Beyond productivity: The socio-cultural role of fishing among the Baka of southeastern Cameroon
Au delà de la productivité : rôle socioculturel de la pêche chez les Baka du Sud-Est du Cameroun

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Introduction

People living in the tropical forests of the Congo Basin present a diversity of subsistence strategies which can be globally categorized in three main groups that relate to habitat: the fishers along the rivers, the farmers-fishers in swamp forests, and the farmers-hunters in terra firma forests (Bahuchet 1989). In this latter ecosystem, populations practicing slash-and-burn farming often cohabit with populations more involved in the exploitation of wild resources, historically grouped under the term hunter-gatherers. Despite the term, such populations also practice a high diversity of fishing activities that reflect complex ethnoecological knowledge and practices and symbolic and social roles (Oishi 2006, Dounias 2011, Oishi 2014). However, and although hunter-gatherer populations have been intensively studied in the last decades by anthropologists, ethnoecologists and human ecologists (see Hewlett & Fancher 2009 for a review of the literature), the place of fishing has long been overlooked, potentially eclipsed by the admitted term of hunter-gatherers. The overlook is particularly relevant for the area of Southeastern Cameroon, where most Baka live. Researchers have studied the relations of the Baka with their environment by looking at the process of adoption of farming (Leclerc 2012), the central role of hunting in economic, social and spiritual aspects (Joiris 1998, Hayashi 2008, Yasuoka 2014, Duda et al. accepted), and the economic and cultural importance of wild resources (Letouzey 1976, Dounias 2001, Hattori 2006, Brisson 2011), this last topic marked by an intense debate on the wild yam question (Bailey et al. 1989,

Studies focusing on subsistence strategies among hunter-gatherer societies have emphasized the importance of the sexual division of labor (Dahlberg 1983, Marlowe 2007). Taking an evolutionary approach, such research has often aimed at explain why men are commonly more involved in hunting while women are more involved in child care and gathering. Such research has combined approaches related to household economy, productivity, mating, reproduction, and child care (Hurtado et al. 1985, Bird 1999, Bliege Bird & Bird 2008, Crittenden et al. 2009, Gurven & Hill 2009, Codding et al. 2011), but assessing also differences in men's and women's involvement in subsistence activities by looking at the trade-off between productivity and reproduction. However, few researchers have analyzed the sexual division of labor by looking at the symbolic and social roles involved into the sexual division of labor, and except the work conducted by Joiris (1992) about the role of women in hunting activities, none has been done among the Baka.

The goal of the paper is to give a broad overview of the characteristics of fishing among the Baka. We do so taking into consideration different dimensions present in Baka fishing activities. After introducing briefly our case study, in the first substantive part of this paper, we analyze the place taken by fishing activities within the Baka livelihood, productivity, and diet. The second part introduces the different ecological knowledge and practices related to fishing activities. Finally, the third and last part further explores the social and cultural aspects of fishing activities, with a particular emphasis on dam-and-bail fishing.

Case Study

The Baka, Oubanguian speakers, are a group of about 30,000 individuals mostly living in southeastern Cameroon (Leclerc 2012). Until recently, they displayed a high mobility and exclusively depended on hunting and gathering, and on regular exchanges of products with their farmer neighbors, all Bantu-speakers. In the turn of the 1950s-60s, their livelihood started to drastically change. Driven by the government-led sedentarization program, the influence of the missionaries, and the progressive decline of large game, the Baka started to gradually abandon their forest camps to establish themselves in villages along the logging roads (Leclerc 2012). With sedentarization, the Baka got greater access to health services, to schooling, and to the market economy (Althabe 1965, Kamei 2001), and they also started to engage in agricultural work by opening their own plots (Leclerc 2012). In the last decades, with the development of new extractive activities in the area (Ichikawa 2001), the Baka have faced increasing pressures from logging and mining companies, and bushmeat and natural resources traders, but also from government’s initiatives such as the creation of natural parks (Ichikawa 2006). All these factors have led to the reduction of Baka access to their territory and natural resources, especially to game and wild edibles (ichikawa 2006, Lewis & Nelson 2006). Nowadays, albeit with many variations (Yasuoka 2012, Gallois et al. 2016), most Baka live in permanent settlements and are engaged in agricultural work, both cultivating their own plots and providing wage labor for their neighbors. Nevertheless, the Baka continue to be highly dependent on wild resources and very mobile going-back-and-forth between villages and forest camps.
Mobility is mostly organized around the agricultural calendar and the extraction of non-timber forest products (NTFP). Thus, the longest continuous presence of the Baka in forest camps occurs during the major rainy season, sɔ̄kɔ̀dṳŋa, from September to November, when long-term hunting expeditions take place, and at the beginning of the major dry season, yākā, in December, period generally dedicated to NTFP harvesting. During the rest of the year, i.e., from January to August, the Baka mostly live in the village where they dedicate most of their time to agricultural work. During such period, they only conduct one-or two-day expeditions, although expeditions might last longer during the period of fructification of some coveted NTFP: the wild mango — pāyō and pēkē (Irvingia excelsa and I. gabonensis) — and the African oil bean seeds — mbālākā (Pentaclethra macrophylla) — highly appreciated, valued and nowadays traded by the Baka.

