

POSSIBILITIES AND LIMITS OF PASTORAL WATERING PLANS IN THE NIGERIAN SAHEL

The Sahelian zone has been defined in many ways, according to the criteria chosen by different authors (climate, vegetation and so on). Its northern boundary is not really questioned : it begins around isohyet 100 mm, where small grass with stinging seeds grows, "cram-cram" (*Cenchrus biflorus*). Authors differ about its southern boundary, but one can set it around isohyet 550 mm. This climatic zone is a fringe, a transition between the rural cultivated sudanian Landscape, and the wide barren Saharian desert spaces. The southern part of the Sahel is cultivated and tends to extend into the north, domain of extensive cattle breeding. Legislation was enacted in order to stop this Northern movement of the farmers. This Northern Sahelian zone, between 400 and 100 mm isohyets, constitutes a choice territory for cattle breeding. Between 400 and 200 mm, it is suitable for any type of herds : camels, cows, sheep and goats, owing to the diversity of its pastures, trees as well as bushes and grasses. Between 200 and 100 mm, it is mainly favourable to camels. Therefore, the Northern Sahelian zone has been subjected to pastoral hydraulical programmes, clearly delineated in a 1960 report. This region has been set up as a "zone de nomadisation pastorale" and numerous administrative regulations have been issued since 1961, to protect grazing fields and set the rules for those of new watering points.

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~~The~~ years later, in 1971, it is interesting to see the results of such programmes, and to observe how far the nomads have applied laws, and in the final analysis, whether the aims have been reached.

I. GENERAL PRINCIPLES OF PASTORAL NOMADISM IN THE SAHELIAN ZONE.

Climate, and first of all, rainfall, characterise the Northern Sahelian zone. Rainfall is concentrated in a short two or three months season, which diminishes from South to North. But the rainfall is irregular, both in time and space.

In time, annual averages over long periods give only an unrealistic idea : in Agadez, for instance, while the average is 164 mm, there have been maximums of 288,2 mm, and minimums of 54,8.

In space, too, for the rain falls in heavy showers, strictly localized and two close points may have, for the same year, very different rainfall values.

This double irregularity brings about permanent insecurity as far water and pastures supplies are concerned. Moreover, rain, in order to be useful for vegetation, must fall at relatively regular intervals. Early abundant rain followed by a long dry spell, makes grass sprout and grow too quickly, and the fodder supplies can be compromised for the next year. Only useful rain is to be in account, as it may happen that a quantitatively well watered year is followed by a catastrophic dry season.

Those irregularities explain nomadic life which, in principle, aims at a rational exploitation of grazing fields and surface waters, according to conditions of the year.

The central and western Nigerian Sahelian zone, which alone will be considered, because it was the priority beneficiary of the first hydraulic works, was traditionally an area occupied by Tuareg pastoral cattle breeders. About thirty years ago, this area was invaded by Fulani nomads, driven back from Northern Nigeria and Southern Niger by the demographic pressure, the extension of cultivated surfaces and the introduction of cash crops (groundnuts and cotton mainly).

Therefore the population of this area has increased notably and consequently cattle too, mainly bovine cattle.

In this context, pastoral nomads carry out a nomadism with relatively regular movements.

Two periods have to be distinguished during the year : the rainy season, where breeders are free from any geographical constraints. Water is available everywhere in the rainpools and pastures are covered with new grass. The dry season ; where ponds are dry and both men and herds congregate around deep wells or bore-holes. Between these two periods, after the end of the rains, the dwindling rainpools allow for some time a certain freedom of movement. The rainy season,

from July to September, releases people from the exhausting labour of recovering water. The herds, better fed, begin to provide plenty of milk. Camps then move north to the plains surrounding the Air massif, in order to supply herds with salty water and grazing places with fresh grass characteristic of these clayey plains.

This is yearly pendulum movement, closely linked to the regular seasonal cycle and to the cattle physiological needs.

The Return Journey starts in late September.

