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Mobility, Sedentism, and Intensification: Organizational Responses to Environmental and Social Change Among the San of Southern Africa

ROBERT K. HITCHCOCK

HUNTER-GATHERER ADAPTATIONS included mobility strategies that were geared toward mapping people on to both resources and other people. There are factors that condition the ways in which people position themselves on the landscape and move over it. Mobility strategies are organizational responses to the structural properties of the natural and social environments (Binford 1980, 2001). The logistical component of a settlement system, in which task-specific groups range out from residential locations for purposes of obtaining food, raw materials, or information, is related to the organization of production of a society as well as to the distribution of critical resources in the environment.

Anthropologists and archaeologists are concerned about the organization of human actions. Mobility, or the movement from one place to another by a group or individual, is an important aspect of human behavior, in part because it has important influences on social systems and ecosystems. Mobility is a characteristic feature of human adaptive strategies. Movements are undertaken for a variety of purposes, some of them relating to the need to exploit spatially and temporally variable resources and others for social, political, and ideological purposes.

Mobility is a multidimensional process. Humans carry out cost/benefit analyses of mobility options; individuals and groups consider the risks involved in undertaking moves or opting instead not to move. To take an example, people living in an area in which the resources upon which they

depend for subsistence have become depleted, either because of exploitation pressure or some other cause (such as drought or a bush fire), have the choice of staying put and putting up with less in the way of food, or they can move to another place. Moving to other places is costly in terms of time and energy and, in some cases, physiological well-being. Decision making about movements may depend on the numbers of people in a group who require assistance, as is the case, for example, with infants, some elderly persons, and the infirm. Decisions may also be influenced by the availability of transport technology. In some cases, moves to new places may pose some risks if people already living in those localities do not wish to deal with additional people in their areas.

Sedentism, the process whereby human groups reduce their mobility to the point where they remain stationary residentially year-round, is a subject of interest not only to anthropologists and archaeologists, but also to policy-makers concerned about delivering services and development assistance to rural populations (Hitchcock 1982, 1995; Kelly 1992, 1995; Sandford 1983). Various explanations have been offered for mobility reduction among human populations, ranging from environmentally deterministic ones, in which resource abundance, diversity, and stability are cited as reasons for people settling down, to ones in which demographic, social, or political factors are seen as important in the process of sedentarization (Binford 1968; Cohen 1977; Flannery 1972; Hitchcock 1982:26–64; Kelly 1992:51–54, 1995:148–152). Some of the arguments use combinations of explanations to account for mobility reduction.

It is possible to characterize arguments about the causes of sedentism as being ones that fall into either the “push” or “pull” category (Price and Brown 1985). People are “pushed” into sedentary situations when their mobility options are circumscribed by the presence of other people in the habitat. Such a situation may occur when population growth has resulted in the filling up of potential residential locations by people. It also may occur when populations from another area migrate into a habitat, resulting in competition for space between those people who are relocating and populations who were there previously. “Pull” arguments for sedentism among human populations include those that hold that “resource abundance” is a necessary if not a sufficient explanation for mobility reduction (Kelly 1992:51–52). This resource abundance arguably can come in the form of wild plants, wild terrestrial fauna, or marine resources that have sufficient productivity to sustain human populations that stay year-round in specific localities. A major problem with the resource abundance argument is that natural resources tend to vary spatially and temporally on local, regional, and global scales (Binford 2001). In other words, there is no such place as a Garden of Eden where all resources are available to people all of the time.

A subset of the pull explanation for sedentism is one that might be termed “contact sedentism” in which people reduce their mobility because

of the presence of other groups in a habitat that provide the resources necessary to sustain them. Such a situation could be seen on the Great Plains of the United States in the nineteenth century, for example, where military forts and trading posts offered opportunities for indigenous peoples in the region to settle on their peripheries in order to obtain access to food, trade goods, and employment. Similar events occurred in the outback of Australia in the vicinity of mission stations and pastoral properties (e.g., cattle stations), and government-sponsored settlements for some 70,000 Bedouins in the Negev Desert region of Israel.

There are also situations in a number of countries in the world, including the United States, Canada, Australia, Japan, Russia, China, Iran, Israel, Egypt, and Botswana, where governments carried out efforts to sedentarize mobile populations, ostensibly to increase the efficiency of service delivery but also to exert greater control over them. Settlement is often seen by governments as a positive phenomenon, a view that more often than not is not shared by the populations being sedentarized. It must also be kept in mind that some groups may opt not to remain settled and instead move to other places beyond the reach of the state. The choice to migrate—in spite of the potential costs and risks—is seen by some societies and individuals as a worthwhile alternative to remaining under the control of other groups.

The degree to which a group or society is settled can vary over time, as can the factors that affect decision-making about mobility and residential stability. Demographic factors, including human population distribution and density, influence the extent to which people can move from one place to another (Binford 1968:328–336; Flannery 1972:26). An important point about the relationship between sedentism and population density is made by Binford and Chasko:

It can be argued that sedentism is one pole of a variable that might be called the relative extension of the effective exploitative space. For non-industrial, non-trading systems sedentism represents the maximum concentration of a population into a minimum of exploitative space . . . Trends toward sedentism from whatever prior condition of mobility do in fact represent trends toward decreasing effective resource space. Thus, there is an inevitable correlation between sedentism and effective population density [Binford and Chasko 1976:137].

There are conditions under which populations have little or no choice but to give up their mobility, including ones in which there are so many people in an area that any movement would impinge on other groups. Such “social circumscription” is a by-product of population growth, in-migration, or both.

An important question that has been asked by anthropologists and archaeologists is whether sedentism and its correlates are “threshold phenomena” (Binford 2001:266–267, 310–315, 363–399; Kelly 1992:50–51).

It might be assumed that there is a direct correlation between group mobility and population density, although there are other variables at work, such as group size and structure, labor organization, and the nature of the technology of the various groups occupying a habitat. Binford (2001:363) sees *intensification* as “the process that impels hunter-gatherers to increase the amount of food they extract from smaller and smaller segments of the landscape.” The linkage between population increase and intensification was identified explicitly by Boserup (1965). A response to population growth is the intensification of labor; in other words, more labor (work) is expended in order to meet basic needs. An alternative strategy is to increase efficiency, in other words, humans may employ tactics that are aimed at reducing time and energy inputs.

Sedentism can be seen in part as an intensification response to habitat-packing and restrictions in movement options. Mobile populations such as savanna foragers or pastoralists may respond to changes in their natural and social environments by intensifying labor. They may also engage in activities that enable people to remain residentially stationary, such as the procurement or production of goods that are then stored for later use. Storage of food and goods is a strategy employed by many societies undergoing mobility reduction (Binford 1968; Flannery 1972). Residentially stable populations living in villages often have storage facilities inside the settlements or close by.

Technological changes accompanying sedentism may include an expansion in the numbers and types of facilities, those items of technology whose functions are to constrain or transform energy (Wagner 1960:94, 97). Examples of facilities seen in societies that are considered to be residentially stationary include baskets, ceramic pots, buildings, storehouses, and mortars in which grains are processed. Mobility reduction among humans may necessitate the acquisition of goods that, as Cohen (1977:36) notes, “both enrich life and reduce labor costs.” The exchange of goods and services among social units is yet another example of a strategy aimed at providing groups settled in specific localities with resources that otherwise would not be available from local sources. In the case of “contact sedentism,” dependency strategies may be employed, ones in which people become dependent upon other individuals or groups or institutions, such as the state, to meet their needs.

An examination of the situations in which sedentism has occurred globally, both in the past and in present-day contexts, reveals that there are two main contexts in which mobility reduction comes about. The first I have termed primary or in situ sedentism, and the second is secondary or contact sedentism. Primary sedentism, occurring in certain parts of the world as much as 10,000 years ago, occurred when groups’ mobility options were reduced due to habitat-packing. In these contexts, groups took

advantage of highly nucleated and abundant resources and adjusted their technologies so that they could maximize the use of the resources, as seen, for example, in parts of the Middle East where some prehistoric societies procured the wild ancestors of wheat, emmer, barley, and other plants that they stored in order to get through periods of low resource productivity.

Contact sedentism occurs when a region already supporting a resident population is entered by a group or groups that are technologically or organizationally more complex than those already inhabiting the area in such a way as to alter local living patterns. A subtype of contact sedentism is forced sedentism, in which a group is required to reduce its mobility through political, economic, or military pressures brought to bear on that group. States may promote contact sedentism through the provision of goods and services in specific localities that are aimed at encouraging people to settle nearby. In this situation, a kind of pull factor—aimed at providing incentives for people to settle—is responsible for mobility reduction.

MOBILITY AND SEDENTISM IN THE KALAHARI DESERT

In the Kalahari Desert region of southern Africa, indigenous peoples that have a history of hunting and gathering, including the San (Basarwa, Bushmen), have made adjustments in movement patterns, group size and composition, labor organization, technology, and resource exploitation strategies in response to changes in their natural and social environments (Draper and Kranichfeld 1990; Hitchcock et al. 1996; Lee 1979, 2003; Lee and DeVore 1976; Solway and Lee 1990; Wiessner 1977, 2002; Wilmsen 1989). Harpending and Wandsnider (1982:29), for example, state “Ngamiland groups have become less mobile because of the increased availability of water from boreholes and pressure from surrounding Bantu populations.” Lee (1979:362–368) offers two suggestions for Ju/’hoansi San populations settling down in the vicinity of cattle posts owned by Bantu-speaking peoples. First, he notes, the Ju/’hoansi who do so get access to domestic foods (milk, the meat of domestic animals, and, if crops are raised there, grains). Second, in his estimation, the Bantu-speaking peoples provide a kind of “legal umbrella” that enables the Ju/’hoansi to seek assistance and resolve localized conflicts that otherwise might lead to the breakup of groups. Thus the presence of outsiders is seen as a crucial factor in mobility reduction of San populations.

