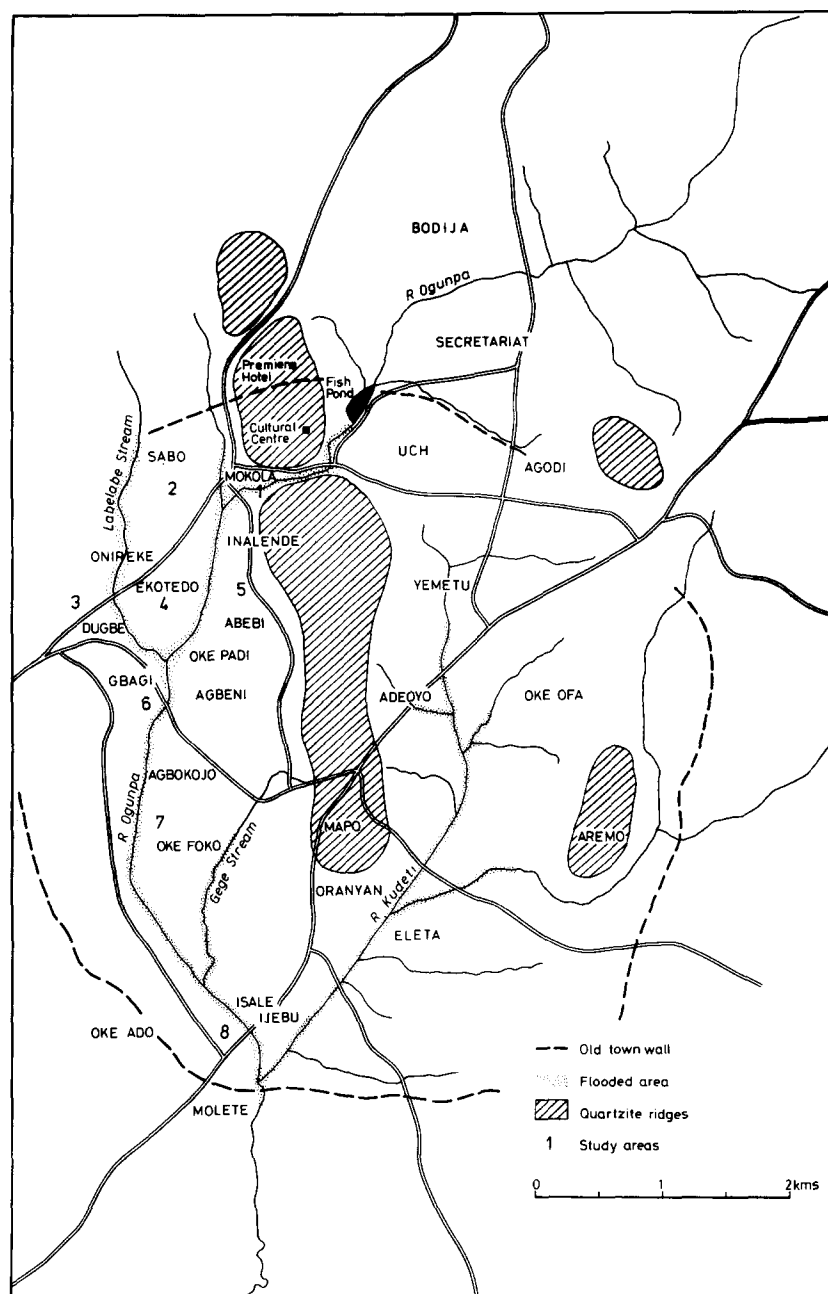
Fig. 1.

The study

The questionnaire was designed to cover three main issues. The first concerns specifically the flood of April 1978. The survey sought information on the people's reaction to the flood; the losses sustained by those affected by it; and the people's perception of the causes of the flood. The second issue relates to the usefulness of the river to the inhabitants of the city both now and in the future. Finally, questions were asked on the channelization scheme itself and the benefits to be derived from it.

The questionnaire was administered to people living or working close to the river throughout its length within the city. Eight zones were delimited along the river; the number of persons interviewed in each zone

varied from 46 to 56. Thus, a total of 399 people were interviewed. The interviews were conducted by second year University undergraduates.