The dry season means coming back to the customary tribal wells or bore-holes. Some herds led by shepherds stay around seasonal rainpools still supplied, and join the wells only when they are completely dry in December, January or February. Usually, each camp comes back to its waterpoint and moves about a ten to fifteen Km radius. The Tuaregs, when used to a given well or a given valley, are very attached to their dry season places. Only in case of exceptional drought and complete lack of grazing sites will they leave that place for a time in order to go to a more favourable neighbouring ^{area}. Generally speaking, the dry season is a period of restricted movement around a settlement, contrasted to the rainy season general nomadisation. But this yearly migration is performed along almost fixed routes. Each camp, each tribe follows the same yearly pattern towards a definite aim. The rainy season also draws the Sahelian zone southern herds, driven back during cultivation time. Cattle on the move comes for two or three months. They cause an overgrazing that must be taken in account, but they do not use the hydraulic works which only operate during the dry season.

On the whole, the northern Nigerian pastoral zone is used by nomads with rather regular habits : each water spot has its own users, and one can easily find a camp from such and such a well or bore-hole. However, the spatial distribution of the nomads, changed with the building of hydraulic works. New areas have been offered to herds, and concentration unknown until then occurred all around bore-holes stations.

But this spatial evolution has been accompanied with a social transformation which has to be emphasized, for it is at the origin of

these pastoral watering programmes.

The Tuaregs are the main human group in this area. Tuareg traditional society is a hierarchical one, where there exists a division of labour at all levels. The distinction between "freemen" and "slaves" does not exist any longer de jure but de facto is enduring and is materialized in the tasks given to anyone. Traditionally, "slaves" (iklan) were in charge of herds' maintenance, keeping, and watering, while their wives were housekeepers in the camp. Since the beginning of colonisation, a movement of emancipation from slavery began and increased in importance over the past fifteen years. Many slaves families leave the nomad area and become farmers in the South. The wealthier herds owners alone keep their "slaves", for these have a share in their masters' wealth. But masters can no longer retain them by law. This rapid decrease of the labour available may be prejudicial to the cattle, which is one of the main Nigerian resources. Thus it became necessary to free people from the heaviest tasks, especially in recovering water in order to avoid the degradation of the herds. The Hydraulic Works Project was therefore set up to remedy through mechanical means the lack of manpower due to this progressive but irreversible evolution.

II. THE DEVELOPMENT PROJECTS.

a) Pastoral Hydraulical Programmes.

Though deep wells has already been dug by the government for a long time, a new development project of the Sahelian zone took place in 1960. This policy was defined in two reports which can be considered as a basis for this pastoral hydraulic project.

As herd have a permanent water deficit during the dry season, they must be fed directly available water. Deep wells with animal traction supply an insufficient output. Therefore shallow wells (less than 40 m), where superficial water can be found, and pumping stations which will collect deep ground water, with a 4 l/sec minimum yield, were planned. These stations will be supplied with a mechanical system for recovering water, tanks and drinking-troughs sufficient for many heads of cattle.

The papers refutes several usual objections

- Economic objections, about the investment costs, and especially operational costs. The financial participation of the cattle-breeders taking advantage of the project, will be required and this should ease matters.

- Technical objections; difficulty of operating these installations, far away and scattered, and overgrazing around them, leading to destruction of the pastures.

The latter point being the major stumbling block, pasture utilisation regulations have to be set : if the usable surface around a bore-hole is a circle with a 8 km radius, and if it is not used for more than 8 months during the dry season, it can be grazed by 5000 heads of bovine cattle (or 10.000 heads without distinction). The paper concludes : "It clearly appears that there is little risk of a cattle saturation rate leading to overgrazing occurring". The theoretical solution consists in setting up a network of wells, each being 7 to 10 km away from the other, and a wider bore-holes network, about 20 km apart . But because of the rainpools and waterholes existing at the beginning of the dry season, it is possible to limit the use of the bore-holes to a February to July period and to space them every 40 or 50 km. Very rigorous regulations will be required about bore-holes use, their opening time and authorized cattle load.

b) Legislative texts :

To implement this policy, legislative texts were published in the years 1961. They can be summarized as follow :

