

KNOW TO MOVE, MOVE TO KNOW

ECOLOGICAL
KNOWLEDGE AND
HERD MOVEMENT
STRATEGIES AMONG
THE WODAABE OF
SOUTHEASTERN NIGER



FAO INTER-DEPARTMENTAL
WORKING GROUP ON
BIOLOGICAL
RESOURCES



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AMONG THE WODAABE OF
SOUTHEASTERN NIGER

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FAO INTER-DEPARTMENTAL
WORKING GROUP ON
**BIOLOGICAL
DIVERSITY**
FOR FOOD AND AGRICULTURE



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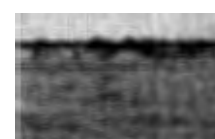
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All photographs have been provided by the author.



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F O R E W O R D

The present case study sets out the vital role that local knowledge plays in conserving biodiversity and ecosystem function in semi-arid rangelands. This study describes in detail the activities of the Wodaabe nomads, who strive to promote the prosperity of their herds through pastoral mobility and labour. The latter comprises many tasks such as driving animals to graze, watering animals at wells, feeding them minerals, searching for pastures. The relationship between the herder, his red Zebu cattle and the bush land (ladde) is marked on the one hand by cultural values such as the endeavour to leave the herd in good shape to his descendants; and on the other hand by Sahelian economic life in which the Wodaabe work to maximize herd fertility in order to gain animal wealth for market exchange and milk for household consumption.

The Wodaabe's ecological analysis of the two landscape units that they occupy is discussed, and the quality of the grasslands is related to soil quality. Their consideration of the vegetative cycle of grasses illustrates the Wodaabe's precise knowledge of plants, and the capacity of their scouts (pastoral sentinels) to predict the quality and quantity of grasses available for their livestock. Their indigenous knowledge, related to feeding schemes and the stage of the animals' nutritional development is investigated, as well as the animal watering schemes. The application of Wodaabe environmental and pastoral knowledge to the pursuit of herding is reported, and the relevance of their knowledge to make a significant contribution to economic production of the region and to sustainable use of its natural resources and biodiversity is presented in the conclusions.

The Food and Agriculture Organization of the United Nations (FAO) is committed to preserving biodiversity as a way to help people develop a sustainable livelihood based on their own resources. The assistance of FAO is channelled through various avenues and provides intergovernmental fora where biodiversity-related policies are discussed and relevant agreements negotiated and adopted by member countries, such as the International Commission on Genetic Resources for Food and Agriculture (CGRFA), established in 1983, which now numbers 165 countries, and the European Community. The International Plant Protection Convention, the Code of Conduct for Responsible Fisheries and the Treaty on Plant Genetic Resources for Food and Agriculture, are parties to a legally binding agreement, adopted in 2001 by the Conference of FAO, which recognizes Farmers' Rights along with Breeders' Rights.

The new perception of balance and limitations of the ecosystems and traditional pastoral knowledge presented here adhere closely to the spirit of the Convention on Biological Diversity's (CBD) ecosystem approach. As stated

I N T R O D U C T I O N

have not yet been answered. But it must be made clear that what is presented as indigenous knowledge in a written account is an abstraction of processes that, in their original place, need not have a textual and serial form.

Thus, the arrangement of sections in this case study is not to be understood as a model of a serial and verbalized reasoning process of the Wodaabe herders. It is only one of several possible ways (see Schareika 2003a for another) to introduce the reader to a foreign knowledge system and its application.

Another possible way is shown in Figure 1 below; which represents in a simple graphical synthesis some of the causes and effects directly related to the risk of loss of biodiversity in grasslands. Similar graphs have been developed for all biodiversity case studies.

Note on orthography:

It was not possible in the following text to represent the implosive b and d used in the Fulfulde language with their corresponding characters. For this reason, they are written in the same way as their plosive counterparts, i.e. b and d. The implosive y is given as ý.

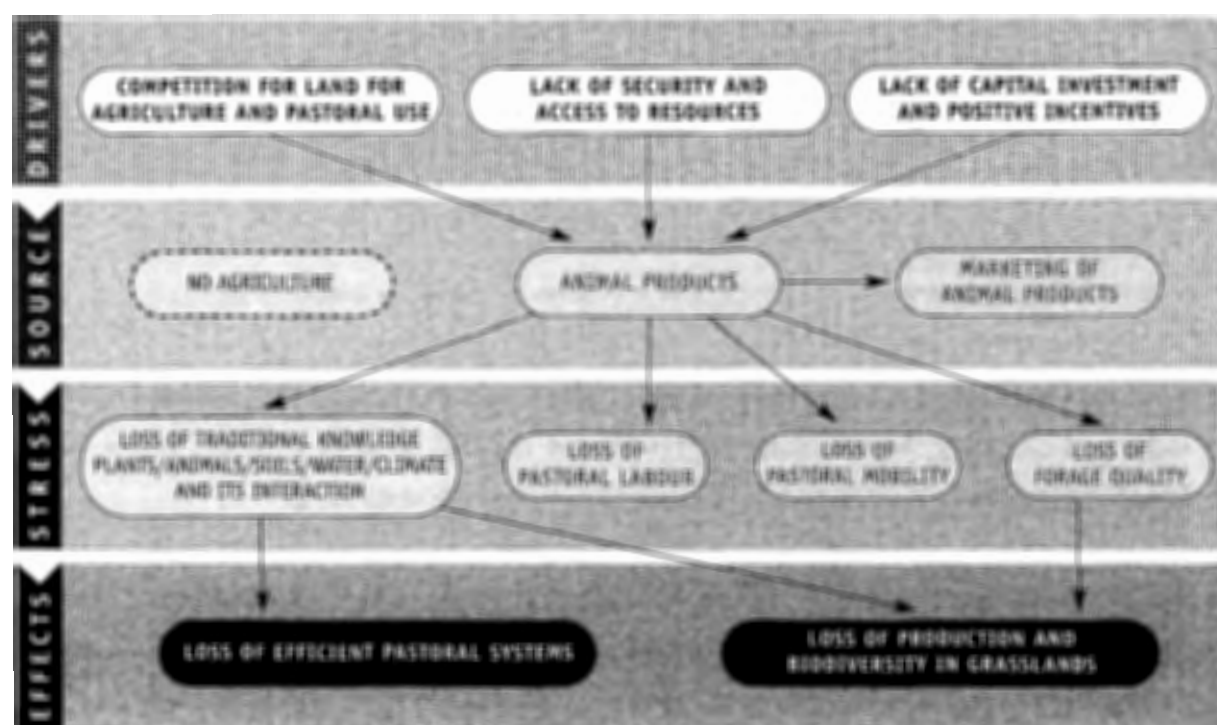


Figure 1: Drivers-Effects framework; a simple graphical synthesis of the causes and effects as portrayed in the text.

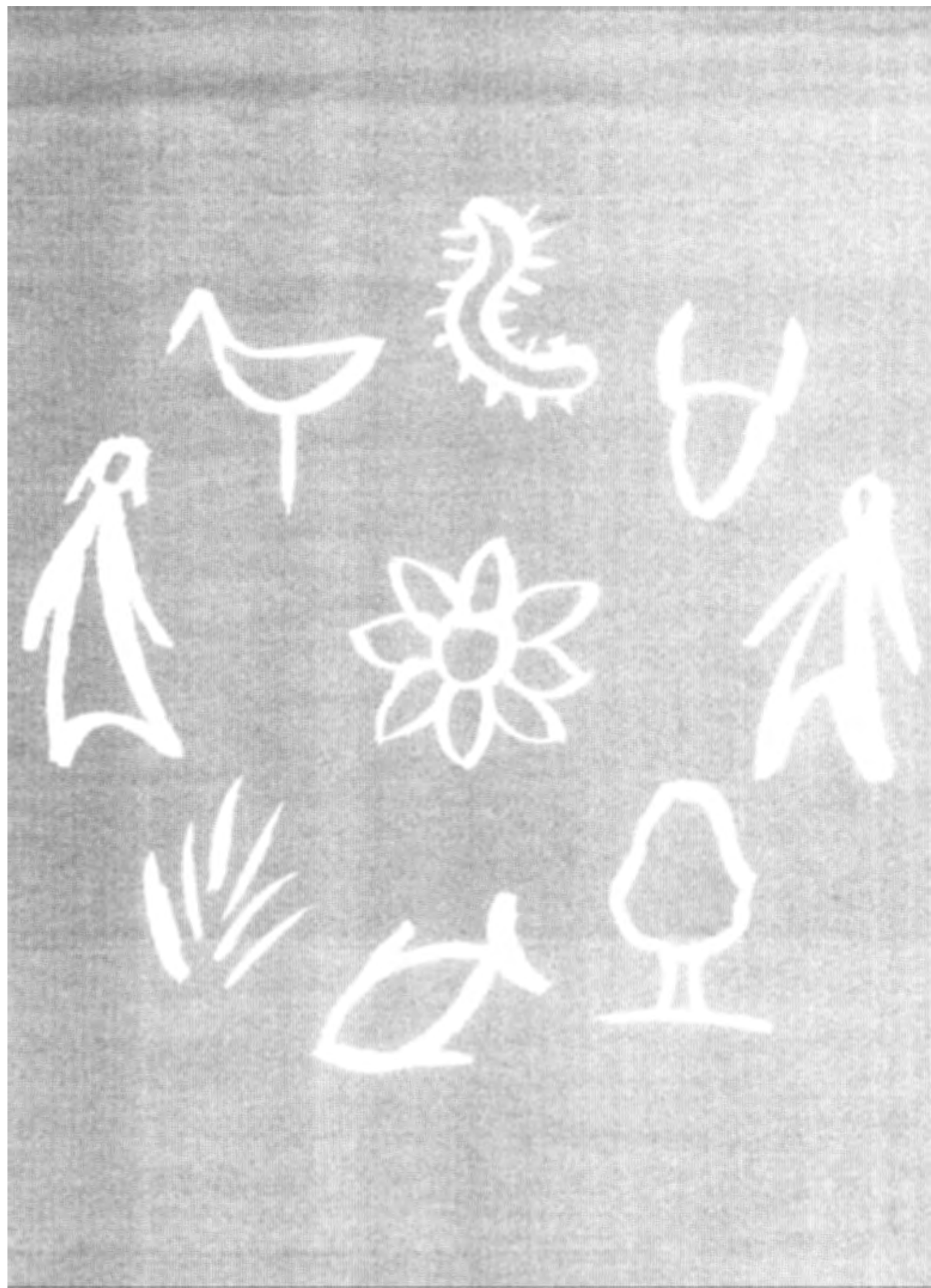




Photo 1: Wodaabe herder with his cattle

THE WODAABE OF SOUTHEASTERN NIGER

The geographic area of this case study is the southeastern corner of the Republic of the Niger, a region of the Sahel immediately west of northern Lake Chad. It is part of the department of Diffa, and is called *Karal Kawlaa* ('the plain of *Kawlaa*') by the Wodaabe themselves. This clayey plain inclines gently towards the Komadougou Yobe River, which forms its southern border. To the east it is bordered by the shores of Lake Chad which stretches from Bosso to a point somewhat south of N' Guigmi, to the north by latitude 14°10', and to the west by an imaginary line at N'gagam-Kinzayde (see map).¹ Average rainfall

during the years 1960–1996 was 280 mm in Diffa, 350 mm in Maine Soroa, and 194 mm in N' Guigmi.² Groups of Wodaabe are found in several parts of the Niger, in Nigeria, Cameroon, Chad and the Central African Republic. Originating from the central parts of today's Republic of the Niger, some of these groups immigrated to *Kawlaa* in several waves of historic migration that broke off from 1910 onwards (cf. Bonfiglioli 1982). The French colonizers who, from 1904, held a base at N' Guigmi, encouraged infiltration into *Kawlaa* by the Wodaabe, by driving its former inhabitants, the Daza Wendala (a group

¹ In the local literature (Nachtigal 1879; Tilho 1910; Zakari 1985: 19) this region is named Kadzell (alternatively Kadschel, Kazal).

² Calculated from data of the Direction de la météorologie nationale, Niger, Niamey.

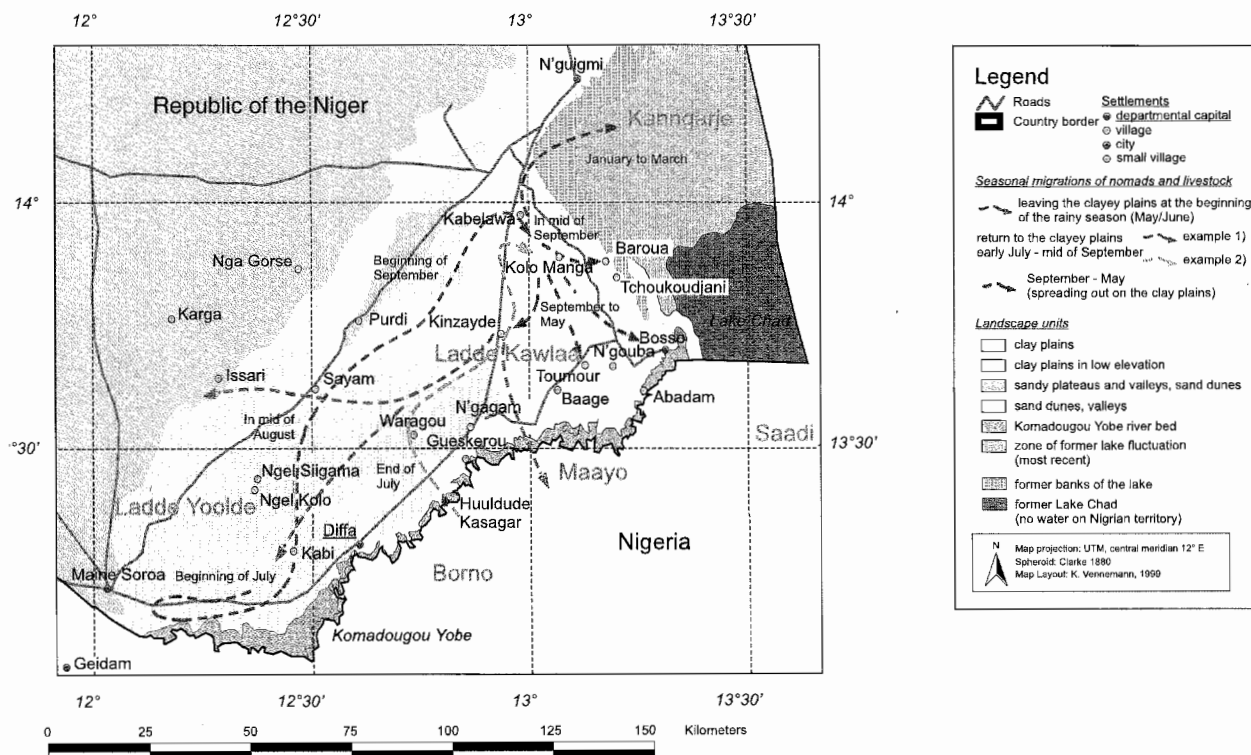


Figure 2: The pastoral zone

ranked among the Tubu), northwards (see Schareika 2003b; Thébaud 1999: 216-17).