It should be stressed, however, that contact does not always lead to mobility reduction. Lee (1979:364), for example, notes that contact may instead lead to increased fragmentation of groups and greater mobility. Contact in and of itself is not a sufficient explanation for sedentism. Another problem with the contact argument for sedentism is that it is incapable of explaining those situations in which people become sedentary in the absence

of outside forces; that is, it cannot explain *in situ* (primary) sedentism (Hitchcock 1982).

The Kalahari Desert is a useful region within which to examine questions relating to mobility, sedentism, intensification, and organizational change among human populations for several reasons. First, it is an area where there are populations that in the past and today display significant variation in the degree to which they employ mobility as an adaptive strategy. Second, there is detailed information available on human populations that utilize natural resources for their subsistence and incomes. Some of this information has been obtained during the course of long-term, interdisciplinary studies of human populations, some of them extending over several decades (Biesele 2003; Hitchcock 1982, 1995; Hitchcock et al 1996; Lee 1979, 2003; Lee and Biesele 2002; Lee and DeVore 1976; Marshall 1976, 1999; Marshall and Ritchie 1984; Wiessner 1977, 2002). Third, there are both quantitative and qualitative data available on populations that moved from one place to another during the course of a year and ones that remained stationary residentially. Finally, there are examples of societies in the Kalahari that experienced mobility reduction as a result of habitat-packing and organizational change in the absence of outside forces as well as ones that became sedentary as a result of contact with other groups and the state (Hitchcock 1982, 1995; Lee 1979, 2003; Wilmsen 1989).

In this chapter I focus on the factors that condition mobility and settlement among several groups of Kalahari San: the Kua of the east-central Kalahari, the Tyua of the northeastern Kalahari, and the Ju/'hoansi of the northwestern Kalahari Desert (Figure 5.1). Each of these groups has a complex history and a wide range of variation in the experiences of specific social units and individuals. Methods employed in the study include field interviews and participant observation, a comparative assessment of ethnographic information on the various populations, and ethnoarchaeological research. The goals of the study are: (1) to arrive at some generalizations about mobility, sedentism, organizational change, and intensification among populations residing in savanna ecosystems; and (2) to make some predictions about some of the kinds of archaeological and ethnographic patterning one might expect in these kinds of environmental settings.

In order to analyze the mobility strategies of hunter-gatherer populations and the factors that condition them, it is necessary at the outset to draw a distinction between two types of mobility: residential and logistical (see Binford 1980, 2001; Hitchcock 1982; Kelly 1992, 1995). Residential mobility can be defined as the movement of an entire group, both producers and dependents, from one point to another on the landscape. Logistical mobility on the other hand is the movement to and from a residential location by an individual or task-oriented group for purposes of obtaining matter, energy, or information. Logistical trips consist of either daily forays or expeditions of several days or weeks.

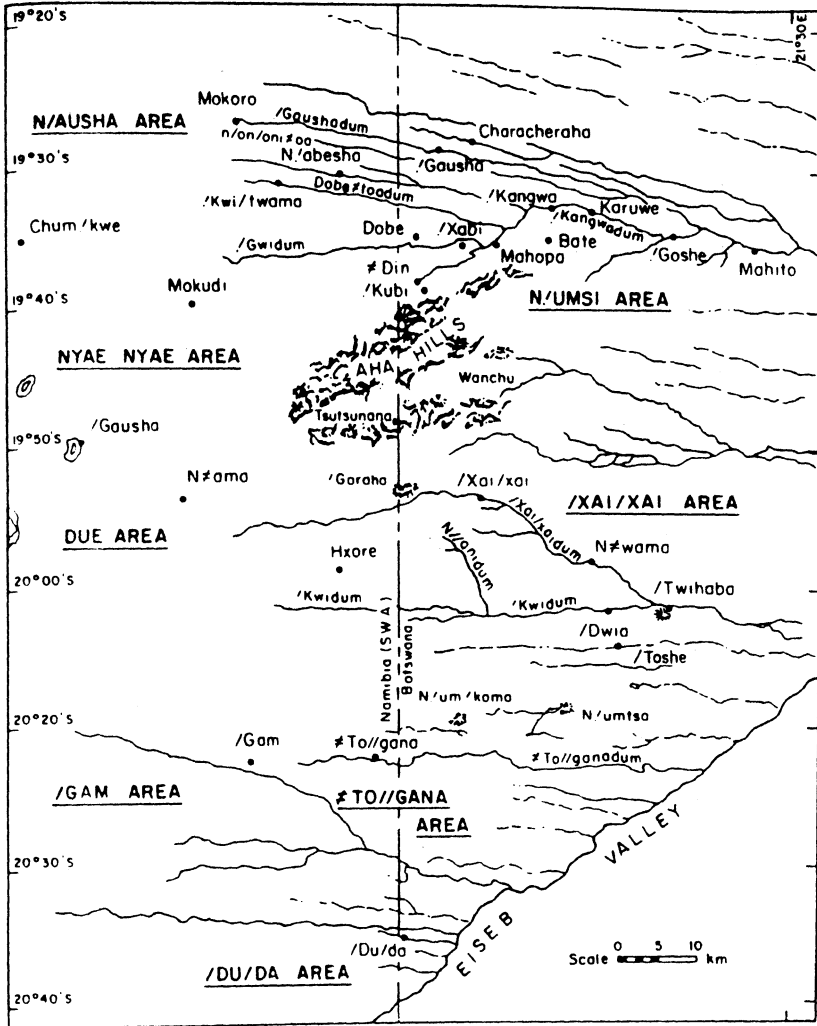


FIGURE 5.1 Map of the Republic of Botswana showing the western Sandveld (east-central Kalahari), the Nata River region (the northeastern Kalahari), and the Dobe region (the northwestern Kalahari).

There are several ways to measure the degree of mobility of a population. One such measurement is the number of residential moves made by a group during the course of a year. A second measurement is the foraging trip distance of logistical parties involved in hunting, gathering, or other resource procurement activities. A third measure is the area covered by groups

or individuals in socioeconomic or ideological activities (e.g., visiting places of ritual importance such as the graves of ancestors or places where specialized ceremonies are held).

The role of information in this system of aggregation and dispersal is important among hunter-gatherers and other populations dependent on natural resources for their livelihoods. Monitoring and information dissemination among groups and individuals are crucial in decision-making about mobility and land use strategies. Prior to the breakup of groups, the localities to be occupied by the various family units are surveyed. The resources available in the areas to which people might move are assessed carefully. Efforts are made to find out what other groups are planning as well. Once this process is complete, the relative advantages and disadvantages of the places are the subject of exhaustive discussion. This kind of information-sharing system served as a means of ensuring subsistence security and reduced the threat of competition for scarce resources.

The Kalahari Desert region within which the Tyua, Kua, and Ju/'hoansi are found today is a complex and highly variable ecosystem (Sporton and Thomas 2002; Silberbauer 1981; Thomas and Shaw 1991; Yellen and Lee 1976). The Kalahari is semiarid, with rainfall averaging between 400 and 600 mm per annum in the three study areas, although there is significant year-to-year variation, as is common in savanna environments. Rainfall data collected at !Xangwa in northwestern Botswana, for example, revealed that annual totals ranged from 224.7 mm to 935 mm in the period 1983–1990 and averaged 469.4 mm. In the Nata River region where the Tyua reside, some years saw annual rainfall as low as 240 mm and as high as 970 mm, with as much as 300 mm falling in a single month at Nata in December 1973.

Distinct seasons are recognized by the occupants of the Kalahari. These consist of a four-to-six-month rainy season in the summer and a moderate to cool dry winter season. The hot/dry season in late winter and early spring is considered by many San to be a hungry time, when resources are scarce and people and animals are under stress (Hitchcock 1982; Silberbauer 1981). The rains bring relief not only to human but also to plant and animal populations. In some cases, San groups move away from pans (low-lying playalike features on the landscape) where they have spent the winter and disperse into smaller groups. This was the case, for example, with the Ju/'hoansi, who tend to travel more during or just after the rainy season, when water is available on the landscape and plants, animals, and insects are widely distributed.

Much of the Kalahari is an undulating sandy plain covered with trees, shrubs, and grasses. Permanent water is rare except in a few rivers such as the Chobe and the Okanbago. Some rivers, such as the Nata, are seasonal ones that flow only after rains. There are features on the Kalahari landscape such as fossil riverbeds and pans, low-lying areas that have clay bottoms.

The pans were important to the adaptations of Kalahari human and animal populations, serving as places where water and nutrients could be obtained.

While each of the areas under discussion—the northeastern Kalahari, the east-central Kalahari, and the northwestern Kalahari, contains pans, it is only in the northwestern Kalahari that some of the pans contain water year-round. In some cases the pans were used for specialized purposes, such as ambush hunting of animals that came to them to drink and consume mineral-rich earth (Brooks 1978; Crowell and Hitchcock 1978). The pans were also the focal points of San settlement systems, and they sometimes supported cattle posts where owners of livestock kept their domestic animals.

Today there are few if any San in the Kalahari who are not completely settled and earning a living from a mixture of pastoralism, agriculture, foraging, wage labor, and small-scale entrepreneurial activities such as craft production and sale. To my knowledge there are also no San who are living in complete independence of other groups. Virtually all of the San and other peoples in the Kalahari are involved to at least some degree with local, national, and international market forces and the governments of the nation-states in which they reside.

In the balance of this chapter, I consider the mobility strategies of the Kua, Tyua, and Ju/'hoansi San, focusing particularly on the ways in which the mobility patterns have changed. An attempt is made to document the organizational changes that have occurred over time in the Kalahari, with particular emphasis on the past 50 years, the time period in which San groups have been studied in detail.

