

Settlement Patterns and Land-use in Northern Ghana - A Study of the Changes during the period 1963-1991 based on Historical Surveys and recent SPOT-images

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A study by Hunter (1966) describes how large areas along the Red Volta River bank, have been abandoned due to river blindness. The mapping of current land-use status and settlements patterns, using multispectral SPOT-satellite images, shows how the border of settlements continue to retreat, whereas new land is being reclaimed for bush fields in the abandoned areas.

Keywords: River blindness, land-use, rural settlements patterns, Ghana.

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The Bongo-Nabdam area in north-eastern Ghana is traditionally a very densely populated area. An exception to this, is the area bordering the Red Volta River, which is affected by river blindness (onchocerciasis). The fly vec-

tor, *Simulium damnosum*, lays its eggs in swiftly flowing water, and is thus restricted to a zone a few miles wide in riverine areas. When human bodies are infected by the parasitic worm, *Onchoecra volvulus*, it causes the formation of fibrous nodules, skin infections and eye infections which finally, after some years, lead to blindness (Learmonth, 1988). In 1955, 83 % of the adult population examined in Zoa, an enumeration area in the study area, was infected by onchocerciasis. (Hunter, 1967).

The effect of river blindness on settlement patterns and land-use in the area was intensively studied in the 1960's by Hunter (1966 & 1967). His work describes how settlement patterns have changed drastically during this century. According to this study, the now deserted river bank, which was colonized in the late 19th century during a severe famine, was still occupied as late as 1918.

After colonization, river blindness slowly spread among the settlers, who were not aware of the disease. As the farmers saw no connection between blindness and the location of their compounds, they usually made no attempt to move, and settlements seemed to die out not because of migration but because of the inability to work which led to hunger and poverty (Hunter, 1966).

Based on these observations, Hunter proposes a hypothesis of a cyclical advance and retreat of settlement, suggesting that colonization and abandonment of the river bank had occurred before in the area.

The objective of this paper is to examine the current state of the settlement pattern and land-use in the area and make a comparison with the studies by Hunter in

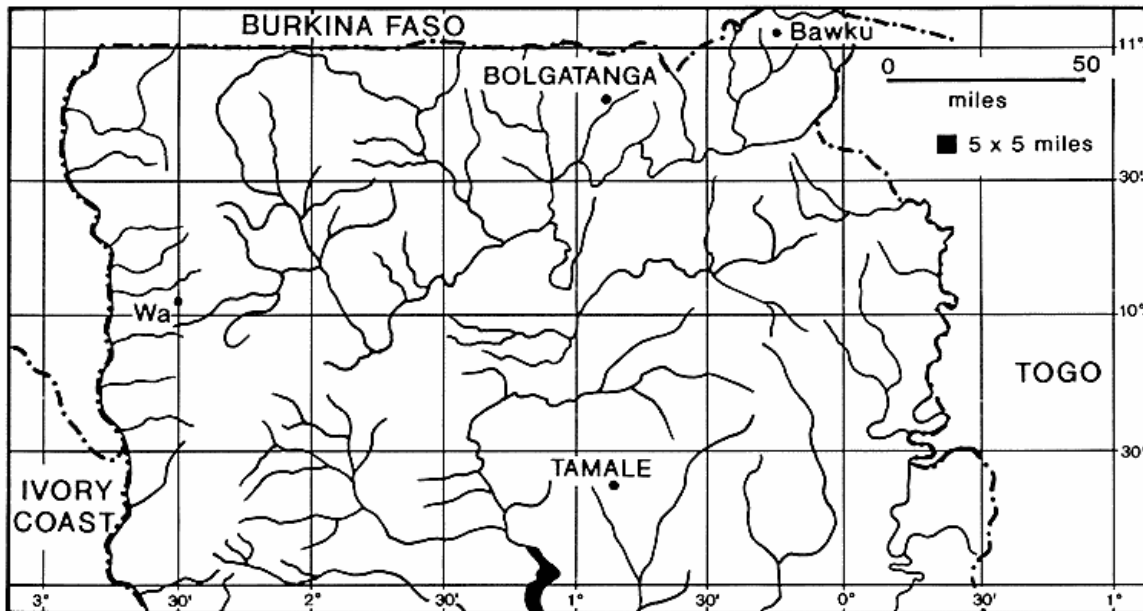


Fig. 2. Location of the study area.

order to examine his hypothesis of cyclical settlement patterns.

