

Wilkie, D.S. 1988. Hunters and farmers of the African forest. *In People of the Tropical Rain Forest* (eds. Denslow, J.S., and Padoch, C.), pp.111-126. University of California Press, Berkeley.

With bow and arrows in hand, Karambodou ran quickly and quietly through the sparse undergrowth of the forest. Finding a suitable spot he carefully bent over several shade stunted saplings to give him a better line of sight. Placing an arrow against the bow string he waited, ready to ambush any game flushed from hiding by the other men of this pygmy hunting group. The relative cool of the forest with its dappled light, filtered through the leafy canopy some 160ft above our heads, was a relief from the scorching equatorial sun. Waiting was no burden as the forest entertained us with the steady buzz of Cicadas, colorful flanks and inquisitive faces of a mixed troupe of Blue and Mona monkeys and the reverberating "Akoku-toku-toku-toku" of a pair of great blue turaco.

How different this scene, in the rain-forest of the Congo (Zaire) river basin, is from our stock images of Africa -- broad sweeping savannas covered with grazing herbivores constantly watchful of powerful and everpresent predators. We usually equate Africa with the immense grasslands that sweep in a huge arc from West Africa, east to Sudan and south through Tanzania, and can readily picture African pastoralists such as the Masai eking out a subsistence by following their herds of cattle and goats as they exploit seasonably available forage. Yet, it shouldn't be forgotten that tropical Africa also contains over 840,000 square miles of rain-forest that is home to millions of shifting cultivators, from hundreds of tribes, and supports one of the last cultures of hunter-gatherers remaining in Africa, the Pygmies.

## AFRICA'S RAINFORESTS

### Location and Evolution

Africa, the second largest continent after Euro-Asia, contains over 20% of the world's remaining rain-forest, the largest and least disturbed section of which lies within the Zaire (Congo) river drainage.

As the giant granitic block that became the African continent slowly warped and the edges uplifted, it's equatorial center formed a broad shallow bowl some 1000 miles in diameter. By the tertiary (65-1.6 million years ago) this depression was a vast lake that, as a result of the inexorable forces of erosion, slowly drained through a narrow outlet to the Atlantic, exposing the now forested Congo basin

The Congo basin covers some 1,425,000 square miles, an area a little less than 1/2 the size of the USA, and contains over 80% of Africa's tropical moist forests. It extends in a contiguous zone from Gabon on the Atlantic seaboard through the Congo, Cameroon, Central African Republic and Zaire. Other sections of rain forest still remain in Nigeria, west of the Dahomey gap in the Ivory coast and Guinea, and on the eastern edge of Madagascar.

Although rain forests are thought to be the grand-daddies of all forests, having remained unchanged for millennia, recent studies by palynologists (identification of fossil pollen can tell us much about the types of plants that existed in a given area hundreds or thousands of years ago) clearly show that much of the area now covered by tropical rain forest in Africa is, in geological time, of very recent origin. When Europe and North America were under miles of glacial ice tropical Africa's annual temperature and rainfall were less than today, and the Congo basin forests shrank in size until only three remnant patches of forest existed. These "Pleistocene refugia" sustained and preserved the plants and animals that, depend on a constant hot (27 C), humid (80%), rain drenched (1800mm/yr) environment, and are now unique to Africa's rain-forests. As the last ice-age gradually receded, rainfall increased and the boundaries of the refuge forests in Guinea, Gabon and Eastern Zaire expanded

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to fill the vast central "cuvette". That the central region of the Congo forest was "recently" savanna scrublands is reflected by its much lower variety of plants and animals compared to the "Pleistocene Refuge" areas such as the Ituri forest of northeastern Zaire. The Ituri was the largest and most ecologically diverse of the three refuges and consequently now contains the greatest number of floral and fauna species of any African forest, over 15% of them endemic to that area. Presently the forests of the Congo Basin appear to be at equilibrium with the environment and are neither exhibiting a natural expansion or contraction of their domain.

#### Flora and Fauna of Africa's rainforests

Tropical rain-forests of Africa, like their counterparts throughout the globe, are most often seen from the rivers and roads that cross them. These roadside/riverbank strips of forest form impenetrable thorn-vine tangles of vegetation that unfortunately give the traveller the impression that all rain forest is like this. On the contrary, the home of pygmies, like Karambodou, is an open easily traversed landscape. Unlike road- or riversides that receive constant and intense levels of sunlight, most of the rain-forest is kept in relative shade by the leaves of mature forest trees that capture most of the light 100-160ft above the ground. Below this canopy, very few plants are able to secure enough light with which to grow, and those that do grow extremely slowly. The real rain-forest is in reality a layered environment with tall, 100-300 year old hardwood trees, such as the African Ironwood (*Cynometra alexandri*) and Mahoganies (*Entandrophragma* species), forming a varied and nearly continuous leafy canopy, shading the forest floor that is sparsely covered with stunted saplings, shade-tolerant shrubs and broadleaved herbs. The forest only resembles the vine entangled jungles of "Tarzan" films on riverbanks, roadsides and where a giant forest tree has died, fallen down and opened up a large gap where the sun once more beats steadily to the ground prompting the frantic growth of vegetation in competition for light.

As most of the sun in tropical rain forests is captured by the trees that dominate the high canopy, most of the plant food, in the form of leaves, flowers and fruits, that is available to animals and man is also at the tops of the trees. Not surprisingly then, rain-forests have large numbers of birds, bats and arboreal mammals - the most conspicuous being monkeys - that exploit these abundant, tree top resources. However, African rain-forests, unlike the forests of South America and South East Asia also have a wide variety of ground dwelling animals; fruit eaters primarily, they range over the forest floor in search of fruits and seeds that once ripe have either simply fallen from the canopy, or have been dislodged or discarded by feeding bats and monkeys. The most abundant of the forest floor fauna other than rodents, are the forest antelope called duikers, an Afrikaans word stemming from their habit, when startled, of "ducking" into the nearest brush pile. Duikers probably moved into the forest, as did elephant, buffalo and the forest giraffe (Okapi), from the enormous neighboring savannas that are largely absent from around the world's other rain forests.