The Wodaabe divide into agnatic kinship groups at different levels of inclusion.³ First, there are the two principal groups, the Degerewol and the Alijam. These are divided into clans (*lenyol*), which are again subdivided into lineages (*taarde*). Of the clans, one regularly meets the Suudu Sukayel, Jijjiiru (both Degerewol) and Bii Ute'en (Alijam) in *Kawlaa*. The group represented in this case study are the nomadic families of the Siiganko'en lineage of the Suudu Sukayel clan. As culture and pastoral economy can vary among different Wodaabe groups, we emphasize that the term "Wodaabe" (sing. Bodaado), used here applies to the study group and not to all of the Wodaabe people.⁴

The simple or complex family (*wuro*) with its herd of Zebu cattle is the most important unit of ordinary economic life and decision-making. The family household typically consists of a man, his wife or wives, and their children. Beyond this there are households consisting of a) two generations of married men, i.e. father and son with their wives and children, or b) married brothers living together. On average a Wodaabe family disposes of 44 head of cattle and 11 sheep (Thébaud and Nomao 1987: 79). The household units are, in fact, created by decisions concerning marriage and naming of children at the lineage level. However, the existing households are independent in their pastoral decisions and move with complete freedom. They join forces in migratory groups (*wuumre*), but do not hesitate to leave these when their pastoral strategies diverge.

³ Details on Wodaabe social organization are found in Dupire 1996; Bonfiglioli 1984, 1988.

⁴ Ethnographic description of the Wodaabe in southeastern Niger (Departement of Diffa) is found in Bovin 1985, 1990, 2001; Paris 1997; Thébaud 1999; Schareika 2001, 2003a, 2003b.



Photo 2: Joodi



Photo 3: After the river-crossing



Photo 4: Pile sorting exercise with voucher specimens

METHODS

This case study is based on ethnological fieldwork which was carried out from February to October 1996, from January to April 1997, and from July to December 1997. The empirical research among the Wodaabe families of the Siiganko'en lineage was characterized by two features which are methodologically important to the study of indigenous knowledge. First, research activities took place in a situation which anthropologists call "participant observation", i.e. the researcher lives in close contact with the people he is studying over a considerable period of time. This has some important implications:

- By living together in the bush, sharing meals, seeking protection from the fierce heat under the same trees, and by accompanying the nomads during their migrations, the researcher shows that he holds the lifestyle of his hosts in high esteem. This factor nurtures that confidence in people that is a prerequisite to sharing their knowledge.
- The researcher lives through all sorts of situations as they develop. Even the very best informant cannot anticipate all possible aspects of an event that might be important to the researcher, and, conversely, the researcher can never contemplate all the factors he may need to know in order to describe events and behaviours. Only direct experience will allow him to make observations about hitherto unknown themes, and enable him to pose meaningful questions.
- There will always be a difference between what people say and what they do. Therefore, interview data should be cross-checked with observation data; discrepancies between the two sets often lead to interesting research questions.

The second point concerns how the Wodaabe's environmental and herding knowledge was elicited. The nomads' knowledge of geography, geology, climate, wild plants and animals, time and space relations, pastoral mobility, herding, and the social organization of pastoral work was captured using an "encyclopaedic" approach. Capturing means that the researcher puts himself in the position of a disciple who learns step by step from his instructors, the pastoralists. Knowledge here always consists of two overlying views of reality: empirical, factual statements about what is or what happens in the world, and normative statements by which the world is represented, or expected to be. Moreover, it is important to note that the entirety of these (and many other) themes are also a reference to any single theme. Therefore, knowledge of the whole (i.e. the context) is a prerequisite to an understanding of a particular topic. Take a simple example: The tree *Ficus platyphylla* takes its name *kalkaldihi* from the word which designates the breeding bull of the herd. Thus, a knowledge of herd structure is vital to understanding the significance of the *Ficus platyphylla* for the Wodaabe.

As pointed out above, not all knowledge can be verbalized. Language, though, is the first key if scientific understanding of indigenous knowledge is to be developed. Verbal statements were tape-recorded, transcribed and then analysed. Asking for names of things (e.g. plants) is a starting point. The classifications adopted can be obtained with analytical tools, like pile sorting and paired comparison (Martin 1995). Question frames are used to arrive at definitions of concepts and propositions

(cf. Ellen 1993: 60). Preference ranking and triadic comparisons help to obtain evaluative statements, e.g. concerning the quality of fodder plants. These question techniques are very narrow in that they clearly pre-structure what the informant is expected to respond. Therefore, they are mainly suitable for the purposes of systematizing and comparing data.

However, in order to obtain less filtered data, more open forms of data collection are needed. Asking informants to describe whole processes or to recount events is one possibility. Just accompanying them and letting them comment on what is happening and what they are doing is another. Here, those under study still refer exclusively to the researcher. That is, their statements are structured by what they expect him to be able to understand – or worse – to be willing to hear. Therefore, just listening without interrupting (e.g. the herders discussing pasture information they obtain from their scouts (see

photo 5), or the political speech of a local leader), is one way to have more authentic information. There is much more language competence needed to follow free conversations of the local people than to understand longer accounts that are directed towards the researcher. But it is with the first method that new and often very insightful information can be obtained, when other techniques have exhausted themselves. Data from these longer speech acts are usually less systematic and more difficult to compare, but give rise to a whole context of conditions, associations, side effects and causes that is relevant for understanding the issue at hand. None of the techniques cited for oral data collection is sufficient for investigating local knowledge. Rather, they need to be combined in order to form a reliable method. Information obtained with one technique is cross-checked with that obtained with the others, and insights gained by applying one technique are used to develop questions within the structure of the other techniques.

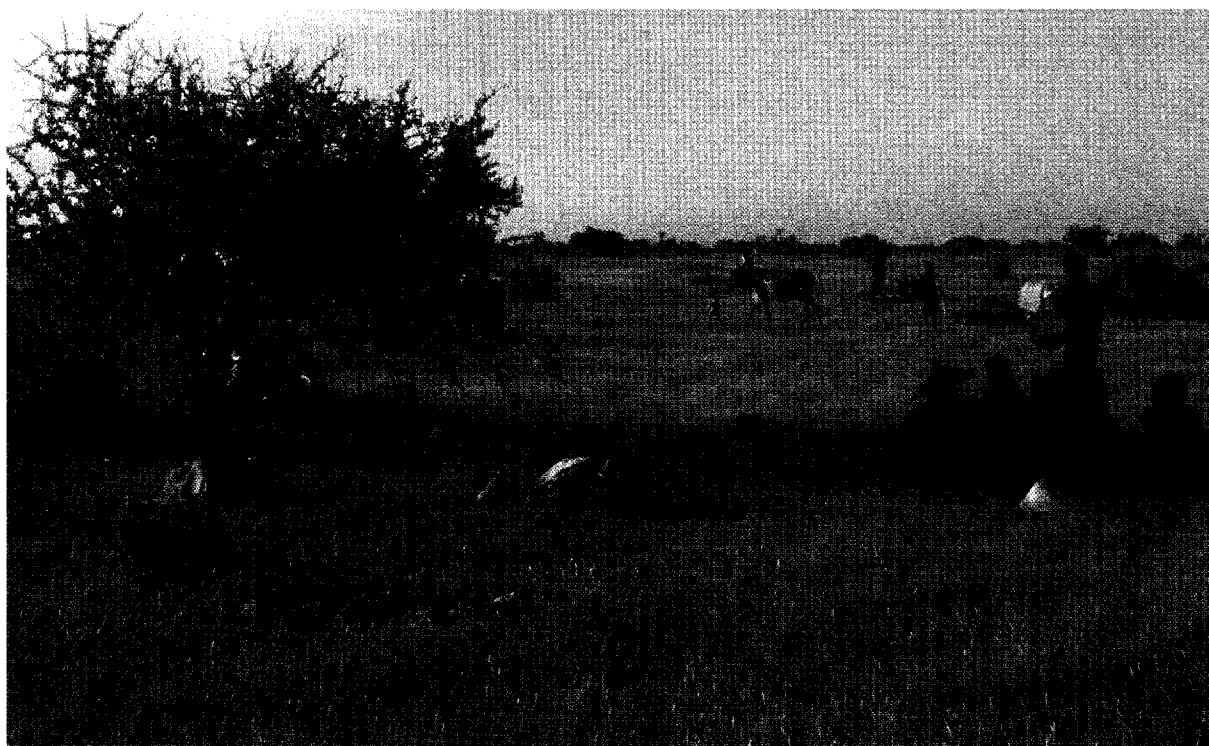


Photo 5: Herders discussing their rainy season migration

THE CULTURAL CONDITIONS OF PASTORAL DECISION-MAKING

The knowledge and perception of the environment that the Wodaabe possess, and the strategies they use for raising herds do not follow from interaction with physical realities alone. Their view of nature and pastoral work is filtered and shaped respectively through and by a screen of cultural values and orientations. These are vital to understanding how the Wodaabe relate to the Sahelian savannah and to their herds. These values and orientations concern the relationship between the Bodaado, the red Zebu cow (*nagge*), and the bush (*ladde*), which the Wodaabe perceive as being primordial. According to this optic, the Bodaado does not choose through economic calculation, to raise red Zebu cattle; he receives them in heritage from his agnatic kinsmen, only to pass them on to his children. He does not receive his heritage in one go but during a long-term process of living in the bush with his family and the herd. Over time, a close relationship of

mutual confidence and responsibility develops between the Bodaado and his cattle.

The red Zebu takes care of the Bodaado in return: she provides milk, butter, bone marrow and meat; the money needed to buy millet and clothing; and the bullocks to be butchered in name-giving and marriage ceremonies. The cow accepts the Bodaado as her owner and stays with him faithfully; she always comes back to the camp and refuses, sometimes angrily, to follow anyone who tries to steal her. In return for her loyalty, the Bodaado acts as a guardian and benefactor of the cow. In practice, this means a number of things, but in principle it is clear that the Bodaado constantly tries to maximize the herd's well-being and fertility by living where the animals feel most at home – in the bush – and facing all sorts of hardship for their sake. This motivation manifests itself in every possible aspect of Wodaabe herding knowledge and practice, as will be shown in the following chapters.

BOX 1: THE RELATIONSHIP BETWEEN COW AND BODAADO (Nyaleega, Nov. 1995)

Anyone else who gets a cow just wants to roast and eat her. The Bodaado by contrast finds grass and water for her, and free bushland far away from sedentary farmers. Like this place where we are sitting now: this is the kind of place where we can park the cattle so that they can leave the camp at night to graze. There is no village, there is no farmer. The cows can spend the night grazing, and drink as much water as they want. The next morning they will already be standing in front of the calf rope to let themselves be milked; they will replete us with milk and butter. The Bodaado watches them and feels happy; this is all the Bodaado wants. And if things don't go well for the cow, as they do when she is with the Bodaado, she will be not amused.



Photo 6: Bodaado driving a young bull to the market

THE PASTORAL WAY TO EARN A LIVING

The Wodaabe follow one of several ways available in West Africa to earn a living from pastoral work. Herders can opt for one of two basic orientations: diversify or specialize. Most Fulani in West Africa diversify production by herding cattle and cultivating fields. This combination of occupations has important consequences for herding: being tied to fields, herders and herds are restricted in their mobility. The effect of reducing mobility under Sahelian conditions is that the calving rate decreases (Amanor 1995; Wilson et al. 1984; Le Houérou 1989; Colin de Verdière 1995). Fulani who cultivate are therefore very reserved about marketing their cattle assets. In fact they see cultivation as a strategy to avoid selling animals from the herd (cf. Schareika 1994). This would either reduce the productive capital – the herd – (Bierschenk and Forster 1991), or the social capital – single beasts – that the family head needs to bind his sons as a labour force (increasingly needed for cultivation), to the household (Schareika 1994, 1998). As cash is always needed and the demand for milk on the

part of neighbouring farmers offers a good commercial opportunity, the Fulani women sell fresh and sour milk in the local markets. As a consequence, the men have taken over the work of milking, fearing that their women leave too small a share to the calves.

The Wodaabe, by contrast, have opted for specialization. They only raise cattle and a few sheep, and they do not own any fields. They meet their needs in grain and other goods by selling animals from the herd. With present price ratios, this style of pastoral life requires the highest possible rate of animal production, i.e. maximum herd fertility. The Wodaabe cite five principal factors as prerequisite to harnessing high fertility: pastoral labour, constant mobility, high quality fodder resources, herbal herd magic, and the knowledge needed to combine all these correctly. Thus, the Wodaabe own no fields to distract them from taking care of their herds, and they are obliged to make use of this liberty of movement to induce fertility in their cattle.

The work ethic (Box 2) that the Wodaabe display

BOX 2: THE IMPORTANCE OF PASTORAL WORK (Nyaleega, Nov. 1995)

One has to stand upright in front of one's herd; only then will you ensure order. You must look after your cattle day and night, and never take your eyes off them; then they won't come to harm, then they will prosper. If you go away and leave them on their own, you will find every time you come back that one or more of them has got lost, or worse, that they've contracted some disease or even that somebody has sold them. This is not the way to make your cattle advance. If, on the other hand, you stay with them, keeping them in order, they will be healthy and will bring you profits: your family will drink plenty of milk, and you will be sure to have calves to sell. Your cows will calve and will not come to any harm.

reflects the importance of the herders' efforts and work input to the prosperity of the animals. It is true that in cattle husbandry, success is proportionally related to the amount of capital, i.e. sexually mature cows, invested (Schneider 1979: 84) and that each further investment of labour will not yield a proportional growth of the herd. However, pastoral production does not only depend on herd size, herd structure and natural conditions (Swift 1977: 461). There is a margin within which a greater input of pastoral labour yields higher returns in animals; it is this margin that the Wodaabe exploit.