THE STUDY AREA

The study area (fig. 1) which measures approx. 10 x 10 km, is situated in the Bongo-Nabdam area, Upper East Region on the west bank of the Red Volta, some 15 km south of the Burkina Faso border (fig. 2). It is situated on soils of generally low fertility, developed on granites and birrimian rocks. Soil is shallow in places and soil erosion is common, especially around cattle tracks, ponds and along streams.

With an average rainfall of 1000 mm a year, falling from May to October, the natural vegetation may be described as Sudan Savanna woodland - where cultivated areas have developed into a park-like savanna, dominated by useful species such as shearbutter trees (*Butyrospermum parkii*), and dawa dawa trees (*Parkia filicoidea*).

The agricultural practice that predominates in the area is an intensive farming system typical of Northern Ghana referred to as compound farming (Wills, 1962) - a compound being defined as a small group of huts, making up a household. Fields around the compounds are permanently cropped, soil fertility being maintained by the application of manure and household refuse. The production of the compound fields is supplemented by that of bush fields where bush fallow is practiced. The most common crops are early millet, late millet, sorghum and groundnuts.

Livestock are reared extensively and are kept mainly for social prestige and religious purposes, but contribute to the system by supplying compound fields with manure and by exploiting areas unsuitable for farming.

Although the area has several small ponds, irrigation is not practiced. Some valley bottoms are terraced and intensively cultivated with rice and vegetables, mainly tomatoes and onions.

In contrast to most of northern Ghana, where compounds are concentrated in villages, the Bongo-Nabdam area is characterized by dispersed settlements, which is partly due to the practice of fertilizing. Livestock are kept in the compound during the night and manure is applied to the compound field, which surrounds the compound in a circular shape. Compounds in the study area are somewhat more concentrated around the small towns of Nangodi and Sekoti, where the local market, school, health clinic as well as the residence of local chiefs, are situated.

The population density in the Bongo-Nabdam area is high - 161 persons per square kilometer - compared to the rest of Ghana - with 52 persons per square kilometer (Population Census, 1984). As area maps from the 1984 census, covering the study area, are not available, the population density of the 10-12 small enumeration areas

in the study area can not be given. However, field observations indicate that the population density in the study area varies, with a very high density in the areas of Sekoti Yakoti and Nangodi, probably exceeding the average of the Bongo Nabdam area. By contrast, areas along the Red Volta River are completely deserted.

METHODS

In order to compare the development of settlement patterns and land-use during the early sixties with the current situation, historical maps were related to new surveys based on SPOT-images.

The settlement boundary 1963, is digitalized on the mapwork by Hunter, 1966. Fieldwork was carried out in 1963 on the basis of aerial photography from 1960. As Hunter only distinguishes between settled and unsettled land, a classification of land-use from a soil survey of 1962 has been digitalized (Adu, 1969) and superimposed on his map.

On the basis of fieldwork carried out in 1991 and the visual interpretation of a multi-spectral SPOT-image from 1989, the recent settlement and land-use have been mapped.

The maps of the historical surveys are at a scale of 1:250,000, (Hunter's approx). A comparison of these data with the maps based on SPOT-images is therefore not very accurate. (The SPOT-images, being digital, have no scale, but with a spatial resolution of 20 x 20 m, they are detailed enough to support maps of 1:30,000).

SETTLEMENT PATTERN AND LAND-USE - 1963-1991

In figure 3, the settlement pattern and land-use in the 1960's is shown. Within the study area, the applied classification of land-use (Adu, 1969) operates with the following mapping units.

1. Compound farms (areas with fixed agriculture, where the land is continually cropped), cover approx 16 % of the study area.
2. Compound farming mixed with land rotation or bush farms, covers approx. 31 % of the study area.
3. Tree savanna (little-cultivated ungrazed areas, including forest reserves), covers 53 % of the study area.

Note that the term 'farms' here refers to 'fields' - bush farms are thus fields located in the bush - and not 'farms' in the traditional European sense of a production unit including the household.