In such context, subsistence livelihood strategies are based on the household and follow a sexual division of labor (Joiris 1998, Leclerc 1999). Women are more involved in housekeeping, childcare, agriculture, fishing, and the gathering of daily food. On their side, men are more involved in cash generating activities, such as agricultural work for farmer neighbors, timber extraction, the gathering of commercial NTFP, and hunting.

At a social level, like among other hunter-gatherers living in the Congo Basin, the social organization of the Baka is structured around the nuclear family (Joiris 1998, Leclerc 1999). Although sedentarization led to the creation of traditional chefferies (chiefdoms) for which village leaders are elected to communicate with local authorities (Robillard 2010), the role of chief appears as socially superficial and the level of egalitarianism among the Baka remains high, following an acephalous organization along with a fundamental respect for individual autonomy (Joiris 2003).

**Research setting and methodology**

This research was conducted among several Baka communities of southeastern Cameroon, in the districts of Lomié and Messok, in the Haut-Nyong Department, in a territory also inhabited by the Nzime, a Bantu-speaking population. Most data come from two communities (referred to as village A and village B respectively) where we lived for 18 months (February 2012 to May 2014). Each village contained about 300 inhabitants (of which about half were children). Before starting data collection, we obtained the free prior and informed consent (FPIC) from both villages’ representatives and from every participant in the study. As the study also included children, we obtained the consent of the parents. This study adheres to the Code of Ethics of the International Society of Ethnobiology and received the approval of the ethics committee of the Universitat Autònoma de Barcelona (CEEAH-04102010).

**Methodological approach**

We used a mixed-method approach combining qualitative and quantitative data collection. We collected qualitative data from adults and children using semi-structured interviews and participatory observation through interactions with as many households as possible. While living in the villages, we followed local socio-cultural norms, e.g. on sharing, cooking and children caretaking; we also participated on household’s daily life sharing with them their daily activities, accompanying them during forest expeditions,
and to their agricultural plots. We alternately worked with a Baka and a Nzime translator who were fluent both in French and Baka language.

**Fishing involvement and productivity**

To assess Baka involvement in fishing activities, we collected data on the daily activities performed by adults in both villages. Between August 2012 and August 2013, we visited weekly every household in the sample and conducted interviews with all the adults present. We asked respondents to report the main activity they had performed during each of the two days preceding the interview. These activities were grouped into 17 different categories. When the respondent reported to have been fishing or hunting, we asked him/her to report the quantity and composition of fishing/hunting products s/he had obtained. For hunting products we also asked about the species, the sex and the age category (adult/juvenile) of the animals killed. We converted these data into biomass using previous insights from the literature (Gautier-Hion et al. 1999, Kingdon 2001).

We estimated an individual’s involvement in an activity as the ratio between the number of times the activity was mentioned and the total number of interview-days. Therefore, the variable that captures an individual’s involvement in an activity took a value between 0 and 1, where the sum of the involvement in the 17 activities equals to 1. A total of 4,447 observations were conducted with 272 individuals (114 men and 158 women).

To estimate fishing and hunting productivity, we converted the quantity in weight and considered the weight of products brought home after every expedition. In the case of fishing, we used the average weight of the reference unit (a packet made of leaves), which was estimated at 100 grams (estimation made on 20 different packets). In the case of hunting, we evaluate the weight of game brought home by using published data to estimate animal’s weight according to the age category and the sex of the animal (Gautier-Hion et al. 1999, Kingdon 2001).

We first analyzed the average quantity of fishing products brought home, as well as the total weight brought to the village by all the interviewees. We also compared results according to gender and season. We tested whether the average of fishing products brought home varied from men to women using Wilcoxon ranking tests. Seasonal variations were tested using Kruskal ranking tests. We used the same analysis for hunting productivity.

**Fish in diet**

To assess the contribution of fish into the Baka diet, we led a dietary diversity survey twice every quarter. We used 24 hours recall interviews on all the food and drinks consumed. We then coded all the foods enumerated into 17 food groups, following the *codex alimentarius* of the FAO (Food and Agriculture Organization of the United State & World Health Organization 2016). A total of 2,296 surveys were realized with 269 individuals (156 women, 113 men).

Based on these data, we estimated Baka dietary diversity by calculating the frequency of every food group for men and women separately. We then calculated the proportion of fish in diet by calculating the number of times the individuals reported having eaten fishing-related products divided by the number of observations (number of days and
individual had provided diet data). Then, we compared the ratio of fish-product per meals for the different seasons. Finally we compared the proportion of fish and meat-products.