Wodaabe pastoral labour comprises many tasks: driving animals to graze, watering animals at wells, feeding natron, checking the condition of the herd, providing for medical care, removing parasites, searching for pastureland, searching for animals that get lost, lighting a fire for the herd, tethering calves to the calve rope, milking the cows, twisting ropes, visiting a neighbour to bring home a calf given as stock loan, and many others. These, however, are not the tasks that define the

particular quality of Wodaabe pastoral labour. Two things are important: first, the herders are constantly attentive to their animals, thinking and discussing whether there is something to be done to improve the well-being of the herd. Second, the energy expended in promoting the prosperity of the herd is not so much contained in single and mechanically applied acts, as in the whole Wodaabe lifestyle, which is thoroughly pastoral. What this means will become clear in the next section, on the culture of moving.

Although animals have to be sold to buy grain and other goods, the strategy of maximizing herd productivity through work effort is complemented by a strategy to minimize capital loss through plain living and sacrifice (Box 3). Household equipment and clothes are repaired again and again before they are replaced. The Wodaabe often abstain from investments that could ease the burden of daily life, e.g. buying an additional canister to avoid the family running out of water too soon, or a warm blanket to shield off the cold wind during the cold dry season.

BOX 3: SUCCESS IN HERDING REQUIRES PLAIN LIVING. A FATHER INSTRUCTS HIS SONS (Baaki, Sept. 1997)

There are two sorts of people who will never be good at keeping cattle: the first covets a shady place, turning away from his animals and towards where people gather to talk, enjoy the shade, and sleep; he will have no cattle. The second sells beast after beast in order to lead a life of extravagance. One who does not put off their sale, will not have cattle. You strive for them, to the point of exhaustion, you scare them off sale, you scare them off the market! Even if there are only three left [after a drought, for example], they will bud to become cattle. And after three or four years it will be plain to see that they have become a family herd; they have gone ahead instead of becoming less.

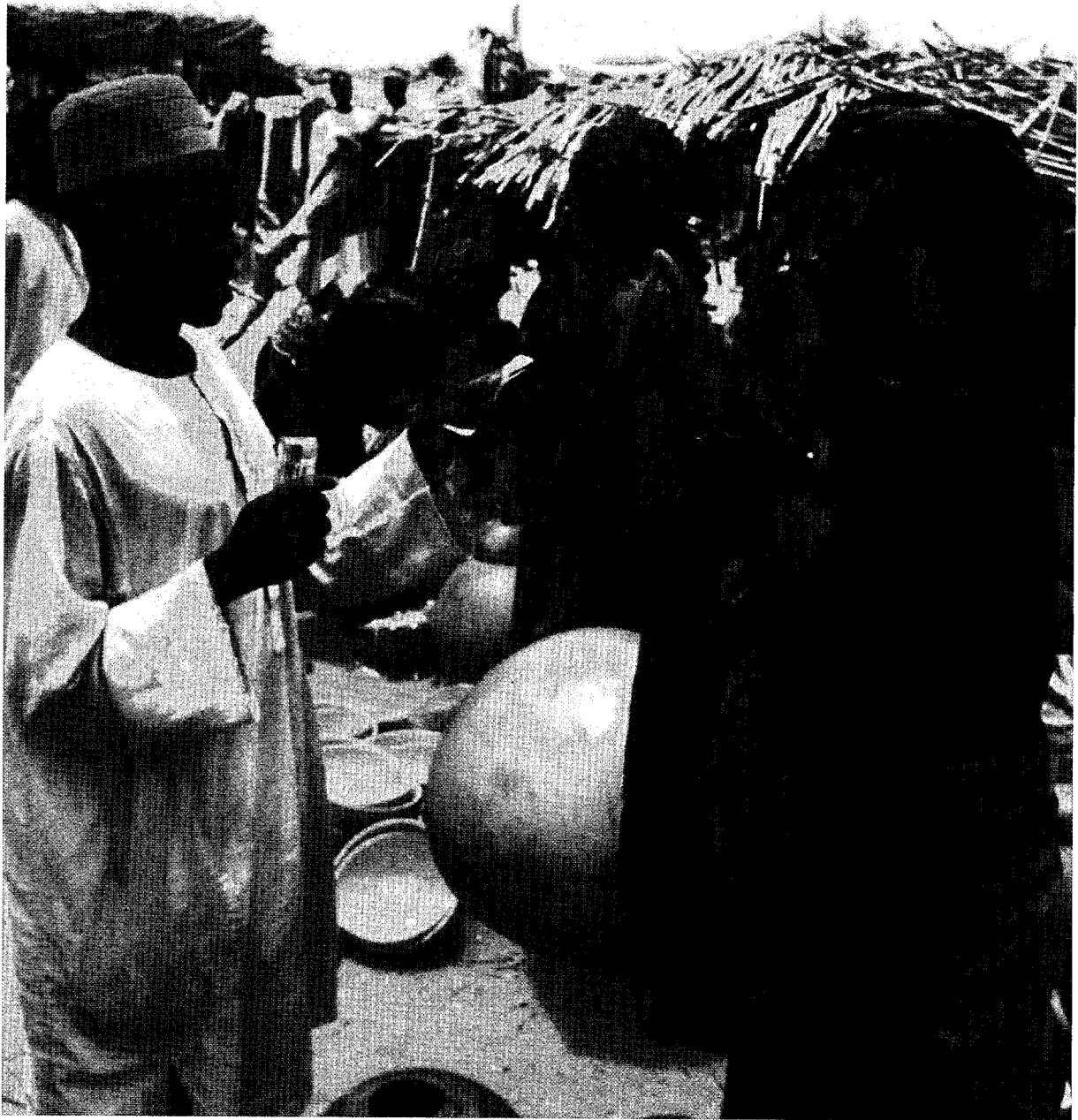


Photo 7: Woman discussing the price of a calabash in a local market



Photo 8: Wodaabe family on the move

THE CULTURE OF MOVING AND THE PATTERNS OF MOVEMENT

According to the Wodaabe, constant and unhindered roaming through free and unpopulated bushland is of prime importance to herd development (Box 4). Therefore, Wodaabe households are physically and socially organized in a way that allows for a very high degree of herd mobility. Two dimensions of this mobility have to be considered:

1. moving between camp and pasture;
2. moving from one pasture to another.

As herd and human family move together about every two to ten days, the camp which serves both is always placed within the grazing area chosen for present use (Figure 3; Photo 9, 10). The Wodaabe conceive of their cattle as having a will that directs them to do what is good for them. The herders concede to this will by letting the animals move freely, choose the direction and timing of the daily pasture walks, and by giving them the opportunity to graze as they like during day and night. For this very reason, the nomads choose the most sparsely populated bushland, far away from cultivated fields and human aggregations, as their living space.

Furthermore, they use only an indirect method to bind the herd to the human family. Cattle are not attached with ropes or driven into enclosures; there is a calf rope which separates the camp into an eastern sphere of human female family life and into a western sphere of the herds' and male herders' life (Photo 11). The calves are attached to the calf rope, and this ensures that the cows always return to their home camp. (The calf rope is in fact a central symbol of Wodaabe pastoral culture and not only a technical implement, cf. Schareika 2003a.)

Putting the herd out to pasture is an activity that supplies the animals with grass, browse and water, and structures their own and the herders' daily routine (Table 1). However, it is through pastoral migration of herd and household together that the Wodaabe principally decide on how the cattle are tended. There are four types of pastoral movement:

1. Historical migration (*perol*) is a rare event that is politically as well as ecologically motivated. In an historical migration the Wodaabe make a general choice of a bushland that has a certain quality for

BOX 4 : F R E E D O M O F M O V E M E N T (Sheefu, Sept. 1996)

First [when our parents came to Kawlaa] there were no people in the bush, there were no fields, there was enough grass, and enough feed for all the cattle. You could pasture and make your camp site; you could leave your cattle to pasture far off, fill themselves and then come back. There were ponds in the bush, grass in plenty, and land with wonderful clayey plains; there were no arid spots without grass, no thieves, no discord. This is what the real bush is: your cattle filling themselves, ... you can make your camp site wherever you want, there is no [political] power, there are no fields. There is no "Do not make your camp site here!" You just put your animals out to pasture, look around for water to water your cattle and then come home.

their pastoral endeavour (see Schareika 2003b for details). They remain within this bushland to exploit its resources through other types of pastoral migration, and only temporarily transcend its borders to escape from droughts and other sorts of crisis. The historical migration that brought the Wodaabe to *Kawlāa* occurred from 1910 onwards.

2. Seasonal migration (*baartol*) is a regular event by which the Wodaabe choose, according to seasonal factors, between ecological zones that are particularly suitable at different stages of the yearly cycle. Seasonal migration is an undertaking that leads the nomads away from and back to the land of affiliation. The migratory route is established a) by sending out scouts to look for interesting areas, and b) by following a general predetermined direction based on knowledge and experience. Typically, seasonal migration starts

with the beginning of the rains in May or June and leads towards the west. It does an about-turn when the rains are properly installed by July, and reaches its easterly point of departure with the end of the rains at the beginning of October.

3. The middle range move (*goonsol*) connects two pasturelands within an ecologically unitary zone: during the dry season such a pastureland is the area from which a given well is accessed. During the rainy season it is the area that receives the same rain shower and is therefore covered with grass at the same stage of the vegetative cycle.
4. The short range camp site transfer (*sottol*) is a movement within one of the aforementioned pasturelands. It is used to replace a camp site that has been degraded by animal droppings.

At no time of the year do the Wodaabe stay any longer than two (rainy season) to ten (dry season) days. They



Photo 9: Wodaabe homestead set up in midst of pasture

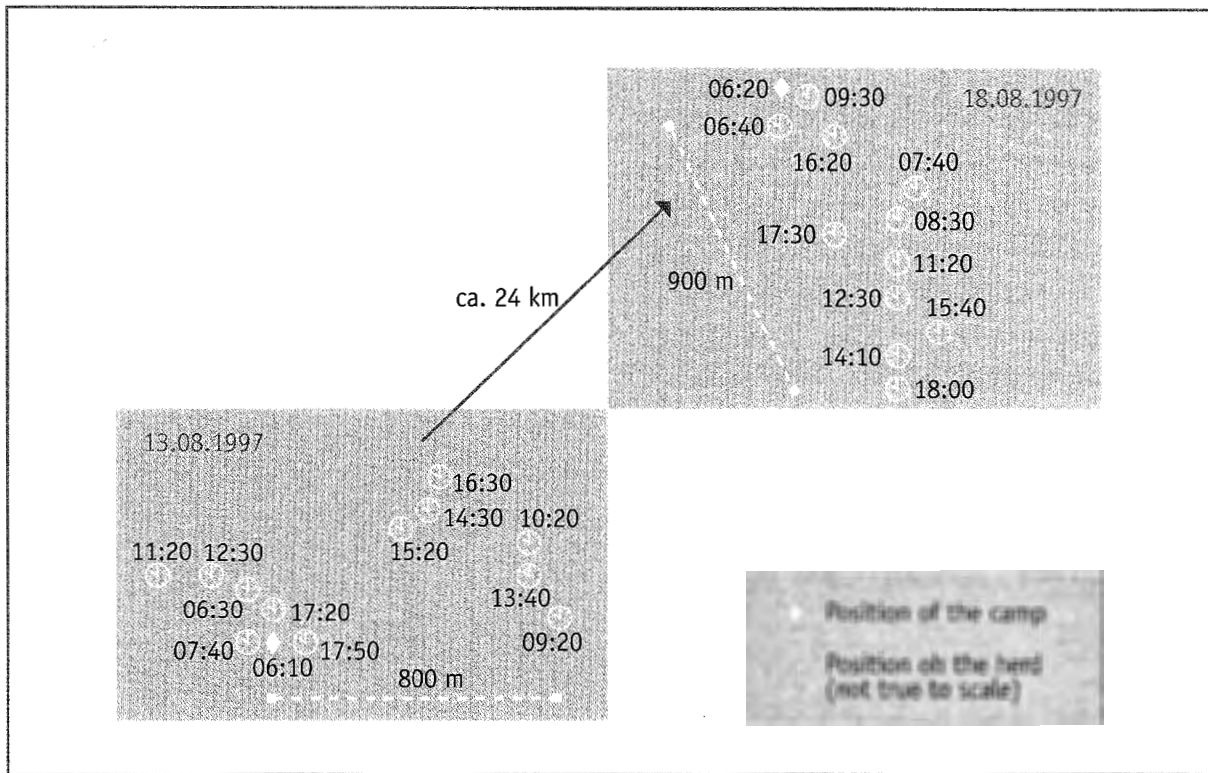


Figure 3: Pastoral migration and daily herding



Photo 10: Camp (wuro) in rainy season bush

dispose of neither huts nor tents and only possess belongings that can be easily and quickly saddled to a couple of donkeys. The two largest and heaviest items belong to the married women: a wooden beadstead and a wooden platform on which the donkey carrier bags containing the household appliances are put (Photo 12, 13, 30). The household, a unit of a human family with its herd of cattle, is independent in its decisions to move. Socially it allows for a level of aggregation – organized through agnatic descent – that renders the pastoral family viable, but which does not impede it from making fast and flexible decisions.

As mentioned before, it is normally composed of a man, his wife or wives, his sons and their wives; or his brothers with their wives. A camp can easily split, e.g. an adult son setting up independently from his father, a common event when herders no longer agree on pastoral decisions.

The significance of pastoral mobility is often evidenced by the pastoral importance of the locations occupied during the moves. However, the example of the Wodaabe shows that for them moving has its own merits, regardless of the exact location chosen. This becomes clear when seen from a relativist point of view.