Figure 3 shows how the settlement boundary has moved 3-4 km west, away from the river. It also shows the border of the forest reserve which marks the approximate limit of settlement as it was in 1941, when this reserve was demarcated. It can be seen that areas with compound farms are placed around the local centers, of Sekoti and Nangodi,

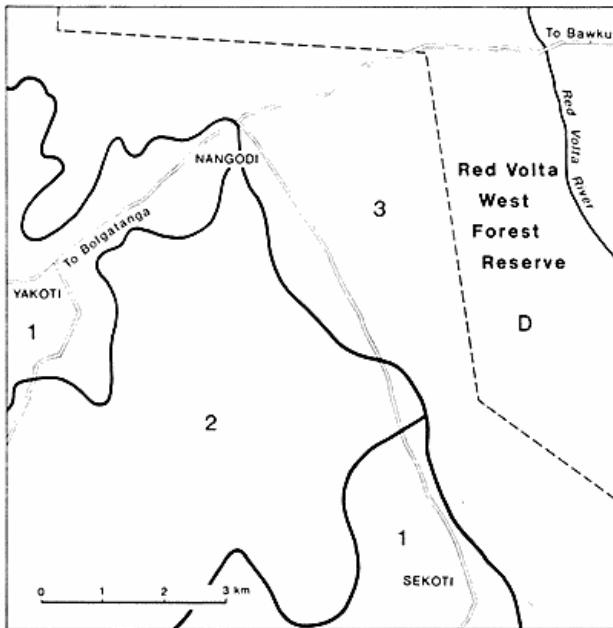


Fig. 3. The Frontier of the Settlement, 1963. (After Hunter, 1966) and Land-Use 1965. (After Adu, 1965). 1: Compound farms (areas with fixed agriculture where the land is continually cropped). 2: Compound farming mixed with land rotation or bush farms. 3: Tree savanna (little-cultivated ungrazed areas, including forest reserves).

whereas the central part is dominated by a more extensive land-use consisting of a mixture of compound farms and bush farms.

Figure 4 shows the present distribution of land-use. On the basis of field recording, it was possible to identify the following mapping units in the SPOT-images:

- A. Areas dominated by compounds. Compounds and compound fields occupying major parts of the area - the rest consisting of pasture and grass fallow. In total approx. 12 % of the study area.
- B. Areas with compounds and compound fields making up about half of the area, mixed with pasture and different stages of fallow. In total approx. 20 % of the study area.
- C. Areas of bush fields, pasture and different stages of fallow mixed with natural vegetation. No compounds occurring. In total 27 % of the study area.
- D. Natural savanna woodland. In total approx. 41 % of study area.

These mapping units correspond approximately to those by Hunter (1966). The extensively farmed areas of Class 2 have been divided into Classes B and C in order to distinguish between extensively farmed areas with and without compounds.

The general pattern of the 1960's prevails, with inten-

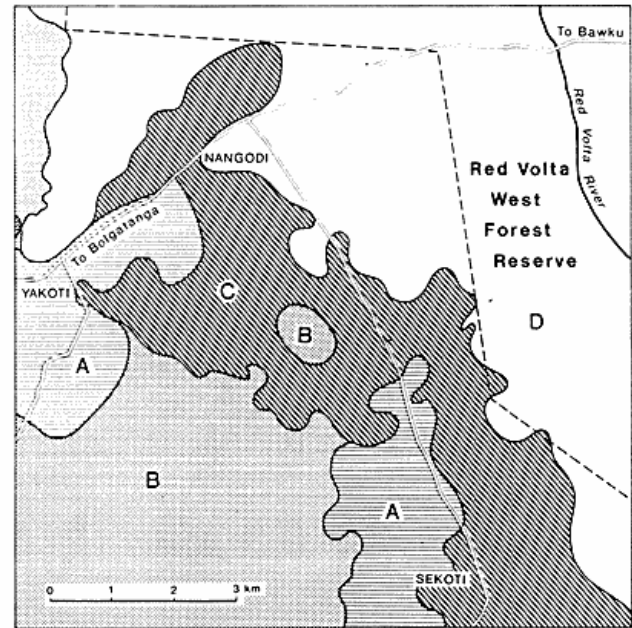


Fig. 4. Present Land-use. Mapping based on SPOT-satellite images from 1989 and field surveys carried out in 1991. A: Areas dominated by compounds. Compounds and compound fields occupying the major part of the area - the rest consisting of pasture and grass fallow. B: Areas with compounds and compound fields making up about half of the area, mixed with pasture and different stages of fallow. C: Areas of bush fields, pasture and different stages of fallow mixed with natural vegetation. No compounds occurring. D: Natural savanna woodland.

sively farmed areas around Yakoti and Sekoti and the more extensively farmed areas in the central part. In the northern part of the study area, the frontier of the farmed area is still far from the forest reserve, whereas there seems to be some encroachment along the border of the forest reserve in the southern part of the area.

DISCUSSION

When comparing the present land-use with Hunter's studies (fig. 5), it can be seen that the retreating limit of compounds has continued westwards, by up to 4 km in places.