**Fishing knowledge**

To assess the ichthyodiversity known by the Baka, we used a free-listing method. Specifically we asked individuals to name all the taxa they know belonging to the category **si**, a generic term for fish and shellfish. The free-listing was conducted with 51 individuals, including 25 adults (12 men and 13 women) and 26 children above the age of 5 (14 boys and 12 girls). We chose to ask children to get a broader overview of the local ichthyodiversity, as previous studies have shown that Baka children might hold specific ecological knowledge (Gallois *et al.* in press). The scientific correspondences of fishes and shellfishes have been established based on the literature (Brisson 2010, Paulin 2010, Vivien 2012). As some names reported did not appear in any previous publication, we verified previously not-reported names by asking ten adults and ten children to confirm that such lexems actually corresponded to fishes or shellfishes.

We first calculated the saliency of each lexem reported, which is an index that captures the cultural importance of an item across all the reported lists (Bernard 1995). Then, to assess whether there were differences in the number of lexems reported according age and gender, we compared the average number of lexems reported separately, first between adults and children, and then between women and men, as well as between boys and girls. We tested the differences in the number of lexems reported by using a Wilcoxon ranking test. For each group, we compared both the total and the average number of lexems reported by the interviewees according to gender and age (children versus adults). We also explored and compared the contents of such lists by looking at the differences between men and women, as well as between children and adults.

**Fishing practices**

To assess the specificity of the fishing practices, we participated in several fishing expeditions performed by adults and children. The first author, as a woman, was able to join the group of women performing dam fishing. Beyond her qualitative observations, the author systematically collected the total duration and duration of the different parts of the activity and the number of participants, along with information about age, gender and kinship relation. During the performance of each expedition, she also collected data on individual’s involvement in each part of the activity, and children’s activities. Data were gathered during ten fishing expeditions: eight in village A and two in village B. The second author, as a man, participated in men’s fishing expeditions. As there was not any expedition made by the Baka for fishing with ichthyotoxins during our stay, no observation with this technique was documented. However, ethnographic data collected among Baka adults during interviews allowed us to complete and update information regarding poison fishing.
Commented Results

Fishing among the Baka

Time invested in fishing

In terms of time investments, fishing does not occupy a central place among the Baka. From a total of 4,447 observations conducted with 272 individuals, Baka reported having performed fishing activities only in 3% of the observations versus 7% and 11% for hunting and gathering respectively. Agriculture was the most frequently performed activity, both in Baka and Nzime swiddens, and was reported in 37% of the observations. In general, the Baka reported to fish mostly in groups (they went alone only in 7% of the reported observations), which contrast with hunting activities that the Baka reportedly performed alone in 42% of the reported observations.

Baka’s involvement in fishing activities highly varies according to gender and season. Women are more involved in fishing than men, as women reported having fished in 5% of the observations while men reported having fished in only 1% of the observations (Figure 1). Moreover, the Baka mainly fish during the major dry season, when “there is plenty of fish” and “they are the fattest”. This seasonal involvement is especially relevant among Baka women, who reported fishing in 10% of the observations collected during this season (Figure 1). Baka do not regularly fish during the minor rainy season, because, as they reported, this is the fishes’ reproductive period.

Figure 1: Baka adult main daily activities (in %) according to gender and season

The reported Baka low involvement in fishing matches previous reports in the Baka literature (Yamauchi et al. 2000, Sato 2014). Thus, among the Baka, Vallois and Marquer (1976) observed that, even before the 1950s, fishing was a secondary activity, even when
very fish-bearing streams were present in the surroundings, what led the authors to conclude that the Baka just “do not like water”. The same result has also been found among other African hunter-gatherer groups who, with the exception of the Batwa (Pagezy 1986, 1992), do not regularly practice subsistence fishing even when they live close to large rivers (Bahuchet & Thomas 1983, Ichikawa 1987, Hewlett 2014a, Ngima Mawoung 2015).

This low engagement in fishing activities has to be explored through the scope of the cultural value of both fishes and fishing practices. First, fish do not benefit to the high cultural and symbolic significance that the Baka attribute to meat, a fact also shared among most Congo Basin forests dwellers (Garine 1990). According to the Baka semantic categorization, the generic sì category is not included in the só category referring to edible animals. The high value of game is mirrored by a specific term related to meat hunger pëñë, which does not include fish products. Indeed, even if the Baka accept cutting meat scarcity with fish (Bahuchet 2014), fish consumption is not considered to end with meat-hunger. Then, beyond the differentiation between fish and meat, we also observe a contrast in the cultural significance of the context of resource acquisition that might explain men’s low involvement in fishing. In essence, hunting is a socially valued activity: the encounter between the hunter and the animal not only requires individual courage, but also the hunter’s ability to engage with forest spirits, a relationship leaned on mythological founding principles, explaining the origins of wildlife (Brisson 1981-1984, Joiris 1998, Köhler 2000) and transmitted in the folk narratives likänë. Differently, fishing is lesser embedded into a spiritual relation with forest and spirits, for which is socially less valued.

**Fishing products in individual productivity and diet**

Baka overall fishing productivity is low, especially when compared to hunting productivity. The average weight of fish extracted by person during an expedition was 0.44 kg, while the weight of game extracted from a hunting expedition was 10 times more (4.4 kg). Consequently, meat is much more present in the diet and is reported in 29.7 % of the observations, while fishing products are reported only in 11.4 % of the dietary observations. Whereas the proportion of fishing product in the diet is similar between genders, the proportion of hunting products varies according the gender (33.7 % for men and 21.2 % for women) (Figure 2).

