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Mapping change in time and space: floodplain fishing communities in Nigeria

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• Introduction

One of the strengths of RRA methods is their ability to explore and reveal local, fine level detail. Understanding variation is essential if development is to be equitable and reach those at the 'margins' of society. The level of detail required to understand processes of development, and to plan accordingly, requires understanding of variation at a number of temporal and spatial scales. For example, planners compiling an agricultural development programme at a district or regional level will require a different and broader understanding of socio-economic and environmental variation than village-based extension workers that ultimately implement the plan.

Much RRA focuses on within-village variation, exploring the differences within and between households. This paper records an RRA approach[1] that was used to explore patterns of development at much larger spatial and temporal scales. The study looked at change within the Hadejia-Jama'are floodplain in northern Nigeria - an area of about 5000 km² - over a period of 20 years.

The Hadejia-Jama'are floodplain

The floodplain and the uplands surrounding the Hadejia-Jama'are floodplain are inhabited by hundreds of thousands of people whose livelihoods depend on the fertile, well watered lands. Since 1974, the floodplain has been affected by a programme of dam building on one of its major tributaries - the River Hadejia - and by a prolonged drought that affected much of the Sahel region. By altering the river flows and patterns of flooding, the dams have disrupted economic activities and social relations of floodplain inhabitants. For most of these people, fishing had been an important source of food and income.

Most studies of the ecology and economy of the Hadejia-Jama'are floodplain have treated it as a spatially homogeneous unit and changes caused by the dams have been described as if they were uniform. There has also been little attempt to explore temporal dimensions to change in the floodplain, most economic studies have been short-term. Yet floodplains are known to be spatially and temporally highly dynamic systems, and understanding this dynamism is central to the sustainable development of intact floodplains, as well as the relief of inhabitants of floodplains affected by dams.

· Methods

Profiles of change usually depend on reliable statistical data through time and baseline information. However, for the Hadejia-Jama'are floodplain no written records existed at the level of detail required. In the absence of written records, the study relied on the recall of floodplain inhabitants for information on environmental and socio-economic change.

The study took place within 27 floodplain villages that had been selected by stratified random sampling. The stratification was based on administrative boundaries, dominant ethnicity of communities, proximity to main markets and all season roads and distribution of natural resources (forests and water).

[1] The study contributed to a PhD thesis. The research mode was mainly extractive and has thus been classified as RRA rather than PRA.

Source: PLA Notes (1997), Issue 30, pp.29–33, IIED London

Environmental change: perception of change in floods and river flows

Environmental change around each village was explored through semi-structured interviews and field visits. Within an unmodified floodplain there are considerable fluctuations in flood extent resulting from annual variation in rainfall and natural changes in channel morphology (e.g. siltation, meandering.). Floodplain inhabitants are aware that such fluctuations are normal. In the discussions that took place, participants were asked if they had perceived any change in patterns of flooding and river flows in the vicinity of the village that were longer term and more lasting than this annual variation. The nature and timing of such change was determined using a list of key events in recent Nigerian history.

The village economy: past and present

The objective of this part of the study was to explore spatial patterns of economic development in the floodplain in the 20 years since the onset of the environmental changes associated with dams and drought. The survey sought to obtain a general picture of the village economy, and to compare it to the present time.

A ranking method was used to determine the relative importance of different economic activities. A group of men and unmarried women in each village were asked to rank their activities in terms of their relative importance to the village economy using the marketable value of all produce. This was chosen as the best single measure of the importance of each activity given the high degree to which villages in the floodplain are now integrated into a market economy. Also, the complications caused by some products being traded, others consumed by the household, others stored and others divided and disposed of according to individual household circumstances, made this the best general measure of the economic importance of each activity.

Once ranked, the group was then asked to score each activity. The exercise was undertaken with reference to two periods: the present (the last 2-3 years) and the years immediately prior to the 1972/73 drought and the construction of the Tiga Dam. Because of the natural between-year variation in floodplains no single year was used as reference; the goal was to produce a picture of the general orientation of the village economy for these two periods.

The results of this exercise were used as the basis for a debate on the changes that had taken place. Explanations for the decline or expansion of activities were sought, together with more detail on the timing of significant shifts in the economy. The result was a spatial representation of how the contribution of different activities to the economy of the floodplain has changed in the last 20 years, and an interpretation of how and why the economy had been transformed.

Results: environmental change

Differences in inhabitants' perceptions of changes in the direction and timing of flooding highlighted that the environmental changes caused by the Tiga dam and by drought had not been uniform. Neither were they random. Analysis of the information provided suggested that the floodplain could be divided into 4 main areas of environmental change. Box 1 describes the major changes recorded in these areas.

Results: economic change

Today, the floods, although diminished compared to the recent past, are central to many of the productive activities in the floodplain. The study found that patterns of change in flooding have had a significant effect on patterns of development in the region and in particular, in the fishing sector.

