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Brief Communication

Population Pressure and Subsistence Strategies Among the Mbuti Pygmies

William S. Abruzzi¹

Several distinguishing features which have characterized Mbuti subsistence in the Ituri Forest in eastern Zaire have so far eluded an ecological explanation. The most notable of these features is the separation of the Mbuti into two distinct economic divisions: net-hunters and archers. In this communication I suggest that this distinction represents the differential response by different segments of the Mbuti population to the disruptive influences that have resulted from the invasion of their habitat by non-Mbuti populations (see Abruzzi, 1979).

Researchers have consistently attested to the prominence of these two subsistence strategies among the Mbuti (cf. Putnam, 1948; Turnbull, 1965a,b, 1968; Harako, 1976; Hart, 1978). While the net-hunters occupy larger camps, comprising between seven and thirty families, and practice a communal form of hunting, archers inhabit smaller groups and hunt individually with bow and arrow. A net-hunt, which entails the beating of underbrush by women (primarily) in order to drive game into nets attended by the men, "demands cooperation between a minimum of six or seven nuclear families and allows a maximum of thirty" (Turnbull, 1968: 135; cf. Harako, 1976: 58-66; Tanno, 1976: 109). In distinct contrast to the net-hunt, "the ideal number of archers for either tracking or ambushing game is three. Five would already be felt as unwieldy" (Turnbull, 1968: 135; cf. Harako, 1976: 66-74). Moreover, while net-hunters and archers are quite aware of the alternate hunting technique, and even adopt the appropriate hunting methods when living in each other's camps (Turnbull, 1968: 134), the employment of these two subsistence strategies, as well as the location of net-hunter and archer camps, appears to exhibit a relatively discrete distribution within the forest (cf. Turnbull, 1965a: 317, Map 2; Harako, 1976: 45, 85; Tanno, 1976: 122).

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Two explanations have been offered to account for this variation in subsistence strategies, neither of which proposes an ecological basis. Turnbull (1968) suggests that the division of the Mbuti into net-hunters and archers is the result of fortuitous forces which have been permitted to operate due to the generosity of an abundant or "permissive environment." Harako (1976: 84-86), on the other hand, proposes that the distinction emerged as a consequence of different historical contacts. Recognizing archery as the original strategy of the Mbuti, Harako suggests that some Mbuti became net-hunters as a result of contact with Bantu-speaking populations who reportedly introduced nets into the area. The high efficiency of net-hunting, he maintains, "caused it to spread rapidly" (Harako, 1976: 86). While Harako's explanation comes closer to accounting for the west-east distribution of the net-hunters and archers, it is nonecological, proposing the operation of diffusion within an ecological vacuum. The net-hunting technique did not spread rapidly to the east and northeast, for example. Furthermore, the members of the archer band studied by Harako (1976: 47) were originally Sudanic-speaking Mbuti who came to be connected with Bantu-speaking peoples 20 years prior to his studying them, yet they had not adopted the net-hunting technique. While a reference to outside sources may be valid for the purpose of locating the origin of a particular trait, diffusion alone cannot explain the acceptance of that same trait, particularly if its adoption displays a clear and nonuniversal distribution.

The distribution of resources in the Ituri Forest shows temporal and spatial variations that have important implications for human populations employing a hunting and gathering subsistence strategy. Distinct wet and dry seasons occur within the forest (Harako, 1976: 42; Tanno, 1976: 103; see Abruzzi, 1979). In addition, Harako (1976: 41-42) distinguishes several different biotic communities within the boundaries of the forest, including three types of primary forest, a swamp forest, and secondary forest in the vicinity of agricultural settlements. Perhaps the most significant spatial variation from the perspective of Mbuti hunters is the existence of disturbed forest areas due to the encroachment of non-Mbuti populations. For several centuries the Ituri Forest has served as the focus of a continuing invasion of agricultural populations expanding from the more densely settled regions to the east. In recent years, the invasion of the Mbuti habitat has approached new dimensions, particularly in the southeastern region: in addition to the disturbances produced by the activities of swidden agriculture, the region has suffered the impact of mining, commercial plantations, tourist centers, missions, administrative settlements, a station for the capture of game animals, and consequent road building (Turnbull, 1975b: 299), as well as the profound impact deriving from commercial interest in the Mbuti hunt (Hart, 1978). This invasion not only has caused the Mbuti to retreat from their former dispersed occupation (Abruzzi, 1979), but also has all but eliminated their exclusive exploitation of those remaining areas of the forest which they inhabit today. The area of continuous disruption encompasses the principal location of

archer distribution (Turnbull, 1965a: 317, Map 2; 1965: 299). Exclusive subsistence upon the forest resources in much of the disturbed areas has been considered either very difficult (Turnbull, 1965b: 299, Harako, 1976: 81) or nearly impossible (Hart, 1978: 331). Moreover, while the Mbuti habitat, like that of other contemporary hunters and gatherers, has been reduced in size due to the expansion of competing agricultural and industrial systems, there is no indication of a reduction in the size of the Mbuti population (Turnbull, 1965a: 26).