The Kua of the Eastern Kalahari

The Kua are San peoples who are part of the Eastern Khoe (Khwe) population of central and northern Botswana (Barnard 1992:117–131; Bartram 1993; Cashdan 1979; Hitchcock 1982). They belong to the Central Bush (Tshu-Khwe) language group, the largest of the San language groups in Botswana. Numbering some 4,800, the Kua are found mainly in the eastern and southeastern Kalahari Desert region of Botswana (Vierich and Hitchcock 1996). In the 1970s, most Kua had mixed economies, combining livestock production, agriculture, wage labor, and foraging.

The determinants of mobility strategies in the eastern and central Kalahari tended to vary over time, both on an annual and a longer-term basis. The primary determinant of mobility in the region is not surface water but rather plants (Bartram 1993; Hitchcock 1978, 1982; Silberbauer 1981; Tanaka 1980; Vierich and Hitchcock 1996). Water is available in pools for at most two to three months each year. The rest of the time foraging populations must satisfy their moisture requirements by eating water-bearing plants or squeezing juices from the rums of animals.

In the latter part of the rainy season and into the dry season, Kua foragers depended heavily on melons (e.g., *Citrullus vulgaris* or *Citrullus naudinianus*). During this period the Kua tended to be aggregated in groups ranging from 14 to 44 persons in size (Table 5.1). Mobility was relatively high, with groups making from four to eight moves per annum in the 1970s. In the hot, dry season, on the other hand, the Kua were dispersed into family groups that lived primarily on roots and tubers, especially a plant known locally as *bi* (*Coccinia rehmannii*). These family groups usually stayed in a relatively small area, in part because travel was difficult and moisture-bearing plants were limited (Hitchcock 1982).

In the eastern Kalahari Desert, logistically organized groups of Kua San covered distances from residential localities of from 2 to 36 km. The

Table 5.1 Population Data for East-Central Kalahari Foraging Groups (Intact Bands)

Survey Number	Location	Number of Households	Population Size
W18a	Mosetlharobega (a)	2	14
W18b	Mosetlharobega (b)	6	28
W20	Metsimonate	4	42
W24	Uwe-Abo	4	30
W33	Ramokgophane	7	23
W60	Yeena	8	40
W63a	Bae (a)	3	19
W63b	Bae (b)	3	16
W73	Khwee	9	42
W92a	Diphala 1	3	14
W92b	Diphala 2	5	22
W96	Pulenyane	7	44
W144	Makhi III	5	31
TOTAL	13 groups	66	365 (14-44)

average daily foraging trip distance was about 5 to 6 km, depending on such factors as resource density, numbers of task group members, and types of transport available (e.g., donkeys).

Some decisions about site location and the movement of residential camps related to hunting. The Kua of the east-central Kalahari engaged in pursuit hunting of both small and large game using bows and arrows, spears, and clubs (Bartram 1993, 1997; Hitchcock 1982; Hitchcock and Bleed 1997). The Kua hunted at least a dozen species of large game in the 1970s, including gemsbok, eland, wildebeest, hartebeest, and duiker. In some cases, especially during the hot, dry season, Kua men and boys would attempt to run down game on foot and dispatch the prey using a spear or, in some cases, a knife or digging stick. Animal food procurement patterns varied by season, with smaller species being obtained in the hot, dry season (e.g., duiker, *Sylvicapra grimmia*; steenbok, *Raphicerus campestris*; and springhare, *Pedetes capensis*), the latter species being obtained with the aid of a springhare hook. Trapping of animals, including small antelopes and birds, was generally done in the dry season because the cord, which was made of *Sanseveria scabrifolia*, would get wet and spring the snare during the rainy season (Bartram 1997:329). Kua hunters told me that they would move their camps a bit of a distance away from pans during the dry season so they would not scare the game animals that would come to drink from pools of leftover rainwater. At this time of year they would employ ambush hunting strategies, hiding in hunting blinds made of brush or stone and firing arrows or throwing spears at game that came down game trails to the pans.

A major determinant of residential shifts in the Kalahari was localized resource depletion. The intensity of resource use in an area depended on a number of variables, including the number of consumers (group size), number of producers (group composition), the type and quantity of resources, the efficiency of a group's technology, and the length of occupation of the area. In the eastern Kalahari there was a correlation between large group size and frequency of residential moves. In the wet season, when groups of families had coalesced into bands, the frequency of moves varied from once every six to eight weeks in the middle of the wet season to once every six to seven days in the dry season. Larger groups had greater food requirements and thus tended to deplete an area more quickly than might otherwise be the case.

During the rainy season, especially in the period between March and May, daily foraging trip distances tended to be lower than in the dry season, in part because of the relatively high availability of food plants, particularly melons, beans, and berries. In the dry season (roughly from May to October) on the other hand, trip distances tended to be somewhat higher and energy expenditure greater because there was more reliance on roots and tubers. In the late dry season, when groups in the eastern and central Kalahari were dispersed into family units over the landscape, foraging

distances again retracted because of the difficult conditions. This was the period of greatest stress for Kua and other San populations, and families were observed lying in the shade for long periods during the day in an attempt to conserve moisture and energy. At this time of year, gathering was usually done only in the early morning and late afternoon, in areas relatively close to camp.

Moves were made to places that not only contained food, water, and water-bearing plants, but also to ones that supported specialized resources. Some areas contained plants that served as hosts for larvae that provided poison for hunting arrows. The roots of the seroka shrub (*Commiphora pyracanthoides*), for instance, support the larvae of an insect (*Diampthidia nigro-ornata*), the entrails of which were squeezed onto the spot just below the arrow point. There were also places that contained stone that could be used for the manufacture of tools, one example being the Letlhakane River that flows south-southeast from the village of Letlhakane.

In the past, Kua hunter-gatherer groups moved several times from one residential location to another during the course of a year. Those Kua who lived on cattle posts had a slightly different pattern. Kua families tended to remain stationary on cattle posts, moving out on logistical forays with their animals to grazing areas, to visit other people, or to take meat to the owner of a domestic animal that had died. They also paid visits to other groups living on the peripheries of cattle posts in order to renew friendships, share information, or engage in economic exchanges (Vierich and Hitchcock 1996).

Kua populations covered a relatively sizable area over the course of the year. They tended to move within specific areas over which they had rights that they had acquired through inheritance, marriage, allocation by another group, or by establishing themselves in an area that was unoccupied. The range sizes in the eastern Kalahari tended to be smaller than some of those in the central Kalahari, which in the 1960s averaged some 4,000 km² (Tanaka 1980:79, 117, Table 20). The size of the area over which people moved averaged 989.3 km², with the smallest range being 675 km² and the largest being 1,370 km².

In the eastern Kalahari, long-distance hunting trips were taken by groups of males, sometimes with donkeys and horses, during the rainy season. The numbers of annual moves were also influenced by political decisions. Kua groups moved more frequently in the wet period of 1975–1976 than they did in 1978–1979 after the declaration that there was hoof-and-mouth (foot-and-mouth) disease in the area. Individuals were not allowed to take their domestic animals with them when they moved from one area to another because of Botswana government restrictions, and as a result they tended to move less frequently.

It is interesting to consider the criteria used by eastern Kalahari foragers in determining whether or not to move camp. Some people said that the

critical variable was how far they had to walk; thus there may be an upper threshold on daily foraging trip distance, evidently around 20 to 25 km, that, when reached, served to convince group members that it was time to move.

Some Kua groups claimed that it was not the distance traveled but rather the yields of subsistence products that were important. Average daily gathering yields in the eastern Kalahari were between 18 and 25 kg of plant matter (including dirt, husks, and inedible portions). It was noted by some people that once the yields dropped to around 5–7 kg per day, then it was time to move to a new foraging area. A number of Kua informants said that they decided to move after reaching the point where they were gathering most of the day without having the opportunity to sit in the shade and consume a portion of their pickings while they were still out in the field. It is clear that residential shifts are based in part on people's judgments as to the relative costs and benefits of foraging in an area.

The frequency of residential mobility is often said to be related directly to resource abundance in an area. It is interesting to examine cases that cast doubt on such an assumption. In the Uwe-Abo area of the east-central Kalahari, for example, groups left a rich melon site so they could get closer to a small patch of *machancho* beans (*Bauhinia macrantha*), which could not support them more than a few days. They did this, they said, because they wanted to "eat different foods." The desire to vary the diet, therefore, may provide an impetus for moving from one residential location to another.

Reduced availability of surface water in the eastern Kalahari has been a problem faced by resident populations there, especially in recent years. Some Kua informants said that the water table was dropping and that their sip-wells and other water facilities were not working any longer. One way of getting around this problem, they said, was to locate their camps in areas that had access to sources of groundwater, such as those with boreholes. It was from these locations that task groups ranged out to procure other important resources.

Some groups dug their own wells or deepened areas in the sides of pans in order to expand the amount of water available. The process of well-digging has been practiced among San populations for at least the past several generations and probably much longer. A fallback or buffering strategy was for groups to move to villages where there were water points that could be utilized by members of the public (i.e., ones that were not owned privately).

Another means of circumventing the problem of reduced water availability was through the aggregation of one's moisture source, a strategy employed by a number of Kua groups that cached ostrich eggs filled with water in places they planned to visit during the dry season. People also ensured access to water by planting wild or domestic melon seeds in the

vicinity of their camps. This technique can be seen as a way of growing one's own water supply.

As mobility of coresident groups was reduced and local resource pressure increased, people had two options: they could either forage farther away from their residential locations, or they could change the kinds of plants they used. One response to mobility reduction in the eastern Kalahari was to expand the daily foraging range. A second response, also evident in the eastern Kalahari, was to broaden the diet, taking resources that were formerly ignored or used only occasionally. It is in this context that we see the shift toward the exploitation of a larger number of plant species. As Lee (1979:175) points out, these two strategies, foraging further and exploiting less-desirable food species, frequently were employed simultaneously, with different members of the group following one strategy or another. At the end of the day, resources were pooled and then shared among the camp residents. In this sense, organizational changes in the labor base can be seen as yet another means of overcoming problems of local resource scarcity. The organization of labor and variability in resource procurement costs then must be considered in any analysis of foraging strategies.