**Figure 2: Proportion (in %) of the different categories of food consumed by Baka women and men**

<table>
<thead>
<tr>
<th>Food group</th>
<th>Description</th>
<th>Proportion (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Females</td>
</tr>
<tr>
<td>White variety and nuts</td>
<td>Cassava, peanuts, cocoyam (Manihot esculenta), bananas, pine nuts</td>
<td>90.0</td>
</tr>
<tr>
<td>Dark green/yellow vegetables</td>
<td>Collard greens, bitter leaves (Lactuca indica), spinach, African spinach</td>
<td>88.5</td>
</tr>
<tr>
<td>Onions and garlic</td>
<td>Shallots, onions, shallots, shallots, garlic</td>
<td>83.0</td>
</tr>
<tr>
<td>Leafy vegetables, roots, tubers</td>
<td>Kola nuts, sweet potatoes, bananas, probes</td>
<td>31.2</td>
</tr>
<tr>
<td>Fish and fish products</td>
<td>Fish, fish, fish, fish, fish</td>
<td>21.2</td>
</tr>
<tr>
<td>Eggs, and other products</td>
<td>Eggs, eggs, eggs, eggs, eggs</td>
<td>17.3</td>
</tr>
<tr>
<td>Fruits</td>
<td>Mangoes, pineapples, sweet potatoes, avocados, peaches</td>
<td>11.4</td>
</tr>
<tr>
<td>Beverages</td>
<td>Coca-cola, tea, coffee, beer</td>
<td>6.8</td>
</tr>
<tr>
<td>Other meat</td>
<td>Liver, beef, fish, or other meat</td>
<td>6.0</td>
</tr>
<tr>
<td>Spice and condiments</td>
<td>Chilies, salt, onions, garlic, chili powder, kava kava, kava, kava, kava,</td>
<td>48.0</td>
</tr>
<tr>
<td>Grains</td>
<td>Grains, rice, millet, beans, plantains</td>
<td>0.1</td>
</tr>
<tr>
<td>Beverages</td>
<td>Cocoa, coffee, tea</td>
<td>1.2</td>
</tr>
</tbody>
</table>

The quantity of fishing products brought home varies according to gender and season. In both villages, women brought at least the double of the quantity of fishes brought by men (Figure 3). The contrast is sharper during the major dry season, when women brought four-fold the amount of fish brought by men (49 kg by women versus 11 kg by men). As
shown in Figure 4, the difference is explained by the frequency of fishing expeditions, as the average quantity of fishing products brought home by men and women does not vary.

Figure 3: Total weight estimates (in kg) of the fish captured in both villages, according to gender and season

![Graph showing total weight estimates by gender and season.]

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Men (kg)</th>
<th>Women (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Rainy</td>
<td>45</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Major Dry</td>
<td>113</td>
<td>40</td>
<td>73</td>
</tr>
<tr>
<td>Minor Rainy</td>
<td>42</td>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>Minor Dry</td>
<td>8</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>

N WOMEN = 88; N MEN = 24

Figure 4: Average weight of fishing products extracted during a fishing expedition (in g) according to gender and season

![Graph showing average weight of fishing products by gender and season.]

<table>
<thead>
<tr>
<th>Season</th>
<th>Gender</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Wilcoxon ranking test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Rainy</td>
<td>Women</td>
<td>45</td>
<td>15</td>
<td>30</td>
<td>0.68</td>
</tr>
<tr>
<td>Major Dry</td>
<td>Men</td>
<td>7</td>
<td>70</td>
<td>100</td>
<td>-1.10**</td>
</tr>
<tr>
<td>Minor Rainy</td>
<td>Women</td>
<td>113</td>
<td>40</td>
<td>100</td>
<td>3.23**</td>
</tr>
<tr>
<td>Minor Dry</td>
<td>Men</td>
<td>24</td>
<td>660</td>
<td>220</td>
<td>-0.74</td>
</tr>
</tbody>
</table>

NOTE: *p<.1; **p<.05; ***p<.01 TO THE WILCOXON RANKING TEST ON THE AVERAGE BIOMASS OF FISHING PRODUCTS BROUGHT HOME RESPECTIVELY BY WOMEN AND MEN

24 Fishing productivity also varies according to season, especially in the case of women. Women bring home more fish during the major rainy season (almost 580 g) and less during the minor dry season (almost 280 g) (results of Kruskal Wallis test -chi² with ties-r=11.65, p<.01). Similarly, men bring home more fish during the major dry season (almost 660 g) and less during the minor rainy season (almost 220 g) (results of Kruskal Wallis test -chi² with ties-r=7.68 p<.1) (Figure 4).