The first text establishes with the greatest precision a northern farming boundary. It attempts to stop the farmers rise to the North, who year after year clear new fields at the pastures expense. The aim is to protect a zone much more adapted to cattle raising than to farming because of the insufficiency and irregularity of the rainfall. The second one establishes a "zone for pastoral modernisation" north of the fixed boundary and defines the allocation of the pumping stations and pastures to certain groups. Groups and

tribes admitted to bore-holes and surrounding pastures will be fixed by decree, taking into account customary law. The dates of opening of the station will be fixed each year by the administrative authority in accordance with climatic or social conditions. Pastures within a 40 km square around bore-holes will be protected. During closing-time, pastures will be forbidden inside a 20 km square. The maximum number of heads of cattle admitted on protected pastures will be fixed every year. In any case, they will never exceed 1 cow per 5 ha (or 1 camel, of 10 sheep or goats) every year.

Protection against bush fires and systematic cattle vaccination will be attempted around the bore-holes stations. Sanitary, educative and economic action will be undertaken.

At last, in 1963, a public office in charge of the ground water exploitation was created (OFEDES : Office des Eaux de Surface et du Sous-Sol).

As one can see, all these decrees are part of a coherent policy in favour of the nomads, taking into account ecological conditions, and both regional and national economic potential.

We now have to consider how these texts were implemented and what were the reactions of the main beneficiaries.

III - THE PRESENT SITUATION :

The main effort was carried out in the northern part of the Tahoua Department, where there are large herds of camels, cows, sheep and goats. Hydrogeological conditions are favourable, with the "continental intercalaire" water table supply, reached by the deep bore-holes. Since 1961, about twenty bore-holes were dug and OFEDES is in charge of their exploitation. Year after year, their number increased :

1963-64	:	9
1964-65	:	10
1965-66	:	13
1966-67	:	15
1967-68	:	15
1968-69	:	16

During the 67-68 dry season, bore-holes were in ~~service~~ almost ~~cons-~~
~~tantly~~ for nine months. In 1968-69, the opening and closing of
bore-holes were scaled in terms of their specific conditions. ~~of them~~
They were opened when the neighbouring waterpounds were
completely dry, and closed when pastures were exhausted ~~of~~ when early
rains filled the pools. On the other hand, not all the existing
stations were put into operation. Some of them remained closed for
reasons of economy after ~~decision and choice~~ of the Cattle Breeding
Dept (3 in 1968). Therefore, potential resources were not fully
exploited.

We shall not dwell on the financial difficulties. As every-
where in the "Third World", it is easier to find money for equipment
than for operational and maintenance costs. The average yearly ope-
rational cost of a bore-hole is assessed at about 2 millions Francs
CFA. OFEDES has limited means, and shares in the general austerity
policy of the State Budget. In fact, and contrary to what had been
planned, National Budget has to bear the whole of operational costs
through subsidies. It proved to be impossible to ask the local
authorities to cover these expenditures. In fact, the bore-holes
are settled in given districts and their operational costs would
often exceed half of the local budget.

The technical difficulties are derived of the abovemention-
ed problems. OFEDES has now used up all the stocked spare-parts,
and cannot resupply its store-houses. Now the commercial companies
that sell the equipment are in charge of storing it. It is easy to
see how any delay in delivery might cause long interruptions in case
of breakdown. Thus, economical reasons can provoke voluntary (for
saving), or unexpected bore-holes stops.

But there are more serious problems yet : in many cases
the pastures have been overgrazed by excessive heads of cattle.
Each new bore-holes settlement attracts numerous stock breeders. The
traditional users of the wells or bore-holes have been invaded by
nomads of all neighbouring tribes and also nearly always by Fulani
with their immense herds of bovine cattle. The figures (5.000 oxen
or 10.000 heads without distinction) supposed to insure a balanced
use of the pastures have more than doubled everywhere. We badly
lack statistics, but some summary counts all point to the same direc-

tion. The following figures are certainly not very reliable but can be considered as indications.

- Abalak station : daily estimate :

7 to 8.000 oxen

8 to 10.000 sheep and goats

1.500 to 2.000 camels, i.e. approximately 18.450 animals or 10.150 "cattle-units" (in French : Unité ~~élevé~~ - U.B. = 1 ox, 1 camel or 10 goats or sheep).