It is apparent that substantial change has occurred over time in the eastern and northeastern Kalahari regions. Whereas in the past a critical problem facing resident populations in the east-central Kalahari was access to water in the dry season, the expansion in the numbers of wells and boreholes has increased the availability of this critical resource. The spread of water points has coincided with an expansion in livestock densities in some areas. Grazing pressure in the immediate vicinity of many of the water points is high, and bush encroachment and changes in plant species composition have occurred. Some of the plant resources that cattle eat are the same ones that people depend on, such as melons (e.g., *Citrullus naudinianus*) and beans (e.g., *Bauhinia macrantha*).

In some parts of the Kalahari, cattle and other livestock have contributed to local habitat deterioration and a decline in wild foods. At the same time, some wild animal species' numbers have gone down in high cattle density areas, especially grazers such as wildebeest and zebra. The consequence is that foraging success rates in the areas around cattle posts have gone down, and people have had to resort to alternative strategies to earn a living. These alternative strategies include shifting to more logistically organized systems of resource procurement; engaging in livestock-related labor in order to earn income; and depending on goods provided by relatives, livestock owners, or, in a number of cases, the government of Botswana, which began mounting drought relief feeding and labor-based relief and development programs as a means of averting hunger in rural areas.

Overall the rural economy in the east-central Kalahari Desert is very varied and complex. The populations that reside there in many cases

combine foraging with other sources of subsistence and income generation, including working for cattle owners and getting food and wages in exchange (Hitchcock 1982; Sporton and Thomas 2002). Rural people in the eastern Kalahari, including the San, tend to spread their risk and diversify their income and subsistence sources in order to ensure livelihood security. In general, the relative importance of income in kind (i.e., from informal sources such as sales of crafts) is greater among poorer households in the eastern Kalahari Desert than it is among well-to-do households. It is also important to note that nearly all of the San households reported on here get at least some of their subsistence from transfers (both private remittances and public transfers). Remittances (e.g., payments from mine labor) have been important to rural households in Botswana and Namibia, but were becoming less significant in the latter part of the twentieth century as changes occurred in the mining industry and the economies of southern African states.

Livestock ownership is important in southern Africa, both economically and socially; and many people, including sizable numbers of San, have sought to obtain cattle and other domestic animals. Some eastern Kalahari Kua received livestock as payment for their labor on cattle posts in a system known as *sejara*, or a cow per year in exchange for work performed. Others invested the wages that they earned from their work on cattle posts and ranches or in the mines in the purchase of livestock.

One of the problems some of the San cattle owners faced was that they were sometimes not allowed to graze their animals on the cattle posts where they were working. In the late 1970s, when commercial cattle ranches were allocated to individuals and small groups of cattle owners under leasehold tenure under a program known as the Tribal Grazing Land Policy (TGLP), a number of San who had been working in the eastern Kalahari on cattle posts that became ranches were encouraged—some would say forced—to leave said ranches. In a number of cases the San and their animals moved into villages on the peripheries of the grazing areas. Some of them moved to places known as communal service centers, where they attempted to earn a living doing odd jobs. There they did what foraging they could in places that were already heavily utilized. In response to the pressures, some people intensified their labor while others increased their dependence government food relief and cash-for-work programs.

Mobility Strategies of the Tyua of the Northeastern Kalahari

The Tyua (Chwa, Shua) of the northeastern Kalahari Desert region of Botswana and western Zimbabwe are Central Bush or Khoe-speaking peoples who are sometimes referred to as River Bushmen (Barnard 1992: 117–131; Cashdan 1979; Hitchcock 1982, 1995, 1999). Numbering approximately 7,800, the Tyua are divided into a number of differently

named groups. These groups are found in areas stretching across the Makgadikgadi Pans in Botswana, northwestward toward Mababe, and northeastward across the northern part of the Central District and the state lands of northern Botswana. Some Tyua are also found in the area south of Hwange National Park in Zimbabwe in the Tsholotsho and Blualima-Mangwe Districts of Matabeleland North Province. A sizable number of Tyua are found on the Nata River or, as it is known in Zimbabwe, the Amanzanyama River. The vast majority of the Tyua today combine agriculture and livestock production with foraging and small-scale rural industries, in some cases supplemented with employment on cattle posts of Kalanga, Bamangwato, or, in Zimbabwe, Ndebele (Hitchcock 1999).

The Tyua populations of the northeastern Kalahari faced different kinds of problems than the Kua. Mobility strategies were geared not so much to the distribution of moisture-bearing plants as to the distribution of surface water and food plants. The Tyua had a kind of tethered settlement system in which groups remained close to permanent water during the dry season and ranged out over the landscape during the wet season when they engaged in hunting and trapping and gathered berries, nuts, and bulbs (Hitchcock 1982, 1995, 1999). A major factor affecting residential mobility in the northeastern Kalahari was the presence of other groups in the habitat. Nearly every pan had one or more groups that used the place as a dry season fallback point; the Nata River had an even higher density of resident groups (Cashdan 1979; Hitchcock 1982). Monitoring trips to determine the whereabouts of other groups thus came to be of increasing significance as regional population density increased.

The determinants of mobility in the northeastern Kalahari region have changed substantially over time. The presence of cattle posts and ranches in the Nata area was a major factor affecting residential location decisions. The long-distance hunting and gathering trips undertaken by Tyua groups were planned in such a way as to include areas that had not experienced the devastating effects of overgrazing by livestock. In other cases, foraging was done locally, with some emphasis being placed on species found in agricultural fields. Contemporary groups in the Nata River region no longer aggregate and disperse but instead live in small units in single locations, usually moving only once a year or every two to three years. In the past decade many of these single-family locations have coalesced into larger settlements where services are provided by the Botswana government. The village of Man//otai (Manxotae), for example, which had a population of 120 people in 1975–1976, now supports a population of over 800 people (Masego Nkelegang, personal communication).

It is apparent that there is a relationship between the degree of residential stability of a group and the amount of area utilized by that group. In the northern Kalahari, where groups moved relatively infrequently, there tended to be a situation in which range sizes were smaller and population

densities greater than in other areas. The population densities in the better-watered riverine and swamp areas of northern Botswana (the Okavango Delta and the Nata River regions) tended to be greater than in the more arid areas of the eastern and central Kalahari, with the ranges varying from 50 km² to 1,963 km². The average range size of Nata River Tyua was 709.8 km².

The data on mobility of the Tyua indicate that the foraging trip distances for more sedentary groups tended to be greater than among mobile groups. Long-distance foraging trips, therefore, tended to become more frequent as residential mobility was reduced. On the one hand, the longer trips could be seen as a response to localized resource depletion. However, they could also be seen as a means of enhancing residential stability, which in turn served to attract services from the government. Long-distance trips in the northeastern Kalahari were undertaken expressly for purposes of obtaining resources in large amounts for storage. The stored food, in turn, meant that fewer foraging trips had to be made.

It is interesting to compare logistical hunting trips among eastern Kalahari Kua populations and those of the Tyua of the northeastern Kalahari. In the eastern Kalahari, most daily hunting trips were undertaken by a pair of hunters who went out as far as 30 km from camp. The number of people on long-distance hunts, which covered up to 350 km in some cases, was between one and four individuals. By way of comparison, the Nata River populations often undertook long-distance hunts that included large numbers of hunters, sometimes as many as 30. Moreover, these hunts were organized carefully, often with the assistance of a *dzimba*, a man particularly skilled in hunting and often called upon to take the lead in long-distance hunts. In some cases women and children accompanied men on these long-distance trips in the Nata region, primarily to provide a labor force for processing the various animals killed by the hunting party. These cooperative hunting activities were somewhat reminiscent of the communal hunts organized by Tswana chiefs.

It should be stressed that moves were not always made for purposes of resource procurement. In some cases trips were undertaken specifically to determine the whereabouts of other groups or to assess an area prior to making a move. These monitoring trips provided important information to the various groups and helped in the formulation of decisions concerning residential shifts or dissolution of the group. There were also social visits by foragers to relatives in other areas and in some cases trading trips were undertaken during which cattle posts or villages were visited for purposes of trade and exchange.

Specialized trips for purposes of insect collection (e.g., *mopane* worms, *phane*, *Imbrasia belina*) were observed in the Nata region in the mid to late 1970s and early 1980s. Trips were also taken to areas where there were *marula* trees (*Sclerocarya caffra*) in order to exploit the fruit, some of which

was eaten fresh and some of which was used to make a kind of *marula* wine, which people sold. A particularly important resource procurement trip for Nata River Trua in the 1970s was undertaken in order to obtain salt from the bed of the Nata River south of Nata Village. This salt was then used for domestic purposes or exchanged for goods such as pots, ammunition, and agricultural crops.

In a situation where an elephant had died or been killed, large numbers of people moved to the place in order to take advantage of the windfall. People would camp some distance away from the elephant carcass and proceed to butcher it, cutting the meat into strips, which they would hang in the trees or on specially designed racks to dry. The meat was then taken back to their residential locations on the river, often with the aid of donkeys. It is interesting to note that in these cases, territorial rules were often relaxed.

Among sedentary populations, surface water and the distribution of other groups in the habitat came to assume greater importance in determining where people located their residences. While the distribution of food and moisture-bearing plants was important to site location decisions during part of the year, most of the year was spent close to surface water. The shift away from plants as primary determinants of site location in the eastern Kalahari and toward other kinds of determinants can be attributed in part to the rising costs of water procurement relative to those of plant exploitation and hunting.