#### The Rainforest's earliest human inhabitants

The Congo river basin is inhabited by over 200 different tribes speaking as many different languages and dialects. For just how long the forest has been home to man is unclear. Although evidence of a stone-age culture (Sangoan) of hunter-gatherers has been found within today's forest boundary it has neither been shown that the region they inhabited was forested at that time nor that the hunter-gatherers of today, the pygmies, are their descendants. Regardless, it is known that stone-age man was foraging for food within the Congo basin over 40,000 years ago. By studying the linguistic patterns of today's forest dwellers we have been able to trace the occupation of the forest back at least 2,000 years. If we are to believe the accounts and drawings of Egyptian Pharaoh Nerfrikare of the sixth dynasty, pygmies have been seen living south of present-day Sudan, in the Congo basin rain-forests, for at least 5,000 years. Presently three main groups of people live in the rain-forests of the Congo basin. Bantu and Sudanic speaking shifting cultivators, and Pygmy hunter-gatherers. More Bantu inhabit the Congo than the other two groups combined, which is not really surprising as Bantu peoples are the most widespread and successful culture in Africa south of the Sahara.

#### Rainforests: an abundance of plants a scarcity of food

Karambodu's pygmy ancestors were probably the first inhabitants of the forest; living in small, highly mobile bands, ranging over the forest in a seasonal pattern, foraging for fruits, roots and leaves, damming small streams to trap crabs and catfish, and hunting forest duikers and monkeys. The prehistoric pygmies may not have spread over the whole Congo basin, for their present distribution indicates they may have avoided the "central cuvette" preferring instead the species-rich "refuge" forests of Gabon and Eastern Zaire. The enormous diversity of rain-forests would have provided the early pygmies with a wonderful variety of foods to choose from, however, a diverse resource also often means that no individual food species ever occurs in great numbers at any one location. Unlike temperate zone foragers, who could harvest a whole hillside of wild grain, gather an abundance of acorns from a forest of oak, or hunt herds of deer and bison, the pygmies of the rain forest would have to range over an area of several kilometers to find two or more fruiting trees of the same edible species or to capture more than a couple of forest duikers that either live alone or at best in mated pairs. Rain-forests which may appear to offer lush and abundant foods actually do so in a very dispersed, patchy manner. Foragers are thus forced to roam widely in order to find enough to eat and must move camp frequently to exploit the forests dispersed, seasonally available resources.

#### Advent of forest agriculture

The nomadic, hunting-gathering life-style of the pygmies was to change dramatically between 1000 and 3000 years ago when farmers, from the more densely populated bordering savannas, entered the forest along the innumerable watercourses that drain into the Ubangi and the Zaire rivers. What prompted this invasion of the forest? Africa's main native cultivated crops are millet and sorghum, neither of which can tolerate the constant humidity of the rain-forest. The only native crops species of the rain-forest are oil palms (*Elaeis guineensis*) that provide oil rich fruits and seeds but only do so 3-5 years after planting, and herbaceous vine-yams (e.g *Dioscorea* spp.) that produce rather bitter, unpalatable tubers. Thus extensive farming within the rain-forest only became feasible with the introduction, by Arab traders, of rain-loving crop plants such as bananas from southeast asia, and much later (1500's) when the Portuguese brought cassava, maize, sweet potatoes, peanuts, beans, and squash from the Americas. So with the increased cultivation of bananas, primarily the hard green plantain, came the progressive introduction of agriculture into the Congo basin. The rain-forests of Africa have therefore been altered by the hand of man for well over 1000 years. The world renowned tropical forest ecologist Dr. Paul Richards contends that what has always been considered to be primeval uncut rain-forest in West Africa, is actually the ancient, abandoned gardens of early forest farmers. However, as all forests of the world are mosaics of young, old and dying trees it becomes very difficult after a few centuries to tell what were natural treefalls or a result of felling by man. The rapid growth and decay characteristic of rain-forests makes Richards conclusions even more difficult to prove. Suffice it to say, African rain-forests have been altered by mankind for a considerable time and maybe longer than any of the worlds other moist forests.

Forest farming methods have changed little since becoming established within the Congo basin. Very few tools are used, no draught animals exist, and crops are only produced in sufficient quantities to feed the family and provide seed for the next year.

#### Contemporary forest farmers of the Congo Basin

The Lese Dese of the Ituri forest of northeastern Zaire are forest farmers and Ngodingodi is a typical Lese village. Mupenda built the village on its present site when he was a young man, newly married, and needed to find suitable land to clear and cultivate. His stepfather's village is less than a kilometer away and the two villages work and socialize with one-another daily. Mupenda, who now has two wives, he took on another wife when his first wife failed to conceive - a not uncommon occurrence here in the "infertile crescent" of Africa, lives in the village with the families of his three married sons. Of his three daughters, only Manjeke survived through puberty. She has recently married an industrious young Lese man, who as tradition dictates gifted her father with a bride wealth which included a "kitunga" of seed peanuts and several chickens. Manjeke will soon move to a nearby village to live with her new husband.

Gamiembi, Mupendas youngest son is building a new "Mafika - kitchen shelter" at the entrance to his mud hut. Each family has their own hut, mafika and cooking fire. The women of Ngodingodi have been out in the forest all morning cutting the broad *Megaphrynium macrostachyum* leaf called "Tilipi" with which to shingle the roof of the mafika. Huts, mafika and the mens social-gathering shelters called "baraza" are all made from small trees and saplings, tied firmly together with tough, flexible strapping made by carefully splitting a palm-vine that grows to over 100ft long. The mafika has open sides, whereas sleeping and food storage huts have lattice work sides covered completely with mud. Huts are usually built in December at the end of the heavy rains when the soil is still wet and easily mixed into mud; which when applied to the hut walls will have time to dry over the next two months of the annual dry season. The dry season is never totally dry, but at least it rain less often and less heavily.

By early afternoon the woman are back with their bundles of leaves. Alimoya, the oldest women in the village sits down with legs outstretched beside the pile of leaves. With the aid of a small knife, fashioned locally from metal smelted by the Zande in the northern savannas, she methodically splices leaves together in wads of five. Next morning, before the sun rises high in the sky and before the leaves begin to dry and curl, Gamiembi and his brothers will climb on top of the mafika. Starting from the bottom, they will overlap the leaves into a waterproof roofing that, once held down with saplings or split bamboo, will last for 3-5 years. As Alimoya works on the leaves her co-wife, Uboobi, sets out again for their garden - field - to dig up some cassava and cut down some plantains for tonight's dinner and tomorrow's breakfast. Her task complete, Uboobi adjusts her sling slightly to let Tofi nurse, places 4 or 5 large pieces of firewood on top of her already laden food basket, and with the expertise of a weight lifter hoists the cargo onto her back and adjusts the tump line across her forehead.

