



THE RAINFOREST FOUNDATION
SECURING LANDS, SUSTAINING LIVES

RESOURCE RIGHTS AND TIMBER CONCESSIONS:

Integrating local peoples' land-use practices in forest management in the Congo Basin.

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SUMMARY FINDINGS AND RECOMMENDATIONS

- The pattern of land rights within the Congo Basin forest is a complex mosaic, with overlapping rights to the same areas of forest and resources. Such a pattern reflects the fact that land and resource rights are often not exclusively held, and sharing of resources within and between communities is either tolerated or fully sanctioned. Bantu and Pygmy peoples often have parallel systems of land tenure and resource rights.

- Traditional tenure and resource rights were the result of constant negotiation, and they showed some degree of flexibility and adaptability. However, the situation is changing; land management policies in many parts of the region have often involved the granting of exclusive use rights to outside parties for extensive areas of land.

- Determining land "needs" is problematic, since it requires a judgement to be made about people's resource-use practices and way of life. The need to make such judgements means that land-use planning is an inherently political process. Typically, zoning projects have prioritised conservation and economic needs, with the allocation of large areas as national parks, or for timber concessions, rather than recognition of local peoples' traditional rights and practices.

- A fundamental problem with many land-use plans is that they are based on the assumption that the best way to manage a forest is through allocating specific areas to different functions. However, such a strict separation between different areas does not reflect the reality of land-use or land claims in the region.

- There is a need to develop joint management regimes, which recognise multiple and overlapping use rights. Existing systems and structures of land management should be built on and adapted where necessary, rather than either being ignored, or at best, considered at the end of the process.

- This would entail intensive community consultation, to map local tenure and management systems, followed by lengthy negotiations between the various parties. There would need to be a long-term, ongoing, process of negotiation and monitoring.

INTRODUCTION

A crucial issue currently being faced by the forestry sector in central Africa, as in many other parts of the world, is the question of how to reconcile the competing needs and claims for access to forest resources. Those claiming rights to the forest include rural people, conservationists and industrial interests, most notably the timber industry but also the mining and plantation sectors. Pressure on the forest, and conflict between the various stakeholders, has grown hugely in the last few decades, in particular, with the expansion of the timber industry. Today, about 45% of the forest area of the Congo Basin lies within logging concessions, land that also supports the livelihoods of millions of rural people (Ndoye & Tieguhong, 2004).

Some attempts have been made to resolve these competing claims and rights through land-use planning exercises. Most commonly, this has entailed the establishment of zones allocated for specific purposes, for example, with areas designated for the production of timber, conservation of biodiversity or for use by local peoples. However, such a system is at odds with local resource use and land tenure regimes. Investigations into these systems from throughout central Africa show that there is a complex network of multiple and overlapping rights to land and to resources. How then can these rights be effectively incorporated into land management strategies?

This paper presents an overview of land-use practices in the Congo Basin, as described in the literature, and then considers these in relation to forest management planning. Data are presented for both Pygmy peoples and agricultural communities. Land-use by Pygmy peoples has mainly been looked at in relation to traditional territories, with the mapping of these areas and some documentation of property rights. For agricultural communities, most work has focused on assessing land requirements for current agricultural practices, and to a lesser extent, the use of forest areas for resource extraction. Taking a more ecological perspective, data on wildlife biomass are presented, and these are considered in relation to the carrying capacity of forests for hunting activities.

The sources of these data stretch back over the last few decades, and so this paper does not necessarily reflect present-day practices. Many parts of the region have experienced huge social and environmental changes, as a result of conflicts, large-scale resource extraction and urbanisation, among other factors. However, "traditional" land-use practices have been maintained in many communities, and customary tenure continues to be an important element of local management systems.

LAND TERRITORIES OF PYGMY PEOPLES

The traditional territories of Pygmy peoples are those areas of forest within which hunting, gathering, rituals and other cultural activities are carried out (Barume, 2000, citing Bahuchet, 1991). Furthermore, they are the areas of forest with which a band or community associates itself, and with which it is intimately familiar (Lewis, 2002).

These territories may be associated with individual bands or groups of bands. Ichikawa (1986) described the territories of individual bands in his research on the Mbuti of Ituri forest in the Democratic Republic of Congo. However, the territories mapped by Lewis (1997 a-d; 2002) for the Mbendjele of northern Congo-Brazzaville represent the areas shared by a number of intermarrying lineages. Similarly, for the Aka of the Central African Republic, territories were recognised at the level of regional bands. These bands were composed of a number of groups living along the same trail, this being used to traverse their territory (Bahuchet, 1992).

These territories are composed of named sites – natural features, such as rivers and lakes, and important resource sites, for example, areas rich in wild yams, fruit trees, seasonal caterpillars, fishing sites, etc. (Lewis, 2002; Schultz, 1991). Bands move between the resource centres within their territories, and so these sites and the interconnecting paths form the "skeleton" of the territory (Ichikawa, 1986: 174). While the core areas are used primarily by the bands linked with that territory, there is overlap of territories. Thus, near the boundaries, neighbouring bands may also hunt and use resources (Ichikawa, 1986; Kitanishi, 1995).