There is one other strategy that eastern and northeastern Kalahari populations utilized for procuring nonlocal resources, besides the movement of coresident groups to resource patches and logistics combined with reciprocity, that must be mentioned. Many of the households on the Nata River area and some of the family groups in the eastern Kalahari cattle post areas engaged in long-distance trading expeditions to villages. The Nata River groups took these trips in the winter and early spring, when local foods were hard to find. People took bush foods, dried meat, blocks of salt, baskets, and bundles of palm leaves to Kalanga some 80 to 100 km to the east of the Nata River. Many of these trips were undertaken with the aid of donkeys to transport goods and people.

Unlike the more localized exchange systems in the Nata area, which tended to be characterized by balanced reciprocity, the long-distance trading trips saw exchanges that were much more balanced in nature, with both sides gaining access to goods not locally available. The number of trading trips in the Nata region has declined, in part because of the construction of a veterinary cordon fence that prevented the movement of animal products and because of the increased availability of store-bought goods.

A factor that has affected the long-distance trading trips of Tyua populations was the 1989 establishment of the Nata Sanctuary, a 230 km²

conservation area at the base of the Nata River, which closed off access to the salt deposits so crucial to the Tyua exchange systems. It should be noted that no compensation was paid to the communities along the Nata that lost access to this critical resource, something that made the local people look askance at the Nata Sanctuary and at conservation programs generally.

Yet another factor that has affected the mobility of local groups in the Nata River region is the situation in Zimbabwe. In the past, groups and individuals crossed the Botswana-Zimbabwe border on a regular basis. These trips declined, however, during the Zimbabwe war of independence (1965–1980) and then later, in the early 1980s, when the government of Zimbabwe cracked down on people they defined as dissidents in western Zimbabwe. More recently, Zimbabweans have been crossing the border into Botswana in order to get access to scarce goods such as food and gasoline. In response, the government of Botswana has erected a security fence along the Botswana-Zimbabwe border, ostensibly to prevent the movement of potentially disease-bearing livestock into Botswana, but also to stop movements of people from Zimbabwe into the country.

Some groups responded to the complex situations they faced by moving elsewhere, relocating their homesteads in towns away from the Zimbabwe border. Others took up new kinds of income-generating activities, such as working as tour guides at tourist lodges in the Okavango Delta and the Makgadikgadi Pans region. Still others moved to Gaborone, seeking the bright lights of an urban area in the hope of finding a job.

One of the organizational responses to sedentarization and socioeconomic change was to engage in fishing (Hitchcock 1982:287–294). Fishing was undertaken with the aid of baskets, fish spears, and hooks and lines. In the 1970s large-scale fishing expeditions were carried out in the bed of the Nata River that consisted of dozens and sometimes more than a hundred people. People of all ages, both male and female, participated in this kind of communal fishing. Children were brought into the labor force, where they performed important functions in fishing operations, helping to catch, carry, process, and, in some cases, distribute the catch.

A major organizational response to sedentarization among the Tyua and other San groups in the Kalahari was the intensification of labor. Greater efforts were expended in foraging, food production, and household maintenance activities by people who did not have the option of moving to new places to obtain resources. Children were pressed into service in the domestic and subsistence spheres, with girls engaging in such activities as firewood and water collection and child care while boys worked in the fields and took care of domestic animals. Both boys and girls assisted their parents in food processing and preparation activities. Overall, the number of children involved in subsistence and maintenance activities was much greater among sedentary groups than among the mobile ones.

The Ju/'hoansi of the Northwestern Kalahari

The Ju/'hoansi San of northwestern Botswana have been studied extensively by anthropologists and archaeologists, resulting in some of the most detailed interdisciplinary insights on any indigenous people in the world (Barnard 1992:39–40; Gordon and Douglas 2000:21; Lee 1979, 2003; Lee and Biesele 2002; Lee and DeVore 1976). The Ju/'hoansi have become so well-known in anthropology and archaeology, in fact, that they are sometimes referred to as anthropology's "model people."

In the 1960s the Ju/'hoansi of northwestern Botswana resided in camps near pans that contained water during the dry season, and they dispersed into smaller groups that were widely distributed during the wet season in order to take advantage of wild plant and animal resources and the distribution of other people. It was estimated by Lee (1968:35) that the Dobe Ju/'hoansi moved residences five to six times per year in the early 1960s. In the late 1960s (January–July 1968) one group of Ju/'hoansi consisting of three brothers and their families moved as many as 37 times (Yellen 1977:60). The range sizes of Ju/'hoansi averaged between 300 and 600 km² in the 1960s (Lee 1979:334; Yellen 1977:54). Living group sizes in 1968 ranged from 4 to 34, with an average of 16.9 persons per group (Lee 1979:58, Table 310). In the dry season of 1964, the numbers of people at Dobe varied from 25 to 40, with an average camp size of 30.9 (Lee 1979:255).

The Ju/'hoansi exploit some 150 species of plants and over 40 species of mammals; thus they can be described as being generalists in terms of their subsistence. It should also be noted, however, that some Ju/'hoansi groups depend heavily on a small number of plants, notably *mongongo* nuts (*Ricinodendron rautanenii*), *morama* or *tsin* beans, and *grewia* berries (Lee 1979:158–172). The distributions of these plants and their availability by season affected the mobility decisions of Ju/'hoansi.

In July 1964 the Dobe Ju/'hoansi worked an average of 12 to 19 hours a week in order to obtain sufficient resources to sustain themselves (Lee 1968:37). It should be noted, however, that the labor inputs of Ju/'hoansi varied both over time and from place to place. The Ju/'hoansi of the /Du/Da region south of the Dobe-/Xai/Xai region expended considerably more hours in subsistence procurement in the late 1960s, in part because of the absence of *mongongo* groves and lower resource densities (Patricia Draper, personal communication).

An important aspect of Ju/'hoan land use was the way in which they organized the use of space regionally. Virtually all Ju/'hoansi (and all San) had territories, or, as they called them, *n!oresi*. For purposes of this discussion, a territory is an area over which local people have rights of access and resource use. A Ju/'hoan territory usually is a named unit of land that contains natural resources upon which people depend, including water, wild plants, trees for shade, fuel wood, and construction, and materials

used in the manufacturing of tools and other products. Ju/'hoan territories in the Dobe-/Xai/Xai region were roughly elliptical areas, some of which extended out from the pans in the dry riverbeds (*molapos*), which held water and where most people resided during the winter dry seasons.

Some of the Ju/'hoansi *n!oresi* included dune-top *mongongo* nut groves while others contained areas where a combination of important plant resources were found such as *tsin* bean fields (*morama*), grewia berry shrubs, and vegetable ivory palms (*Hyphaene ventricosa*). An important point resource in a number of Ju/'hoan territories (and the territories of people in the Nata River region as well) were baobab trees (*Adansonia digitata*). Baobabs provided food in the form of fruits rich in calcium and vitamin C. They also were home to animals and birds that were desirable as food. In addition, some baobabs had holes in their trunks that contained water after rains that could be recovered by aid of a straw or a sponge made of plant leaves, thus serving as another moisture source for people traveling from one place to another.

It is important to note that the *n!oresi* of the Ju/'hoansi were not undifferentiated areas over which people ranged in their quest for food, water, and other goods. There are different kinds of *n!oresi*, some of which are residential while others are used primarily for hunting and gathering. Figure 5.2 shows an idealized version of a Ju/'hoan territory. Each residential *n!ore* has one or more "eating places" (*>m/hosi*), which may or may not be shared with contiguous *n!oresi*. A residential *n!ore* also has an associated "hunting place" (*!age/ho*) or direction of usual hunting. According to Ju/'hoan informants, these hunting areas are sometimes shared with nearby residential

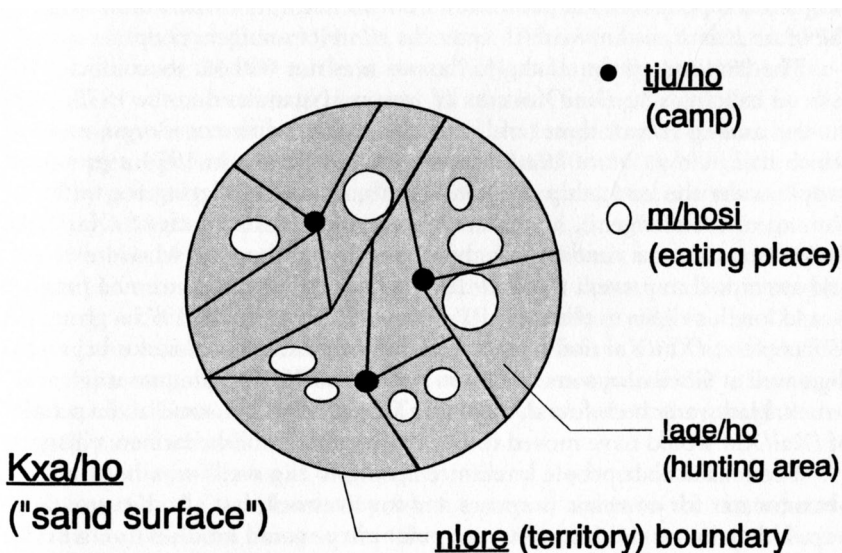


FIGURE 5.2 Diagrammatic representation of the Ju/'hoansi land use system.

n!oresi. In those localities where “eating places” (>*m/hosi*) are shared, each inhabitant of a *n!ore* has a special but ultimately nonexclusive relationship to the portion of the >*m/ho* closest to their village (*tjul/ho*). This portion is called a *q/ani*, which is defined by the Ju/’hoansi as “the gathering area that is behind you” in the sense of being “in your backyard.”