TIME OF THE DAY	HERD ACTIVITY	
Just before sunrise	Inspecting the herd	(<i>tiima pinde na'i</i>)
After sunrise	Milking the cows freeing calves from calf rope	(<i>bira na'i</i>); (<i>yoofa nyalbi</i>)
Morning hours	Morning pasture	(<i>wammunde, maajunde</i>)
Noon	Cattle rest calves separated from herd	(<i>iftol</i>); (<i>nyalbi kodaama</i>)
Afternoon hours	Afternoon pasture, sometimes without herder	(<i>hiirtunde</i>)
Late afternoon	Calves tethered to the calf rope	(<i>habba nyalbi</i>)
Early evening	Herd comes back from pasture lighting herd fire	(<i>na'i njaa'oo</i>); (<i>dudana na'i</i>)
Before sunset	Milking the cows	(<i>bira na'i</i>)
Before sleep	Tethering older calves to the calf rope	(<i>habba nyalbi</i>)
During the night	Night pasture, only supervised when in the vicinity of fields	(<i>soggunde</i>)

Table 1: Structure of a herding day



Photo 11: Milking in front of the calf rope (daangol)



Photo 12: Camp (wuro) seen from the east

MOVING AS A WAY TO KNOW

The Wodaabe are primarily concerned with maximizing herd fertility. This means that they are not so much interested in the mere possession of animals as in herd performance. This seems to be the fundamental reason why herders do not count their animals: It has little to do with any traditional or magical fear that by counting one “fixes” the number of beasts, which is meant to augment *ad infinitum*. It is, rather, that static herd size is not the appropriate and relevant unit of analysis to a herder; what matters is the number of cows mated, and these, in fact, the Wodaabe do count.

Nourishing and abundant grass is needed to prepare the cows for conception. But the Wodaabe do not only follow absolute standards in order to determine what a good pasture is; their judgement is further guided by a strict sense of relativity. Comparison and competition are always operative stimuli to the refinement of pastoral performance. The comparison of herd performance in the joking battles of words among herders (a praxis called *mbeeffi*) is one manifestation of this attitude. Another is the permanent moving of herd and household, the leitmotif of which is the search for something better. The Wodaabe use several indicators to establish

whether a given piece of bushland is good range or not. In their final judgement, however, they apply an experimental approach to find an answer to the question. The herders must put their animals out to pasture to see how they react with respect to the range formerly used: proper animal behaviour and breathing, brightness of the coat, indention of the rumen, weight gain and milk production are at the same time the result and confirmation of good pasture. Restlessness of the herder and frequent moving of herd and household are therefore instrumental to understanding what stimulates the herd and what refines the herding scheme.

The importance of pastoral mobility, however, is balanced by the concept of habit (*woowa* ‘to become used to’). Animals and men gradually become used to their environment and the rhythm of life exercised therein. The Wodaabe see that there is no absolute standard for choosing good range; what makes the cattle of other herders prosper in some region may be detrimental to theirs. Thus, the choice must always be made in accordance with what the animals have become accustomed to. In addition to this, herders have an intimate knowledge about regions familiar to them, while they know little about the regions frequented by other herdsman. They often cite this lack of knowledge as preventing them from going into some particular region where others graze successfully.

BOX 5: INDIVIDUAL AND SOCIAL DRIVE TO MOVE (Bello, Aug. 1997)

These cattle that he keeps are unable to stay in one place for any length of time. He would find it very hard work to try to get them accustomed to staying put. And he himself cannot manage either. As for me I have to admit that if I thought I would have to stay for three months at this place, kaay, even if I was given whatever number of cattle to do so, I could not do it. If one of us settles down, we say he’s a good-for-nothing, a layabout. ... if drought kills his cattle or some disease, he will not find anybody to replace them. People will only say: what is he good for, he’s still there where we left him at our used up camp sites. He is no good, he is no herder, he is not equal to the job, he is not one of us.

MOBILITY AS A MARKER OF IDENTITY

Thus, to the Wodaabe, pastoral mobility is not simply a technique by which resources are appropriated; it is the very source of success in the pursuit of herding. In fact, while promoting the image of a primordial relation of mutual trust between themselves and the cows, the Wodaabe represent the impetus to move as the inner disposition not only of the beasts but also of themselves: They are always on the move, not because their animals compel them

to be, but because they simply do not feel comfortable otherwise. Pastoral mobility has thus become a socially relevant marker of attitude of those who 'keep the cows under surveillance' (*reena na'i*): to qualify for membership in the community of herders – which is crucial to getting animals on stock loan (*habbaye*) – one has to prove oneself mobile. Moving has yet another very important meaning apart from reaching a chosen destination, which will become apparent when the environmental and pastoral knowledge of the Wodaabe is illustrated throughout the following sections.



Photo 13: Woman packing up her homestead



Photo 14: Pond (weendu)

THE WODAABE'S ECOLOGICAL ANALYSIS OF *LADDE KAWLAA*

A decisive factor in the Wodaabe's understanding and perception of ecology is their classification of landscape into sandy dunes and clayey plains (Table 2). These two concepts are applied on two levels of analysis:

1. geo-morphological elements within a landscape composed of several geo-morphological elements;
2. whole landscape types that are characterized by the occurrence of the respective elements and that are prototypically named after them.

These two landscape units correspond to the two most important geographical units into which the Wodaabe divide their pastoral world (Figure 2). For the greater part of the year they occupy the vast clayey plain immediately west to the northwestern shore of Lake Chad. This is the region they call the 'bush' (*ladde*) or the 'plain' (*karal*) of *Kawlaa* and which constitutes their land of affiliation (*ladde meeden* 'our bushland'). West of this plain begins the land of the sand dunes (*ladde ýoolde*), which the Wodaabe move towards during their rainy season migration (*baartol*). These two regions are bordered by the Komadougou Yobe River (*maayo*) to the South.

On both sides of the river, farmers cultivate legumes under irrigation. When there is a pasture shortage the herders cross the river to Borno, Nigeria. Two other zones of retreat are *Kanngarje*, part of the dry Lake Chad basin, immediately south of N' Guigmi and *Saadi*, a more southern and vast part of Lake Chad beginning in Nigerian territory.

THE WODAABE'S ANALYSIS OF THE CLAYEY PLAINS

The Wodaabe consider the clayey plains of *Kawlaa* as excellent rangeland. Here, in a typical transect, one can find a hollow that forms a puddle or pond (*weendu*) during the rainy season (Photo 14). Around this depression there is a comparatively dense vegetation of trees, herbs, creepers and climbers. The hollow leads to a flat plain consisting of hard, compact and dark loam. This is what the Wodaabe mean by *karal*. It is either bare (*karal buulal*) or covered with gramineae (*geene*) and trees. The terrain then rises gently with a sand layer that can be of different sizes

LANDSCAPE TYPE	SANDY DUNES (<i>ýoolde</i>)	CLAYEY PLAINS (<i>karal</i>)
Geo-morphological element	dune (<i>ýoolde</i>)	clayey plain (<i>karal</i>)
	dune valley (<i>ýeengol</i>)	dune or layer of sand (<i>ýoolde</i> , <i>ýoolel</i> , <i>tilel</i>)
	sandy plain (<i>baaringo</i>)	pond (<i>weendu</i>)
	basin (<i>luggere</i>)	woody depression (<i>luggere</i>)

Table 2: Landscape types

and is accordingly named *yoolde* (bigger dune area) or *yoolel* (smaller dune) (Photo 15).

To a large extent the Wodaabe attribute the high quality of pasture found in this region to soil quality. With the concept of *mbaawu* – ‘power’ they refer to the fact that the loam (*loopeeri*) and the dark soil (*lesdi baleeri*) of the plains proper as well as the sand layers found on them, are rich in salt and minerals. This view has been proven by pedological analysis (cf. Schareika et al. 2000). The Wodaabe compare the soil to the natron (*kawwa*) they buy when pasturing on sandy soil, and consequently they call it *kawwaari*.

It is in these soils that the fodder plants grow which the Wodaabe prefer for their cattle, partly because of their characteristics, and partly because of their high salt and mineral content (Table 3). Among the grasses figure the soft and delicious *Chloris prierii* (*geenal dimal*), the energy rich *Panicum laetum* (*kaasiyaari*) and *Echinochloa colona* (*sabeeri ngonngorsa*); among the trees, the particularly salty *Salvadora persica* (*kasassi*).

The surface quality of the plains produce four ecological consequences which the Wodaabe consider as advantageous for them. Compared to sand, the clayey soils have a higher water storage capacity and a lower surface infiltration rate. This means that:

1. after the beginning of the rains, the grass sprouts slower and therefore later than in the sandy dune areas;
2. during the rainy season ponds fill with water that is easily accessible to cattle, and therefore not only liberates the herders from hard work at the wells, but also the herds from having to frequent the well as a fixed point;
3. water running over from the ponds remains on the low level plains to form flood plains on which *Panicum laetum* (*kaasiyaari*) and *Echinochloa colona* (*sabeeri ngonngorsa*) grow (Photo 16);
4. particular herb species (Table 3) emerge from the soil which is soaked with water, and remain green even when the rains have stopped or become scarce by the end of the rainy season.

Another characteristic of the clayey plains is very important to Wodaabe herding. When the rains come to an end prematurely, the grass that stands on somewhat elevated plains where surface water tends to run off cannot complete its vegetative cycle. It stops growing at the stage of tillering and becomes fodder of highest quality. The Wodaabe call it *kundeeri* then: grass that remains short, carries no ear, and has a reddish gleam. This sort of grass stores energy and nutrients, so to speak, for the benefit of cattle, instead of using them for its own reproduction.



Photo 15: Clayey plain in the bush of Barowa

	UTILITY	CLAYEY PLAIN (<i>karal</i>)	SANDY DUNE (<i>yoolde</i>)
GRASS	Energy feed	<i>Chloris prieurii</i> (<i>geenal dimal</i>) <i>Echinochloa colona</i> (<i>sabeewal</i>) <i>Panicum laetum</i> (<i>kaasiyaari</i>)	<i>Cenchrus biflorus</i> (<i>hebbere</i>) <i>Eragrostis pilosa</i> (<i>saraawal</i>) <i>Andropogon gayanus</i> (<i>rayýere rimre</i>), nearly extinct <i>Commelina forskalaei</i> (<i>balaasa</i>), isolated
	In case of scarcity	<i>Aristida adscensionis</i> , <i>A. funiculata</i> (<i>selbiwal</i>)	
HERBS	Supplement to grass	<i>Colocynthis citrullus</i> (<i>layol gunaaru rimru</i>) <i>Indigofera hochstetteri</i> (<i>jaa'oomaahi</i>) <i>Cucumis melo</i> (<i>yamburuuwol</i>) <i>Heliotropium ovalifolium</i> (<i>yaharehi</i>) <i>Ipomoea verticillata</i> (<i>amaseekel</i>)	<i>Zornia glochidiata</i> (<i>dengeere</i>) <i>Alysicarpus ovalifolius</i> (<i>gadaji'irehi</i>)
	In case of scarcity		<i>Tribulus terrestris</i> (<i>tuppere</i>) <i>Achyranthes aspera</i> (<i>kebbel-jaawle</i>) <i>Corchorus tridens</i> , <i>C. olitorius</i> (<i>laalo</i>) <i>Gynandropsis gynandra</i> (<i>gaasaya</i>) <i>Portulaca oleracea</i> (<i>takkal-siilal</i>)
TREES	Supplement to grass	<i>Salvadora persica</i> (<i>kasassi</i>) <i>Maerua crassifolia</i> (<i>senseni</i>) <i>Cadaba farinosa</i> (<i>karatiyyel</i>) <i>Calotropis procera</i> (<i>bamammibi</i>)	
	In case of scarcity	<i>Cordia sinensis</i> (<i>dornohi</i>) <i>Boscia senegalensis</i> (<i>amjahi</i>) <i>Acacia raddiana</i> (<i>silluki</i>)	

Table 3: Fodder plants



Photo 16: Swamp (*karal maawam*) with *Panicum laetum*

THE WODAABE'S ANALYSIS OF THE SANDY DUNES

It is clear from the description above that the clayey plains are the preferred range of the Wodaabe herders. In fact, when there is sufficient grass, they stay on the plains for the greater part of the year, notably from the end of July until May or June of the following year. During the short period at the beginning of the rainy season, however, they move into the sandy dune areas to the west (Figure 2; Photo 17, 18).

The sandy soil there is not as rich in salt or nutrients as the clayey plains; it lacks what the Wodaabe call *mbaawu*. Its surface does not retain water so that it is often difficult to find places where the animals can

drink. Thus, sometimes, the herders need the wells even during the rainy season. According to the Wodaabe, a prominent feature of the dunes and valleys is that on their sandy soil grass sprouts earlier and quicker than on clay. As will be seen, this is of great importance to their herding scheme.

One of the fodder plants appearing first after the dry season, *Tribulus terrestris* (*tuppere*), grows on sand. It grows alongside the leguminous herbs *Zornia glochidiata* (*dengeere*) and *Alysicarpus ovalifolius* (*gadaji'irehi*), as well as some other quick growing herbs. The grass *Cenchrus biflorus* (*hebbere*) also sprouts on sand; cattle like it when it is soft and young but it develops disturbing spiky fruits at a later stage of growth.



Photo 17: Sandy dune area (*ladde joolde*) of Maine Soroa; cow feeding on natron from a bowl



Photo 18: Bush of sandy dunes (around a depression) north of Issari



Photo 19: Treating a cow with a medicinal plant, after swallowing sand while grazing

THE WODAABE'S ECOLOGICAL ANALYSIS OF THE PLANT WORLD

The Wodaabe's knowledge of plants is the result of a combination of empirical observation and the general view of things they have developed as herders of cattle. Plants are things that sprout from the soil (*fuda*). What breaks through the surface is first of all classified in one of two categories: If it has 'two ears' (*noppi didi*), it belongs to the class of woody things (*ledde*); if it has one leaf it belongs to the class of grasses (*geene*). This classification corresponds to a certain botanical reality but also reflects a major principle of Sahelian cattle herding: grass is the real source of energy for cattle, with woody plants only complementing it.

The two life forms are further subdivided (Figure 4). Gramineae are split into annual (again: *geene*) and perennial (*dayye*) grasses; woody things divide into trees (*ledde mawde*), smaller and bigger herbs (*lekko* and *legga*), and creepers and climbers (*layi*).