25 Despite the low time investment in fishing and the relatively small contribution of fish to Baka diet, our analysis reveals an important pattern worth considering concerning subsistence strategies. Men’s involvement in fishing and fishing productivity vary according to season, with the highest involvement occurring when the hunting productivity is lowest (see Figure 5). Indeed, the average of biomass extracted from hunting expeditions also varies seasonally, with a higher productivity during both the minor rainy and dry seasons (respectively almost 7.8 and 7 kg), while the lowest productivity occurs during the major dry season (3.6 kg on average) (Figure 6).

Figure 5: Average weight (in kg) extracted during hunting expeditions according to season

![Table showing average weight extracted during hunting expeditions.]

<table>
<thead>
<tr>
<th>Season</th>
<th>Gender</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Rainy</td>
<td>Women</td>
<td>25</td>
<td>1.50</td>
<td>1.40</td>
</tr>
<tr>
<td>Major Dry</td>
<td>Men</td>
<td>161</td>
<td>17.11</td>
<td>121.6</td>
</tr>
<tr>
<td>Minor Rainy</td>
<td>Women</td>
<td>109</td>
<td>5.97</td>
<td>3.87</td>
</tr>
<tr>
<td>Minor Dry</td>
<td>Men</td>
<td>8</td>
<td>0.97</td>
<td>0</td>
</tr>
</tbody>
</table>

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Fishing might then be seen as a complementary strategy to hunting, providing proteins in period of meat scarcity, as already reported by other authors (Sato 2014). This ‘alternate’ acquisition of resources is obviously helped by the incidence of seasonality on both practices. In the major dry season, the dry forest soil makes difficult the identification of animals’ tracks, a necessary condition to set snares or pursuit game. By contrast, the low stream levels facilitate dam fishing. Although this practice is primarily performed by women, Baka men’s interest in it rises as their ability to succeed in hunt decreases. In this sense, we might suppose that such gendered division of subsistence activities might be subjected to changes in the future years given the severe biodiversity decline, and notably mammals, due to the current pressures on forest resources in this area (Ichikawa et al. 2016).

**Fishing knowledge and practices**

**Specific fish diversity**

The Baka generic term sī, employed during the free-listing, embeds both fish and shellfish. The Baka reported a total of 36 lexems related to fish and shellfish, including 20 lexems reported more than once. The most salient lexems are ndengë (Brycinus kingsleyae), kaanjì (shrimps), ngbaàkà (Haplochilus sexfaciatus), nția (Siluridae) and mbosè (Momysus macrodon) (Figure 7). Interestingly, these five most salient lexems are also the three most frequently fished species.
Then, both the number and the content of the lexems reported vary according to respondent’s gender and age. In general, women and girls reported less lexems than men and boys. Surprisingly, even if women fish more often than men, the total number of lexems reported by women is lower than the total number reported by men. In general, women reported a total of 17 lexems versus 24 reported by men. Girls reported a total of 13 lexems versus 20 reported by boys (differences are significant according to a Wilcoxon Ranking test $z=-2.9$, $p<.01$) (Figure 8). Differences between women and men also exist in relation to the average number of lexems reported, with women reporting an average of 7 lexems versus 10 reported by men ($z=-2.39$, $p<.05$); and with girls reporting an average of 5 lexems versus 7 reported by boys ($z=-2.27$, $p<.05$). However, some lexems were gender-specific: 12 lexems were exclusively reported by males and four lexems were exclusively reported by women.

The fact that some lexems were only reported either by men or by women reflects specificities of women's and men's fishing: men and women do not use the same fishing techniques, the same ecological settings, and do not target the same species. As argued by other authors (Howard 2003, Pfeiffer & Butz 2005, Díaz-Reviriego 2016) the gender differentiation in the use of natural resources helps explain gendered knowledge differences. Therefore, it is not surprising that men and women somehow differ in their ethnoichthyological knowledge. However, further research is needed to explore the specificity of men's and women's knowledge regarding other aspects, such as their identification abilities, or their knowledge related to the ethology of the different species.

It is also interesting to note that, since their early age, children seem to know a large amount of lexems. Overall, children reported more than 70 % of the number of the lexems reported by adults (22 versus 30). Moreover, the five most salient fish names listed by children are the same than the five most salient names listed by adults. However, some
differences exist: children reported an average of 6 lexems while adults reported 8 ($z=-2.58, p<.01$). Differences in the number of lexems reported by boys and men were statistically significant ($z=-2.61, p<.01$), but differences between girls and women were not ($z=-1.53, p<.13$). This is congruent with previous insights reported elsewhere showing that children in hunter-gatherer societies present a precocious acquisition of ecological knowledge (Soengas López 2010, Zarger 2010, Demps et al. 2012, Hewlett 2014a), a finding also reported among the Baka (Gallois 2015). Our results also show that children's knowledge regarding fish and shellfish reproduce the division of knowledge observed among adults, and supports the idea that the gender differentiation of knowledge occurs early during childhood, in this case at least since the age of five.