Following Uboobi as she heads back to the village, I'm reminded again how hard Lese women have to work to provide for their families. Uboobi's days are always busy with child-care, food preparation (which includes gathering, cleaning, peeling, pounding and cooking), cutting and hauling firewood, carrying drinking water and her husbands washing water, washing clothes and cooking items, and working in the fields. In contrast, the men have few demands on them other than field clearing, and live a much more leisurely existence.

In late November/early December Mupenda, and his sons Gamiembi, Kenikungu, and Itude search for a section of forest to clear for cultivation. They are looking for an area as close to the village as possible as the women will work there each day and will have to return with heavy loads of firewood and foodstuffs. Like most shifting cultivators living in the Congo basin, Mupenda prefers sections of forest that he or his relatives cleared 15-20 years previously. The forest growing in these patches is composed of softwoods such as "Kere" the parasol tree, *Musanga cecropioides* which can be fairly easily cut down and cleared with their simple tools. This secondary succession, regrowth tree species, which never exceeds a height of 30-60ft, colonizes 4-5 years after fields are abandoned by farmers, and dominates the canopy for the next 15-20 years. *Cecropia* in South America occupies a very similar niche. If Mupenda chooses an area of forest younger than this, the dormant weed seeds stored in the soil from the last cultivation period would still be viable and his wives would spend much time weeding. Moreover, competition by the weeds for limited nutrients in the infertile soil would substantially reduce crop yield. Forests older than this contain progressively more mature forest trees, characteristic of uncut forest, such as African Ironwood, that are extremely difficult to cut down, as the axes available to most forest farmers are frequently made from suspension springs of old Renault trucks or Land-Rovers. Once a suitable area has been found that satisfies the requirements of a "good" field and is located within Mupenda's usufruct, all the men of the village, usually with the help of pygmy men, begin the arduous task of cutting and clearing the forest. Mupenda's usufruct is a region of the forest that he and his relatives have hereditary rights to cultivate --- the land is not actually owned by Mupenda he only holds it in trust for future generations. This traditional system of land tenure promotes conservative use of the rain-forest as individuals would, one might assume, not degrade a resource which their children and children's children will inherit and upon which they will depend for subsistence.

While Gamiembi cuts part of the way through several of the smaller trees, Kenikungu, braced on a scaffold above the huge buttress roots of a "Kobokobo" where the trunk is narrower, chips away at a slowly enlarging "V". If their plans work out, Kenikungu's tree will fall across Gamiembi's trees bringing them down with it. This time they weren't so lucky and Gamiembi went back to finish the job. After a week or so the trees are down and the field crisscrossed with fallen timber. As the remaining branches are lopped and added to the debris on the ground, Uboobi and the rest of the women and adolescent girls move through the tangle, planting cassava cuttings and plantain sprouts. For two months the sun beats down on the field, drying the dense cover of debris which protects the fragile soil from hardening and erosion. During this hiatus the women of the village, in addition to their other tasks, start to shell and sort the seed peanuts and remove the dry corn kernels from their cobs. In February, on a windy day if possible, firebrands, carried from the village, are used to torch the field, which is as dry as it ever will be. The fire is not very hot and burning is never complete. The soil stays remarkably moist and cool allowing the already sprouted banana and cassava plants not only to survive but to make the most use of the limited wood ash fertilizer. Unburnt debris is cut, piled into mounds and reburned until all that is left are scattered boles of large trees.

The field is now ready to plant the first crop of the year -- peanuts. Planting is a communal affair and Mupenda calls friends and relatives from other villages and the nearby camp of Efe (pygmies) to come and help. Alimoya, along with all the other women and girls down to the age of three or four, drop seed peanuts from leaf cornets into shallow holes dug by the men using long-handled hoes. Some women carry Maize seeds and intersperse them with the peanuts, while two adolescent girls plant small mounds of a climbing squash called "Kokoliko" close to several of the tree stumps. Once finished the field is a patchwork of sprouted plantains and cassava surrounded by a mixed planting of peanuts, maize, sugarcane and squash. Mixed cropping in this way closely emulates how natural vegetation grows in an open area in the forest where, for instance, a giant old tree has fallen. Combining crops that require different levels of scarce nutrients, and that grow at different heights and at different rates means that, much like natural successional vegetation, the most is made of the available sunlight and wood ash fertilizer. Moreover, mixed cropping means that the fragile soil is quickly protected from the destructive effects of direct sunlight and heavy rains, and crop diseases and insect pests are kept to a minimum.

At the end of peanut planting, men's work for the year is all but over. Other than hut building every 5-10 years, and tool and basket making, Gamiembi and his brothers have a full 9 months of inactivity before next year's field clearing. Lese men spend this time socializing around "Libondo" palms -- drinking the mildly alcoholic sap, visiting neighbors, and idling away the days in endless games of "mali".

Unlike the men of the village, Alimoya, Uboobi and the other women and girls have only begun a work schedule that starts as soon as they can fetch items or carry a basket (2 to 3 years old), and continues unrelentingly until Elephantiasis, Leprosy or death excuses them. The women of Ngodingodi will weed the field each day until the peanut leaves cover the soil and inhibit excessive weed growth. In late June the peanuts are uprooted and laid in a specially built baraza to dry. The field is then broadcast with upland rice just in time for the heavy rains of August through November. Bananas and cassava are ready for harvest after 12-15 months, although Uboobi will start gathering cassava leaves as soon as they appear. She'll use these to make the Ituri's most flavorful dish "sombe" -- boiled and pounded cassava leaves mixed with palm oil and searingly hot red pepper. Sombe is one of the few good sources of vegetable protein, and essential vitamins and minerals available to the Lese, but Uboobi must be wise in her use of these nutritious leaves as without them the plant is unable to produce the starchy tubers that provide the bulk of the calories in her family's diet. Each new garden is used for about 2 years, by which time most of the crops, all planted within the first 6 months, have been harvested. A few plantains and oil palms will survive for a while longer after the garden is abandoned to the already colonizing natural succession vegetation of the rain-forest.