The larger camps and the cooperative hunting technique employed by the net-hunters, unique among contemporary hunters, may be seen to represent predictable responses to the subsistence pressures that accrue from continued population growth within a fixed, or declining, resource base (cf. Boserup, 1965; Stevenson, 1968; Odum, 1971; Spooner, 1972; Harner, 1975; Harris, 1977). The continued growth of a human population within a circumscribed habitat demands an increased intensification in the exploitation of a given unit of land within that domain. Moreover, due to the Law of Diminishing Returns, such increases in population density are likely to raise the per capita work loads of members of that population in order to maintain existing levels of consumption (Boserup, 1965: 41ff; Odum, 1971: 187; Harris, 1977: 176, *passim*).

While the elasticity of farming and the productive advantages deriving from an individual farmer's investment in a specific plot of land may permit a limited intensification of land use in conjunction with a decrease in the size of productive units (cf. Netting, 1969), demand for greater yields in the absence of major technological subsidies clearly places pressure upon local segments of a population to increase the level of coordination in food production. The demand for coordination is particularly acute where continued disjunction of subsistence activities increasingly threatens the stability or survival of the larger population (cf. Carneiro, 1970). For contemporary hunter and gatherers, whose resource base is inherently inelastic, and for whom the exclusive possession of a specific section of land does not represent a viable adaptation to the exploitation of mobile resources (cf. Lee, 1972: 139-140), increases in population density are likely to lead to increases in social cooperation and organization, and to associated adjustments in per capita work loads. The evolution of more complex human communities comprises in part the evolution of organizations and institutions which assure a minimum productivity, and which protect the basis of that productivity from internal and external threat.²

Continued reliance upon a shrinking forest habitat has demanded that the net-hunters hunt cooperatively and employ a technology (nets) and a social organization (see Turnbull, 1965b: 298) which facilitate the integration of labor

² Organizations as diverse as those which control the construction, operation, and maintenance (including defense) of complex irrigation systems and those which police large-scale buffalo hunts constitute such stabilizing mechanisms.

at a more inclusive level.³ These characteristics of net-hunter bands suggest that the population pressure experienced by them has been greater than that sustained by archer bands, despite the fact that it is the latter that inhabit those areas of the forest most affected by the encroachment of non-Mbuti populations. While reliable demographic data which would resolve this apparent paradox are not available, some relevant information does exist which may clarify the issue.

Turnbull (1965a: 317, Map 2) recorded the locations of 65 Mbuti camps which he visited; while about 50 of these were net-hunter camps, only about 15 were those of archers. Although the representativeness of his sample cannot be determined, Turnbull's survey, in conjunction with the fact that net-hunter camps are generally larger than those of archers, does suggest that the net-hunters comprise the denser of the two populations. Current research on the Mbuti, moreover, appears to reinforce this impression. Tanno (1976: 125) and Harako (1976: 58), for example, report average daily lengths of time expended by net-hunters during net-hunts of 7 hours and 56 minutes and 8 hours and 21 minutes, respectively. By contrast, Harako (1976: 67) reports that, depending upon the method employed, the average amount of time spent per day in hunting by archers may vary between 3 hours and 25 minutes and 4 hours and 18 minutes, but "never exceeded seven hours." Furthermore, while the frequency of hunting by archers is not indicated, Tanno (1976: 114) claims that the incidence of hunting among net-hunters increases with the size of the band, such that larger bands would hunt practically every day. Harako's band, for example, which was larger than that studied by Tanno, not only consumed more time per hunt, but also hunted more frequently.

The substantially greater labor cost of net-hunting is recognized even more clearly when the greater size of the net-hunting unit (which is distinct from the entire band) is considered. Whereas among the archers, only adult men participate in the hunt, net-hunting incorporates and fundamentally depends upon the labor of women (cf. Tanno, 1976: 114-115), and at times even of children and the elderly (Hart, 1978: 337). The labor power provided by women is critical to the success of the net-hunt: while Tanno (1976: 114) claims that the number of women participating in a net-hunt was "always somewhat less than the number of men," Harako's (1976: 60, Table 4) data indicate that for the band he studied the number of women participating normally exceeded the number of men. Moreover, due to the exhausting nature of net-hunting, fatigue, particularly of the women, restricts its performance (Tanno, 1976: 114). Thus, while the net-hunters have achieved a more abundant and stable hunting return than have

³ See Turnbull's (1961: 94-108) discussion of the "crime of Cephu," which he describes as "one of the most heinous crimes in Pygmy eyes, and one that rarely occurs" (Turnbull, 1961: 109). Cephu, a member of the Epulu net-hunting band, was discovered secretly placing his net ahead of the nets of the other members of the band. The seriousness of Cephu's crime in the eyes of these Mbuti was symbolized by the permission given everyone (even children) since that event to act disrespectfully toward him. This incident clearly demonstrates that pressures exist among the net-hunters for cooperation in the hunt.

the archers (Harako, 1976: 84), they have done so only at the cost of a considerable increase in the total amount of labor expended in hunting activities. Due to the problems inherent in coordinating the activities of larger net-hunts, these net-hunting units encounter greater difficulty in maintaining a sufficient number of separate net-casts per day (cf. Tanno, 1976: 115). Consequently, they require reserve labor power in order to allow net-hunting to occur nearly every day (Tanno, 1976: 114). The amount of energy consumed by the net-hunters in their subsistence activities, then, is considerably greater than that reported for other hunters, such as the Bushmen (cf. Lee, 1968; Tanaka, 1976), and they scarcely qualify for Sahlins' (1968) designation as the "original affluent society."