The respondents

About 69% of those interviewed were male while 31% were female. They were people of different social status including artisans (26%), civil servants (18%), traders (43%), students (6%), teachers (5%) and military personnel and the police (2%). Only 2% of those interviewed were not gainfully employed. The vast majority of those interviewed were in the age group 18-45 yr (Table 1). Table 2(a) shows that the majority of respondents (63%) came to Ibadan in the last 20 yr or so. About 38% have resided near the river for 5 yr or less while about 34% have been living or working near

the river for 6-10 yr (Table 2(a)). Not all of these people were affected by the flood of 1978; about 25% of them were not affected in any way.

Table 1. Age distribution of respondents

Age group	% Respondents
Under 18 yr	3.5
18 – 45	74.7
45 – 65	18.8
Over 65	3.0

Table 2(a). Length of stay in Ibadan City by respondents

Years	% Respondents
No response	1.8
1 – 10	36.8
11 – 20	26.6
21 – 30	17.5
31 – 40	8.5
Over 40	8.8

Table 2(b). Length of stay near river Ogunpa by respondents

Years	% Respondents
1 – 5	38.3
6 – 10	33.9
11 – 15	9.3
16 – 20	9.2
Over 20	8.3

Results and discussions

The flood of 22 April 1978

About 75% of those interviewed were affected by the flood: 35% suffered nothing more than the mere inundation of their apartments but about 41% lost their property. The estimated values of property lost varied very widely from ₦6-90000. It was not possible to ascertain the accuracy of the figures given by the respondents; the figures may have been inflated in some cases. The mean value of property lost is about ₦2960 per individual, but there is a great deal of variation as Table 3 shows. For example, about 22% of the people lost property worth only ₦500 and less, giving an average of about ₦250 per peson. A further 10% are in the ₦500-1000 range. The heavy losers were few but the sums involved were very large, ranging from ₦10000 to 90000. In this group were the traders and shop-owners in the commercial zones of Dugbe and Gbagi (Fig. 1).

Table 3. Estimated values of property lost to the flood, 1978

Category of losers	% Respondents	Average loss (₦)
Unaffected/no loss	38.3	—
₦500 and less	21.6	250
₦501 – 1000	10.3	792
₦1000 – 2500	13.0	1490
₦2501 – 5000	10.3	3610
₦5001 – 10000	3.2	6725
Above ₦10000	3.3	27800
	100.0	2960

Asked about what they thought were the causes of the flood, the five most frequently mentioned causes were, in order of importance, (1) poor drainage system in the city; (2) heavy rains; (3) refuse disposal into the river; (4) shallowness of the river; and (5) unplanned layout of streets and buildings (Table 4). Those who provided answers to the question were rather few. But, the responses are quite revealing since the answers were not precoded but the respondents were left free to give their own views. They show a fairly high degree of awareness of the gamut of factors leading to excessive river floods in the city. All the five factors are interrelated somehow. In particular, the poor drainage system in the city is partly due to the irregular and confused arrangement of the buildings and streets.

Table 4. Perceived causes of the flood by respondents

Causal factors	% Respondents
Poor drainage system	30.8
Heavy rainfall	10.0
Waste disposal in river	4.8
Shallow river	0.8
Unplanned layouts	0.8

Majority of those interviewed (about 73%) thought the flood could occur again. Yet only about 35% intended to move out of the areas liable to flood. Table 5 gives the reasons adduced by the people to support their decision not to move out. Difficulty in finding alternative accommodation in the city appeared to be the most important constraint on movement. Indeed, shortage of residential houses is a major social problem in Ibadan as in most large urban centres in Nigeria. The traders, shopowners and craftsmen made up a substantial proportion of those unwilling to move because of their long attachment to the area. Many of them felt they had taken adequate precautions against subsequent floods. It is more likely that these were swayed more by economic considerations; they would not want to lose their shops and customers.

Table 5. Reasons why respondents do not want to move out of the flood zone.