The Lese way of life is thus intimately synchronized with the environment and the annual cycle of field clearing, planting, and harvesting that are all integral to their shifting cultivation subsistence economy. Unlike all other Congo basin inhabitants, barring perhaps the forest elephant, the forest farmers have been a major force in restructuring the natural rain-forest landscape, such that the sea of mature, high canopy forest is now dotted with islands, 5-50ha in size, of active cultivation and regrowth vegetation of various ages. As long as mature forest predominates the impact of subsistence level shifting cultivation is negligible and may actually increase ecological diversity and provide more food resources for forest animals.

By six in the evening the sky turns a spectacular red and the sun plunges out of sight. Here at the equator days and nights are always twelve hours long and the beautiful twilights last only a few short minutes. Uboobi crosses to where her sister-in-law Melinea is cooking, and returns with a hot ember with which to rekindle her fire. This evening as always Uboobi leaves a bowl of hot wash water for Mupenda and returns to her hut to sit with her children and co-wife Alimoya. Later, she moves the fire into the hut and rolls out the sleeping mats. As her children fall asleep and Tofi fusses, the sound of Lese voices is punctuated by the crescendo yell of a tree hyrax. This small mammal not much larger than a house cat, but remarkably, most closely related to the elephant, screams its territorial imperative each night at dusk. There's no moon tonight and city lights are thousands of miles away. The stars seem that much closer, and outside the red glow of the fire, the night is dark indeed. Tofi is still fussing as the village quietens for the night. Uboobi mentions that tomorrow she must visit the Efe (pygmies) camped nearby and get them to find some stomach medicine in the forest, so that she can "changa" Tofi and hopefully cure her stomach ache. Sickesses of all kinds are treated by "changa"ing the patient. Small cuts with a knife or arrowhead are made in the skin over the area where it hurts and a herbal potion rubbed into the shallow incisions. In some ways, Lese medical histories can be read, much like a map, by examining the extent and location of past changa marks.

#### The Pygmies: hunter-gatherers of the Rainforest

The pygmies who Uboobi sets off to visit in the morning are camped in the forest at the far side of the "Kero" river, only a short distance from the village. The "Andiokbo" are a clan of Efe-Mbuti, one of the two tribes of pygmies presently living within the Congo river basin. The Mbuti live throughout the Ituri forest of northeastern Zaire, whereas the Binga forage in Gabon, the Cameroon, and the Central African Republic. So called pygmoid groups, the Tswa a fishing tribe of the lower Ubangui and Zaire rivers, and the Twa of Ruanda have extensively intermarried with Bantu farmers and no longer maintain their traditional subsistence practices. The Mbuti of the Ituri remain the largest and least acculturated of all tribes of hunter-gatherers within Africa's rain forests.

#### Mbuti (pygmies) of the Ituri forest

Karambodu is an "Andiokbo" Efe (pygmy). Efe are bow hunters and live in the north-eastern Ituri. They are one of four sub-groups of Ituri forest pygmies collectively called the Mbuti. Tafe, who refers to himself and his sub-group only as Mbuti, hunts with nets and lives in the southern and central Ituri. The Sua and Aka are also net hunting Mbuti living in the northwestern and northern forest-savanna edges, however both these sub-groups have all but abandoned their traditional way of life and subsist as plantation laborers or as guides to ivory poachers.

Why two different hunting techniques should have persisted in the same rain forest is a puzzling question, especially as both bow and net hunters are aware of the other group's technique and on occasion, when members of the two groups meet, they will hunt together. Surely if one hunting technique was better than the other it would have eventually supplanted the less efficient method. As this has obviously not happened, there must be some other reason for the establishment and perpetuation of two such unique subsistence economies.

#### Efe bow-hunters

Karambodu, Ima-chabo and their toddler Chabo (Karambodu's wife is named mother of Chabo) live with his

uncles, cousins, and their families. The camp, located in a small gap in the canopy next to a clear, gravel bottomed stream, has 8 adult men, 6 adult women, 4 adolescent girls and boys, 1 toddler and 1 newborn. The camp for most of the year remains within 2km of a Lese farmers' village; at other times it may be a day or two days walk away, deep in the forest. Ima-chabo and her family live in a simple but effective hut constructed from saplings imbedded in the ground, and bent and woven into a dome. The lattice of saplings is shingled with the ubiquitous and ever useful "Tilipi" leaves. Each family constructs a hut, and in general they arrange them in a rough circle with the hut entrances facing inward, thus enclosing a communal social space. That's not to say that if arguments break out in camp that a hut entrance can't be quickly repositioned, thus effectively separating the antagonists. Arguments are usually short lived, however, and camp life is in general harmonious. Bokbau, the leader of Karambodu's camp, calls me over to show me a new dog bell that he is in the process of carving out of a block of "Hoye" -- *Alstonia boonei*, a semi-softwood. Although all Efe men learn to make bows, arrows, and bow strings, Bokbau is renowned as a master craftsman. He no doubt adopted this specialization after losing his left leg below the knee from a festering Gabon Viper bite, and was no longer able to accompany the other men on hunts. The bells are used not only so that the hunters know where their dogs are but also to provide additional noise to help flush hiding game. Pygmy dogs are probably descendants of the "Basenji" and although not mute do not have a resounding bark. Karambodu, Kebe and the rest of the men of the band go hunting with their dogs 3-4 times a week.

#### Men's work: a bow hunt

In the relative cool of the morning hunters sit close to the fires filling small clay pipes that they attach to the 3ft hollowed mid-rib of a banana leaf. A concerted draw on the pipe produces a large, cool "blast" of very strong tobacco smoke. As the exhaled cloud clears around Kebe's face he grins a chisel-toothed smile. Efe prefer the look of pointed teeth and before children reach puberty, they chip the incisors and canines with an arrow head and a small stone. Kebe hands the pipe to me and says that he hopes to kill an "Iti" today. The "Iti" is one of seven species of forest duikers that comprise 90% of all game captured by Efe bow hunters. The smallest, the blue duiker or "Medi", weighs a mere 5kg, an "Iti" about 20kg and the largest, the yellow-backed duiker "Tochi", a comparatively large 50kg. Compared to a white-tailed deer (100kg) of North America or red deer (400kg) of Scotland forest duikers are remarkably small ungulates.