THE VEGETATIVE CYCLE OF GRASS

With regard to gramineae, the Wodaabe's representation of the vegetative cycle is of special interest to this study. When the soil is soaked with rain water, it is called *kessiri*. Scouts dig into the soil in order to estimate from the thickness of the soaked layer at which moment the grass will appear. The expression *lesdi roondoyake* describes an apparent elevation of the soil surface, the day after an abundant shower has receded. Some three days later a delicate sward covers the ground (*lesdi fuufi*). When the grass has grown about one inch, animals can bite it off with their front teeth. This form of biting is

called *happa*; and the grass at this stage is called *happaaru*. Sheep and bovine calves can easily graze these shoots; adult cattle with large mouths however, risk taking in sand (Photo 19). As this can have fatal consequences; herders speak of grass exceeding this length as 'escaping' (*dada*) from the ground. When grass is long enough for cattle to entwine it with their tongues (*sowwa*) the Wodaabe call it *hudo*. It will first develop nodes (*hudo wada jokko*) and then enter the tillering phase (*hudo habbina*). This, in the opinion of the Wodaabe, is ideal fodder, but grass with long stalks that has grown ears (*geene saawta*) is of low nutritional value (*waawaa* 'it can not'). As will be shown later, this knowledge is of great importance to the pastoral migration of the Wodaabe.

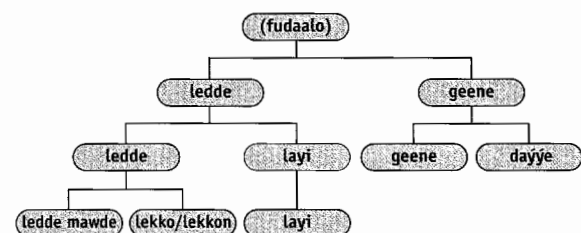


Figure 4: Wodaabe classification of the plant world

THE CLASSIFICATION OF TREES

The classification given by the Wodaabe to trees is vital to this case study (Table 4): it reflects the cultural as well as ecological orientations of the Wodaabe. To begin with, the Wodaabe most often refer to the species level itself when they talk about a particular tree. They would not say, e.g.: "Hang it on the tree over there", but "Hang it on the



Photo 20: Bushland with *Cordia sinensis* (dornohi)

Balanites aegyptiaca over there". They first of all see the differences between single tree species, and only implicitly, rarely or on special occasions refer to the perceived similarities within larger groupings of trees. The principles that govern the formation of these groupings reveal, however, how the pastoralists perceive their environment.

In a dual classification, the Wodaabe distinguish between trees with and without thorns (*gi'al*). Thorns prick and cause hurt and injury. Trees with thorns are therefore symbolically seen as malicious (*ledde kallude*) even though they can be put to all sorts of practical uses. The distinction has its root in practical experience but it does not relate to practical matters. Rather, it elaborates on a symbolic theme that can be found throughout Wodaabe culture and that characterizes their pastoral preoccupations presented in this case study: the distinction between fertility and barrenness. The malicious thorns represent the exact opposite of fertility, whereas trees without thorns are seen as congenial (*ledde de jam*) and the prime symbol of fertility. They are used ceremonially to give blessings (*barka*), and to augur fertility in birth and marriage rituals. In the domain of herding, herbal herd magic (*fudngo*)

that symbolically transfers the life force of plants to the cattle makes use to a large extent of trees without thorns (see also below). The sometimes strained relationship between practical use and symbolic value can easily be assessed by the example of *Piliostigma reticulatum* (*barkehi*). Its branches are the first choice for ceremonially inducing fertility but the presence of the tree in the bush indicates poor pasture.

Another classification of trees that partially cross-cuts the classes of trees with and without thorns is based on the ecological affiliation of trees (Table 4). Particular groupings of trees belong to different sorts of bushland and indicate their varying pastoral utility.

First, the Wodaabe put together the trees of their pastoral zone. Accordingly they call this class 'trees of *Kawlaa*' (*ledde Kawlaa*); 'our trees' (*ledde meeden*, because they are found in their bushland); 'trees of the north' (*ledde woyla*); or 'trees of the bush' (*ledde ladde*). The counterpart to this are the 'trees of the south' (*ledde fommбина*) also called 'trees of Borno'. Several of these are used in herd magic; therefore some Wodaabe acknowledge an additional class of 'herd magic trees' (*ledde fudngo*). Besides the trees of the north and the south one finds trees growing at the edges of the River Komadougou Yobe (*ledde maayo*).

Especially interesting in this classification is the fact that it reflects an evaluation of groups of tree species as browse on the one hand, and as indicators for rangeland on the other. The species for browse are found in the class 'trees of the north'; this class also indicates high quality range (Photo 20). What characterizes the region to which this class is affiliated is that it is arid, meaning that there is low rainfall and no extensive surfaces of water. In this classification of trees the term 'bushland' (*ladde*) as the location where cattle multiply, is opposed, in the

	TREES OF KAWLAA (north)	TREES OF BORNO (south)	TREES OF THE RIVER
WITHOUT THORNS	<i>Boscia senegalensis</i> (amjahi) <i>Cordia sinensis</i> (dornohi) <i>Salvadora persica</i> (kasassi) <i>Cadaba farinosa</i> (karatiyel) <i>Maerua crassifolia</i> (sensen) <i>Grewia tenax</i> (siibooli) <i>Grewia bicolor</i> (kelli) <i>Leptadenia pyrotechnica</i> (suwaalewol) <i>Commiphora africana</i> (badaadi) <i>Calotropis procera</i> (bamammbi) <i>Guiera senegalensis</i> (furohi) <i>Commiphora quadricincta</i> (luuri-badaadi)	<i>Annona senegalensis</i> (dukuuhi) <i>Detarium microcarpum</i> (konkehi) <i>Cassia sieberiana</i> (koohoobi) <i>Securinega virosa</i> (sambisambihi) <i>Sterculia setigera</i> (bobori) <i>Prosopis africana</i> (kohi) <i>Ceiba pentandra</i> (niinihi) <i>Celtis integrifolia</i> (aalahi) <i>Combretum glutinosum</i> (dooki) <i>Sclerocarya birrea</i> (eeri) <i>Kigelia africana</i> (gillaarehi) <i>Ficus gnaphalocarpa</i> (ibbi) <i>Ficus capensis</i> (irin-bessehi) <i>Ficus platyphylla</i> (kalkaldihi) <i>Crossopterix febrifuga</i> (rima-jogoohi) <i>Stereospermum kunthianum</i> (golommbi) <i>Crateva adansonii</i> (guudehi) uncertain (wada-wurohi) <i>Piliostigma reticulatum</i> (barkehi) <i>Mitragyna inermis</i> (kooli)	<i>Tamarindus indica</i> (japmi) <i>Diospyros mespiliformis</i> (nelbi) <i>Mitragyna inermis</i> (kooli) <i>Piliostigma reticulatum</i> (barkehi) <i>Combretum glutinosum</i> (dooki) <i>Stereospermum kunthianum</i> (golommbi)
WITH THORNS	<i>Acacia nilotica</i> var. <i>adansonii</i> (gabari) <i>Acacia raddiana</i> (silluki) <i>Ziziphus mauritiana</i> (jaabi) <i>Acacia senegal</i> (dibehehi daneehi) <i>Balanites aegyptiaca</i> (aduwaahi)	<i>Entada africana</i> (fada-waanduhi)	<i>Acacia ataxacantha</i> (koorahi) <i>Capparis tomentosa</i> (gabdoodoowol) <i>Hyphaene thebaica</i> (gellewol)

Table 4: Classification of trees

expression 'trees of the bush' (*ledde ladde*), to zones of humidity – along the river and to the south. Wodaabe take the view that their cattle cannot prosper in non-arid regions. Although in other contexts they would call these 'bushland' (*ladde*) too, here they restrict the term to what they consider an ideal bush for cattle.

Through herd magic (*fudngo*), fertility can be acquired from the trees of the south. In particular the species of *Ficus*, *Piliostigma reticulatum*,

Crossopterix febrifuga, *Kigelia africana*, and *Bauhinia rufescens*, among many others, display by their botanical characteristics a life force that herders try to transfer to their cattle. Some are constantly budding and are always green as if it were the rainy season; some have latex, looking like mother's milk (both sorts of milk therefore carry the same name, *endam*); some look as if they always bear fruit; and some do bear a remarkable quantity of fruits.



Photo 21: Bull in good shape after the rainy season

THE WODAABE'S PHYSIOLOGICAL ANALYSIS OF CATTLE

FEEDING FOR FERTILITY

As outlined above, maximizing the herd's reproduction rate is the principal economic strategy of the Wodaabe. They focus this strategy on one particular point: they struggle all year through to prepare the cows for mating (*nagge ho'osa*). And struggling in fact means that the nomads do all they can to optimally nourish the animals. They know that if a cow is not well fed, it will not become fertile again soon after calving. The goal is to make cows mate as often as possible, i.e. every year, with a calf born at the beginning of the rainy season, the cow physically rehabilitated with the fresh green fodder available during the months to come and covered by the end of the rainy season. Thus a very simple and fundamental rule guides the nomads: optimizing nutrition raises the reproduction rate!

SIMPLE RULES OF FEEDING

Optimizing nutrition can follow from some simple rules but must also respond to some intricate corporeal processes. To start with, a simple Wodaabe proposition: cattle get energy feed (*nyaamdu*) from gramineae (*geene*) only. Herbs and some tree fruits are only considered a food supplement, or when temporarily overcoming a shortage of grass. In order to be nourishing, energy feed must either contain salts and minerals or it must be complemented by some tasty titbit (*dahatordum*), that provides for them (Box 6). The leaves of some trees, particularly *Salvadora persica* (*kasassi*), which cattle browse during the dry season are tasty, or natron (*kawwa*), which herders buy regularly to feed to their cattle when grazing on sand. The Wodaabe therefore compare the relation between grass and browse to the relation between their own staple food, millet porridge (*nyiiiri*) and its accompanying sauce (*li'o*). The greater the feed intake, the greater weight gains can be expected. This means that cattle

BOX 6: TREES ARE A COMPLEMENT TO GRASS (Bello, Aug. 1997)

Grass feeds the cow. ... But trees should only supplement grass. If the cow does not eat grass but only trees, it will not prevent her from starving to death. ... trees are a supplement but only during the dry season: there is grass but then you wish [the tree] *Salvadora persica* was also there. When the cattle browse *Salvadora persica* we call that a tasty titbit. When cattle browse they feel very good, but when a place has no *Salvadora persica* ... it has no power for the cattle, they do not produce milk. They will not even stay; the cattle will not graze properly in this place.

should be stimulated to graze as much as possible; something they will never do of their own accord. They graze better and more when they find what they like – soft, delicious grass (*geene delemde*) – and when they are given the opportunity to range any time during day and night. They graze badly when disturbed, e.g. by the bad smell of droppings, by pasture infested with grasshoppers, by the smell of a carcass, by grass that is brittle or spiky. Especially during the period when fodder is abundant and animals are already full, herders should anticipate the cows' needs and keep their appetites high.

Fresh matter (*fudo hesso*, *geene kesse*) is better fodder (*geene jo'orude*) than dry matter and cattle should feed on it for as long a period of the year as possible. This simple Wodaabe truth is confirmed by chemical analyses according to which the crude protein content of rainy season grass is 8–14% against 1.8–3.5% with dry season grass (Le Houérou 1989: 110). The amount of digestible protein however is crucial for weight gain (Le Houérou 1989: 147).

INTRICATE ASPECTS OF THE FEEDING SCHEME

The alternation between a short fresh matter period and a long dry matter period in the West African Sahel causes a cyclical process in the cattle's physical development. The herders have to deal with two aspects of this development:

1. the animals' digestive system adjusts once a year from processing dry and fresh matter respectively;
2. the animals' physical condition varies within every year from well-fed, in shape, and strong, to seriously emaciated.

The first means that the cattle's rumen has to adapt itself from digesting poor dry grass to rich green grass. For this task it needs bacteria that

decompose the now greater quantities of cellulose. The bacteria depend on nitrogen, and it appears that the Wodaabe bolster their cattle's development by searching for leguminous herbs notably *Zornia glochidiata* (*dengeere*) and *Alysicarpus ovalifolius* (*gadaji'irehi*) at the beginning of the rainy season. They attribute to these two herbs the quality of arranging (*ma'yyina*) the beasts after the privation of the dry season. Moreover, the Wodaabe see the need for animals to excrete the remains of dry matter (*itta seedu* 'take out the dry') before they can recover with the young shoots of grass. They therefore welcome the laxative effect of the natron they feed.

The second aspect means that the Wodaabe differentiate the stages of the animals' nutritional development and adjust the herding scheme to the following factors:

- the animals' present status;
- the status they expect them to have next;
- the desire to see them build up their maximum weight quickly, and as soon as circumstances allow;
- the overall seasonal conditions.

At the end of the dry season cattle are normally emaciated (*foo'ya*, Photo 22) and hungry (*dola*). They give little milk (*kosam wala*). Some are so weak that they cannot stand up by themselves (*wofoo*), and some may even die. When fresh pasture finally becomes available the animals change from dry to fresh fodder (see above) and begin to recover (*horsina*). They gradually fill themselves up (*haara*), and gain their former weight (*faya*, Photo 21), putting on flesh (*wada teewu*). Only then do the cows produce plenty of milk (Photo 23).

When all this has been achieved there is a good chance that the cows are ready for mating (*nagge ho'osa*). The herders now eagerly look for any tell-tale signs and register each covered cow as a gain. Sooner or later at the end of the rainy season the cattle have to subsist on dry grass of ever poorer



Photo 22: Meagre cow at beginning rainy season



Photo 23: Milking a rebellious cow

quality and quantity. Consequently they lose weight (*fooya*). The cold wind of the cold dry season has an analogous effect. The Wodaabe say that animals exposed to the cold will lose weight and give only little milk. This is confirmed by Western (1982: 187) who states that cold temperatures lead to "the channelling of a greater proportion of energy into the maintenance of body temperature and less into growth and milk production". Zebu cattle are particularly sensitive to cold temperatures. At 20°C they already have to raise their metabolism in order to compensate for loss of body temperature. There is yet another reason why the cold reduces milk yields: it prevents the cows from grazing at night.