At the level of individual bands, there is some degree of fluidity over time. Ichikawa (1986) describes how bands change their hunting ranges over long periods, the base camp of one band having moved 60 km in the last 50 years, moving through areas now used for hunting by four different bands. Use rights are associated with lineages, and this further blurs the boundaries of territories, since individuals have access rights to the territories of a number of different lineages. For example, among the Aka, every individual may have access rights to territories of 10 different lineages (Bahuchet, 1992). Similarly, among the Mbendjele, most people have access to a range of different territories because of kin relationships (Lewis, 2002). Consequently, there exists a network of rights, extending over large areas of forest (Van den Berg & Biesbrouck, 2000).

This complex pattern of resource rights is a reflection of the nature of tenure for Pygmy peoples, for whom the concept of a territory does not equate with exclusive use rights. Although outsiders are required to ask permission to use resources within a band's territory, such requests are generally granted (Lewis, 2002). Bahuchet (1992) writes that for the Aka, territorial restrictions refer to the right to settle. Neighbouring groups are free to cross a band's territory, for example while hunting, but they can not settle without permission. Granting access to resources is both a reflection of, and a key part of, maintaining good relations with others among Pygmy peoples (Kenrick & Lewis, 2004; Van den Berg & Biesbrouck, 2000). This extends not only to other Pygmy groups, but also to Bantu communities and other outsiders. The territories of Bantu communities often overlap with those of Pygmies (Dethier & Ghuirghi, 2000; Lewis, 2002; Van den Berg & Biesbrouck, 2000). In the past, this was not generally the source of conflict, but this situation is changing, as is considered further below.

The territories of particular bands are often linear in shape, this reflecting their movements between an agricultural village and the forest (Bahuchet, 1992; Ichikawa, 1986). The village and forest represent the two "poles" of the Pygmy way of life (Bahuchet, 1992: 243). Typically, many Pygmy peoples spend a

portion of the year based near a Bantu village, participating in agricultural activities, either working on their own fields or most often, working for Bantu farmers. At other times of the year, typically the dryer season, they move into the forest to focus on hunting and gathering activities.

These forest-based activities centre around particular resource-rich sites, as highlighted above. Forest camps are usually established for a few months at a time, people moving camp several times a year, for example, to take advantage of seasonally available resources, or perhaps, a local abundance of wildlife. Bahuchet (1978) describes how, among the Aka Pygmies, groups move about 6 times a year, covering a total distance of about 50 km. Similarly, the Mbuti of the Ituri forest reportedly move 5-7 times a year, each campsite being some 5-8 km distance apart (Ichikawa, 1978). At each of these camps, everyday gathering activities are undertaken within 2-3 km of the camp, within a 12-14 km^2 area. However, longer trips of up to 10 km may be undertaken for particular resources, for example, mushrooms. Further distances are covered for hunting – up to 5 km for trapping and 30 km for net hunting. Kitanishi (1995) also studied the Aka Pygmies, but in northern Congo. He found that gathering and trapping tended to be practiced within a radius of 2 km of the camps, net hunting within 4 km, while spear-hunting involved longer trips.

The relative importance of forest life and village (or increasingly town) life for Pygmy peoples varies hugely, both between different individuals, families and bands, as well as from one year to the next. Thus, a family may spend one year living in a logging camp, but will then live in the forest for the next few years. Hewlett et al. (1982) undertook research with one group of Aka who regarded themselves as agriculturalists. They were no longer nomadic and spent relatively little time in the forest. Conversely, some groups of Mbendjele in northern Congo have decided to spend all their time in the forest, and shun contact with other peoples (Lewis, 2002; 2005).

THE EXTENT OF TERRITORIES

Much of the data recorded seem to be based on estimates, rather than actual mapping of territories. Researchers have estimated territories on the basis of the extent of hunting trips, and the movement of base camps. The reliability of this seems uncertain, particularly in view of the variability of Pygmy peoples' resource use strategies through time. This variability means that a band would probably only utilise the full extent of their territory over a number of years, and so any estimates based on short periods of fieldwork are likely to underestimate the areas used.

One exception to this is the work of Lewis (1997 a-d), who mapped the territories of the Mbendjele of northern Congo. The territories were walked over on foot, and the boundaries recorded using GPS[1]. This was undertaken in 1996, at which time industrial logging was not widespread, logging occurring only in certain concession areas and along the borders of the large rivers. Consequently, much of the area in question was unaffected by these activities.[2] While the Mbendjele regard these territories as their forest, the Bantu villages also lay claim to these areas. These claims are made on the basis of both the Bantu's own use of resources and also because of their links to these areas of forest through the Mbendjele communities with which they are associated.

The data compiled from the literature are presented in Tables 1 and 2. The territories show considerable variation in size, from 120 km^2 to nearly 6,000 km^2. This difference is in part a reflection of the level at which territories are recognised, as mentioned above. Thus, those of the Mbendjele, which are typically several thousand square kilometres in extent, "belong" to a number of intermarrying lineages. In contrast, the Mbuti hunting territory recorded by Tanno (1976, cited in

[1] A map of these territories is provided in Lewis, 2002: 72
[2] Since 1996, all of these areas have been logged to some extent. (Lewis, pers.comm.)

Bahuchet, 1992), which is just 120-150km2, is that of a group of 30 adults. However, even taking the larger population numbers within each territory into account, Lewis' data include several very extensive territories, as indicated by the population density figures.