**Fishing practices**

The three fishing practices observed in the studied villages are hook fishing, poison fishing, and dam fishing, in accordance with what has been also reported by previous scholars (Sato 1998, Hattori 2005, Hattori 2014). However, although some observations of net fishing have been reported among the Baka in previous studies (Hayashi 2008), none of our interviewees reported practicing this technique. The three different techniques present in our studied villages are not performed at the same frequency. For instance, in village A, 167 out of the 180 observations of fishing activities corresponded to fish bailing, 11 to hook fishing, and 2 to poison fishing. Fishing practices are also gender-specific, dam fishing clearly being a women-orientated activity (87% of the observations of dam fishing in village A were reported by women). Poison fishing was equally reported by men and women and 64% of the observations of hook fishing were reported by men.

**Hook fishing**

Hook fishing (kpî njɛ̆njɛ̆, literally “launch the hook”) is commonly performed alone or in duo, as the success of hook fishing depends on quietness and discretion. When it is performed in duo, the partners generally stop at different levels of the river, progressing together but keeping a reasonable distance one from each other. In general, hook fishing targets specific species (mainly ntía and ndéngé, see Figure 7), which depends on the size of the available hook, the thickness of the twine, and the type of pond or river chosen. The low occurrence of such practice might be related to the size of the rivers in the area, which do not allow to access to big fishes (compared to others areas like the Dja river) and also probably because of the difficulty to buy hooks (njɛ̆njɛ̆) and nylon threads (kù nà njɛ̆njɛ̆). The fishing stick is made with a stem, similar to the ones used for snaring, while a piece of wood, mostly Raphia sp., is used for the float. With his machete, the fisher rummages the mud of the riverbanks in search for worms to serve as baits. Old Baka and Nzime reminded that, in the past decades, hooks and wire were also made with wild vegetal materials found directly in the fishing spot, but were more fragile than the manufactured nylon thread used now.

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Children, mostly boys, generally accompany their father. Through observation and imitation, the child would learn this practice. Most of the time however, the intervention
of adults in children's activity is scarce. When a child performs in presence of one of his parents, the adult would intervene only after the act is completed. Negative feedbacks are rare though. If the child makes it in an inefficient way, the adult would invite him/her to observe again.

**Poison fishing**

Poison fishing involves the use of plants containing ichthyotoxins prone to intoxicate fish. The bark of *bòlòŋgò* (*Zanthoxylum heitzii*) and the fruits of *bùkú* (*Grewia coriacea*) are among the most used poison sources. This activity is usually performed by men and women indifferently, but in small groups or couples. When a fishing spot is found, a basin is made with mud (as in dam fishing). Then plants are poured in the water, or a basket containing the plants is shaken in the water, and pressed to release the exudate. Later in the day, the participants collect the fishes dazed by the poison further downstream. This fishing practice requires that the entire village is aware of when and where will take place, to clean and eviscerate rapidly the captured fish, but also to avoid that people drink the water downstream. As reported by our informants, this activity is not performed too often, given its non-negligible impact on water resources. Indeed, during our interviews, some Baka mentioned the unsustainability of this practice on the local ichthyodiversity. As reported by some of them “by using such poison, it might kill all the fish and end up with them, because it might not let fish to reproduce between themselves”. This fact might be explained by the recent changes occurred in this practice. Indeed, as reported by the Baka and the Nzime, as well as by previous scholars (Joiris 1997), naturally ichthyotoxic plants that are known to only daze the fish are being increasingly replaced by industrial chemicals, that are hijacked from their primary pesticide function, and that will indiscriminately kill the ichthyofauna. This abusive use of diverted pesticides will engender dramatic effects on the inland water resources and, incidentally, on human health. At the moment of our fieldwork, none of our Baka interviewees reported having used chemical for fishing. However, their trivialized use throughout the region by other less scrupulous fishermen might have influenced this now negative perception by the Baka of natural ichthyotoxic plants traditionally used for poison fishing.

**Dam fishing**

The Baka also perform dam fishing *ngúmá*, also known as dam-and-bail fishing. This collective fishing technique is mainly performed in streams during the major dry season and it mostly involves groups of women and children, mainly girls. This practice does not target specific fishes, but rather the different varieties present in the river at the moment of fishing. Because dam fishing is the most frequently performed fishing activities, we will further detail in the next part the process and socio-cultural aspects of this practice.

Therefore, our observations show that fishing activities, practices and knowledge are gender orientated, predominantly as a women domain of knowledge — see for instance the works of Ichikawa (1987), Oishi (2006), Lewis (2014), Hewlett (2014b), Dounias (2016) and Ngima Mawoung (2015) — but also shown that fishing activities are also performed by men, with a strong differentiation in practices and techniques used. The scarce performance of hook fishing and poison fishing is not surprising as both techniques were not known by the Baka and even absent in the area before the 1950s (Vallois & Marquer 1976). They might be seen as an adoption of the past few decades. By contrast to hook
fishing and poison fishing, dam fishing is embedded in Baka culture and might be considered as 'traditional', even if this notion is tricky as we are dealing with hunter-gatherer societies which have long been subject to mobility, displacement, contact, and consequently exposed to continuous influence by other cultural groups.