The Wodaabe accord special importance to the nutritional effects of the watering scheme. With the beginning of the cold in November, the Wodaabe change from watering the herd every day to every two days only – a practice they call *degol e koorka*. They give three reasons for this:

1. During the cold dry season too much water intake would endanger the animals, which could be 'seized by the cold' (*peewol nannga nagge*). Their stomachs would distend and the rumen would no longer show the healthy indentation that indicates a proper metabolism (*nagge lokoo*). The coat would become long, and further indicate that the cattle are not well looked after. They would also lose weight.
2. When, after the rainy and the early dry season, good grass is no longer available and cattle have to feed on what remains, they must still not

(according to the Wodaabe), drink too much water. This would lead to a loss in weight. Therefore, the scheme of watering only every two days is also maintained during the hot dry season.

3. With the appearance of fresh fodder at the beginning of the rainy season, cattle that were watered only every two days during the preceding dry season will gain weight faster than cattle that were watered every day.

This watering scheme points once more towards the pastoral specialization of the Wodaabe outlined above. They organize the watering with respect to the animals' weight development and not with respect to milk production. By watering only every two days they accept lower milk yields, knowing that other Fulani water their cattle every day to get more milk. It is noteworthy that Wodaabe women are not allowed to sell fresh milk in the markets but only butter (Photo 24). There is no record of how this prohibition came to be within Wodaabe culture but it has some interesting effects within the pastoral family.

Butter is made from milk that has a high fat content. This milk comes according to the Wodaabe from cows with two- or three-year-old calves but not from those with one-year-old calves. Thus, dairy women would not personally gain more money either by taking saleable milk from the young calves' share or by having the cows drink more water during the dry season. Accepting the general prohibition of selling fresh milk, they gain personally by following their husbands' herding scheme, i.e. doing everything to fatten the cows, and to yield richer milk.



Photo 24: Making butter by swinging the calabash



Photo 25: Children happy after a rain shower

THE SEASONAL CYCLE

Seasonal factors are of utmost importance to pastoralism and pastoral decision-making in the Sahel. The Wodaabe dispose of a detailed seasonal calendar that describes the ecological changes occurring from one season to the other. Although very precise, this is in fact not an objective description of ecological processes but of these processes in their *relation to the pursuit of cattle herding*. As these processes are of existential importance to herders (and to farmers too), the Wodaabe have strong feelings about the different seasons.

THE DUAL CLASSIFICATION OF THE YEAR

Although more detailed, the calendar makes a first and crucial distinction between the dry period *seedu* (nine months from October until May or June) and the wet period *ndunngu* (three months from June or July until September). When the Wodaabe use these concepts as parts of this dual classification, *seedu* stands for hardship, barrenness, drought and the danger of animal death; *ndunngu* by contrast is joy,

fertility, freshness and life (Box 7, Photo 25). Its colour is green and anything that resembles sprouting grass, e.g. trees that come into leaf during the dry season are appreciated as 'like the fresh matter period' (*kama ndunngu*).

Although precipitation is at the core of the concepts *seedu* and *ndunngu*, they first and foremost refer to the state of the vegetation. Thus they are best translated as 'dry matter' and 'fresh matter period'. Both are states within which a herder finds himself and not particular periods of time. The two sets – time of the year and state of vegetation – are strongly but not perfectly related; e.g. when during the rainy season parts of the bushland stay dry, they will be described as *seedu*.

The two seasons do not alternate reliably. There is always the fear that the dry season will deviate into two – sometimes overlapping – diversions from the expected course of things and develop into a drought if :

1. the rains do not arrive in time to regenerate the used up pasture;
2. the rains do not come in sufficient quantity to produce enough grass to get through even a regular dry season (Figure 4).

BOX 7 : RAIN : THE GREATEST GOOD (Mbohori, Feb. 1996)

In his prayers to Allah, the Bodaado only hopes for rain and fresh plant growth. He prays for it to rain, for the rains to stay, the grass to grow; then he feels joy in his heart. There is nothing else he desires more. Other people often feel petty jealousy for each other. The Bodaado, on the contrary, is relieved and happy when the rains come, and the grass shoots up.

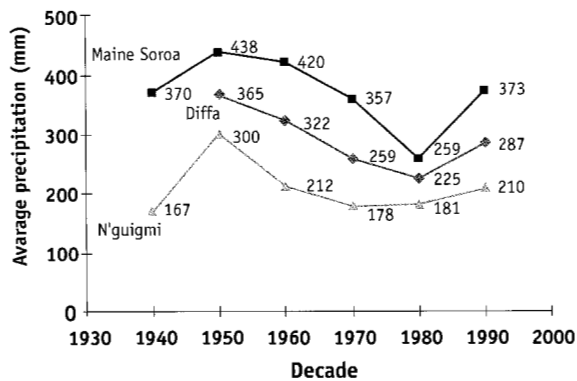


Figure 4: Average precipitation per decades ("1940" reads as 1940-49 and so on; "1990" is 1990-96)

When this happens once, the herders speak of a bad year (*hitaande*); when it happens for two consecutive years, they call it a disastrous drought (*seeduwa*). Whereas the Wodaabe think they can somehow cope with the first, they know that the latter claims many lives in livestock and sometimes even in men.

THE SEASONS IN DETAIL

There are some familiar indicators that the rains are on their way. When the Pleiades (*dassuki*) appear during the early dry season, the Wodaabe know the new rains are about eight months off. When the Pleiades as well as Orion (*pidpidooje*) are set, rain is imminent. The

end of the dry season called *bajara* is marked by muggy heat (also *bajara*) and a light southwesterly wind (*loowru*). The heat of the day causes this wind to spring up in the early hours of the following day. It is this wind that brings the trees to leaf before the rains, and that brings the clouds. The Wodaabe say that after blowing for some weeks this wind is 'ripe' (*loowi benndi*). The 'first clouds' (*duule arane*) then appear in the sky; this season is called *duruule* (Photo 27).

The Wodaabe describe the emergence of rain as follows: the southeasterly wind *loowru* drives the clouds to the east where they assemble. It thunders and a strong wind returns. After the wind, dark grey clouds (*duule pure*) come from the east to appear during the afternoon, bringing the rain with them. After the rain, a light fragrant wind (*mbiinam*) is felt. When this and subsequent rains have given the bush a cover of delicate light green grass, the Wodaabe speak of the season *se'eto*. While the grass grows and more and more regions receive rain, the cattle recover from the strains of the dry season by grazing the young fresh shoots. The recovery of the cattle marks a seasonal turning point that according to the verb describing this process (*na'i korsina*) is called *korsol*. It is followed by the fresh matter period proper (*ndunngu*; the concept prototypically



Photo 26: Dry season pasture

used to describe the whole rainy season, see above): The grass has grown long enough for the cattle to twine it with their tongues, and the whole bushland appears under a dark green grass cover. Rains should be frequent now although there is no guarantee for this. The Wodaabe observe the clouds in the sky

which they differentiate according to shape and colour (Box 8). Studying the cloud types, they try to foretell whether there will be rain or not. This, however, is an intellectual exercise that is of little importance to pastoral planning and decision-making. Decisions to move are mostly based on the

B O X 8 : T Y P E S O F C L O U D S A N D R A I N

ruulde arannde, pl. duule arane: scattered clouds at the beginning of the rainy season (syn. **duule pidayde** oder **duule puttayde**)

ruulde arre, pl. duule ade: fast moving clouds of the early morning; bring about two days later plenty of rain of type **yafa-yafalde** that falls during the early morning hours

ruulde furde, pl. duule pure: grey clouds that appear in the afternoon to bring rain of type **woynnoore-baadi** ('howling of the monkeys') in a dark stormy front

daangolje: rain bringing clouds that appear in a row (like a **daangol** 'calf rope')

nyiinga, pl. nyiiko big thundercloud ('big teeth')

ruulde dilaaruure, pl. duule dilaaruuje: scattered clouds (**dilaaru** jackel)

nduulaaye, pl. nduulaaje: black clouds appearing at the end of the rainy season but bring no rain

ruulde fohere, pl. duule pohe: bank of white clouds that bring no rain (syn. **bello**; **fohere** 'pat of butter')

piitipaata: overcast

ruulde yiidamre: cloud that appears during the dry season to bring a rain shower

nyaafu: light rainfall (can also appear during the dry season to spoil the grass)

hokkitirde, pl. kokkitirle: rain falling on pasture that because of enduring lack of water has begun to dry up (**hokkere**)

wowtere, pl. bowte: last single rain during the early dry season that spoils the grass

maadka: dribbling rain (syn. **meto**)

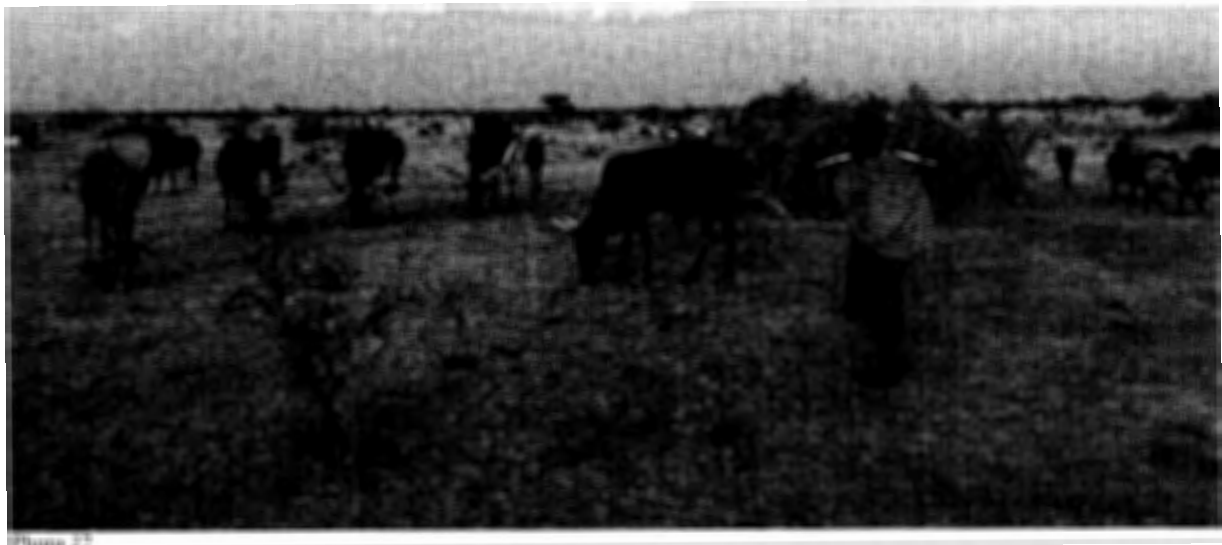


Photo 22

inspection (*seewtunde, woosunde*) of ground surface and the grass found there.

By September the rains become scarce and eventually stop (*ndiyam helta*): this marks the early dry season *yaawol*. An easterly wind (*huyorooru*) and a burning sun (the heat of which is now called *kapitel*) dry up the ponds (*weendu beeba*) and the plains (*karal hena*). The grass begins to dry (*geene dahila*) and then dries up completely (*geene njo'ora*). There may be some last isolated showers (*wowtere*) that are no longer welcome because they spoil the dry grass.

Haze (*maambol, suddi*) and moderate coolness (*peewel-peewel*) in the evening announce another seasonal change (Photo 29). This transitional period is called *soorol*. Night temperatures drop more and more until the cold dry season *dabbunde* arrives. It brings two sorts of cold with it: one, *gelemol*, that simply 'falls like rain', and another, *jaangol*, that is caused by the strong cold easterly wind *henndu dabbunde*. This wind is said to 'strike' (*fiya*) man and animal. It raises lots of dust (*sollaare*) that covers the entire bushland. By the end of February the veil of dust is revealed. The cold easterly wind is replaced first by a hot and thirst-making southeasterly wind, then an easterly

one (*hamseetaaru*). The Wodaabe call this short, transitional period the time of 'uncovering' (*sudditte*). It is followed by the hot dry season (*seedu* or *bajara*).

The sun's burning heat (temperatures rise as high as 43°C) is felt like pain (*naange naawnge*). Everybody is made to look out for a tree to give shade (*dowdi*). As perfect pasture with the bushy *Salvadora persica* often does not provide perfect shade, the nomads hollow out bushes to creep into, and put pieces of cloth on the branches that are too bare to keep off the burning rays of sunshine. Thirst (*domka*) becomes part of the daily life experience of the Wodaabe. There is enough water in the wells but in the camps it is sometimes finished in the morning. With distances between camp and well becoming longer, it is often noon before the women or children arrive with the donkeys carrying water.

The southwesterly wind, *loowru*, that brings a change from dry to muggy heat tentatively announces the arrival of the first clouds although the sky will not expose these fully for several weeks to come. The Wodaabe try to acquire a taste for the stifling heat by repeating one phrase of their climatological wisdom: The hotter these weeks, the richer will be the rains.



Photo 28: Major rain shower



Photo 29: Hazy bush during the cold dry season



Photo 30: Early rainy season. Packing up the homestead to "follow the rains"

APPLICATION OF KNOWLEDGE TO THE PURSUIT OF HERDING

In the light of the environmental and pastoral knowledge of the Wodaabe presented so far, we will now take a look at their pastoral trajectory.

EARLY RAINY SEASON – MOVING TO THE SANDY DUNES

When, after the long dry season the rains are on their way, the Wodaabe leave the clayey plains in order to move in seasonal migration (*baartol*), towards the sandy dune areas in the west. By now their cattle have finished the last residues of pasture and are in urgent need of fresh fodder. This will sprout earlier and faster (*fudlaway*) on sandy than on clayey soil, with *Tribulus terrestris* and other herbs just relieving the animals from hunger, and young shoots of *Cenchrus biflorus* helping them to recover (Table 3, Photo 17).

Moving is arduous work now: the animals are weak and long distances must be covered. Moreover, the herders will not accept that their cattle stay where there is nothing to eat. If necessary herd and family migrate well into the night or do not even set up camp and only take a little rest before moving on. Or again, the herd led by a herder sets off during the night with the family following the next morning.