As the sun rises above the trees and the day begins to warm, the men string their bows, and harden and straighten their arrow shafts over the fire. One of Kebe's metal arrow heads has become loose on the shaft, so he melts a piece of "Ando" - tree resin - over the fire and uses it, while still soft, to reattach the barbed arrow point. Efe mostly hunt terrestrial animals, although they will shoot at primates, with untipped poison arrows, if they come low enough in the trees or if a sick or aged monkey, foraging on the ground (as do Crested Mangabeys), is slow to flee. The poison is slow acting and death has probably more to do with blood loss than its toxicity. Just when I thought they had decided not to go hunting today, hunts are often cancelled because of "bad omens" -- which are admittedly more prevalent when it's raining, Kebe jumps up, calls his dogs and heads out into the forest. We head west at a steady walk-trot, fording rivers, climbing hills, crossing precarious log bridges, obviously going somewhere known to the hunters. Within an hour we came to a clearing, where an Efe named Matiasi is sitting next to a small fire. I had not even seen him leave the camp that morning, when I asked him he said he had left before dawn to sit in a fruiting tree nearby to wait in ambush for any duikers that might find the fallen fruits a tempting food source. This hunting technique, called "Ebaka", is not as haphazard as it first seems as the Efe only practice it during the dry season when few forest trees are in fruit and duikers therefore are drawn toward them. After another quick smoke, the archers set off to form a rough semicircle at the head of a short watercourse. Eyalu waits by the fire with the dogs for about 15 minutes until he is sure that the archers are in place. Sitting by the fire I remember with amazement that neither the Efe or the Lese know how to make fire and must carry hot embers with them or extract them from the smoldering remains of giant forest trees felled by lightning. Calling "Aas aas ibu aas" to beckon the dogs, we start up toward the archers, through the much more dense riverine vegetation; yelling, beating the brush and generally making as much noise as possible.

A game drive or "Mota" like this can take anywhere from 30 minutes to over an hour and is completed once the beaters have reached or passed the archers. Several "Mota" are conducted until the hunters feel that they have caught enough game or that it is time to give up and return to camp. If an animal is flushed close enough to an archer for him to get a clean shot, the hit animal is seldom killed outright and must be chased down by dogs and hunters. The dead animal, usually a duiker, is butchered on the spot and the meat and innards wrapped carefully in the utilitarian "Tilipi" leaves. Who gets what parts of the animal is fairly rigidly determined. The man who shot the first arrow gets the largest and most prized portions - the hind quarters and liver, while the man who owns the dogs gets the head and one forequarter. If a second arrow hit the animal or the arrow that killed the duiker did not belong to the archer, the second hunter or arrow owner receives the other forequarter. The rest of the carcass is divided in an amicable manner according to need. It is not exactly true to say that if few or no animals were killed the men would return to camp with little or nothing. Once the last "Mota" is conducted we spread out and head home talking and singing, but never-the-less constantly on the lookout for forest mushrooms, and other gatherable foods such as tortoises, forest francolin eggs and fallen fruits. The Efe are also remarkably attuned to the sound of bees, who's hives provide sweet honey as well as pollen and grub comb -- the latter, when cooked tastes rather like loose scrambled eggs.

As I strained to keep up with the deceptively swift pace of Kebe and the rest of the band, a "Borokboro" - dark mongoose- broke from the undergrowth and ran within 2 feet of Matiasi. Although he followed it, with a feathered bow, until it was out of range, he never tried a shot. I asked him why he let an easy kill escape him, and he replied "don't you know that my wife is pregnant and that there is a taboo against expectant fathers killing or eating this animal". Again I realized just how little I knew about this forest and the people who live within it.

I was hot, dripping with sweat and bone tired by the time we got back to camp, but the hunters looked as though they hadn't broken sweat all day, and had just returned from a Sunday promenade rather than 6 hours of hunting. Small body size means a greater surface area to volume ratio, the Efe are thus far more efficient at radiating excess body heat in the humid forest, than Europeans, and consequently do not overheat, and sweat much less.

As we had caught two blue duikers the camp was filled with chatter and the excited expectation of meat for dinner. Ima- chabo unwrapped a "Tilipi" leaf parcel to show me a pile of "Opi", the oily, olive-like fruits of the *Canarium schweinfurthii* tree, and an equally large mound of "Iswa" - fatty alate termites that she had gathered while we were out hunting. All forest game is extremely lean and one very quickly develops a craving for anything with oil in it. "Iswa" are delicious anyway and I never needed to find an excuse to eat them. I asked Karambodou when he intended raiding the honey tree that he had marked on our way back from the hunt and he said not until after the "Rofo" had flowered. The two major canopy trees in the Ituri are "Ato" (*Cynometra alexandri*) and "Rofo" (*Brachystegia laurentii*) which flower from late February through March and from May to August. Honey season is therefore best during the months of July through September. At this time the Efe all but abandon hunting to focus solely on gathering honey, which during these brief months manages, incredibly, to contribute 13.5% of the Efe's annual calories.

### Honey collecting

Honey gathering, like hunting, is man's work. Karambodou's honey tree is an old "Ndau" *Irvingia gabonensis* and the hive is located in a rotten branch some 60ft from the ground. It's an *Apis mellifera* colony which is good because stinging bee hives always seem to contain more honey than the *Meliponula bocandei* stingless variety. Gathering honey is a dangerous pursuit but the rewards are potentially enormous. Kebe hands his 12 year old son an "apopau" - small machete with which to open the hive, and helps him up to a notch on an adjacent tree that Ndikpa will climb to reach the lowest branches of the tall "Ndau". As Ndikpa manoeuvre across to the hive, smoke from the "Tilipi" parcel of hot embers and green vegetation swirls around him and keeps the now agitated bees somewhat at bay. Three quick hacks, he's into the hive and starts pulling out and throwing down sections of

honey-dripping comb which we catch in mitts of "Sini" leaves - a smaller forest version of "Tilipi". The bees are everywhere, sticking to the comb, sticking to our skin. I keep my arms away from my body so as not to trap an irate bee under my armpit and Ndikpa makes short snorts as bees sting his honey-coated hands and arms. It is a good hive and we collect about 5kg of honey, and 2kg of grub comb. As Ndikpa starts down, the Efe at the base of the tree are consuming what to me are huge sections of comb. Twenty minutes of gorging and only about a 1kg of honey is left to take back to camp with the grub comb. This is one of the first trees of the season and it's not uncommon for the men to eat nearly all the honey leaving little for the women and children. In good years there is always plenty for everyone, and even a large surplus for exchange with the villagers.