As one informant stated in June 1992 in response to questioning about exclusive rights to resources in his *q/ani*: “Look, even if bush food is in my backyard, it doesn’t belong to me alone; it belongs to all of us.” The rights of *n!ore* owners are understood to include the right of permanent, exclusive possession, with resource access modified by flexible rules of sharing and reciprocity with neighboring groups.

According to the Ju/’hoansi, there are two key concepts of land tenure and resource use in the Ju/’hoan *n!ore* system. These are (1) *n!ore* rights and (2) the right of the *kxal/ho* (the larger land area of the Ju/’hoansi under which *n!oresi* are subsumed). The *kxal/ho* (literally “the sand surface”) is all of the land traditionally inhabited by the Ju/’hoansi and all of its water, plant foods, game, grazing, wood, minerals, and other natural resources.

The right of the *kxal/ho* is usually exercised in the following ways: First, it confers the right to drink the waters of the land, particularly in times of drought. Second, it confers the right to travel freely through the land, and to drink water, hunt, and gather while on the journey. Third, it allows for the right to shoot and follow wounded game anywhere in the land. And last but not least, it gives the right to people to gather key bush foods, medicinal plants, and other important resources anywhere in the area. It should be stressed that people are supposed to ask permission from the territory owners or managers, the *n!ore kxausi*, if they wish to enter the *n!ore* of another group.

The land use system of the Ju/’hoansi was not without its conflicts. To take an example, the /Xai/Xai area of western Ngamiland in the 1970s was divided among at least three (and, in the past, four) different *n!oresi*, each of which had its own *n!ore kxau* or several *n!ore kxausi*. In 1974 a group of people under the leadership of Qoma Qomquasi began digging for water at Xumxgeni (//Gum//geni), a summer water point 30 km south of /Xai/Xai. This action caused a conflict with the *n!ore kxau* of the area, who intervened and attempted to prevent the well-digging because he was concerned that he would lose his rights to the *n!ore* (Wiessner 1977:54–55). In 1975 a group of 37 people at /Xai/Xai under the leadership of XiXae Komandako began to dig a well at G/wihaba, some 35 km to the east of /Xai/Xai, but no water was struck. Had water been found, there was a possibility that some of the people of /Xai/Xai would have moved to G/wihaba and established a new village.

The reason that people were attempting to dig wells was not only to obtain water for domestic purposes and for livestock, but also because they hoped that by establishing a water point they would be able to claim *de facto* land and water rights under Tswana customary law. The Ju/’hoansi

and their neighbors, including the Herero and the Tawana, were well aware that they would not only have rights to the water itself but to the surrounding grazing as well. The well-digging efforts sometimes brought conflicts between ethnic groups, something that occurred, for example, in the mid-1970s at Dobe. There, the Ju/'hoansi dug a well, but when they struck water, the well was taken over by the Herero. The Ju/'hoansi attempted to get the district land board to grant them rights over the water point and to have the Herero removed from the site, but were unsuccessful.

A number of factors affected the mobility of Ju/'hoansi populations in the past several decades, including the decision of the Botswana government to provide social services and economic opportunities in specific locations. By the new millennium, Ju/'hoansi in northwestern Botswana were found in eight locations (Table 5.2). All of the settlements had permanent water and facilities such as schools, health posts, and community centers. In all of these settlements, Ju/'hoansi were living alongside Bantu-speaking neighbors, including Herero, Batawana, and Mbukushu. A small population of Ju/'hoansi, some 40 people, resided in the Tsodilo Hills, a national monument that recently was declared a World Heritage Site. In 1995 the Ju/'hoansi of Tsodilo were resettled away from the hills by the Botswana government, but they remained close enough to the hills to take advantage of the tourists who visited there.

A major factor that brought about changes in the northwestern Kalahari was the expansion and contraction in the size and distribution of domestic livestock populations over time. In northwestern Botswana, livestock, especially cattle, had long been an important source of support for the Ju/'hoansi and their neighbors (Hitchcock et al. 1996; Wilmsen 1989). In 1991 there were some 21,000 cattle in western Ngamiland. By late 1996, however, there were no cattle in the area, all of them having been killed by the Botswana government in an effort to contain lungsickness, or contagious bovine pleuropneumonia. Eventually some 320,000 to 400,000 cattle were killed by government officials and individuals working on contract with the Ministry of Agriculture.

This loss of livestock had significant socioeconomic impacts on the Ju/'hoansi, Herero, and other people in northwestern Botswana. Some people fell back on foraging, going into the bush to collect wild foods. Others crossed the border into Namibia to live with relatives and friends in the Nyae Nyae region. Still others moved to the towns around the Okavango Delta such as Gomare, Nokaneng, Tsau, and Maun, where they sought employment or lived with relatives.

Today the Ju/'hoansi of western Ngamiland are faced with a number of dilemmas. On the one hand they want to retain rights to the settlements where they have been living so that they can utilize local resources and have access to social services and government relief and development programs.

Table 5.2 Ju/'hoansi Communities in Western Ngamiland (Northwest District), Botswana

Name of Community	Controlled Hunting Area Number; Size (square kilometers)	San Population and Total Population and Composition	Activities
Tsodilo Hills	NG 6; 225 km ²	70 out of 140 (50%) Mbukushu	tourism, farming, small stock, crafts, foraging
Nxau Nxau	NG 2; 7,448 km ²	488 out of 813 (66%) Herero	foraging, farming, crafts, livestock
Dobe	NG 3; 5,760 km ²	100 at Dobe; 350 out of 550 (63%) in Dobe localities, Herero	foraging, farming, crafts, livestock
Goshe (Qoshe)	NG 3; 5,760 km ²	107 out of 153 (70%) Herero	foraging, farming, crafts, livestock
!Xangwa (Qangwa)	NG 3; 5,760 km ²	416 out of 833 (50%) Herero, Tawana	foraging, farming, crafts, livestock
/Xai/Xai (Cgae Cgae)	NG 4; 9,293 km ² ; and access to NG 5; 7,673 km ² (16,966 km ² total)	345 out of 431 (80%) Herero (Mbanderu)	foraging, farming, crafts, livestock
Chuchumuchu	NG 1; 2,970 km ²	29 out of 289 (10%) Mbukushu, Herero	foraging, farming, crafts, livestock
//Kaudum (Xaudum)	NG 1; 2,970 km ²	40 out of 162 (25%) Mbukushu, Herero	foraging, farming, crafts, livestock
8 communities	33,369 km ² (6 CCHAs)	1,845 Ju/'hoansi out of 3,371 total (55%)	

Note: Data obtained from the Remote Area Development Program, government of Botswana. Three of these villages are gazetted (i.e. recognized by the Botswana government as official settlements): Nxau Nxau, !Xangwa, and /Xai/Xai. CCHA = Community Controlled Hunting Area.

On the other hand they wish to have the option of moving out to areas away from the larger settlements, in part to get away from tensions and conflicts. Some of the Ju/'hoansi want to try and reestablish their occupancy rights in their ancestral territories in the hopes of gaining greater security of tenure.

ORGANIZATIONAL CHANGES IN MOBILITY AND SETTLEMENT SYSTEMS

It can be seen that the factors that condition population structure and mobility strategies of human populations are multiple and complex. The peoples of the Kalahari respond to a number of different environmental and demographic conditions that vary both spatially and over time. Although moisture is a critical element in decision-making relating to mobility in this semiarid ecosystem, populations are also affected by resource structure, technology, and the presence of other groups in the habitat. The problem for the Kua, Tyua, and Ju/'hoansi is that their mobility options are now more circumscribed because of population growth, habitat shifts, and changes in land tenure systems.

Environmental monitoring and information sharing are employed by Kalahari San populations in an attempt to reduce the degree of unpredictability and risk. Adjustments in group size and composition, shifts in mobility strategies, and the relative emphasis on different resources are all responses to the complex environmental and socioeconomic problems posed by the intricate and highly variable Kalahari ecosystem. Table 5.3 presents data on the numbers of annual residential moves made by the various San groups that were investigated for study. It can be seen that there was a wide range of variation in the degree of residential mobility of Kalahari San populations. In general, the greater the time period during the year that permanent water was available, the more likely it was that people would stay at specific locations for long periods. If resource density was high in the vicinity of the water points, it was even more likely that people would stay stationary residentially for at least part of the year. People opted to move away from permanent water during seasons when resources were more widely available, in part, they said, to allow them to have greater variety in their diets and to enable them to "get a break," as they put it, from the tensions of living in close proximity to one another. There are social reasons for mobility as well; as Draper and Cashdan (1988:343) note, "When a camp breaks up, people often relocate for the express purpose of visiting other kin and renewing former acquaintances." Sometimes, according to Kua, Tyua, and Ju/'hoan informants, people felt that there were just too many people in one place and too many interpersonal conflicts. Clearly, residential mobility was not determined by natural resource availability alone; other factors were at play as well, not least of them population size and density and the degree of intensity of social interactions and intragroup conflicts.

As anthropologists and archaeologists are well aware, many factors, both natural and cultural, affect the ways in which people behave and the archaeological patterning that comes about as a result of natural and cultural formation processes. As Binford (1982:5) notes, "The material consequences of an occupation represent a document regarding an organizational aspect or phase of operation of the cultural system under study."

Table 5.3 Number of Residential Moves per Year Among a Sample of Kalahari San Populations

Group Name	Period of Observation	Numbers of Annual Residential Moves	Reference(s)
Kua	1/75–11/76	6–18	Hitchcock (1982:191)
Kua	7/77–10/78	4–9	Hitchcock (1982:191)
Tyua	9/75–11/76	0–1	Hitchcock (1982:191)
Tyua	8/77–7/78	0–2	Hitchcock (1982:191)
Ju/'hoansi	8/63–1/65	5–6	Lee (1968:35)
Ju/'hoansi	1/68–7/68	37	Yellen (1977:59)
Ju/'hoansi	10/97	0–1	Hitchcock field notes
G/wi	1959–1966	6–16	Silberbauer (1981:196, 246)
G/wi	9/67–3/68	11	Tanaka (1980:81)

Kalahari San group size and structure vary, depending in part upon the availability of resources to support those groups; the kinds of kinship, marriage, friendship, and reciprocity links that exist; and the organization of labor. Among Kalahari San, a response to decreased mobility and greater residential stability was a reduction in group size. Those groups living on the peripheries of pans where cattle posts had been established, for example, tended to be smaller in size than groups that engaged in foraging.