Seasonal migration, however, is not only motivated by the fact that what the animals need is to cover a certain distance. Rather, the nomads use spatial mobility as a tool for timing an ecological process – this is the meaning of pastoral mobility that was intimated but not yet elaborated in the chapter on patterns of movement. The Wodaabe want their cattle

to stay for as long a period as possible within a state they call the ‘midst of the fresh matter period’ (*saka ndunngu*). Therefore they migrate towards what they call the ‘head of the fresh matter period’ (*hoore ndunngu*), i.e. a place where rain transforms itself relatively early into fresh fodder. It will be shown that this technique of lengthening the fresh matter period by spatial mobility leads the herders to move back later on to the clayey plains.

There is yet another reason for the choice of sandy soil at the beginning of the rainy season: the grass on this soil does not only sprout earlier within the yearly cycle but also faster after each shower of rain. Given that in the Sahel rainfall is highly erratic – particularly at the beginning of the rainy season – the nomads turn both these features into an advantage. If it receives enough rain, grass will run through its vegetative cycle. As the rains are spatially and temporarily distributed, grass reaches the state of optimal nutritional value in different places at different times. In middle range moves (*goonsol*), the Wodaabe ‘follow the rains’ (*tokka duule*) and thus guarantee that their herds always have access to the best grass available. The general choice of sandy soils with fast shooting grass species *Cenchrus biflorus* (*hebbere*) continuously and immediately provides new patches of grass at an optimal stage of development. Thus, the erratic nature of rainfall is not necessarily a constraint in a marginal region. On the contrary, if rainfall were distributed equally in time and space, grass would develop beyond the state of optimal nutritive value everywhere at the same time and herders could exploit it only for a relatively short period.

HEIGHT OF THE RAINY SEASON – BACK TO CLAY

At the height of the rainy season (about the beginning of August), the advantage of sandy soil turns into a disadvantage. Most grass is beyond the tillering phase and *Cenchrus biflorus* carries spiky fruits that disturb cattle while grazing. The Wodaabe now turn their seasonal migration back towards the eastern plains of *Kawlaa*. Here they find the flooded plains and ponds where cattle graze *Panicum laetum* (*kaasiyaari*) and *Echinochloa colona* (*sabeeri ngonngorsa*), with corn that has by now become ripe (*gawri benndi*). On the elevated plains they find *Chloris prierii* (*geenal dimal*) that is short and without ears. Since the grass now absorbs enough salts and minerals from the clayey soil, herders can stop feeding their cattle with natron.

The nomads are driven by the wish to find untouched rangelands (*geene de njaabaaka*), and move in a succession of short or middle range moves

(*sottol* and *goonsol*) in an easterly direction from flooded plain to flooded plain. By moving frequently, i.e. about every two days – sometimes even the day following a move – they avoid that the cattle become disturbed by the herd's droppings (*welaande*) and the stench of dirty grass (*fufo*), particularly after a light rain. This would make the already satiated animals feel uncomfortable (*nefa*), and keep them from grazing. A strong rain shower by contrast 'washes the bush' (*ladde lootoo*) and makes it again attractive for the cattle.

There are other factors important to this leg of rainy season migration. Range touched by other herds or infested with grasshoppers is to be avoided. It would not provide for the soft, tasty, leafy grass that the cattle now like. Herds that have caught a contagious disease like the foot-and-mouth disease (*mbooru*) have to be kept at distance even if this means that interesting pastures cannot be accessed. With their moves the herders are not only going from pasture to pasture, rather, they already head



Photo 31: First step of pastoral migration: tethering the calf rope to an ox

for their land of affiliation where they wish to spend the dry season. Therefore the Wodaabe do not turn back to the west but keep an eastern course. The general behaviour the nomads display becomes itself a factor to their moving. Hundreds of herds are drawn towards untouched bushland. Being ahead of the others means that one has a better chance of finding them. Therefore, the Wodaabe sometimes present their eastern migration as a kind of running (*nyaara*) competition where being in the lead means being in the most rewarding and at the same time most prestigious position.

When, by the end of the rainy season, the grass of the sandy dunes has already become dry and brittle, the Wodaabe exploit the still fresh grass of the clayey plains. Moving to these plains is thus their way of lengthening the fresh matter period. They conceptualize this idea by stating that through their migration they find several instances of *ndunngu* 'fresh matter period' that their animals eat up.

EARLY DRY SEASON – EXPLOITING THE BEST OF THE CLAYEY PLAINS

As the clayey soil stores the rainwater for a while it is a location where some herbs sprout by, or even after, the end of the rainy season. Although they cannot generally replace grass and represent only a supplement to it (*wiitiri*) – 'something that helps the grass' (*ballirdum geene*) –, these herbs add to the strategy of lengthening the fresh matter period. They provide green fodder when grass is already drying up. This is especially interesting when *Panicum laetum* and *Echinochloa colona* have become scarce and grass comes into a state of being half-fresh-half-dry (*siifaaru*) – a state that cattle dislike and to which they react by only fussily picking out the fresh leaves, leaving the rest of the plant untouched (*na'i siifoo*).

An outstanding herbal plant species is *Indigofera hochstetteri* (*jaa'oomaahi*), to which the Wodaabe attribute the quality of producing good milk and



Photo 32: Herd on the move (sottol)

fattening the cattle. It is a plant that may help cattle to tide over a period when good grass becomes scarce, and can even affect the planning of the late rainy and early dry season migration. Other highly valued herbs are *Cucumis melo* (*yamburuuwol*), *Heliotropium ovalifolium* (*yaharehi*), *Ipomoea verticillata* (*amaseekel*), *Ipomoea spec.* (*yagalawol*) and *Ipomoea spec.* (*buluuwol*).

A special place is accorded to *Colocynthis citrullus* (*layol gunaaru rimru*) that bears melon-like fruits with a high water content. Cattle like these fruits very much. They add something fresh to their dry grass diet and even provide for water, thus releasing the animals from the ponds for a while.

The most precious resource of the clayey plains, however, is the protein rich short grass *kundeeri*. During the early dry season the herders eagerly look out for this kind of grass, and in general for any pasture that is yet untouched by cattle. They are ready to deploy middle range moves to get to it. Although the Wodaabe like all Sahelian people hope for abundant rains, they appreciate the fact that a relatively low precipitation in their pastoral zone results in partial shortcomings of rain, prerequisite to the development of *kundeeri* on the somewhat elevated argillaceous plains. They say that, generally, with too much water they get only grass that is long and therefore of poor quality (Box 9).

BOX 9: TOO MUCH RAIN MAKES LOW QUALITY GRASS

When there is too much water you get grass of poor quality; when there is only a small quantity of water, the vegetative development of grass breaks off early, then you have *kundeeri*, which is the best fodder.

This (here) is a kind of long unsightly grass. When you come across it, grown long and ugly, you know what's up, you don't want to use it during the early dry season. You go away and leave it for the late, hot, dry season. When you find short grass like the kind over there you know its value and you make for it (Mbohori, Sept. 1996).



Photo 33: Early dry season. Herd leaving camp for short range move (sottol)

COLD DRY SEASON – BACK TO THE WELLS

Some weeks after the last rains the ponds drain and the Wodaabe have to get water for their cattle from wells (Photo 34, 35). Their expression *nanngita bunndu* 'catch anew a well' refers to two related ideas. First, by resuming the work of watering at the wells the herders close the cycle of seasonal migration *baartol* they opened when starting their move to the west. Second, choosing a well means being relatively fixed. A herder either has to register and pay for access to one particular state-owned well or he is to construct or pay for his own well. The latter only applies in some zones but in either case the pragmatic change of pastureland, viz. during the rainy season, becomes costly because:

- one would have to abandon the well one had paid for;
- at the new well one would have to join the queue thereby getting the last and less favourable position;
- one would have to expend the animals' energy in times of diminishing fodder resources and thereby cause them to lose weight.

The last point marks an important shift of strategy in Wodaabe herding. During the rainy season their thinking and talk revolve around the idea of getting the cows into shape and thereby ready for mating (*nagge ho'osa*). Now they are very concerned with the idea of 'getting the cows through the dry period' (*feýýina na'i*). Therefore the herders choose a well to stay with as long as possible. They make short range moves (*sottol*) by which they gradually drift away



Photo 34: Well made of wood



Photo 35: Well made of cement

from the well as the range in its vicinity becomes more and more degraded. When the range from which a particular well can be accessed has completely deteriorated (*meheri*), the nomads are ready for a middle range move (*goonsol*) to reach a new well and its surrounding pastureland.

The Wodaabe appreciate throughout the dry season that the grass *Chloris prieurii* and the tree *Salvadora persica* prevail in the bush of *Kawlaa* (Box 10). After *Salvadora persica* the Wodaabe cite *Cadaba farinosa* (*karatiiyel*) and *Maerua crassifolia* (*senseni*) as most interesting *dahatordum* yielding species.

Besides providing for browse, trees have another important function during the cold dry season. The Wodaabe place their camps in woody depressions (*luggere*) that protect man and animal from the cold and 'striking' eastern wind, especially to avoid its negative effects on the cattle's body maintenance and milk production.

The reduction of milk yields has a very important economic consequence. During the rainy season the pastoral family could subsist entirely on the herd's milk production, i.e. by drinking fresh, sour, and butter milk. Now it has to sell animals to buy millet in the market.

HOT DRY SEASON – COPING WITH DEGRADING PASTURE CONDITIONS

During the hot dry season, nobody would set up camp in a woody depression. The nomads seek rather the open plains to enjoy a cool wind at night.

The progression of the dry season means a worsening of living conditions for man and animal (Box 11), since the critical resource grass is produced only once a year during the rainy season and is then consumed bit by bit. The best parts of the range have by now been eaten up. What remains is grass of lower quality, i.e. long and hollow grass and other species than *Chloris prieurii*, e.g. *Aristida adscensionis* and *A. funiculata* (*selbiwal*). Although these are disdained because of their prickly fruits (*selbol*), the herders still attach some importance to them because they provide fodder when everything else is finished.

The consequences of this development are:

- loss of animal weight;
- reduction of milk yield for the human family;
- drop in animal prices coupled with a rise in millet prices.

Additionally, some herders may paradoxically suffer from their own success. Cows that have been covered at the end of the rainy season will now, five months after conception, wean their calves and give no milk until the birth of the new calves. This again means a reduction of milk yields.

BOX 10: CHLORIS PRIEURII AND SALVADORA PERSICA

The usefulness of *Chloris prieurii*, it is soft, it does not prick the cow, that is its use, it fattens the cow, it has milk ... during the early and the cool dry season the cattle feed on it (Mbohari, Sept. 1997).

During the dry season the cow likes nothing more than *Chloris prieurii*. And during the rainy season too she does not leave it (Bubukar, Sept. 1997).

Salvadora persica is the veritable pastoral tree.

A bush without *Salvadora persica* is no good for anything.

BOX 11: DRY SEASON: PERIOD OF HARDSHIP AND SCARCITY (Baaki, Sept. 1997)

The dry season, isn't it a time of pain? Butter milk doesn't make it through the afternoon, and neither does fresh milk.

By April or May consideration of fodder quality becomes more and more irrelevant. What was once rangeland has changed into wasteland (*meheri*) and cattle subsist on residues of grass (*furfuru*) they would not touch in better times. Their weight loss can become dramatic (cf. Wylie et al. 1984: 207–213) and herders fear that 'drought catches the cattle' (*seedu nannga na'i*). Their principal goal is to 'get the cattle to escape from the drought' (*dadniirta na'i seedu*), to prevent the animals from becoming so weak that they cannot stand up on their own (*wofoo*).

Here, the fact that in the Sahelian zone trees come into leaf some time before the rains set in, is of some help to the herders. As mentioned previously, trees are no substitute for grass but now they reduce the

animals' hunger (*itta dolo* 'take out hunger'). The Wodaabe cite *Cordia sinensis* (*dornohi*) and *Boscia senegalensis* (*amjahi*) as useful on that score. Also interesting are the fruits of *Salvadora persica* and *Maerua crassifolia*. When the animals head once again westward into the next rainy season, the leaves of *Hyphaene thebaica*, *Diospyros mespiliformis*, the flowers of *Acacia seyal* and the fruits of *Acacia albida* that are found along the River Komadougou Yobe can be a last resort for some time. If there is still no news of rains and fresh pasture the Wodaabe will try to buy chaff from millet or hay that villagers raked together to sell it for good money when herders are in need. If they cannot afford or find this, their livestock will begin to die of hunger.