The reasons for this variation are a combination of ecological, sociological and historical factors, as can be illustrated by the data for the Mbendjele recorded by Lewis (Lewis, pers. comm.). Thus, of the 12 territories documented, 4 of these have population densities within the range reported by the other researchers, while the remaining 7 all have significantly lower population densities. The one exception to this is the territory of Seke-Beye, which has a high population density. However, this territory actually reflects the claims of the local Bantu community, and the Mbendjele have full use rights to the neighbouring territory.

The low population densities found in some territories are partly due to ecological factors. For example, the territories of Ibamba / Ikelemba and Toukoulaka / Djello both include large areas which are seasonally flooded, this making large areas inaccessible and also reducing the availability of wild yams. Historical and social factors have played a particularly important role. In Ngandzikolo territory people were forcibly removed from the forest during colonial times, and so, although people still lay claim to these areas, it is little populated. In addition, many people moved to other areas or to towns, because of over-hunting in the region. Similarly, in Gatongo, the forest had been severely depleted of wildlife, and so many people moved elsewhere.

HISTORICAL CHANGES

Few data are available on historical changes in resource use practices among Pygmy peoples. Bahuchet (1992) suggests that from the 1950s to 1980s greater effort was put into hunting by the Pygmy peoples of the Ituri forest because of the growing meat trade. More recently, this trend has probably been reversed in many regions because of declining wildlife populations. In some areas of northern Congo, there has been emigration of Pygmy peoples, both because of the depletion of resources and the establishment of protected wildlife areas. These people have either moved to other forest areas or to towns and logging centres to exploit work opportunities (Lewis, pers. comm.).

One trend that has been widely reported is towards increasing sedenterisation, and a decline in the importance of a forest-centred way of life (Bahuchet, 1992; Hewlet et al., 1982; Schultz, 1991; Van de Sandt, 1999). Although this trend is widespread, it can not be assumed that this will result in the forest-based life-style dying out completely. While many Pygmy groups are spending more time near villages, forest-based activities may still be important. For example, Bahuchet (1992) notes that although many Pygmy peoples have changed their lifestyle, even those working with logging companies or on plantations continue to spend considerable periods in the forest.

An important feature of the Pygmy way of life is its flexibility. As highlighted earlier, groups may live for several years in the forest, and then spend time involved in agriculture or working for a logging company. This adaptability means that people are able to respond to the choices available to them, and take advantage of resources and opportunities as they become available – whether these are seasonal forest resources, such as caterpillars, or work opportunities with logging companies. However, the industrial scale exploitation of the forest for timber may undermine this strategy, because of the permanent and wide-scale depletion of forest resources. As Lewis has highlighted (2002), while farmers or bushmeat traders can go elsewhere in response to resource depletion, this is much more difficult

for Pygmy people, since important seasonal wild resources may only occur in certain areas of the forest. These changes have been experienced by some groups of Pygmies. For example, in the region of Ouesso, northern Congo, Mbendjele groups have been forced to adopt a more sedentary way of life because there are no longer sufficient forest resources to sustain long periods living in the forest (Thuret, 1999).

LAND TERRITORIES OF AGRICULTURAL PEOPLES

The main system of subsistence agriculture practiced in the forest zones of central Africa is shifting cultivation (Barnes & Lahm, 1997). Subsistence crops include cassava, taro, maize, rice, peanuts, plantain and bananas, and these are grown in multi-crop fields. Some cash crops are grown, the most important of which are coffee and cocoa. The forest and its resources also make an important contribution to the livelihoods of agricultural communities. Use of the forest varies enormously, but can be significant both as a source of food, especially protein, and of income, for example, through the sale of bushmeat. Research with a Bongando community in central DRC found that more time was spent in hunting, fishing and gathering than in cultivation activities, with people spending several months at a time in the forest (Kimura, 1998). Conversely, a study within a Badjoué village in southern Cameroon reported that villagers never spent nights in the forest, and only travelled as far as 8 km from the village (Vermeulen, 1997). In those situations where farming and Pygmy communities live alongside each other, the farmers may rely heavily on forest resources collected by the Pygmy peoples, rather than going on extensive hunting and gathering expeditions themselves (Schultz, 1991).

Typically, villages are surrounded by an agricultural zone, dominated by fields and fallows. This usually extends for about 5km around the village, sometimes up to 10km. Beyond this lies a forest zone which is frequently used for gathering, fishing and trapping, this extending up to 20km from the village, with more distant areas of forest being used for occasional hunting trips (Kamou et al., 2004; Robiglio et al., 2003; Vermeulen, 1997; Wachter, 1997; Wilkie et al., 1998). This represents a simplified picture of resource use for many villages. In reality, there is a complex pattern of access and use rights because of the history of village establishment, including the displacement of communities during colonial times.

The traditional residence pattern of Bantu communities was migratory. Villages moved every few years, although this tended to be within their own clan's section of the forest (Diaw, 1997; Kimura, 1998; Wilkie & Curran, 1993; Wilkie & Finn, 1988). Villages began to settle during colonial times, because of government encouragement or impulsion. With the establishment of settled villages, agricultural activities changed, also with encouragement from the governments of the time. Consequently, there was an increase in the establishment of permanent fields, particularly for cash crops. This particular history has added to the complexity of tenure rights in the region. For example, many villages were formed from a number of different clans, or lineages, each of which has its own territory. Consequently, a complex mosaic of land ownership may exist (Diaw, 1997; Robiglio et al., 2003). Furthermore, many people were displaced from their own territories, establishing villages on the land of other clans. However, they continued to cultivate land in their former territories, a practice encouraged by the difficulties often encountered in gaining access to land close to their new villages (Auzel, pers.comm.). Therefore, the members of one village may have rights to land which is closest to a neighbouring village (Van den Berg & Biesbrouck, 2000).