Source: PLA Notes (1997), Issue 30, pp.29–33, IIED London

BOX 1

SUMMARY DESCRIPTION OF ENVIRONMENTAL CHANGES IN PARTS OF THE HADEJIA-JAMA'ARE FLOODPLAIN

Within the **floodplain of the Keffin Hausa Channel** regular flooding virtually ceased in about 1968 (i.e. before dam construction). This is likely to have been caused by a northward shift in the channel caused by siltation and other 'natural' processes, although reduction in river flow subsequent to dam construction probably hastened this effect. As a result of this change, large areas of floodplain forest in this area (dominated by *Mitragyna inermis*) are in a severely stressed and degraded condition.

In the area around the **Marma Channel**, the extent and duration of flooding, and the area of permanent water, reedbed and marshland has increased since the early 1970s. This is caused by dry season releases from the Tiga reservoir which flow down the River Hadejia and are channelled into this part of the floodplain because of blockage to the Hadejia River by silt and weed.

Adjacent to the **Burum Gana Channel**, the extent of flooding from the River Hadejia has declined since the construction of Tiga dam due to reduced peak season flows and flow diversion into the Marma channel (due to channel obstruction, see above). However, a proportion of the dry season flows released from the Tiga reservoir do flow down this formerly seasonal channel, with the result that along part of its length it flows perennially.

Within the **Jama'are floodplain**, most communities reported a change that coincided with the onset of the drought, and many reported that floods, whilst less extensive than in the past, still covered large areas of land around the village. Indeed, the River Jama'are is virtually unmodified.

Figure 1 summarises some of the patterns of economic change in the floodplain over a period spanning approximately 20 years. The results show clearly that suppositions regarding 'the floodplain' as a homogeneous economic unit for planning and development are mistaken. Discussions with village inhabitants provided a wealth of village-level detail on the pattern of changes revealed in Figure 1, and their economic, environmental and social causes and consequences. Patterns of change in production systems were viewed in the light of changes in patterns of flooding and in the context of more general economic, social and policy changes in northern Nigeria over the period.

The sections that follow discuss very briefly patterns of change in the fishing sector of the floodplain economy[2]. This shows how environmental changes have interacted with wider economic and technological change to produce complex patterns of development within the floodplain.

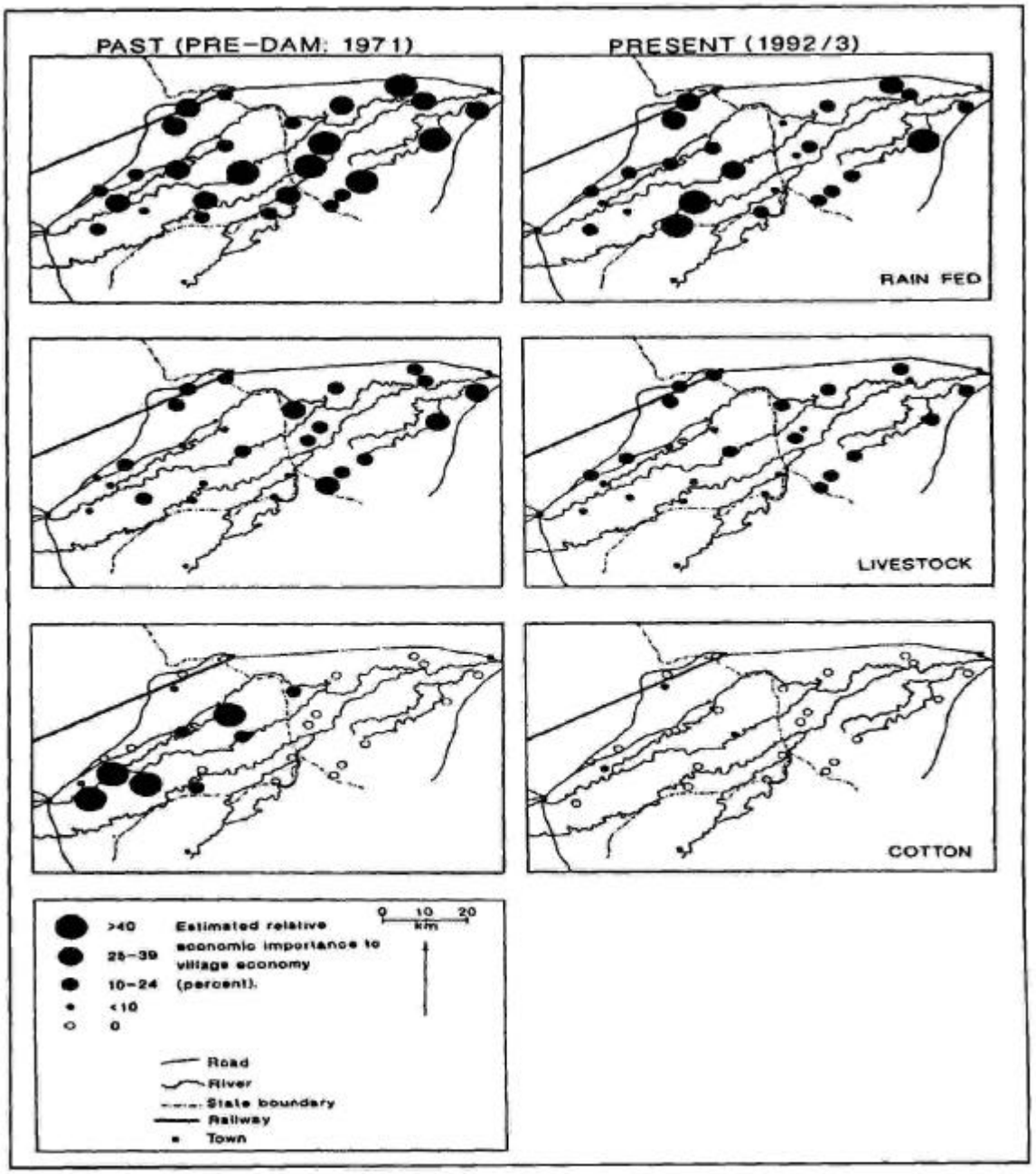
The study found that compared to the years immediately preceding the construction of the Tiga Dam and drought, the relative contribution of fishing to the village economy has decreased in most parts of the floodplain. This result was expected, and had been demonstrated at a floodplain level by earlier studies of the fishery. The significant finding of the present study was that the relative economic importance of fishing has not decreased in all parts of the floodplain.