#### Back in camp

The camp settles down to eat, although this doesn't prevent a fairly constant banter from hut to hut to fireside. Karambodou chops a small piece of boiled meat until tender, hands it to Akoro one of the camps toddlers, and is then himself handed Chabo to look after, while Ima-chabo goes to get some more firewood. Efe children, like their Lese counterparts, are highly valued and are frequently passed from adult to adult to adolescent around the camp. Children therefore get to know all the band at a very early age, and with so many caretakers available are quickly allowed free range of the camp. When Ima-chabo returns, Kebe starts to tell the story of today's hunt. With sounds and intricate motions he makes the wounded blue duiker sound real, as it bleats and crashes through the forest in a desperate attempt to flee the dogs. The story ends, the camp chatter resumes and quietly at first, Bokbau beats out a cadence on a duiker skin drum. Kebe joins him with a "Likembe", -- finger piano and the rhythms became more interwoven and complex. Women around the camp gradually add their voices in a series of roundelays and soon an impromptu dance is in progress. The drum beat and singing become so insistent that it is impossible not to join the swaying circle of dancers surrounding the fire. The dancing never really stops all night, for as some dancers drop out others step in to take their place. Yet the approaching dawn finds most of the band either sleeping by the large dance fire or back in their huts.

#### Women's work

Ima-chabo is up early, even after a nights carousing. She has a full day ahead of her looking after her children, carrying water, gathering firewood and generally seeing to the welfare of the camp. Although hunting is quite hard work, Efe women on the whole have more subsistence related responsibilities and spend more hours working than do the men. The demands of Efe womens work often require that they be out of camp in places where it is difficult to care for, or dangerous to, small children. Even when Chabo was still nursing his mother would often leave him, for short periods of time, with another lactating woman who would breast feed him if he got hungry or began to fuss while his mother was away. This type of multiple caretaking may be unique to the Efe and it certainly contradicts many of the beliefs held by sociobiologists. It does, however, allow Efe women considerable freedom, safe in the knowledge that their children are being well cared for.

Efe women provide over 60% of the calories within their family's diet, traditionally by gathering and fishing but now more importantly by laboring in the fields of their Lese exchange partners. Efe men and women, unlike the Lese, share many of the day to day subsistence tasks. Efe men prepare and cook food when their wives are busy, a practice condemned by the Lese who have a much more rigid sexual division of labor. Efe women do most of the gathering and fishing, but seldom help to raid a bee hive and only accompany the hunters during the dry season when large "Musilio" hunts are conducted. These hunts are more like picnics and the women are there only to carry food for the hunters and any game that are killed.

The importance of women in the subsistence economy of the Efe is often overlooked. Although hunting is exciting to write about, it is both highly dangerous, and an exceedingly unpredictable source of food. In contrast, plant food, within the rain-forest, is generally more abundant, more reliably collected and therefore usually provides more calories to the diet than animal food. Woman the gatherer, therefore, contributes more to her families food supply, on a daily basis, than man the hunter. Thus gatherer-hunter may be a more accurate

description of the pygmies and indeed of most contemporary hunter-gatherers.

#### Mbuti net-hunters

Unlike Efe woman such as Ima-chabo, woman in Tafe's group, are a required component of net hunting and this is one of the major differences in subsistence economies between the Efe bow hunters and the Mbuti net hunters.

Tafe lives in a camp much like Karambodu and his family, however the camps of net hunters are much larger, containing many more huts and many more people. It is not uncommon for 50 to 80 Mbuti to live in Tafe's camp whereas a camp of more than 25 Efe is rare indeed. Net making was probably adopted from Bantu farmers; net hunting is therefore considered to be a more recent technology than the more traditional bow hunting. Regardless of when nets were first made by pygmies, net hunting is still practiced very much like an Efe bow hunters "Mota", but instead of archers waiting in ambush, an arc of nets is set to trap fleeing game. Nets are made from the tough skin of a forest vine called "Sowdi" or "Nkusa" the epidermal hairs of which can give you a very nasty "friction burn" if your skin brushes against it. The nets are about 3ft high and 30-100 meters long. By linking nets together the trap can be upto 1km in length. As most game only get temporarily tangled in the nets all the men of the camp are positioned at intervals along the barrier, ready to club or stab trapped animals. Not only does it require many men to secure a 1km long net but someone must still be available to drive the game. Not surprisingly then, Mbuti women and children are always employed as beaters on hunts.

Where Ima-chabo contributes to her families subsistence by working in the Lese's fields, Obolu, Tafe's wife, does so by joining the hunt. Although a net hunt results in the capture of many more animals (<10) than a bow hunt (<3) it requires many more participants and the actual per capita success rate for the two techniques is amazingly similar. Why then does Obolu go net hunting and Ima-chabo go to work in the fields? The answer may partly lie in differences between the exchange partners of the Efe and the net hunting Mbuti.

### HUNTERS AND FARMERS: A COMPLEX RELATIONSHIP

#### The Efe and Lese of the northeastern Ituri

Kebe has a "balanced reciprocal" relationship with the Lese farmer Gamiembi. Kebe's father Achukpa had a similar exchange relationship with Gamiembi's father Mupenda. The Efe-Lese trading system is hereditary and complex. Exchange is not on an instantaneous basis, instead repayment obligations extend over long periods and are even passed from father to son. Neither side consistently bests the other, and both players constantly vie for what they ascertain to be an equitable system. When Kebe arrives in the village with a "faruci" - leaf parcel - of meat and mushrooms from the forest to give to Gamiembi, these exchange items are usually in repayment for a past debt or a deposit to pay for future trade items, rather than a specific request for some plantains or cassava. Kebe's wife may, however, return to the camp later in the day with some rice or peanuts given to her by Atosa, Gamiembi's wife.