Traditional property rights throughout the region are based on kinship and descent (Dethier & Ghurighi, 2000; Diaw, 1997; Dounias, 1996; Gami & Joiris, 2000; Karsenty et al., 1997; Robiglio et al, 2003; Schultz, 1991; Vermeulen, 1997). A lineage lays claim to an area of forest, within which its members have usufruct rights. Thus, they have the rights to cultivate land within this area, and fields and their products are owned by a particular household. However, this land can not be sold, and once mature secondary forest has regenerated, the land reverts to the control of the lineage.[3] Rights to trap and fish in particular areas may be individually held,

[3] This description represents an ideal 'model' of traditional land rights. Today, land is commonly rented, and sometimes sold. (Auzel, pers.comm.)

or more commonly, are open to all lineage members. There is often overlap in the claims to the more distant forest areas between neighbouring communities.

AGRICULTURAL LAND-USE

In studying the agricultural practices of central African peoples, many researchers have documented the areas of land being used for cultivation. These data are summarised in Tables 3 and 4. Comparison of land-use is difficult because of the different ways in which data have been recorded. F, for example, areas of cultivation have been calculated per capita, per household or per adult, and some authors have only reported land under cultivation, while others have included fallow areas.

The area of land cultivated per household ranges from 0.5-3 ha. and fallow periods have been reported of between 4 and 20 years. This wide range partly reflects the fact that many communities cultivate two types of field – those with short fallow periods are used for crops such as peanuts, while longer fallow periods are used for cassava, bananas or rice (Barnes & Lahm, 1997; Wilkie, et al., 1998).

Data on field size and fallow periods can be used to calculate the area of agricultural land used by a community, or conversely, the carrying capacity of a region. For example, Barnes & Lahm (1997) calculated that if 0.18 ha. is cultivated per person per annum, with a fallow period of 10-15 years, and assuming that 38% of the land is unsuitable for cultivation, then agriculture could support 20-28 people / km^2. Diaw (1997) made a slightly lower estimate, suggesting that a population density of less than 20 persons / km^2 is required for shifting cultivation to be sustainable, allowing for fallow periods of 10-20 years.

HUNTING AND GATHERING

As highlighted earlier, forest resources may constitute an essential element of rural livelihoods. However, the areas used for hunting and gathering have often not been taken into consideration when determining the land-use of agricultural peoples. This can result in huge under-estimates of land-use requirements for agricultural communities. For example, Grenand & Joiris (2000) contrast the estimates resulting from different studies in a Cameroonian village. One study, which only considered agricultural land, calculated the village territory to be 94 km^2, while two other studies, which also took into account the villagers' forest use, estimated the territory to be 218 km^2 (based on activities at the time of the research) and 355 km^2 (taking into account both current and non-seasonal activities).

Patterns of forest use by agricultural communities have been documented through recording the distances people travel from their village to collect forest resources. Studies from Cameroon, Congo and DRC have found that villagers typically travel from between 13 km to 25 km into the forest for hunting, fishing and gathering activities, occasionally travelling much further (Gami & Joiris, 2000; Kamou et al., 2004; Robiglio et al., 2003; Vermeulen, 1997; Wachter, 1997; Wilkie et al., 1998).

A number of researchers have documented the actual size of the territories being used or claimed by communities, as shown in Table 5. There is considerable variation in these data, the area of land per person ranging from 25 ha. to over 300 ha. per person. Determining the reasons for this variation would require a more detailed investigation, but as outlined for the territories of Pygmy peoples, it no doubt reflects the particular sociological, historical and ecological circumstances of these communities.

From these data on forest territories, the average area of land per person is 98 ha. This contrasts with a figure of 11 ha. for the

average area used for agriculture, based on the data presented above (see table 4). Among the most important forest resources for agricultural communities are bushmeat and fish. Indeed, it has been suggested that it is the availability of game and fish which limits the distribution and size of subsistence-level human communities in neotropical forests. "The limited data on hunting suggest that game populations can support only 0.3 people / km^2, compared with the 20-28 that could be supported by cultivation. Thus, the need for carbohydrate and protein, and the need to gather extra forest resources to sell for cash, means that a large area of forest is needed to support each person." (Barnes & Lahm, 1997: 256)

This estimate of a carrying capacity of 0.3 people/km^2 was made on the basis of the area of forest that was being used by a community in north-east Gabon for hunting and fishing. Population densities calculated from the hunting territories of agricultural communities in central Africa (see table 5) are typically much higher, ranging from 0.3 to 4 people/km^2. This would seem to suggest that a greater population density could be supported here. However, while these figures show the areas that are being used, they do not give any indication as to whether hunting levels are sustainable. Indeed, Wilkie et al. (1998), from research in the Ituri forest, found that the hunting activities of the current population, with a density of 1.2 people/km^2, may be unsustainable, and that when population levels reach 4.4 people/km^2, hunting at current rates would certainly be unsustainable.