Reason	% Respondents
No specific reason	18.5
Happy to be living here	1.8
Not affected by the flood (1978)	13.8
Difficult to get alternative accommodation	19.0
Long attachment to the area	5.0
Have taken precautions against future floods	6.8
Proportion not moving	64.9
Proportion of those moving	35.1
Total	100.0

Use of the river

Each respondent was presented a list of possible uses of the Ogunpa river and asked to indicate the ways in which the river had been useful to him. The results are indicated in Table 6. Many said the river had not been of any use to them! The river has been used mostly as a refuse dump! It is likely that rather than confess to dumping refuse into the river many people chose to say that the river had not been of any use to them. In a sense this may be true; afterall refuse dumps are not regarded as of much consequence among most Nigerians. What is

clear from the information on Table 6 is that the Ogunpa river has not been of much value to the city whether socially, economically or in terms of aesthetics. Even the 13% who indicated that they used the river for recreation, also said that this was merely in form of sight-seeing. Very few people ever fish or swim in the river.

Table 6. Uses of river Ogunpa by the residents

Use	% Respondents
Waste disposal	37.8
Recreation: Swimming (0.7%)	13.0
Picknicking (1.3%)	
Sight-seeing (11.0%)	
Water for construction purposes	6.5
Watering gardens	5.0
Washing clothes	4.0
Car wash	2.3
Fishing	2.0

The factors responsible for the low value placed on the river by the inhabitants of the city are listed in order of importance in Table 7. The dirty and unhealthy river environment is the most important factor judging from the first three items on the table. Akintola and Nnyamah (1978) have confirmed empirically that rivers in Ibadan City are heavily polluted. But the level of pol-

Table 7. Factors responsible for the poor usage of the river

Factors	% Respondents
Dirty, polluted water	48.4
Bad odour	27.3
Mosquito infestation	16.8
No open space along river	7.8
Shallowness of river	7.5
Seasonal flow of river	5.5
No access route to river	0.8

lution varies with land use. The rivers are most heavily polluted in the commercial zones; in the high density residential areas and in the traditional core of the city. In the commercial and traditional areas, as Table 8 indicates, the dissolved oxygen in the water is only 0.25 and 0.20 mg/l. respectively. Akintola and Nnyamah attribute the high level of pollution in these areas to the dumping of solid wastes, garbage and sewage in the rivers.

About half of those interviewed were so despondent about the Ogunpa river that they could not see it being of greater use to them in the future. The damages of the last flood probably accounted for this mood. However, half of the people interviewed believed the river could be improved and made to contribute positively to the social and economic life of the city. But there was a wide divergence of opinions as to what purpose the river should be developed (Table 9). However, it is clear that the people considered this point from the perspective of the major socio-economic problems confronting them in the city. These are the problems of food and water shortages, sewage and wastes disposal. The practical problems of harnessing the river in such a heavily built-up area, for domestic water supply appeared not to have been considered; the struggle for survival in the city was upper-most in the people's minds. The aesthetic and recreational value of the river is only a secondary consideration.

Table 9. Suggested purposes of river improvement programme

Purpose	% Respondents
Domestic water supply	23.8
Market gardening	24.6
Sewage	20.8
Waste disposal	13.3
Recreation	14.5

Table 8. Land use and surface water pollution in Ibadan City (from Akintola and Nnyamah, 1978)

Parameters	Low density housing	High density housing areas	Tradi-tional core	Commer-cial zone	Agric. zone	Indus-trial zone	WHO limits
Acidity	0.00	40.00	15.80	83.80	147.80	60.00	—
Alkalinity	118.80	19.30	114.00	27.50	0.00	75.50	—
Chloride	2.00	3.65	4.50	4.00	5.30	5.80	200.00
Colour (Hazen unit)	102.00	209.00	630.00	546.00	135.00	130.00	2 hazen unit
Copper	0.03	0.04	0.19	0.21	0.05	0.01	0.05
Fluoride	5.60	19.20	28.30	21.80	2.70	1.90	0.90
Hardness	135.00	195.00	405.00	350.00	142.50	175.00	100.00
Iron	0.03	0.02	0.04	0.03	0.94	0.38	0.10
Manganese	0.39	1.40	1.40	2.10	7.70	3.80	0.05
Nitrate	2.50	0.95	0.50	0.90	33.30	13.70	50.00
Dissolved oxygen	6.50	0.98	0.20	0.25	7.40	2.30	—
pH	7.50	6.30	7.30	6.30	6.10	6.50	6.50
Phosphate	16.70	14.80	20.00	17.50	34.50	28.10	—
Suspended solids	7.00	222.00	260.00	182.00	15.50	41.30	—
Turbidity	23.50	275.00	325.00	228.00	24.00	57.50	25.00
Temperature °C	24.10	26.00	27.50	25.00	24.80	28.30	—

