

The Evaluation and Exploitation of the West African Sahel [and Discussion]

J. Dresch, V. C. Robertson, R. Dodo, Jr and W. E. Ormerod

Phil. Trans. R. Soc. Lond. B 1977 **278**, 537-542

doi: 10.1098/rstb.1977.0060

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The evaluation and exploitation of the West African Sahel

BY J. DRESCH

Union Géographique Internationale, Institut de Géographie, Paris, France

A critical review and discussion of: (a) the natural resources of the Sahelian Zone in West Africa and their use by the population to strike a balance between agriculture and pastoralism; (b) the incidence of droughts; (c) the results of economic and social changes during colonial times and since independence; and (d) the solutions that have been proposed for the problems that have arisen.

The West African semi-arid lands fringe the Sahara to the south. This is why it is called in arabic Sahel. It is a transitional region between desert and savanna. Rainfall increases gradually towards the south; in the northern Sahel rainfall is between 100 and 300 mm, falling during the 1.5 to 2–2.5 monthly wet season; agriculture is not possible. In the southern Sahel rainfall is between 300 and 500–600 mm or somewhat more, the rainy season lasts between 3 and 4 months; agriculture as well as stock breeding are possible. But rainfall is irregular, stockbreeders and farmers are threatened by droughts, and famines are frequent so that, between 1968 and 1973, international assistance has been necessary. The people are poor, among the poorest in the world, and solutions to development problems and even to the maintenance of population and of human activities in this area have yet to be found.

1. THE NATURAL RESOURCES

Resources are rather similar from west to east, from Mauritania and Senegal to Tchad and Sudan through Mali, Upper Volta and Niger, because Africa is a flat land, all along the Sahel, without any mountains, or wide ranges of altitude between plateaus, plains and valleys. There are, of course, varying natural conditions between rocky plateaus and their escarpments, some isolated rocky hills and large alluvial plains and valleys. They are often covered by sands, ancient dunes inherited from dry periods when, during the Upper Pleistocene, the desert advanced several hundreds kilometres southward. Those Sahelian sands are rather good soils because they store the rain, pools hold water between the dunes. The alluvial plains and deltas, more or less flooded during summer and autumn, frequently provide valuable soils and moisture when rivers coming from the southern more rainy zones bring an additional supply of surface and underground water. Elsewhere, the ferruginous tropical soils are generally poor.

Though the geomorphological features differ somewhat from place to place, the Sahel looks like a rather monotonous landscape because vegetation does not show large differences along the belts extending from west to east. It is called a steppe, the main patterns of which are trees, deciduous trees, mainly acacias at least within the driest belts, and various Gramineae or other families form an open formation. This steppe is easily cleared for cultivation and does not burn as savanna grasslands. So the Sahel can be used either by Saharian nomads, such as the Tuaregs coming during the dry season for grazing, mainly within the sandy areas or

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along the pools and rivers, or by cattle breeders such as the Fula, or by farmers who can be stockbreeders as well.

However, all of them have to be cautious because rainfall is irregular. First of all within the year so far as the summer rainy season is short, begins more or less early, ends more or less late, the first showers are followed by too many dry days. So a rainfall is efficient if it is more than 3 mm and is followed by another fall less than a week later. The irregularity is evident also from one year to another. The lower the rainfall, the greater the irregularity: the ranges between maxima and minima rise from 2 to 5 in southern Sahel, 1 to 5 or 10 in northern Sahel. So average rainfall has no significance. Dry years can follow one another. Several droughts have been noticed and people remember famines. The last ones occurred between 1909–16, 1940–8, 1968–73, but their importance and their length were different from one region to another. Between the droughts, a sequence of years may be humid, for example between 1960 and 1968, so that one isohyet may move several degrees, up to 5, in latitude. The inhabitants of the Sahel know those irregularities quite well. The question for us, people of the developed countries, is

- (1) whether there are regular sequences of dry or humid periods and therefore whether we can correlate them with other meteorological and geophysical data and forecast disasters;
- (2) whether there is a general tendency towards an increase of aridity or not.