Furthermore, some agricultural villages depend heavily on Pygmy communities to supply them with bushmeat. Therefore, such villages are actually using resources from a much larger area of forest than that within their own territory. Lewis' data (1997a-d) provide a more comprehensive understanding of land-use, since they include both Pygmy and Bantu communities. These data also include no information on the sustainability of hunting activities. However, they were recorded before widespread logging began in the region, and so, before the increase in population and the development of a commercial market in bushmeat. Consequently, since they are long-established territories, these data can be taken to give some indication of the carrying capacity of the region under such conditions. They give population densities ranging from 0.1 – 0.85 people/km^2, but the average is 0.35 people/km^2, a similar figure to that suggested above. If a population density of 0.35 people/km^2 represents the carrying capacity for the region, then this is equivalent to a land requirement of about 3 km^2 for every person.

CHANGES IN LAND-USE

While it is relatively easy to determine people's current requirements for agricultural land and forest areas on the basis of their land-use practices, it is more problematic to translate these into future requirements. This is because future needs will depend on so many variables. Agricultural practices may change in response to improved infrastructure, increased access to markets, or to changes in cash crop prices (Bley & Pagezy, 2000). For example, declining prices of coffee and cocoa led many Lese farmers in central DRC to abandon their fields of these crops (Robiglio et al., 2003; Wilkie, 1994). Furthermore, while the area required to support sustainable hunting for subsistence purposes can be estimated, wildlife populations may soon become depleted if a commercial trade in bushmeat develops.

Demographic changes are also crucial. While the overall trend is for population growth throughout the region, this is concentrated in urban areas, and many rural areas are experiencing out-migration as young people leave to seek work opportunities. In some regions, this has resulted in a reduction in the area of land under cultivation (Dethier & Ghuirghi, 2000).

ZOOLOGICAL & ECOLOGICAL FACTORS

The difficulties of predicting future land needs were highlighted by the research of Wilkie et al. (1998). Their estimates for the need for agricultural land in the Ituri forest of DRC were made with a number of provisos. Thus, they stated that there was sufficient agricultural land, provided that: markets for commercial crops were not revitalised; hunter-gatherers did not switch to farming; logging did not become commercially viable; and outside immigration was not a factor.

WILDLIFE BIOMASS

Gaining an understanding of the wildlife populations which can be supported in different forest types is crucial in assessing the hunting pressure which can be sustained in an area. The mammalian biomass in tropical forests is low in comparison to other habitats, particularly in the case of ungulates because of the scarcity of grasses and other sources of browse (Robinson & Bennett, 2000). Consequently, the amount of hunting that can be supported in a forest, compared to savannah environments for example, is relatively low.

There is some variation in the wildlife biomass supported by different forest types. For example, flooded forests tend to support higher populations of large mammals. Such areas may attract high animal populations because the foliage found here is more nutritious, containing more minerals, than that of terra firme forest (Doran-Sheehy et al., 2004). The availability of certain plant species is also a factor. For example, flooded forests tend to support high densities of gorillas because of the abundance of herbs, in particular, Marantaceae and Zingiberaceae species which are used for food and nesting materials (Brugières et al., 1999; Tutin, 1996). Marshy areas are also favoured by elephants because of the profusion of edible herbs, and some groups of elephants are thought to undertake long-distance migrations to feed in such habitats (Vanleeuwe & Gautier-Hion).

The protein-fibre ratio of forest foliage may have a role in determining animal biomass. This ratio varies between different ecosystems, and there is some evidence that those forests with a higher protein-fibre ratio support a larger biomass of wildlife (Chapman et al., 2004).

Animal distribution is also influenced by the distribution of salt-licks, since these are an important source of nutrients within the forest. For example, a long-term study of elephants in Central African Republic found that one salt-lick had been visited by over 2,100 elephants (Turkalo & Fay, 1995).

HUNTING CAPACITY

Determining the carrying capacity of forests for hunting activities requires estimates of the standing population of wildlife and its rate of natural increase. Robinson & Bennett (2000), comparing data from around the world, estimated that tropical forests can produce 150 kg of wild meat per km^2/year. On this basis, they calculated a carrying capacity of 1 person/km^2, assuming a level of meat consumption of 91 kg of meat per person per year. They suggested that this figure holds for both hunter-gatherer and farming communities, since swidden agriculture does not significantly increase the animal protein available to people (Robinson & Bennett, 2000).

Another study, using data from southern Cameroon, calculated a somewhat higher carrying capacity of 4 people/km^2 (Auzel & Hardin, 2001). They assumed a higher productivity for the forest of 330 kg/km^2/year of wild meat (described as "a best case scenario"), and a lower bush meat consumption of 44 kg bushmeat/person/year, also allowing 15% as non-productive areas.

Research in the Ituri forest of DRC sought to determine the sustainability of hunting by local communities on a similar basis (Wilkie et al., 1998). This was done by estimating the

biomass and production of commonly hunted animals, and comparing these data with figures for meat consumption by local people. The findings were not clear-cut. It was found that the current hunting levels for duiker and small antelopes were unsustainable in many areas if low production estimates were used, but that they were mostly sustainable if high production figures were used. For primates, in two out of three areas, hunting was approaching unsustainable levels. However, the long-term forecast was clear, this indicating that hunting would become unsustainable throughout the region within 60 years, as human populations increased. The situation is also probably worse in reality, since these calculations do not fully take into account the trade of bushmeat, which can take place over long distances, supplying areas outside those being studied. This is a major problem in many parts of the region, and it has greatly increased hunting pressure. Consequently, even in areas with low population densities, hunting may be unsustainable if it is supplying the bushmeat market.