The study's sample size is small and so the findings are interpreted with caution. Nevertheless, within the upstream part of the Jama'are floodplain, the Marma Channel floodplain, and the Nguru Lake area a significant number of communities reported that the relative importance of fishing had remained constant or had even increased. Predictably, these are the zones where changes in hydrology caused by the Tiga dam and drought have been least dramatic (see Box 1). The Jama'are floodplain is largely unaffected by hydrological developments in its catchment, and in the Marma Channel and Nguru Lake areas, the extent and duration of flooding has increased since Tiga dam was completed.

[2] The sectors of the economy are actually intimately linked but fishing has been separated for the purpose of description and discussion.

Source: PLA Notes (1997), Issue 30, pp.29–33, IIED London

Figure 1. Spatial patterns of change in the economic importance of rainfed farming, livestock production and cotton farming in the Hadejia-Jama'are floodplain, 1971 to 1992/3



However, in villages where the relative importance of fishing has remained constant or has increased, fishers reported reductions in catch size, less diversity of species in the catch, and a reduction in average size of the fish caught. In semi-structured interviews, fishers explained that fishing had maintained or increased its position in the economy due to relative price changes.

Pre-Tiga dam, fish were abundant, and prices were generally low. Small fish or those of particularly low economic worth were discarded. Since then, the price of fish has increased at a greater rate than have the prices of other commodities. This increase is fuelled by the scarcity of fish induced by environmental change, and also by expanded markets due to improvements in

Source: PLA Notes (1997), Issue 30, pp.29–33, IIED London

communications between the floodplain and cities. As a result, in villages where the productivity of the fishery has declined less than in the floodplain as a whole, the relative economic contribution of fishing to the economy has been maintained or has even increased, even though there may be less fish.

· Conclusion

The methods used in this study allowed spatial patterns of economic and environmental change to be mapped. The overall result was a better understanding of how the changes caused by the Tiga dam have altered the environment in different parts of the floodplain, and how fishing and farming communities have responded to that change. For an area that had previously been treated as a homogeneous unit ('the floodplain') this demonstration of broad and significant differences between villages has important implications for planning and development programmes in the region. Use of the participatory assessment methods allowed the picture of change to be produced rapidly despite the absence of detailed records for the period.

As described in the introduction, most RRA methods have been used for planning at a village level (with some significant exceptions). Certainly it is at this scale that the methods have great strength. However, this study demonstrates the potential of RRA methods for planning at much greater scales: mapping village level results at scales of a geographical region can provide a level of detail not readily or quickly obtainable by other methods. This may allow regional planners to take account of local differences in resources, production systems or other important variables (e.g. health facilities, education, communications).

This paper describes an extensive inter-village survey method used to explore environment-development relationships on a large scale. The advantage of such an extensive method is that it provides an understanding of variation that is not readily measurable at other levels - studying the household picks up on socio-economic factors, whereas studying the entire floodplain misses important within-floodplain differences in flooding that are an important influence on village level economic development. The lack of household-level detail in extensive surveys should not therefore be seen as a disadvantage. That is not what was being investigated. Choosing the most appropriate scale for study is an important decision to make and is determined by the objective of the study and the questions that are to be answered.

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ACKNOWLEDGEMENTS

Thanks especially to Bill Adams, who supervised the study, for his continual encouragement, advice and support. The research was funded by a studentship from the Economic and Social Research Council, with additional grants from the Philip Lake Fund and the Smuts Memorial Fund (Cambridge University). The Hadejia-Nguru Wetlands Conservation Project provided valuable logistic support.

Source: PLA Notes (1997), Issue 30, pp.29–33, IIED London