Unfortunately it is evident that up to now we are unable to forecast years or periods or to certify that there is a long-term increase or aridity: it may be shown in Mauritania, but it is not evident elsewhere.

We can conclude that the Sahel is not lacking in resources. Different kinds of peoples can find either pastures for camels, cattle, sheep and goats, or land for cultivation. But there is a determinate relationship between the livestock, the surface under cultivation, the number of people, their production modes, their standard of living and the governments' policies. Within the countries of Mauretania, Senegal, Mali, Upper Volta, Niger and Tchad, there are a total of around 24 million inhabitants, but a small proportion lives in the Sahara, a larger in savanna areas. Maybe 7 million are living within the Sahel. The g.n.p. in those countries is estimated at US \$ 40–50 in Upper Volta and Mali, and a maximum of \$180 in Senegal. But it is evident that in the Sahel it is lower than the national average. Therefore, the question is whether land use in the Sahel was – and is – able to provide subsistence to the inhabitants, whether the standard of life could be raised with better integration into the national community and whether and why there is desertification, in so far as there is no evidence of a general increase of aridity.

2. THE EXPLOITATION OF NATURAL RESOURCES

Stockbreeders as well as farmers know rather well how to use the Sahel resources. The pastoralists, either in Mauretania or Tuareg further East, in Sahara and Northern Sahel, or Fula, the cattle breeders of the Sahel, move with their livestock from pasture to pasture, varying according to seasons, years, types of livestock, or agreements with other peoples. They gain security by those movements, by spreading their livestock, raising the number of their animals, and by diversification. When they were victims of droughts, they lost, of course, part of their livestock. Families, mainly children, could die, but when rainfall increased again, the community was able to restore the balance between natural resources and their exploitation. Besides, the Saharian pastoralists have long been politically dominant in the Sahel,

from the Middle Ages and the time of the great empires of Ghana, Mali and Gao. Owners of camels and horses in the Sahel, they controlled the regional and international routes and the trade of salt, cereals and gold. During the 19th century, the Sahelian cattle-breeding Fula, who became Moslems and expanded Islam, have created several powerful states.

The farmers cultivating millet in the southern Sahel are strongly organized villagers who use to shift their fields according to climatic fluctuations and soils. They store cereals in granaries, so carefully that they can often preserve food and seeds for several years.

Colonization and the creation of independent states have involved important changes in the economic, social and demographic structures of the Sahelian peoples. They can be summarized as follows:

(1) As everywhere in developing countries, the population increases. What is the rate in the Sahel, we do not know exactly. Some authors say that the rate of increase is higher among farmers than among pastoralists. Maybe that is so in general but not everywhere. Mortality rates are certainly decreasing, especially among children, except during droughts.

(2) Social and political structures have been and are being modified. The domination by Saharian nomad or by Sahelian Fula has come to an end. Most of the governments of the independent states are trying to integrate nomad pastoralists into the national society and economy and to promote sedentarization. The strong organization of the society among nomad communities is progressively broken down, the lower classes, or castes, slaves or captives, have been released. They are migrating southward and settling in the Sahel, where they can combine pastoralism and agriculture. The Sahelian Fula are free either to lead their cattle northward during summer, mainly for salt cure, or to dispute the pastures during the dry season with the Saharians, or to settle and combine cattle-breeding and cultivation. The peasant communities are modified also. They are extending cultivation, especially during humid periods, following the rain northward, and on sand soils, towards the limit of 300 mm. The average yield of millet is between 500 and 900 kg per hectare and the consumption is between 200 and 300 kg per year and person, giving between 6.7 and 8.4 MJ (1600 and 2000 kcal) per day. Rice is used together with millet and some milk or meat. They are often indeed either associated with Fula, or become cattle-breeders themselves. They also have sheep and goats, goats being able, better than any other kind of livestock, to find by themselves pasture and to survive during droughts. That is why, in some regions of the Sahel, settled people own more livestock than pastoralists.