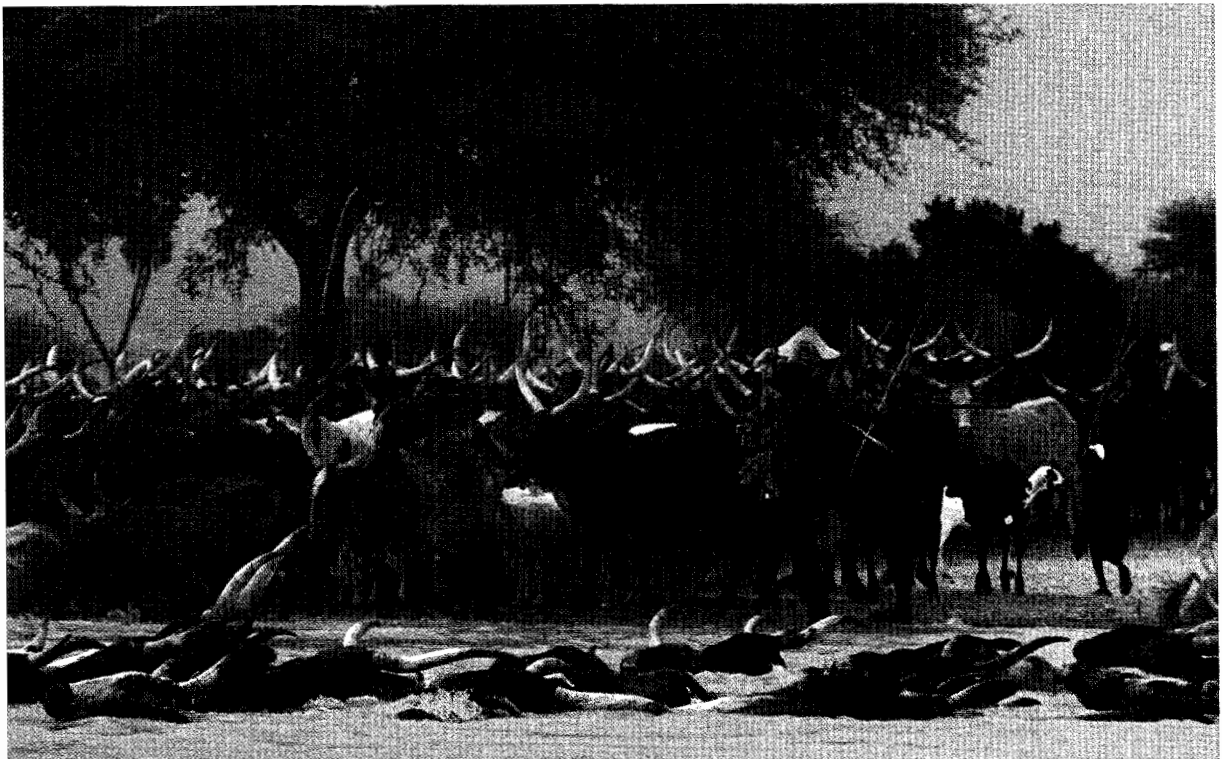


Photo 36: Crossing the Komadougou Yobe at the height of the rainy season (coming from Borno)

IN CASE OF DROUGHT

The Wodaabe hope for abundant rains. But “abundant” to them means that moderate rainfall covers as much surface as possible. Precipitation per surface unit beyond a certain point is detrimental to the development of grass as they like it and renders more likely other sorts of trouble, e.g. grasshoppers. The problem is that bushland suitable to the Wodaabe way of herding is prone to drought.

The Wodaabe have to cope regularly with lack of pasture caused by the combination of too little rainfall and too many herding animals in their pastoral zone of *Kawlaa*. This has been increasingly evident since the two big droughts of 1973–75 and 1983–85 which the Wodaabe see as an important turning point in the ecological history of *Kawlaa*. They feel that since then they have not had the rainfall they were used to and that the bush has ecologically changed for the worse, with species of flora and fauna becoming extinct or severely reduced, and the entire grass production becoming low (see Schareika 2003a).

This is not the place to discuss the complex problems of range use and drought (but see Thébaud 1999). The point to be made is that the pastoral trajectory described above is not mechanically applied in every year. If this were so, drought would have already taken all of the Wodaabe herds. The trajectory described is followed when there is sufficient rainfall. Moreover, it contains much of the pastoral and ecological knowledge which is mainly preserved through the practice of applying it and not through giving lessons; the trajectory is a kind of default setting by which the nomads orient themselves and which they try to keep as long as the situation allows. As soon as conditions change, they deviate from the established path to escape to zones of retreat. When the situation improves, they return to their land of affiliation (*ladde meeden* ‘our bushland’).

Access to zones of retreat is thus an imperative complement to the preferred circuit. The most important zones of retreat are:

- Borno (Nigeria) to the south of *Kawlaa*;
- the Lake Chad basin (*Saadi*) in northeastern Nigeria;
- the Lake Chad basin (*Kanngarje*) south of N’ Guigmi;
- the dune valley Dillia (*Diriyaawol*) stretching in north-western direction from N’ Guigmi to the massif of Termit.

In the case of drought in *Kawlaa*, the following regions may provide for pasture: Borno to the south because of its generally higher precipitation; the Lake Chad basin *Saadi* because of surface-near ground water; the Lake Chad basin *Kanngarje* and the Dillia region because of a generally lower stocking density. However, according to the Wodaabe, pasture quality and herding conditions in these regions do not come up to those of *Kawlaa*.

In Borno, wells are crowded by herds, cultivation hinders the free access to pastures by cattle, and the grass is less nourishing due to poor soil quality; it does not encourage the fast weight gains they are familiar with from north of the Komadougou Yobe. The absence of *Salvadora persica*, *Maerua crassifolia* and *Boscia senegalensis* and the presence of *Piliostigma reticulatum* indicates that there is no ‘power’ (*mbaawu*) in this region.

The northern dune valley Dillia is a very risky zone of retreat, because if there is a grass shortage the routes of retreat which lead to the south and to rescue are too long for animals to survive.

The *Kanngarje* region got its name from the dominant tree species *Prosopis chilensis* and *P. juliflora* (both *kanngarhi*). These have rapidly developed from some introduced exemplars when the Lake Chad waters receded southwards in the early 1970s. They bear nourishing fruits that cattle like. However, the Wodaabe found that these fruits (particularly of *P. juliflora*) ‘demand back’ (*yamtere woodi*). While providing excellent feed, when

consumed to excess they cause a fatal dental decay (*ga'asel*) that makes itself felt some months later and prevents the animals from grazing.

The Lake Chad basin proper in northern Nigeria (*Saadi*) poses yet another problem. It has very nourishing fodder plants (the Wodaabe cite the yet unidentified herbs *yagalawol* and *waralla* as particularly interesting) that are worth reaching, and not only in times of shortage. Water is near the surface and a herder needs only to dig a few meters to have his own well at a short distance from his camp. However, cattle can catch dangerous diseases

in the Lake Chad basin, some communicated by flies. This makes it an ambiguous destination to the Wodaabe. In the Lake Chad basin you can win a lot or lose everything (cf. Schareika 2003b) at the same time. Therefore, most of the Wodaabe only go there in the case of serious grass shortage in *Kawlaa*. (It should be noted though that there are other Zebu cattle herding groups, particularly the Mbororo'en, locally renowned for their wealth, that regularly pasture in the Lake Chad basin. According to the Wodaabe, the people have learned to cope with the pests of the Lake Chad basin.)



Photo 37: Calf that lost its mother is fed with goat's milk



Photo 38: Ardo Sheefu

CONCLUSIONS

What, in conclusion, can development experts learn from this case study? To start with, pastoralists possess a knowledge that allows them not only to survive on the African drylands but also to make a significant contribution to the economic production of these regions. This knowledge is not something that can be appropriated from external sources like textbooks, schools or expert recommendations. It is so much a part of the whole pastoral culture that, in fact, the cultural diversity of a region rather than the knowledge itself, should be seen as the real resource for development. The Wodaabe pastoralists represent a double paradox: first, they have a strong sense of pastoral tradition, with cattle playing a vital role in the social arrangements (e.g. marriage, parent-child-relation), and although like all African herders they try to refrain from selling animals, they are, nonetheless, because of their extreme specialization, very market-oriented. Furthermore, as their pastoral tradition is animated by the persistent aim to find better ways of doing things, there is a built-in tendency towards refinement. Second, among the sedentary population the Wodaabe have a reputation for being wild and dangerous, they are compared to hyenas or ghosts, and, in fact, they keep away from villages, do not send their children to schools and prefer the free and uninhabited bushland. All the same, they do not lead an entirely self-sufficient life: they barter the riches they produce from the grass growing on the periphery of the agricultural zones. These riches form a crucial element in the economic life of the whole region; in fact, without herders, business in the local markets is very subdued.

The question therefore is what can be done for development. The key to the answer is that the Wodaabe are not to be seen as a cultural or professional group to be developed but as a *vital part* of a culturally diverse region that is to be developed. Helping the “Wodaabe pastoral system” to be more efficient will contribute to the region’s as well as to the group’s economic well-being. How can this be achieved? By interpreting the concepts of sustainability and participation liberally and by taking the Wodaabe knowledge system seriously. There is no need to develop this knowledge system from within; we should concentrate, rather, on its central theme which is: *raising the reproduction rate of the herd through pastoral specialization* – specialization even among several pastoral activities. Therefore any programme that aims at adding some not purely pastoral element to the Wodaabe pastoral system (e.g. schooling, management of wells, grain banks) is way off the mark. Moreover, there is no need to put the Wodaabe in a position to deal themselves with eventual problems. They are experts at producing cattle and they are used to paying other experts to deal with the problems they cannot solve. Thus, pastoral development should focus on three related spheres of action:

1. helping to stabilize the external conditions within which the Wodaabe pastoral system can function optimally;
2. elaborating the regional system of economic integration of specialized and culturally diverse producers and service providers, instead of contributing to the self-sufficiency of each of the system’s parts;

3. providing for large-scale, knock-on financing when the pastoral system does not function properly because of past mismanagement of infrastructure or capital loss through natural disaster.

The first point means creating security in all sorts of domains through national and international measures:

- security of life, property and movement, currently jeopardized by the armed conflict between Fulani and Tubu, the emergence of groups of young armed Fulani bandits without herds, who steal livestock, and the imposing of legal and illegal fees and taxes when Nigerian state borders are crossed;
- security of access to pastoral resources which is called into question by the extension of agricultural surfaces, conflicts over field destruction by animals, and the newly developed practice on the part of villagers of raking hay from the bush and storing it;
- security of animal care which is called into question by the herders' experience of fatal vaccination campaigns.

It must be stressed in this context that the Wodaabe do not fear ecological crises as such; they fear that ecological crises become unsolvable because social and political tensions prevent them from taking the necessary steps to overcome them.

With regard to the second point, the Wodaabe spend money on all sorts of investments. Their pastoral productivity is high enough to sustain a sector of pastoral service providers that are already found in

the region: brokers in the cattle market; raftsmen who get them across the Komadougou Yobe River; craftsmen who in some regions build wooden wells for them; villagers who sell stored hay or chaff as emergency food; pastoral service agents who provide for vaccines; Islamic scholars who offer their blessing and spiritual protection for the herd. Thus, as the Wodaabe are ready to invest money in services that support their strategy of specialization in pastoral mobility there might be room for further developing this pastoral service sector.

The third point leads to the problem of capital investment. If one takes the disequilibrium theory (Ellis and Swift 1988; Behnke and Scoones 1993) as a starting point, the task shifts from letting surfaces recover to making grass productive wherever it sprouts. The pastoral zone of *Kawlaa* provides for the grassland, the herds of cattle and the cultural knowledge to make these productive. But it cannot provide for the major capital investment, i.e. construction and repair of wells, needed to optimally exploit the available resources. It is unlikely that these can be realized under the exigencies of participation. But to forego with these knock-on investments means foregoing a rise in economic growth that could provide incentives and room for participatory and sustainable development in the region. With these investments economic growth could be attained through the rise of productivity of the herds.



Photo 39: Taking up a profession

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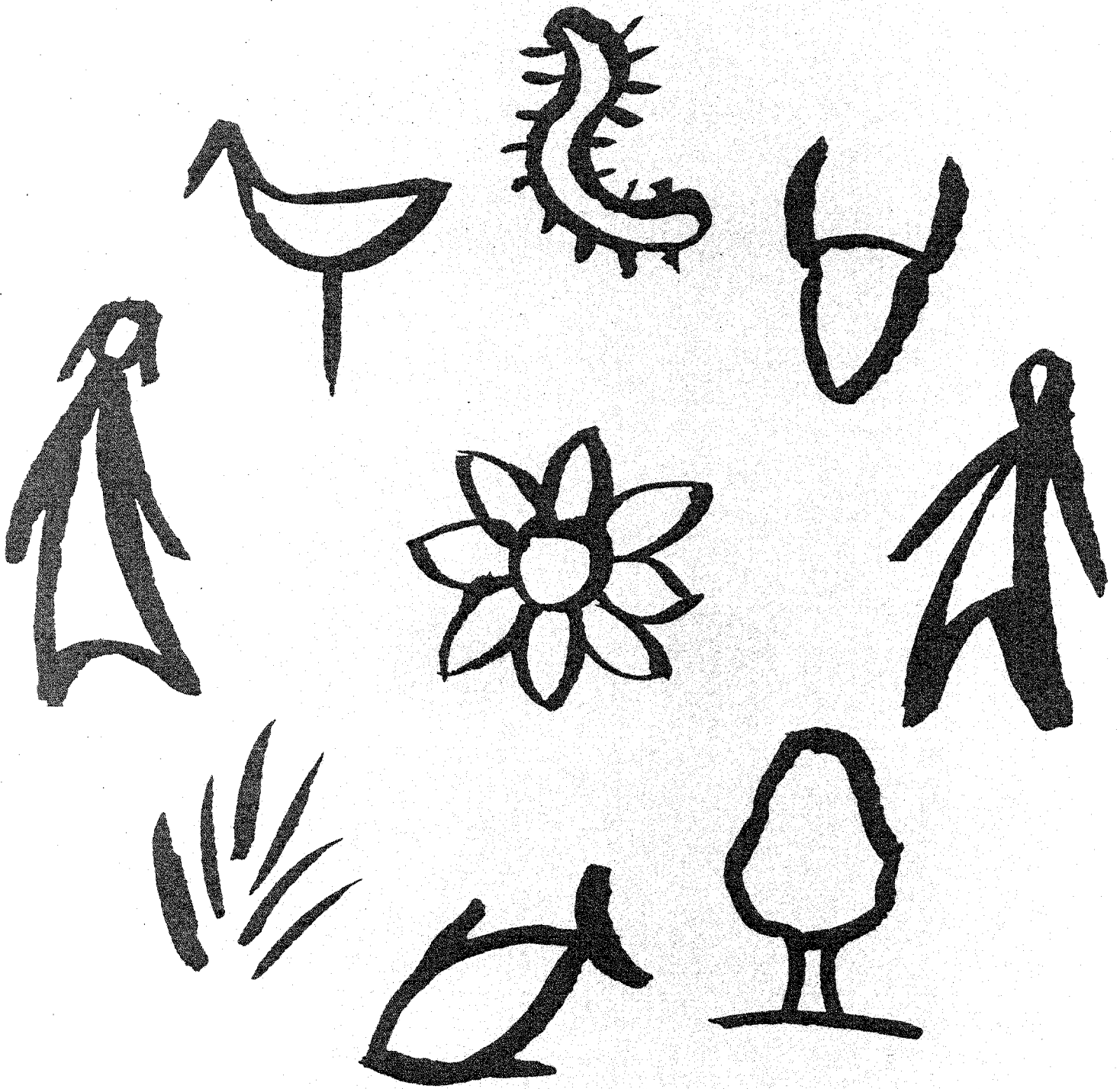
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