All values are given in mg/l unless otherwise stated

Ogunpa river channelization project

About 85% of those interviewed knew about the project. Of course, it was widely publicised immediately after the flood disaster of April 1978. The people were, also, quite knowledgeable about what the project was all about — that is the deepening and confinement of the river to a well-defined channel. The majority (76%), also, knew that the main objective of the project was to control river floods. A few people (5%) thought it was aimed at pollution abatement or sewerage (0.8%). The benefits which they thought would be derived from the scheme are listed in Table 10.

Table 10. Perceived benefits of the Ogunpa river channelization scheme

Benefit	% Respondents
Flood abatement	89.2
Pollution abatement	17.8
Market gardening	10.8
Recreation	8.0
Improved sewage system	7.8
Improved waste disposal system	7.8

However, a few people (15%) thought that channelization would not totally solve the problem of floods. Two important reasons were given for this view: (1) that solid wastes would continue to be dumped in the river; and (2) that the river channel, really, is not wide enough. The people may not be competent to proclaim on the second point but the fears expressed about solid wastes disposal are real enough. This seems to buttress that the channelization scheme must not be executed in isolation from the general problem of environmental management and protection in the city. Indeed, this appeared to be the framework within which the firm of consultants recommended the channelization scheme. The same view may be said to be reflected in the list of other problems which those interviewed felt the government should seriously tackle along with that of flood control. These other problems are, in order of importance, inadequate domestic water supply (49%); traffic congestion (47%); poor waste disposal and environmental sanitation (37%); and bad town planning (2%).

Conclusion

The most important inference that can be drawn from the above is that the management of urban environmental problems in developing countries should not be done in a piecemeal fashion. The general public itself, now, appears to be aware of the need for a comprehensive approach. In adopting this comprehensive approach to the management of the urban environment, it is important to bear in mind that the city is not only a cultural, but also, a physical environment (Guttenberg, 1975). Urbanization involves the transformation of a natural ecosystem into a man-made one. It entails interfering with the natural pathways of energy and matter. Therefore, the primary duty of urban managers and planners is to replace the original natural ecosystem with a relatively stable man-made one. Adequate measures must be taken to deal with the increased input of matter and energy into the environment by man. The experience in Ibadan, which is fairly typical of traditional towns in developing countries undergoing a process of modernisation, has shown that the basic problem still has to do with how to cope with increased runoff and the huge quantities of solid wastes and sewage. But, fortunately it is now dawning on the city managers as well as the people that much of the problem can be solved through proper land use zoning and land development; good, enlightened town planning and even distribution of infrastructural facilities in the city.

References

Akintola, F.O. and Nnyamah, N.C. (1978) Land use and surface water pollution in Ibadan. (Oguntoyinbo, J.S., Areola O. and Filani, M.O. Eds) Resources and Development in Africa: Papers presented at the Regional Conference of the IGU, Lagos, August 1978, III, 338-342.
Areola, O. and Ofomata, G.E.K. (1978) Land use control and natural resource management in Nigeria. Geo Journal, 2(5), 429-436.
Guttenberg, A.Z. (1975) The urban system. (Levine, N.D. Ed.) Human Ecology, Duxbury Press, pp. 296-324.
Maclaren International, Urwick, Currie and Partners Ltd. (1974) Master plan for wastes disposal and drainage, Ibadan IV: Drainage and Solid Wastes. Report prepared for the World Health Organizations acting as executing agents for the United Nations Development Programme.