DISCUSSION AND CONCLUSIONS

FEATURES OF LAND-USE PRACTICES IN CENTRAL AFRICA

These data on traditional territories and land-use illustrate a number of features of particular significance for those concerned with land management issues. The first of these is that the pattern of land rights is a complex mosaic, with overlapping rights to the same areas of forest and resources. Such a pattern reflects the fact that land and resource rights are often not exclusively held, and sharing of resources is either tolerated or fully sanctioned.

As was highlighted above, overlapping resource rights exist both between the same ethnic groups, and also between different groups. Bantu and Pygmy peoples often have parallel systems of land tenure and resource rights. While these may relate to the same forest areas and resources, in practice, resource use by these two groups may be largely complementary since the Bantu tend to use secondary forest and fallow land and Pygmy peoples use high forest to a much greater extent.[4] However, with increasing privatisation of land and population pressure, as well as growing involvement in agricultural activities among some Pygmy groups, there is increasing conflict over land and resource rights (Schultz, 1991; Van den Berg & Biesbrouck, 2000).

Conflict over resources is not a new phenomenon, but previously there have been effective local institutions in place to resolve disputes. Thus, traditional tenure and resource rights were the result of constant negotiation, and they showed some degree of flexibility and adaptability. However, the situation is changing. Land management policies in many parts of the region have often involved the granting of exclusive use rights to extensive areas of land to outside parties. Not only has this increased pressure on resources, but local systems of negotiating and establishing land rights have been undermined, since these have largely been ignored. The resulting insecurity of tenure has led local communities to attempt to reinforce their claims to land, with a shift towards exclusive use-rights, stoking conflict over resources.

Another feature of land-use patterns is that they are not uniform, and population density can vary hugely at the local level. As this report shows, the territories and settlement patterns of both Pygmy and Bantu peoples reflect social, historical and ecological factors. Consequently, the extent of people's land-use varies between different communities and regions, and also through time, in response to the prevailing conditions.

IMPLICATIONS FOR LAND-USE PLANNING

These features of local people's land-use practices raise a number of problems in relation to the development of land-management strategies, in particular, the question of how these systems should be incorporated into land-use plans such as zoning initiatives. The needs and rights of the various forest users seem, at first glance, incompatible. For example, how can the extensive land needs of a nomadic life-style be reconciled with those of a timber company; how can community lands be granted for land on which there is a mosaic of different tenure rights linked to a number of communities? Indeed, these are intractable problems if they are to be incorporated into a "traditional" zoning plan.

One starting point for such initiatives has been the allocation of land to people according to their perceived land "needs". However, the significant variation in land-use found among rural peoples makes it difficult to calculate an average figure for land-use requirements.

Furthermore, determining land "needs" is problematic, since it requires a judgement to be made about people's resource-use practices and way of life. For example, are people to be allowed to practice shifting cultivation, or are more intensive agricultural practices

[4] The land and resource rights of Pygmy peoples are often not regarded as legitimate by neighbouring farming communities (Auzel, pers.comm.; Lewis, 2005). Therefore, rather than "complementing" each other, these two systems of land rights are perhaps best described as co-existing *in spite* of each other.

to be promoted; are people to be allowed to continue hunting, or does this present too great a threat to wildlife populations or require too much land? The figures presented here would suggest that an area of 3 km^2 per person (from the data on traditional territories) or of 0.25-1 km^2 per person (from the ecological data) would be required to maintain a rural population dependent on bushmeat for subsistence purposes only. However, agriculture could support a much greater population density of about 20 people / km^2, equivalent to 0.05 km^2 per person. Furthermore, as highlighted previously, people's land "needs" change, for example, with changes in the availability of markets and prices of cash crops, as well as people's expectations regarding their way of life and involvement in a cash economy.

The need to make such judgements means that land-use planning is an inherently political process. The decisions taken will depend on the priorities which underlie any such initiative, for example, whether for biological conservation, economic development, or protection of indigenous peoples and their rights. Typically, zoning projects have prioritised conservation and economic needs, with the allocation of large areas as national parks, or for timber concessions. The needs and rights of forest-based communities have usually only been considered subsequent to this. Cameroon's Plan de Zonage illustrates this approach. Under this plan, the vast majority of land was allocated as "permanent forest" (this being for timber production or wildlife conservation), with relatively small areas allocated to local communities (Lescuyer, 2003; Vermeulen, 1997).

A fundamental problem with many land-use plans is that they are based on the assumption that the best way to manage a forest is through allocating specific areas to different functions (Lescuyer, 2003). To return to the case of Cameroon, this was the model for the Plan de Zonage, in which the land was divided into the permanent forest estate and the non-permanent forest estate. The agricultural and commercial activities of local communities are confined to the latter. The data presented here illustrate that such a strict separation between different areas does not reflect the reality of land-use or land claims in the region. As Van den Berg & Beisbrouck (2000: 33) explain, "For Bantu farmers and Bagyeli, all forest, whether under cultivation or fallow or in secondary or high forest, represents a multiple use environment in which hunting, fishing and NTFP collection are combined." This distinction between different zones can also create an environment of conflict and competition between land-users, and this has proven to be the case in Cameroon, where there is widespread conflict over forest resources (Lescuyer et al., 2001).