Areas with dense compound farms, Classes 1 and A respectively, have been reduced from 16 % to 12 %. The settled areas, that means areas where compounds occur, Classes 1 & 2 and Classes A & B, have been reduced by 33 %.

Meanwhile, new land has been reclaimed for bush fields towards the river, occupying areas that were not farmed in the 1960's. Savanna, with little or no cultivation has shrunk from 53 % in 1963 to 41 % in 1991. These newly cultivated areas consist mainly of bush farms. Some of

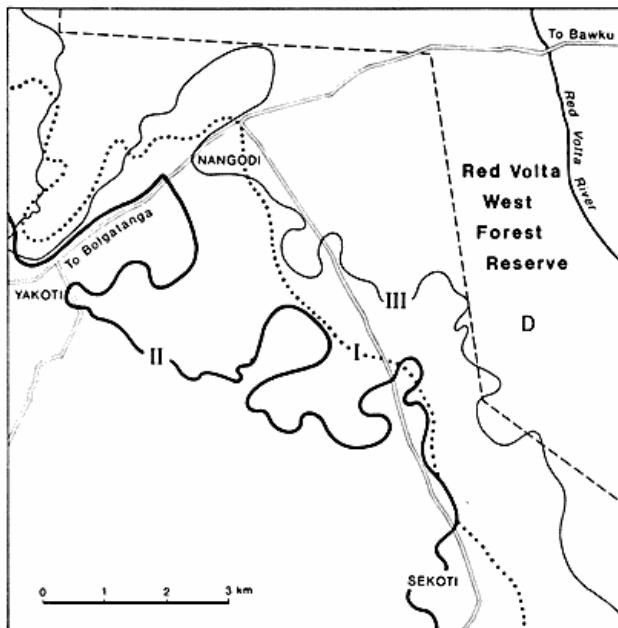


Fig. 5. Frontiers of the settlement 1963 (Hunter, 1966). Frontier of settlement and frontier of farming 1991.

them are of considerable size due to new cultivation methods such as bullock- and tractor ploughing.

The reclaiming of land for bush fields indicates that farmers, still suffering from land shortages, are aware of the risk of river blindness and thus avoid settlements near the river. A factor which could support this assumption is that bicycles are available to most farmers today. It is therefore possible to cultivate bush farms further away, where only a few weeks of work are spent during a season, while maintaining compounds and habitation in areas unaffected by river blindness.

CONCLUSION

It can be concluded that the cyclical course, identified and described by Hunter, has now been replaced by a more complex pattern of settlement and land-use. The retreat of settlements away from the river has continued, while the cultivation of the bush is moving back into the interior. While areas of intensive farming have been diminished, larger parts of the study area are now being farmed in a more extensive way.

The fact remains, however, that large areas outside the forest reserve are still left unfarmed and unproductive in a traditionally overpopulated area. It is a question of whether river blindness can be eliminated in the future, by eradication of the vector, better medication and prophylactic behaviour, such as the use of protective clothing or a vitamin A rich diet, which seems to give some immunity against the disease (Learmonth, 1988).

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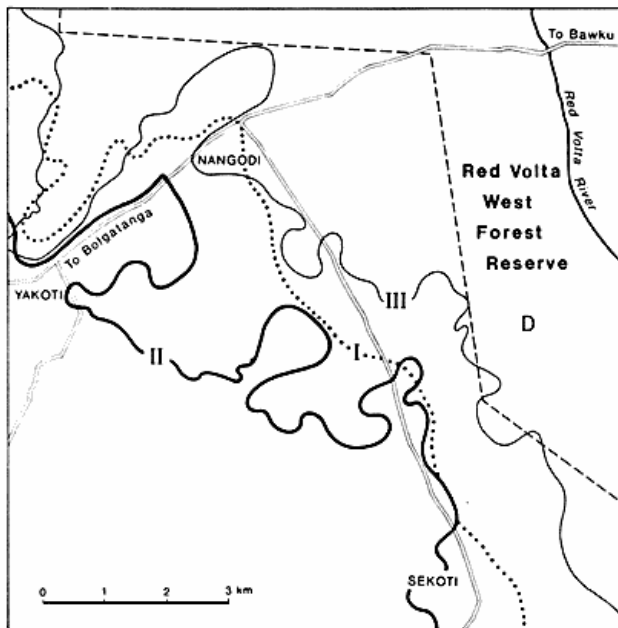


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