The explanation for the absence of such indications of population pressure in the subsistence activities of the archers, who inhabit that region of the forest most affected by the encroachment of non-Mbuti populations, appears to lie in the relative dependence of net-hunters and archers upon the natural productivity of the forest. Putnam (1948: 333) and Turnbull (1965b: 301) have claimed that, while the net-hunters depend for their survival primarily upon the productivity of the forest, the archers are dependent principally upon the garden produce they receive from the agricultural villages, in exchange for protecting the gardens from the ravages of game animals, particularly elephants (Putnam, 1948: 330). Hence, while the natural productivity of the forest has experienced a decline, forcing many hunters to band together in order to sustain and stabilize their hunting return, a new niche appears to have emerged, enabling some hunters to reduce their dependence upon the shrinking forest and benefit instead from the increased productivity made available by the village gardens. In addition, these hunters have profited from the new level of productivity without becoming involved in the heavy labor upon which it is based (cf. Turnbull, 1961: 172-173; 1965a: 39).

Harako (1976: 86) disagrees with the claim of Putnam and Turnbull that the net-hunters are less dependent upon the gardens of the agricultural villages than are the archers. Some of this disagreement, however, may be a function of the events that have occurred since the research of Putnam and Turnbull. The years since their research have witnessed an intensification of outside encroachment upon the Ituri Forest. The most significant new element, beginning around 1958 (Hart, 1978: 332), has been the growth in the commercial sale of meat caught by Mbuti hunters. Because of the greater abundance and reliability of their hunts, the net-hunters have been the focus of the meat trade. Commercial trading followed 72% of the 85 net-hunts recorded by Hart (1978: 343), and accounted for 39% of the total meat resources caught. For one 26-day period these Mbuti hunted practically every day and traded nearly half (47%) of the total meat captured to commercial traders (Hart, 1978: 337). Hart (1978: 340) even suggests that on days of poor hunting the Mbuti may be left with less than adequate meat resources for their own consumption. The intensity of the commercial trade has become so great, at least in some areas, that Hart (1978: 347)

noted a 32% decline in hunting return over 3 years for three camps bordering on the more densely settled portion of his study area, and the Zaire government has imposed a ban on meat trading during the heavy rainy season in order to protect the principal game populations during their breeding season (Harako, 1976: 43; Hart, 1978: 342). The recent decline in the number of game animals apparently also has led to increasing band movements over larger ranges, thus increasing the incidence of conflicts between bands (Hart, 1978: 341), as well as to the adoption of insipient agricultural practices by the Mbuti (Hart, 1978: 349).

From the perspective of the thesis proposed here, however, a significant difference has existed between net-hunters and archers in their dependence upon village gardens. The reliance of net-hunters upon village gardens has not replaced their dependence upon the forest; rather, the incorporation of female laborers into the net-hunt, which has been intensified by the recent growth in commercial meat trade, has curtailed their participation in food-gathering activities and necessitated the purchase of vegetable foods from the village. While the calories consumed by net-hunters may be more or less evenly divided today between the products of the forest and those of the garden (cf. Hart, 1978: 340), acquisition of all of these calories depends ultimately upon the productivity of the forest since the garden products must be obtained through exchange with meat. The archers, on the other hand, obtain their produce through services which are energetically cheaper to provide than is the meat traded by the net-hunters. The sufficiency of the return provided to the archers in exchange for protecting the village gardens is suggested by the fact that, even though the archers acquire much less meat in the hunt than do the net-hunters, they apparently experience little pressure to spend any more time hunting than they already do.

The explanation herein proposed for the persistent distinction between the net-hunters and archers may be summarized. As a result of the continuous invasion of the Ituri Forest by expanding populations of swidden agriculturalists, primarily from the east, the size of the Mbuti population has been gradually increasing relative to its available resources. Consequently, those Mbuti who have retained primary dependence upon the natural productivity of the forest have had to band together, adopt a new technology, and increase their hunting effort in an attempt to ensure a sufficient hunting return. At the same time, the encroaching populations have allowed a distinct niche to be created, in which certain hunters have been able to obtain some of the produce from the village gardens through energetically cheap labor exchanged through individual trading relations. Recent developments, while increasing the reliance of net-hunters upon domesticated food supplies, have done so by augmenting their dependence upon the natural productivity of the forest, thus intensifying existing evolutionary developments. However, due to the current depletion of game resources, continued expansion of the commercial meat trade may undermine the future viability of the Mbuti hunting adaptation within the Ituri Forest.

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