But considering the fact that oxen drink every two days and camels every four or five days, this number has to be doubled, and so we obtain 37.900 animals, or 20.300 U.B., four times more than the expected number.

- In-Waggeur station : daily estimate :

5 to 6.000 oxen

6 to 7.000 sheep and goats

1.000 camels, i.e. approximately 13.000 animals or 7.150 U.B. watering every two days means 26.000 heads, or 14.300 U.B., three times more than prevision.

- Ibeceten : daily estimate :

6.000 oxen

4.000 sheep and goats

200 camels, i.e. approximately 10.200 animals, or 6.600 U.B., and taking into account that ~~the~~ animals drink every two days, 13.200 U.B. twice the expected number.

Once again, these figures are subject to caution as the counts were not made as accurately as one would have wished. One can try to check with the volume of water supplied by every bore-hole ; for the year 1968-69, if we take three pumps among those which had the highest yield (1st, 3d and 4th) and taking as a reference the daily 40 liters required per U.B. we find :

- EKINAWANE : 9.585 U.B. every day during 244 working days

- EGAREK : 7.300 U.B. every day for 243 days

- ABALAK : 6.260 U.B. every day for 260 days.

Once more, these theoretical measurements are not quite satisfactory : are they overvalued, since water for domestic use and losses due to évaporation or overflowing are not included ? are they undervalued, since 40 litres per animal was an ideal daily water consumption ? But an animal drinking every two days (cows) or every 4 to 5 days (camels) drinks a lesser amount of water.

Nevertheless, even without figures, mere observation shows overpasture around the bore-holes. This fact has become so clearly recognized now that for that reason, some of the bore-holes are closed every year on the basis of a rotation system in order to let grass grow again, and not only for reasons of economy.

How was this situation reached ?

In fact, the 25th July 1961 decree, where it is said that "the use of the pumping stations and pastures around them will be reserved to breeders groups to be selected from a list established by decree", was never applied. For political, social, administrative and practical reasons, the stations were opened to the public without any restrictions. The attribution of a bore-hole station to one group, and the prohibition of the same to another group proved to be an insuperable obstacle. In the Eastern part of this region, an attempt was made to reserve three bore-holes to Fulanis (Tofamanir, Abuyaya and Tamaya), and to leave two others for the Tuaregs. But now, the two groups are mixed around all of them, but this fact does not prevent frequent fights. The presentation of these problems and difficulties must not leave out another face of the question : how did the cattle breeders react to this policy.

IV. CATTLE-BREEDERS REACTIONS.

The increasing number of herds watering at the bore-holes seems to be a proof of the success of this policy. All those who have seen, in May, the relentless efforts of the shepherds to lift up the heavy leather scoop and to carry it up to the drinking trough will understand how much a bore-hole saves in time and fatigue.

But after several years, the cattle-breeders have stricken the balance between the advantages and drawbacks of such installations. Take the case, for instance, of the Illabakan Twareg tribe, living

nearby the Inwaggeur bore-hole station. A very deep cement well (90 m), dug in 1948, had allowed the settlement of many Illabakan camps who previously moved about in this area during the rainpools season, from October to December only.

In December 1961, the bore-hole pump was open. Since then, many others Illabakan camps as well as others Twareg tribes (Ishe-riffen, El Wuliten, Tamazleleyt, Tarkaz, Iberogan and also Bororo Fulani (Bikorawa and Gojawa) came overthere. That is to say that the first well users have seen their pastures encroached upon by foreign tribes. Notwithstanding the facilities offered by this immediately available water, eliminating the hard drawing of water from a depth of 90 meters, the Illabakan~~s~~ felt this invasion as unfair in view of their first users rights,

Coexistence was particularly difficult during very dry years such as 1968-69, when the grazing was practically non existent ; numerous herds - mainly beef cattle and sheep - were lost. On the other hand; time saved in drawing water was lost, because the camp had to settle farther and farther from the water hole, as the pastures were completely destroyed inside a circle of about 10 km around the water point. Therefore, in 1970, Illabakan approached the administrative authorities in order to ask the closing down of the In Waggeur station, which was not opened in the 1970-71 season.