Another response to mobility reduction was organizational change in the labor system, with children being brought into the labor force to carry out such tasks as child care, water collection, food processing, and maintenance of residential locations. It is interesting to note that sedentism brought with it shifts in the mobility patterns of males and females. In sedentary contexts in the Kalahari, males tended to be more mobile than females. Adult males would range out farther from residential locations to obtain resources, and they would engage in long-distance hunting and trading trips, as seen, for example, among the Tyua of the Nata River region. The spatial range of

boys was also greater than that of girls in those contexts where livestock were part of the economy. Boys would take the domestic animals out to graze and watch over them to ensure that they did not get lost or taken by predators, and they would take the animals to water points, which were usually a kilometer or two away from where people lived.

In the Kalahari are places on the landscape where there are accumulations of materials that represent a wide array of activities and processes that took place over substantial periods of time. As Ebert (1992:xiv) notes, the archaeological record is a composite of distribution at many spatial and temporal scales superimposed upon one another. The archaeological record is a “massive palimpsest of derivatives from many separate episodes” (Binford 1981:187). What we see in the archaeological record of the Kalahari are sets of material remains that are the product of the dynamic operation of cultural and natural systems.

There was a great deal of variation in the ways in which various portions of the Kalahari landscape were utilized by people. Some places, such as pans and fossil river valleys, tended to have evidence of substantial amounts of use. Other places were utilized for specialized purposes, such as resource extraction or the performance of rituals.

For purposes of this analysis, we can distinguish between areas that had short-term use and occupations by human populations and those that were used for lengthy periods of time, that is, several months or more. Places where long-term occupation occurred include residential camps where both producers and consumers lived together; cattle posts where livestock were kept for substantial periods and where people stayed in order to oversee the cattle; and villages where there were facilities such as houses, gardens, and ash and garbage dumps.

Short-term locality use and occupations include overnight camps of hunters engaged in pursuit of prey; kill sites where an animal or several animals were obtained; ambush hunting sites (hunting blinds), which were usually used for only a night or a few nights during certain times of the year; wild animal processing sites (butchering locations); places where processing of certain kinds of resources took place (one example being the roasting of *mopane* worms, *Imbrasia belina*); tool manufacturing sites; special-purpose resource procurement localities (e.g., places where ochre was obtained); children’s play areas, most of which were close to residential locations; menstrual seclusion huts; places where livestock-related activities took place, such as branding or dehorning of cattle; and areas where activities such as trance healing or burial of the dead took place.

It is sometimes assumed by archaeologists that places occupied over long periods of time tend to be larger in size than places utilized only for short periods. Table 5.4 presents data on occupation length, numbers of occupants, and site sizes for residential locations of mobile and sedentary Kalahari San. It can be seen that the average size of sites of settled Tyua

Table 5.4 Occupation Length, Numbers of Occupants, and Site Sizes for Residential Locations of Mobile and Sedentary Kalahari San

Location, Group	Number of Sites	Occupation Length and Average	Number of Occupants, Average	Areas of Occupation (in square meters)
Northwestern Kalahari, Ju/'hoansi (a)	16	1-30 days, 8.3 days	10-24 people, 17 persons	59-581 m ² , 222.35 m ²
Northwestern Kalahari, Ju/'hoansi (b)	4	4 months	17-40 people, 17 persons	214-2,543 m ² , 1,565 m ²
East-Central Kalahari, Kua Foraging Sites (c)	10	9-41 days, 18.7 days	9-28 people, 19 persons	108-394 m ² , 272.54 m ²
East-Central Kalahari, Kua Cattle Post Sites (c)	9	6-48 months, 17.9 months	5-16 people, 10 persons	165-811 m ² , 506.8 m ²
Northeastern Kalahari, Tyua (d)	11	1-39 months, 15.8 months	3-9 people, 6 persons	36.5-752 m ² , 246.5 m ²

Note: Data on the Ju/'hoansi were obtained from (a) Yellen (1977:237-253, Appendix C) and (b) Draper (1973:302, Table 1); data on Kua (c) and Tyua (d) were obtained during the course of fieldwork by Robert Hitchcock.

groups in the Nata River region ($N = 246.5 \text{ m}^2$), which were occupied for an average of 15.8 months, were smaller in size than the residential sites of east-central Kalahari Kua foragers ($N = 272.54 \text{ m}^2$), which were occupied for an average of 18.7 days. It can also be seen that the sites of some of the mobile Ju/'hoansi hunter-gatherers studied by Draper (1973) at /Du/Da were much larger in size than the sites of other Ju/'hoansi studied by Yellen (1977) as well as those of the Kua and Tyua. It is apparent that site size is related only partially to occupation length and the numbers of occupants.

Site size is also related to the number, nature, and complexity of the activities undertaken by the occupants of a place, the organization of labor, and the nature of the resources being exploited. To take an example, the activities of the Ju/'hoansi of the /Du/Da area of the northwestern Kalahari Desert can be compared to those of the Ju/'hoansi of the Dobe area (see Figure 5.3 for a map of the /Du/Dobe area). Both populations engaged in



FIGURE 5.3 Map of the Dobe-/Du/Da area in the northwestern Kalahari Desert region of Botswana and Namibia.

mobile hunting and gathering in the 1960s when they were studied by Richard Lee (1968, 1969, 1972, 1979) and Patricia Draper (1973, n.d.; Draper and Cashdan 1988). The overall subsistence work effort of the Ju/'hoansi of /Du/Da and that of the Ju/'hoansi of Dobe was very similar. The adults of /Du/Da spent on the average 2.3 days per week at work, while the people of Dobe spent on average 2.4 days per week at work (Draper n.d.; Lee 1979:262). The work effort of adults at /Du/Da and Dobe, however, varied substantially during the year due to the seasonal variation in the availability of resources.

There was also significant variability in the labor investment of adult males versus females in the two areas. Adult males at /Du/Da spent much more time than females in subsistence-related work (Draper n.d.). One

reason for this situation was that the people of /Du/Da were more heavily dependent on meat than were the people of Dobe, in part because of the lower availability of plant resources, especially *mongongo* nuts, in the /Du/Da area. In the Dobe area farther north, *mongongo* trees were abundant and labor investment in animal food procurement was much lower than it was at /Du/Da (cf. Draper n.d.; Lee 1979:182–195, 250–280). Women are the major collectors of *mongongo* nuts and other plant foods in the Dobe area. The women of /Du/Da expend more energy collecting *tsin* beans, which are also high in calories and protein, but *tsin* bean “fields” as they call them are much more widely dispersed, and the resource densities are lower than is the case for the *mongongo* nut groves of Dobe and areas to the north.

Women in the /Du/Da area share information with men about the tracks of animals that they come across during the course of their gathering trips, and there was a substantial interest among the people of /Du/Da in collecting and sharing information on game movements. In some cases, women would go so far as to interrupt their gathering trips to go back to camp to tell men about game tracks that they saw. Women in Dobe on the other hand did not have the same degree of interest in game animals, presumably because wild animals were not as important a part of the diet as they were at /Du/Da (Patricia Draper, personal communication). This comparison reveals that there can be substantial variation in mobility, labor organization, work effort, subsistence strategies, and information sharing even among the same people living in a relatively small area. It should come as no surprise therefore that the archaeological record in that area would reflect similar kinds of variability.

It is interesting to compare the use of places on the landscape by human populations over time. Some places, such as pans, see substantial use both for residential purposes and for specialized activities such as ambush hunting (Brooks 1978; Crowell and Hitchcock 1978; Hitchcock 1982). In the case of the Nata River region, the Tyua utilized the pans north of the Nata River in the nineteenth and early twentieth centuries for both residential and foraging purposes. In the 1940s, two Royal Air Force fliers on a mission out of Bulawayo disappeared. Subsequently, their plane was found, but not the fliers. A group of Ganade Tyua was arrested and tried for allegedly having murdered the men (the Tyua were acquitted for lack of evidence). These events led to a decision by the Bechuanaland Protectorate administration to send police patrols into the northeastern Kalahari region. These patrols disarmed the Tyua, taking away their muzzle-loaders and other guns. They also persuaded—and in some cases forced—the Tyua to leave the area, encouraging them to resettle in villages south of the Nata River.

In the late 1940s and into the 1950s, the Tyua spent much of their time planting gardens, watching over livestock, and working the fields of other people in exchange for a portion of the crops produced. As involvement in

food production activities grew, so too did the complexities of the kinds of tasks performed and the time and energy expended in work. The organization of labor changed, with children being pressed into service and adult males and females becoming more specialized in the kinds of work they did. Adult males and boys, for example, worked with domestic animals and did house and fence construction while women and girls did agricultural labor, carried water, and processed crops for consumption and storage. The mobility patterns of both adults and children changed as well, with adult males and boys traveling farther and more frequently than adult females and girls, who generally stayed closer to home and to their fields and gardens.

In the settled agricultural villages of the Nata River region, people in general were very busy, engaged in diverse kinds of time-consuming activities. Parent-child relationships in the villages were different than they were in mobile foraging contexts, as seen in the east-central Kalahari, with children, especially girls, playing greater roles in child care in the villages. The children in settled villages tended to leave their homes more frequently and stay away for longer periods than did children who lived in foraging camps. The work involved with the herding of domestic animals, agriculture, and long-distance trading required people, both adults and children, to be away from home for greater periods of time. This pattern was counterbalanced by the greater efforts that had to be expended in food processing and domestic maintenance tasks closer to home, activities often done more by females than by males.