(3) The result of those social and economic changes is that Sahelian land is more and more used and settled, especially when humid periods occur. The Saharian nomads cannot desertify the desert by overgrazing because it would involve suicide. In the Sahel, the vegetation cover and the variety of pasture are greater. On good pastures in deltas, or alluvial valleys with pools, cattle breeding needs 3 or 4 ha per animal, and one family can find its subsistence with an average of 50 cattle, often less. As concerns cultivation 2 or 3 ha can provide the cereal supply for one family. In the past, pastoralists and peasants have often quarrelled for either pasture or cultivated fields. In Niger, a limit has been drawn by the administration between nomads and settled peasants. Today, the quarrels may go on, but the opposition between nomads and farmers is slowly decreasing. Nevertheless, their techniques are not modified, they work mainly for self subsistence and do not much increase their participation in the national economy. Why?

During the colonial period and today as well, the Sahel has received much less equipment

than the more humid areas to the south. Ground nuts are cultivated further south where rainfall exceeds 400–500 mm, and cotton further on where rainfall is 600–800 mm. In these areas roads have been built and then schools, and some hospitals, etc. This is why ground-nut and cotton belts have extended so much. The Sahalien regions can only provide the more southern areas grain or meat, and the cattle have to walk hundreds of kilometres to the abattoirs of the towns.

(4) The general result is that the Sahelian balance between resources and population breaks down. During droughts, overstocking and overgrazing become dangerous as also does the extension of cultivated land. During the last drought, herds have been decimated, mainly cattle, though many Fula have migrated early towards the south. There were not stores within the granaries for everybody. Pastoralists as well as farmers had to migrate toward the south and the towns. The natural resources themselves cannot be preserved. Sand dunes revive, soil erosion is becoming dangerous, mainly around pools and wells that have been sunk more frequently but where more numerous livestock gather and destroy vegetation and soils. Some estimates have been made of soil erosion: 10–20 tonnes/ha. It may be so in some regions and in dry years, for instance in Northern Senegal where groundnuts have been cultivated too far north. Fortunately up to now the vegetation cover is often quickly restored except for the trees, but what will occur in the future? And what could be the solutions?

3. SOLUTIONS

We cannot improve the climate. During the last drought, international assistance, unfortunately too late, has provided cereals so that famine has been stopped without too many casualties. But international assistance does not provide solutions to the Sahelian problems.

New techniques could improve pastoral economy, by enriching the quality of pastures and fallow lands, combining nomadic movements with periodic stops in irrigated lands, improving breed quality, increasing the number of pools, natural or artificial, and of wells, organizing meat or dairy marketing and building abattoirs and other factories within the Sahel and specializing in the Sahel in the breeding of young stock sent for fattening to more humid savanna regions.

New techniques could improve agriculture as well. So far as farmers own more cattle, the use of animal power could extend the area under cultivation and the animal manure could be used as fertilizer. Irrigation could be extended by flood retreat agriculture, by boring deep wells where there are large underground water resources, by the construction of numerous dams to store summer water within depressions. On the big rivers coming from the south down to the Sahel, Senegal, Niger, Chari, more important dams and canals can be constructed, as has been done in the past on the Niger, without indeed convincing success. Better methods could improve the storing of the harvest and the marketing.

So we may propose many kinds of management. Everybody knows that it needs equipment, investment. Furthermore, it needs not only a government policy, international agreements, and international cooperation, but also deep economic and social change. The unstable balance between natural resources and land use has to be preserved. Overgrazing and overclearing for cultivation have to be controlled, some areas protected, the use of pastures, wells, and rivers, regulated. Without the agreement of the populations, and their association with this new policy, nothing will be possible. Agreement and association will be obtained only if

young people go to school. But if roads and schools are built within the Sahel, will the young generations stay cattle breeding and millet cultivating? During the last drought, most of the Sahelian population migrated toward the south and into the towns. When rainfall increased again they came back in their pastures and villages. But the young generation have new needs and they are less enthusiastic to go on working and living according to tradition with an income of U.S. \$ 100. But what kind of employment will they find in the humid savanna, or forest, or elsewhere?