**Dam fishing**

**Dam fishing expedition**

As dam fishing is a social event, it typically involves some level of coordination. Thus, in the morning, or the day before, women start talking with friends and family, expressing their desire to go fishing. Women, adolescents and girls begin to prepare the equipment: a basket, a machete, an old pot, sometimes a bucket, and their flip flops. Once the sun is high, and most dew is dissipated in the undergrowth, groups of women and children enter the forest to join the first main river. The fishing expedition begins. As every activity taking place in the forest, fishing expeditions are combined with many side activities. For example, on the way out, women and children pick their lunch gathering in their plot some cassava's tubers. In village A, where we did most of our participatory observations, the main river was located about 3 kilometres from the village. In general, while most of the group is walking on the pathway, some children and adolescents explore the forest fringe, in search for anything to gather or to hunt — mushrooms, fruits, mice, Emin's pouched rats gbë (Cricetomys emini). If an Emin's pouched rat is localized, then, the group would stop and some adult women will take part in the unearthing of the prey. As such activity might take a while, the rest of the group may continue its way to the river. On their way to the river, women would also gather some remedies to improve their chance to catch large size fish. These remedies are generally made of crushed bark of trees applied on the skin or on the location of the third eye; while some others remedies are made with some leaves, as for instance from sëngi (Uapaca spp.) or bótüngä (Greenwayodendron suaveolens) that are hung on the hip.

Once the group reaches the river, the first step of the dam fishing begins with the building of the first main dam to retain the upstream water. The solidity and tightness of this dam will condition the length of the overall expedition, as upstream water overflowing the main dam will put an end to the fishing expedition. To establish the first and the other dams, women and children put large dead trunks on the river, add little trunks and branches, and fill the holes with cubes of mud extracted from the riverbanks.\(^1\)
Figure 9: First dam elevation with small trunks

Figure 10: Sealing the dam with mud
Once the dam is finished, women and children organize themselves in little groups of 2–6 people who go down the river to look for another spot. In general, the groups are age-mixed — for instance an adult woman, her sister, and their children will form a group. In general, adolescents and young adults also go in the same group. However, groups are versatile and constantly recomposed. Then, they elevate two new dams repeating the process as the one made for the main dam, and they begin to extract the water between the two dams using a bucket, a pot, or some Marantaceae leaves, mostly ngôngô (Megaphrynium macrostachyum). Once the water is mostly bailed out, fish and shellfish are gathered manually or with the help of the machete. While part of the scooped fish is gathered on the open part of the river bed, most of the big fishes are generally hidden in between of the several plants, branches, roots, and mud but also on some natural cavities in the riverbanks. Gathering these fishes requires taking the main branches and trunks away to dig and to bury hands, arms and even shoulder on the different cavities. Once all accessible preys have been captured, the group progresses further downstream in search for a new spot. During the different expeditions observed, every stop lasted between 45 minutes to one hour. Once different spots have been prospected, women check with one another to decide on the end of the expedition. Sometimes, the decision to return to the village is implicit when the principal dam is overflowed or broken by upstream water. On the way back, the groups generally stop in a river spot close to the village, where they carefully clean up the captured fishes and wrapped them in Marantaceae leaves, mostly with ngôngô and bôôkô Ataenidia conferta). Back home, these vegetal containers are used again to steam cook fish and shellfish together with spices (chilly, salt) or other gathered food resources: mushrooms, kôkô leaves (Gnetum africanum), cassava leaves or cassava's tuber flour). Baked on the coals, these leafy packages give a highly appreciated special aroma to their cooked content.
Figure 11: Fishes wrapped and steam cooked in *Marantaceae* leaves

Figure 12: Fishes and shellfishes after cleaning, ready to be cooked
During dam fishing expeditions, everyone has a quite similar role during all the process (i.e., the dam construction, the water extraction, and the fish gathering). Once they reach the river, adolescents are mainly involved in the establishment of the first dam and younger children hang around, digging the river in little groups. While adults extract water, the most physically difficult task, children start looking at the river to catch fish in groups or alone. When needed, adults ask children to assist them, indicate places to go, and orientate them on how to fish. However, children sometimes also go on their own to find suitable places. The youngest children generally stay close to adults or adolescents and tend to spend their time mimicking adult’s fishing technique by taking a little stream and building little dams, to extract the water and gather whatever they might find. Sometimes, they go further away to look for other preys. We observed different implications of children during such expedition, which largely vary during the activity.

Figure 13: Children searching for fishes in the holes upstream from the dam

Taking generally an entire day, fishing remains low productive: after most fishing expeditions, women and children come back home with only a one-liter container of fish and shellfish. If fishing is so poorly productive from a food security perspective and with regard to the time allocated to these activities, why do the Baka persist in practicing dam fishing? The main reason of this persistence is to find in the socio-cultural dimensions of fishing.