Sedentism and food production therefore contributed to an increase in the contrasts between the sexes in mobility and certain other behaviors. Boys, who in sedentary contexts had greater spatial ranges than girls, tended to interact more frequently with people from other groups. Males were more likely than females to engage in long-distance trade and exchange activities, and they were more likely to engage in labor that required long-distance moves, such as work in the towns and mines of southern Africa. Structural changes occurred in the composition of families in these situations, with an increase in the numbers of female-headed households. One might anticipate that there would be some differences among the kinds of sites that derive from systems that are gender-specific, such as male-only or female-only task groups, and those that derive from systems that are more generalized, with mixtures of both males and females of various ages.

Settlement systems sometimes leave tangible material remains on the landscape, and in some cases it is possible to determine the kinds of activities that took place in specific localities. It must be kept in mind, however, that the materials that one finds on a landscape are products of a variety of processes, both natural and cultural, that have transformed the remains from their original state to what one sees today. The Nata River region provides an example of how patterning in locality use undergoes transformations over time. In the 1950s, commercial cattle ranches were

established in the region north of the Nata River. The ranches, which were fenced, restricted further the mobility options of the Tyua, who were by that time residing in settled villages south of the Nata. The fences had impacts on mobile plains game that were important to the Tyua such as wildebeest (*Connochaetes taurinus*). Sizable numbers of wildebeest bunched up against the fences and many of them died due to a lack of food and moisture. There were also die-offs of wildebeest and buffalo (*Syncerus caffer*) in the Nata region in the 1950s and 1960s as a result of drought. The Tyua resorted to scavenging, collecting the bones of the wildebeest, buffalo, and other animals that had died and selling them to a bonemeal factory in Francistown. Some of the Tyua visited the pans where they had lived and foraged in the early to mid twentieth century and collected the bones from residential and special-purpose locations.

By the 1960s the presence of game scouts in the Nata River area made it harder for people to hunt locally for subsistence purposes. The Tyua changed their strategies, taking up nocturnal hunting in the local area and engaging in long-distance expedition hunts in which they covered their tracks as best they could for fear that game scouts would follow them. Small and sometimes large groups of Tyua hunters would range out from their villages to the remote pans north of the Nata, where they engaged in both pursuit hunting and ambush hunting of large game. The pans that used to support groups of people in sizable numbers now became the focal points of specialized hunting and animal processing activities. What used to be residential locations during at least part of the year were now used for short-term, overnight camping, ambush hunting, and plant and animal processing purposes. Care was taken by the hunters to bury the remains of the animals after they were processed so that they would not be accused of engaging in illegal hunting.

In some cases, large groups visited the remote pans in order to collect bullfrogs and carry out communal fishing activities. Around Dzivanini Pan on the Botswana-Zimbabwe border, for example, there were large accumulations of fish bones and drying racks for fish that were used briefly but intensively by fishermen who visited the area for only a few days at a time. Informants told me that in the late 1970s they sometimes cleaned up hunting and fishing camps and hid any evidence of having been in the border area in order to avoid being tracked by the Selous Scouts and other members of the Rhodesian armed forces and paramilitary patrols. It is apparent therefore that the organization of mobility, subsistence, and labor changed substantially in the northeastern Kalahari in the latter part of the twentieth century, as did the ways in which occupation and special-purpose sites were treated.

In a sense, the pans and fossil river valleys of the northwestern Kalahari and the strip of riverine gallery forest along seasonal rivers, such as the Nata River in the northeastern Kalahari, can be seen as “islands” or oases

that were crucial to the subsistence and settlement systems of the societies that utilized them (for a discussion of islands on the Great Plains of the United States, see Kornfeld and Osborn 2003). The pans and river valleys are, for all intents and purposes, habitat patches that were taken advantage of by human populations. Low-lying hills and small mountains in the Kalahari, such as the Tsodilo Hills, can also be viewed as islands that were utilized in various ways by human populations. Landscapes in the undulating plains of the Kalahari were not homogeneous; rather, they were heterogeneous, and people utilized them differentially, depending on a whole series of factors. These factors included season, natural resource type and density, group size and composition, the health and nutritional status of the population, and the technology available to the population.

These islands, or patches, were utilized and modified both by humans, wild and domestic animals, and even by insects. Termites, for example, served to attract people who wished to exploit them for food, and those same termites had effects on the homes, fences, drying racks, and other facilities constructed by people. Some San described elephant kills as places to which people moved for purposes of engaging in consumption and processing of the large animal. However, they noted that they could not stay in these places very long both because of the predators, such as lions and hyenas, that were attracted to the kill, and because the remains became, as they put it, “quite ripe and smelly” in a relatively short time, especially if temperatures were high. Under these conditions, according to informants, it was useful if a fairly sizable task group was available to butcher and process the meat for storage, which was done by cutting the meat into strips and drying it on trees and specially constructed racks or smoking it over fires. The next task facing the population was to work out a way to move the meat from the kill site to their residential locations. Sometimes this was done using donkeys or horses, but there were also instances where people carried the meat on their backs, hoping that they would not run in to any game scouts on their way home. In some cases the meat was cached for later recovery if people were unable to carry it or if they were concerned about the presence of game scouts, police, or military patrols.

There is significant variation among San of the Kalahari as to what degree they interact with non-San groups and what form this interaction generally takes. In some cases the San work for non-San. This is seen, for example, in the case of the Tyua, where adult males who are skilled hunters will go with hunters from other groups as guides. It is interesting to note that some San felt that their subsistence and social security would be increased if they interacted with other groups, while others believed that the presence of members of other ethnic groups was to their benefit. In the latter set of cases, this was because there were contractual relationships between individuals in the different groups involving reciprocal exchanges of goods and services. In other cases, it was because people felt that the presence of other groups

increased their security of land tenure, the assumption being that the government or a private individual would be less likely to tell them to leave the area if there were people from a variety of groups present.

In those situations in which insecurity was high due to conflict, some people opted to move into villages as a means of ensuring protection from external forces. This was the case, for example, with the Tyua in Zimbabwe both during the period of the liberation war against the white minority regime and in the period from 1982 to 1988, the "time of troubles" in Matabeleland. Other groups moved further into the bush, living in remote places and moving quickly from one place to another in order to avoid being detected by Rhodesian government forces. Site maintenance and cleanup was viewed as an important activity by groups involved in the liberation struggle. Every precaution was taken, including not having fires, so there was no evidence of hearths left behind. Clearly, mobility and land use decisions and site maintenance behavior vary depending on conditions ranging from the state of the natural environment to the sociopolitical setting in which an individual or group is operating.

CONCLUSION

An analysis of the variability present in subsistence, residential, and logistical mobility, labor organization, and land use systems among Kua, Tyua, and Ju/'hoansi San in the Kalahari Desert suggests that it is possible to distinguish organizational patterns. There are significant differences, for example, between mobile foraging and sedentary food-producing societies, in terms of the ways in which space is used both by groups and by individuals. Mobile foraging groups tend to "map on" to resources in space, while groups that are residentially stationary tend to have differentiated systems in which specialized task groups and individuals engage in activities both in residential locations at home and in places away from the villages. The systems of logistically organized sedentary groups differ from those of mobile foragers, although there are some significant similarities, for example, in the behavior of foraging groups residing for extended periods at water points during the dry season.

Both mobile foraging San and sedentary agro-pastoral San populations engage in long-distance exchange and trading activities, in part as a way of facilitating access to nonlocal resources or as a means of maintaining social alliances. In the case of the Tyua of the Nata River region, groups engaged in trade of wild foods in exchange for domestic products such as sorghum, millet, and maize, some of which they stored for later use. It is important to note that those groups that were in areas that were "packed" in a geographic sense (i.e., ones that had sizable numbers of people per unit space) tended to be ones that were sedentary and that engaged in long-distance

trading and expedition, hunting, gathering, and fishing activities. These sedentary groups were also the ones that tended to utilize traps in faunal procurement more frequently, thus allowing them to gain time utility so that they could carry out other activities while the traps were at work.

An important organizational response to mobility reduction was to intensify labor. Groups and individuals began expending more time in subsistence procurement of wild resources and, in some cases, food production. Sedentary populations often opted to bring additional people in to the labor force, notably children. As a result, there was greater gender differentiation in the activities of settled groups compared with mobile ones, something that had implications for the spatial ranges of males versus females and for variation in the kinds of interpersonal interactions and socialization processes that boys and girls experienced. The mobility shifts and economic transformations that occurred over time in the Kalahari were accompanied by changes in social organization. There were changes in marriage patterns, inheritance, and in the size, structure, and composition of households. While one might anticipate that sedentism would bring with it larger coresidential group sizes, in fact group sizes were reduced, at least initially. It was only later that groups began to coalesce, and multiple-household villages consisting of both kin and nonkin were formed, and that coresidential group sizes increased. Correlated with these changes was a reduction in the size of the area controlled by the demographically larger sedentary groups, as predicted by Binford (2001:213–216).

Food production did not become an important means of making a living for most San groups, at least initially. Some groups chose to intensify their foraging activities and engage in the exploitation of new kinds of resources, such as fish, mollusks, and insects. Others became dependents, working for other people in exchange for a portion of the crops produced, access to livestock products (milk, meat, and draft power), or cash. Still others moved farther into the desert, away from population concentrations. With population growth and the reduction in the amounts of land available for communal use in the Kalahari, mobility options were reduced, and most San had little choice but to remain residentially stationary. Groups responded to mobility constraints by modifying the ways in which their labor, land use, and technological systems were organized, setting the stage for major transformations in social complexity.

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