Discussion

V. C. ROBERTSON (*Hunting Technical Services Limited, Elstree Way, Borehamwood, Herts.*). I would like to raise two points concerning the western Sudan, an area which has not otherwise been touched on.

First, at the time of the drought years in the early 1970s, we heard much of the terrible losses of livestock and of human starvation across the West African Sahel zone virtually all the way across to the Chad–Sudan border. Then such reports reappeared in Ethiopia. One might have thought that Sudan escaped the drought, which of course it did not. The people of Sudan's western savannas were however able to escape the worst effects of the drought years by moving south, which they were able to do firstly because they had no international frontier to cross in doing so and secondly because the wetter country they moved into was not already extensively occupied. This ability to move, with their stock, was often not available to peoples in western Africa.

Secondly, we have for some time been studying the situation of the cattle-owning peoples in western Sudan. Although we are convinced that the raising – particularly the breeding – of cattle is one of the more appropriate forms of land use in this region, we are also convinced that – both because of the relation of livestock numbers to available range and, perhaps more significantly, because of the changing ratio of human and animal numbers – uncontrolled nomadism is not the long-term answer. Indeed the nomads themselves seem to recognize this by settling spontaneously. Building on this, we have evolved an approach to development which involves a rationalization of land use, a separation of settled farming and pastoral use (at least so far as breeding herds are concerned) with the aim of establishing a stable productive system. A first scheme of this kind is now going ahead, with the support both of Government and the local people. Its results could be of very great importance.

R. DODOO JR (*Council for Scientific and Industrial Research, Accra, Ghana*). The Council for Scientific and Industrial Research in Ghana has developed a research strategy for our northeast savanna area that is centred round five problem-solving themes, namely:

(1) The burning component: a better scientific understanding is required of the effects of burning on crop production, range and soil resources, and the general floral and faunal ecology of the area.

(2) Cultivation practices component: here it is intended to focus on a thorough investigation of all the cultivation methods now used or potentially employed, as they relate to land degradation.

(3) Water availability and distribution component: information under this head would contribute to the evaluation of the other resources of the region, and to management decisions as they affect development.

(4) Overgrazing and deforestation component: it is imperative to conduct research on the

problems associated with overgrazing and deforestation as they relate to the management and development of semi-arid ecosystems.

(5) Socio-economic research component: long-term solutions to such problems of the region as burning, overgrazing, malnutrition and low productivity need to be found within the context of the region's social, economic and cultural conditions.

W. E. ORMEROD (*Department of Medical Protozoology, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT*). Dr Dresch has rightly emphasized the importance of a multi-disciplinary approach to the problems of the Sahel semi-arid region; so many of the factors that have interacted in contributing to the drought appear to have little obvious scientific relation to one another.

As he has stated, famines have occurred in the area before: they are recorded by the Tuareg names such as 'Forget your wife' or 'The sale of children', indicating the terrible privations that they underwent; but previous droughts were limited to certain regions and none showed rainfall below average for longer than three years. The recent drought covered much of the Sahara, the whole Sahelian zone and much of the Sudan zone, and continued with below average rainfall for at least six years. This drought seems to have been in a different category from previously recorded droughts.

I think that Dr Dresch perhaps underestimates the economic importance of Sahelian cattle grazing. The Sahel is substantially disease-free, and the Fulani arrange their migrations so that calves are dropped there during the summer rains. Very large populations of their Zebu cattle have been built up which supply the main needs of the coastal towns. The cattle trade has increased the economic prosperity of the region and increased the demand for agricultural production, which may have played an important part in the over-grazing and deterioration of the environment. Unfortunately many of the methods that Dr Dresch has proposed as a remedy, such as wells and increase in agriculture, have already tended to exacerbate the situation.