These problems could be avoided, or at least lessened, if joint management were instituted, with the recognition of multiple and overlapping use rights (Grenand & Joiris, 2000; Karsenty et al., 1997; Lescuyer et al., 2001; Pénelon et al., 1998; Van den Berg, 2001). To date, such efforts have been limited to small areas of forest, for example, through the establishment of community forests. Some overlap of resource use is also allowed for within many forest management schemes. For example, local people are often able to harvest forest resources for subsistence purposes within logging concessions. However, this is by no means a system of joint management, since local user rights are often considered as "a favour granted to the local population by the state" (Van den Berg & Biesbrouck, 2000: 56). Instead, such rights should be taken as the basis for developing land management strategies. In other words, existing systems and structures of land management should be built on and adapted where necessary, rather than either being ignored, or at best, considered at the end of the process.

This would entail intensive community consultation, to map local tenure and

management systems, followed by lengthy negotiations between the various parties (Clouet, 2000; Karsenty et al., 1997; Pénelon et al., 1998; Toulmin et al., 2002). Furthermore, there would need to be an ongoing process of negotiation and monitoring. Forest management needs to be adaptive, rather than prescriptive, in which forest management agreements are viewed as works-in-progress rather than definitive plans (Leach & Fairhead, 2001; Wollenberg et al., 2001). An important element of such an approach should be to build on local institutions for negotiating and arbitrating land rights. The importance of focusing more on such arbitration processes and institutions when establishing systems of collaborative management has increasingly been acknowledged by forestry and development practitioners in recent years (Mvondo & Oyono, 2004; Toulmin et al., 2002; Wollenberg et al., 2001).

Such an approach would provide local populations with greater opportunities for engaging in forest management and to defend their interests. The lack of political and economic power of local people, for example, in relation to timber companies or the urban elite, represents a huge obstacle to establishing truly collaborative management (Anau et al., 2005; Brown, 1999; Van den Berg & Biesbrouck, 2000). However, taking local systems and institutions as the starting point for negotiations would increase the status and recognition of these practices, and so help to place local people in a better negotiating position. Furthermore, it would provide more opportunities for the development of locally appropriate and acceptable land management strategies. Rather than imposing a uniform system of zoning across a region or country, land-use would be negotiated locally, and so the resulting solutions could better reflect the particular social, economic and environmental conditions of an area.

The establishment of negotiated, multiple use rights would seem to provide the best opportunity to find ways of integrating the needs of the various forest users in the region. Establishing such a system of forest management would be time consuming and complex, involving negotiations between stakeholders with diverse and often conflicting interests and needs, and requiring long-term commitment to their continued participation in management processes. However, given the complexity of land-use rights in the region, such a lengthy and difficult process is unavoidable. It will only be through recognising these rights that truly sustainable forest management can be established – that is, forest management which is sustainable not only economically and ecologically but also socially.

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TABLE 1

TRADITIONAL TERRITORIES OF THE MBENDJELE IN NORTHERN CONGO.

Region	Mbendjele population (% of total)	Total population (Mbendjele & Bantu)	Size of territory (km2)	Population density:for Mbendjele / Mbendjele & Bantu (persons / km2)	Area / person:for Mbendjele / Bantu (km2)
Berandjokou, northern Congo	842 (74%)	1137	4831	0.17 / 0.24	5.7 / 4.2
Linganga-Makao	324 (56%)	580	5964	0.05 / 0.1	18.4 / 10.3
Seke-Beye	112 (62%)	182	214	0.52 / 0.85	1.9 / 1.2
Bangui-Motaba	275 (69%)	399	910	0.3 / 0.44	3.3 / 2.3
Mbandza	670 (71%)	943	2239	0.3 / 0.42	3.3 / 2.4
Minganga	293 (65%)	450	3970	0.07 / 0.11	13.6 / 8.8
Ngandzikolo	27 (21%)	128	1189	0.02 / 0.11	44 / 9.3
Gatongo	12 (8%)	148	1495	0.01 / 0.1	124.6 / 10.1
Mobangi / Bene & Mobangi / Mboua	401 (41%)	982	1738	0.23 / 0.57	4.3 / 1.8
Toukoulaka / Djello	95 (28%)	339	872	0.11 / 0.39	9.2 / 2.6
Ibamba / Ikelemba	305 (61%)	497	3736	0.08 / 0.13	12.2 / 7.5
Bomassa / Kabo*	60 (31%)	190	265	0.23 / 0.72	4.4 / 1.4

* Both Mbendjele & Ngombe Baka live in this territory.

TABLE 2

DATA RECORDED ON LAND-USE AND TRADITIONAL TERRITORIES OF PYGMY PEOPLES IN CENTRAL AFRICA.