Was it a success for the Illabakan approach, or a decision planned beforehand ? that is difficult to say. But this year, the Illabakan tribe restarted using their well and spent the dry season nearby. They were no longer obliged to camp as far as 10 to 15 km from the bore-hole to find hardly any grass to feed their calves, lambs and kids. All the foreign tribes were gone. They were once again the masters of their land, just as 9 years before.

During an extensive study of Illabakan tribe, very often we discussed this burning subject. Generally speaking, the shepherds, approve of the mechanical assistance which frees them from overwhelming work : now they can sometimes leave the camp, pay calls to their remote kinsmen, or go to the market, distant about 150 km, to buy millet. Young children can replace them and lead the herds to the bore-hole.

But the herd owners, who do not keep the animals themselves find many disadvantages, which can be summarized as follows :

- Grass is destroyed, the herds have no more pasture at the end of the dry season.

- Camps have to settle farther and farther from the water point.

- The larger number of animals make surveillance impossible and greatly facilitates thieving. At a well, every shepherd tends his pulley and recognize his cattle. Around a bore-hole, all the animals rush headlong to the drinking-troughs in great confusion, and it is impossible to keep them together.

Last but not least, robbers, having raided the animals, can easily reach the southern markets, watering during the night at the successive bore-holes. One cannot distinguish stolen beasts among the moving crowd of herds fighting near the troughs' approach. Two Illabakan families had, for that reason, begun to dig wells at a distance of ten kilometers from the station. Water had not yet been reached, but this fact is significant : they try to escape from too dense herds concentrations, and to move away from the desert zone surrounding the bore-hole.

On the other hand, the bore-hole digging made it possible to build a school. A few mud houses were built by two or three traders, a butcher, and the "civil servants" in charge of the pump and P.W.D. Around the valley, some millet fields are sown every year, notwithstanding the irregularity of the rain and the presence of the herds. A cattle vaccination station was built. During the dry season, the bore-hole became a focus of settled life, where nomads can supply themselves with some useful things. After the millet harvest (October to December), farmers come and sell cereals or exchange it against small animals (sheep or goats). Just before the summer migration, Arab traders come from InGall to sell clothes, tea, sugar, millet, sorghum or rice, at expensive prices, of course ; but this avoids sometimes for the nomads a long trip to the markets. As it was provided for, the bore-hole station gave the opportunity for a regrouping of activities, but it will not be in any case a settled dwelling for the nomads.

CONCLUSION.

To sum up the results of this pastoral hydraulical policy :

- Technically, the pump stations worked well. Breakdowns, normal in such a context, were scarce, in spite of maintenance difficulties.

: - The financial problems were not solved : contrary to expectations, the National budget has to support all the operational expenses : in the future, maintenance difficulties will increase, due to the lack of spare parts or to the poor condition of the vehicles.

- The bore-holes were not supplemented by a network of shallow wells (less than 40 m deep) for relay + dissuasion purposes. The useful deep water table is nearly always more than 40 m. deep so that there is not transition from deep wells (40 to 90 m.) with a low yield and water-holes (5 to 10 meters, shallow and unperennial superficial water) to bore-holes with high yield but expensive infrastructure.

- The last point, but not least : the laws about bore-holes use were never applied. It appeared difficult to give preferential treatment to some groups at the expense of others. So, failing a spatial limitation of the concentration, it proved easier to limit the time of use through delayed opening or by closing down some bore-holes every year.

Such a policy is in itself a semi failure, at once too ambitious, and too restricted. Too ambitious in the present economic circumstances. Too restricted with a mere scattering of bore-holes, each of them surrounded by overgrazing zones.

In fact, we can see here the limitations of ^{2/}pastoral hydraulical policy within an austerity budget and which could not be carried along with a pasture protection policy. The latter would require a national and delayed exploitation of the various areas through a transfer of herds on the basis of the evolution of the vegetal covering. Therefore, there exists apparently no other solution than a spreading of the pumping stations, this is financially impossible

of a very authoritarian pasture management which is politically and practically unrealistic.

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