The Efe exchange meat, honey, building materials, medicine and most importantly field labor for cultivated crops such as cassava, plantains, peanuts and rice that now constitute over 50% of their diet. The Lese also trade metal (for knives and arrow heads), cotton cloth (which is more colorful and more durable than the traditional cloth made from the pounded bark of fig trees), and aluminum cooking pots. These pots are considerably less fragile than traditional "biscuit fired" clay pots, although the latter are still prized for cooking "Sombe" or roasting peanuts. The relationship between the Efe and Lese must have been going on for many generations because the pygmies no longer speak their own language, instead they speak a dialect of KiLese which is the southern Sudanic tongue of their trading partners. Similarly the Mbuti net hunters speak KiBira, the Sua KiBudu and the Aka KiNgbetu. Interestingly, many Lese and Bira words for forest plants and animals are the same, suggesting that these may be the last remnants of an all-but-lost Mbuti language.

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Although the Efe and Lese have been living in close association for hundreds of years the Efe have maintained their genetic integrity. As the Lese consider Efe camps lower class habitations, Lese women would never agree to marry an Efe man and thus have to move from village to camp. Efe women, on the other hand, have no such prejudice against marrying a Lese. The Lese buy their wives for a bride price, whereas when the Efe, Biapi is ready to marry a woman from another camp he must give a sister or cousin of his in exchange. In this way the sex ratio of Efe camps is maintained. Bokbau's camp has, however, "lost" two young women who left to marry Lese men and now Baranga, a single Efe man in the band, is without "sisters" to exchange for a marriage partner.

Reduction in the number of women in an Efe camp is additionally important as Efe women, by laboring in Lese gardens, provide the greatest contribution to the diet of the camp. To continue this important aspect of the Efe-Lese exchange relationship Efe camps must remain proximal to Lese villages for much of the year. This obviously has restricted the nomadic existence of the Efe hunter-gatherers and to some extent sets up conflicts between Efe men and women. The women want to camp near the villages and the men would rather be deeper in the forest where there is less competition for game and honey. At present, Bokbau, Kebe, Karambodou and the rest of the band only move the camp far from the village during the honey season, honey being an exchange item more highly prized than field labor, and during the annual hunger season that occurs, in May and June, prior to the first harvest of the year, peanuts. During a severe hunger season, the Efe will often move to areas adjacent to rocky outcrops (inselbergs), several days trek from the village. Here Ima-chabo and the other women will spend hours gathering the abundant tubers and *Dioscorea* spp yams. Wild tubers are definitely not a preferred food, they are unpalatable, laborious to prepare and are only exploited in emergencies. Great care must be taken in selecting wild tubers; as although "Njatu" and "Kocho" are very similar in appearance, "Kocho" contains deadly concentrations of the bitter-poison hydrocyanic acid.

The intimate and intricate relationship between the Efe and Lese has had profound effects on the nomadic life style, and the health and welfare of the Efe. The Efe certainly gain substantially from their relationship with the Lese. Every day Ima-chabo returns from the village with kilograms of cassava and plantains, a quantity of food that would take many more hours, or even days to gather, assuming that sufficient carbohydrate food was available within the forest. But this bounty of cultivated crops is paid for in the increased exposure of all Efe to a more sedentary, materialistic way of life, as well as a sharply increased incidence of disease.

#### Rainforest life: not quite Utopia

The Ituri forest, much like the Congo river rain-forests in general, is relatively benign. There are few occurrences of death from snake bite or by being mauled by a Leopard. The hot, humid forest is, however, a perfect breeding ground for myriads of insects, fungi and microbes that are of considerably more danger to Efe and Lese alike than even the deadly, if albeit beautiful black and white forest cobra. The illusory, easy going, low stress way of life of the Efe and Lese may seem to us an enviable contrast to the accelerating pace of modern technological society. It is not a paradise, however, and can at times be desperate and brutish in the extreme. Mortality and morbidity amongst children are very high. Many children do not survive to puberty, and few adults reach the ripe old age of 50 or 60. Malaria, infant diarrhea, bilharzia, filariasis, intestinal worms, amoebic dysentery, tropical ulcers, ringworm, pneumonia, leprosy, tuberculosis, sleeping sickness and sickle cell anemia are just some of the diseases that sap the strength of all forest dwellers. Even as good as traditional cures are, they can't hope to defend against such a concerted onslaught. Death and dying are commonplace. I felt so useless when despairing parents would bring their terminally ill children to me in the vain hope that the "Ude" (European) could effect a miraculous cure. It's a scandal that so little money is spent on these tropical diseases that destroy millions of lives each year. Those children that do survive into adulthood seem to carry with them extraordinary immunities and the ability to recover from trauma. After I sewed Karakokbo's kneecap back down after he had nearly severed it falling on his spear, he amazed me by walking into camp the next week with an imperceptible limp. But even the most robust and vital people can suddenly fall sick and die. Karambodou, my Efe

guide and friend, died recently from a sudden and undiagnosed disease. Morbidity and death are often ascribed as the work of forest "bulozi" -- witches -- and accusations fly as to who cast the spell. Villagers are more prone to disease than the Efe primarily because most diseases are water borne or depend on insect vectors that breed in stagnant pools. The permanent nature of Lese villages, and the fact that they have no knowledge of the causes of diseases that afflict them, means that water supplies are almost always polluted. The Efe, who move camp regularly, are generally spared a contaminated water source but contract many diseases by drinking water whilst in the villages.

We have only just started to understand the complexity and mutual-interdependence of the relationship between Efe like Kebe and his villager "Muto". How long since it has been established is unknown, but we do know that the Lese would eat less meat and honey and would be unable to clear and maintain such large gardens without the Efe. While the carbohydrate diet of the Efe would be considerably more meager and unpalatable were it not for their relationship with the Lese. The future of these two populations is interconnected and changes in the life-style of one must necessarily affect the subsistence economy of the other.