Ethnic group	Region	No. People	Size of territory (km2)	Distances travelled (km)	Population density (persons / km2)	Area / (km2)	Reference person
Mbuti	Ituri forest,	~30 adults DRC	120-150		0.2-0.25	4-5	Tanno, 1976 (cited in Bahuchet, 1992)
Mbuti	Tetri region, Ituri forest, DRC	50-60 individuals	150-300 (including overlapping areas) 160-170 (not including overlapping areas)		0.17-0.4 (incl. overlapping areas); 0.29-0.38	2.5-6 (incl. over lapping areas); 2.7-3.4	Ichikawa, 1986
	Ituri forest	592 individuals (9 bands)	Entire area of Ituri forest = 1500		0.4	2.5	
Mbuti	Ituri forest – whole area				0.4	2.5	Turnbull, 1965 (cited in Ichikawa, 1986)
Aka	Lobaye region,CAR	~60 adults*	~400 "Domaine vital" = ~300 **	2-10 (for gathering) Up to 30km (for net hunting)	0.2	5	Bahuchet, 1978; 1992;
Aka	Likouala Region, Northeastern Congo	81 individuals	150 (used for hunting) 70 (used for gathering & trapping)	2 (for gathering & trapping) 3-4 (for net hunting). Further for spear hunting.	0.3 (for spear hunting) 0.54 (for net hunting)***	1.9 (for hunting)	Kitanishi, 1995
Aka	N'Dele area, N'Dele Region, CAR	68 adults		37 half range****			Hewlett et al., 1982
	Bagandou area, N'Dele Region, CAR	41 adults		22 half range			

* This is a conservative estimate made on the basis that the author states that one territory was used by 3 Aka camps, representing 27 households. No population data was given for other territories.

** Bahuchet (1978) uses the term 'domaine vital' to refer to the area covered by an Aka group throughout its existence.

*** These figures were calculated from the areas used for hunting, and so do not take into account possible overlaps in territories.

**** Half range = median of the distances from place of residence to places visited at least once.

TABLE 3

LAND AREAS CULTIVATED BY HOUSEHOLDS IN CENTRAL AFRICA.

Region	Ethnic group	Cultivated area per household (ha.)	Reference
Cameroon	Badjwe (or Badjoué)	0.55	Wachter, 1997
Cameroon	Bulu	0.7	Santoir, 1992
Cameroon	Fang	0.52	Alexandre et Binet, 1958
Cameroon	Mvae	1	Dounias, 1993
Cameroon	Ntumu	1-1.5	Carrière, 1999
Congo	Bakwele	0.8	Guillot & Diallo, 1984
Gabon	Ntumu	3	Ganyo, 1985
Gabon	Ethnic mix	0.26	Binot, 1998
Equatorial Guinea	Fang Ntumu	0.8	Cuyela-Serrano, 1997
Zaïre (DRC)	Boyela	0.8	Sato, 1983
Zaïre (DRC)	Mbo	0.5	Rösler, 1997

TABLE 4

SUMMARY OF DATA RECORDED ON AGRICULTURAL LAND USE IN CENTRAL AFRICA.

Region	Ethnic group	Population density (people / km2)	Field area (ha.) / person (Subsistence)	Field area (ha.) (Cash crop)	Fallow period (years)	Village population	Total agricultural area (fields + fallow) (ha.)	Total agricultural area (ha.) / person	Reference
Cameroon	Badjoué					291 (21 households)	9,400	32.3	Grenand & Joiris, 2000: 120(citing Vermeulen , n.d.)
Cameroon (south, Dja reserve)	Badjoué	2.8 (4.2 if only consider good agricultural land)	0.24 / 0.36	0.21	4-20	154	401**	2.6 (Annual area cultivated per person = 0.55)	Wachter, 1997
Cameroon (south)	Mvae		0.65 / 0.4	0.2					Dounias, 1996
Congo-Brazaville (Mbomo district)	Ollémé		1.5ha. / household			144	1,000	6.9	Gami & (citing Joiris, (citing Joiris, 1996 & Vanwijnsberghe 1996)
DRC (central)	Bongando	9.3-10.4	0.68	0.22	11.2	119 children) (incl. 55 children)	105*	0.88 (or 1.64 / adult)	Kimura, 1998
DRC (Ituri forest)	Lese		0. 42		3-15	550 (160 farmers)		Wilkie, 1994	
Gabon (NE)		1 (for whole region)	0.83	0.58					Barnes & Lahm, 1997

* Based on surveys of land-use.

** Estimate of land requirements at time of study.

TABLE 5

SIZE OF HUNTING TERRITORIES OF AGRICULTURAL COMMUNITIES.

Region	Village	Population size	Size of territory (km2)	Area / person (km2)	Reference
Eastern Cameroon	Djaposten village	600	520 *	0.87	Wal & Djoh, 2001
Mbomo District Congo Brazzaville	Ollémé village	144	81 **	0.56	Gami & Joiris, 2000
Ikela, DRC	Yele (Boyela people)	190	110 ***	0.58	Sato, 1983
	Efenjolumbu (Boyela people)	38	15 **	0.4	
NE Gabon		128	400 **	3.13	Barnes & Lahm, 1997
Kompia region, Cameroon	Essiembot – Kompia	838	211 **	0.25	Grenand & Joiris, 2000: 121 (citing Vermeulen, 1997 & Fankap, 1997)
	Etol – Maleu'leu	431	160 **	0.37	
	Ekom	291	355 **	1.22	Grenand & Joiris, 2000: 120 (citing Joiris & Tchikangwa, 1995 &
	Ekom	291	~300 **	1.03	Jeanmart, 1998
CAR (Central African Republic)	Kanaré & neighbouring villages (Yanguéré majority)	345	452 **	1.31	Dethier & Ghuirghi, 2000
	Dambadjodjo	119	130 **	1.09	

* Basis for estimate unknown.

** Hunting area estimated by the researcher on basis of fieldwork.

*** Area claimed by local people.



Alison Hoare, the author of this report, is a Research Consultant and Associate Fellow at Chatham House with expertise in natural resource use and forest management.





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