#### The Mbuti and Bira of the south and central Ituri

Tafe's camp also has a trading relationship with forest farmers. The Bira are a tribe of Bantu who moved into the forest from the south-eastern savannas less than 400 years ago. The relationship between the net hunters and the Bira is more recent and in some ways different from that of the Efe and Lese. Tafe and his band go net hunting, not only to provide meat for themselves to eat, but to acquire their main trade item to exchange for Bira commodities and cultivated food. Net hunters like Tafe and their women seldom labor in Bira fields and field labor is not a major item in the exchange relationship. Tafe's band heavily exploit the forest for game, travelling long distances and intensively hunting any areas that contain game. The unique importance of meat as a trade item may have prompted Tafes ancestors to abandon bow hunting, where only 1 or 2 animals are captured on a successful hunt, in favor of the large communal net hunts that secure upwards of 8 duikers a day. A shift in the exchange relationship from field labor to meat trade greatly increases the risk that Mbuti hunters will overexploit the forest, severely depleting the populations of duikers upon which they depend for subsistence. To some extent this is already occurring in the southern Ituri where farmer population densities are high and intensive net hunting occurs to satisfy the market for meat. Over hunting is occurring, but what else can Tafe and his band do? He and his ancestors have invested all their energies into satisfying their exchange partners' demands for meat and are now dependant on this system for nearly all the carbohydrate calories in their diet. Large bands of Mbuti net hunters need large amounts of cassava, plantains and peanuts to survive -- these must be provided by the Bira who in return demand large quantities of meat. Traditions are always hard to change, even although their continuation becomes increasingly difficult and may actually jeopardize their future existence.

### COLONIAL RULE AND THE ITURI FOREST

The arrival of Belgian colonialists accelerated the changes in Mbuti way of life that had been started by the Lese and continued by the more recent invasion of the forest by the Bantu - Bira, Budu and Nande. Fifty years of colonial domination saw more change in both the hunter-gatherers' and shifting cultivators' economies than did the previous 1 to 2 thousand years.

By the 1930's the Belgian colonial authority was building roadways, with the pressed labor of villagers and pygmies, and forcibly moving forest dwelling farmers and their associated Mbuti to permanent villages adjacent to the roads. Mupenda's father was required to plant "educative" crops of rice and cotton, for sale in the newly established market economy. Forest populations throughout the Congo were concentrated along the roads and competition for land suitable for cultivation quickly intensified. Traditional usufructuary land tenure systems collapsed, in many areas, as resettled farmers encroached on the "sapu" - home lands of resident farmers. The cultivation period increased from 1 to 2 or more years, while fallow periods diminished from a nutrient restoring

15 years to a barely sufficient 10 years or less. Clearing and planting larger fields increased the Lese's dependence on Efe labor and the development of roadways and trading greatly increased the market for forest resources such as meat and honey. The traditional Mbuti-Bira relationship was often supplanted by "commercant" who travelled from urban centers where the demand for meat was so great as to allow them to pay a much higher exchange rate than could the relatively poor forest farmers. Net hunting solely for the market therefore increased and is still increasing.

The higher population density brought about by enforced resettlement resulted in more widespread disease. Water sources, used by growing numbers of people who were prohibited from moving to new areas, rapidly became rank and disease infested. Establishment of coffee and oil-palm plantations lured the young villager and Mbuti men away from the camps and villages in search of wages and western commodities. Acculturation often brought with it a breakdown in traditional values, an aping of wholly inappropriate European technologies and mannerisms, and an increase in alcoholism. Farmers started to cultivate their fields continuously and abandoned stable polyculture for monocultures of rice or maize. Within a decade or two huge tracts of the forest had been degraded from a productive sustainable mosaic of active shifting cultivation and nutrient restoring forest fallows to infertile ecological deserts of Imperata spp. grass. Intensive cultivation resulted in the development of a zone of regrowth vegetation and active fields 2- 3km wide on either side of the roadways. Only by the 1950's did Belgian agricultural "experts" realize that shifting cultivation as practiced for centuries by forest farmers was, and still is, the only really feasible form of sustained farming within the rain forest.

#### INDEPENDENCE AND HENCE

When the Belgians abandoned the Congo on June 30, 1960 they left behind a legacy of confusion. A new bureaucracy had been established that replaced traditional chiefdoms, and a monetary economy had to a great extent altered the commodity barter system of old. Yet the Belgians had failed to educate Zairois in the new ways, and the early years of independence were chaotic. Successionist rebellions in the south and northeast, in the 60's and early 70's, forced many farmers to abandon their villages and flee with the Mbuti into the comparative safety of the deep forest. Rape, murder and pillage all took their toll, the market economies of the Belgians collapsed, and the roadways quickly became rutted, potholed and all but impassable for much of the year. Ironically, for this brief period between 1965 and 1975 the Ituri inhabitants returned to more traditional subsistence economies.

As the young nation of Zaire grows older and gains experience it begins to look more toward the welfare of its people and understandably the exploitation of its natural resources. The crash in the price of copper negated all of Zaire's optimistic economic forecasts and the nation is now chronically in debt. Under such severe budget shortfalls the rain-forest are in danger of being "mined" for their resources rather than being managed for sustained exploitation. A \$280 million hardwood-pulp mill complex is already clearing huge areas of Gabon's previously untouched forests and clear cutting for lumber and more importantly charcoal is hacking away at the edges of all the Congo basin forests. Resurgence of Zaire's agricultural market economy with the increase in the world price of coffee has resulted in the expansion of coffee and oil-palm plantations and the rapid urbanization of adjacent villages. In addition, over the last few decades the Ituri forest has become a settlement frontier into which, families from the rapidly growing, densely populated savannas and highlands on the north and east are immigrating in ever increasing numbers. These immigrants often bring with them farming techniques that, although applicable to the fertile volcanic soils of the eastern highlands, are incompatible with sustained exploitation of the forest and result in the establishment of short-duration fallows and rapidly, resource exhaustion. Increasing population densities provide growing markets for forest resources, consequently game hunting by the Mbuti solely for sale is expanding and risks cleaning-out all animals from large areas in the forest.

All these developments threaten the integrity of the rain- forest and puts in question the continued existence of

the traditional life-styles of forest farmers and hunter-gatherers. Clearly the future of the Mbuti is a precarious one. Changes over the last 60 years have had a profound effect on their traditional nomadic hunter-gatherer way-of-life. The next few decades can only expect to see an acceleration of these changes, with the possibility of the total acculturation of the Mbuti and consequently the loss of a unique and fascinating human culture.