Social-cultural component of dam fishing

As recounted earlier, a dam fishing expedition may be interrupted by several breaks motivated by various foraging purposes; but these interruptions are also frequently caused, by the sharing of stories and gossips. As soon as the last houses of the village are
out of hearing range, women begin to exchange about their familial and conjugal lives, and to confess on doubts, and gossips. These talks are generally punctuated by a myriad of laughs, of typical Baka onomatopoeia and gestures. Sometimes, it happened that the story aroused so much interest that the group will sit and the chat will turn into a theatrical performance. The following narrative, observed and recorded during a fishing expedition, illustrates the social dimension of the activity.

“After thirty minutes of walking in silence, talks began. It was around 9am. On the way to the river, we stop suddenly. Ekomo begins to tell us how her husband, Ayima, went back home last night. A lot of laughs rise from adults and children. Her husband is unanimously discredited by women because he is frequently drunk and not present for taking care of his family; a fact that involves palpable tensions between him and his family in law. As well, Ayima is close to most women in the group, mostly Ekomo’s sisters. Ekomo, generally discrete in the village, suddenly leaves the sitting group and enters the undergrowth. She begins to shout and to gesticulate in a disorderly manner, imitating his drunken husband. She performs several minutes long, encouraged by the laughs and exclamations of the audience.

Then, after pointing the negligence of men, another woman, Medjun confesses that she would get in trouble. She thinks that she fell pregnant from a Bantu-speaking man. Her husband, known to be very jealous, tends to be seriously violent when he gets drunk. Knowing that, all the group begins to work out this situation, trying to find solutions for Medjun not to get in trouble and for her couple not to get broken”. (Excerpt from field notes).

The story exemplifies how important aspects of women's life and community's issues can be assessed during a dam fishing expedition. Most of the topics women discuss during those expeditions relate to marriage, pregnancy, and community conflicts... Medjun’s confession would not have been possible in the village, where too many people, including men might have heard her. The opinion of the elderly women is attentively considered during these discussions, which are generally initiated by younger and active women. Moreover, in such moments, adolescents and children also talk, and give their opinion. In this sense, dam fishing also embeds cultural and social considerations. We stress that the social importance of fishing might stand more in the activity in itself than in the resource obtained.

**Importance of dam fishing for ecological and cultural transmission**

Like children of other hunter-gatherer groups, Baka children acquire most of their ecological knowledge through the observation, mimicry and performance (Hewlett 2014a, Gallois 2015), set in practice during their daily activities and experiences (Gaskins & Paradise 2010, Zarger 2010). Because dam fishing expeditions are accompanied by many side activities, when they participate in dam fishing Baka children acquire an extensive knowledge and know-how that goes beyond fishing activities. Furthermore, dam fishing mobilizes a corpus of knowledge that might be acquired through several pathways of cultural transmission (Hewlett & Cavalli-Sforza 1986), as the composition of the participant group is highly varied (parents, other adults, children) (Gallois et al. submitted). Dam fishing federates members of several social categories and is a unique opportunity for participating children to grab knowledge and experience from a broad range of sources. These sources include their parents, which are generally absent during most of the subsistence activities performed by their children (Gallois 2015).
Dam fishing also promotes the acquisition of other cultural matters, related to child development and more specifically relevant for girls. Dam fishing is an opportunity for women, generally in the absence of men, to share their personal experiences and to have open discussions about intimate aspects of their sexuality. Although sex related issues are not taboo among hunter-gatherer societies in general (Hewlett & Hewlett 2010), the specific context of dam fishing allows women to collectively solve intimate concerns. The sharing of information related to these topics in the presence of children is an important component of child development. In general, most knowledge young children would acquire about sexuality comes first from the mother and, to a lesser extent, from other members of the nuclear family. But collective activities mobilizing a high number of protagonists are essential alternate occasions for children to learn from a broader range of informants. For instance, Fürniss (2005) argues that song and dance performances are privileged grounds for children and adolescents to acquire gestures that echo sexuality (child delivery, lovemaking). Our results show that fishing expeditions also play a role in the acquisition by children of socio-cultural facets of knowledge, beyond the usual nuclear family circle.

**Importance of dam fishing for social cohesion**

Dam fishing also highlights women’s social place and the dimension of power within the overall sphere of Baka community. It reveals the subtle equilibrium between genders, the fundamental position of women as solid bedrocks of the community and the collective dimension of their power.

Referred to as ‘women hunting’, dam fishing illustrates the equilibrium and cooperative strategies between genders in an egalitarian society, in the sense that existing gender differences do not exclude equality (Lewis 2014). As already stressed by Vallois & Marquer (1976) a long time ago, women, after teasing the unfortunate hunter who comes back to the camp empty-handed, would go for fishing in order to bring proteins. Moreover, even if the Baka present a high level of egalitarianism, authorities and other stakeholders generally consider men as holders of the lead voice for their communities. During meetings with outsiders, women, if any, generally sit in the back, are never consulted, and rarely intervene. It is generally only when the meeting is over and out of sight of the outsiders that women are informed and consulted about the content of the meeting. It is thus generally within the intimacy of the homestead that women will persuasively express their opinion and pervasively influence the course of decision. Among the Baka, as well as among many other small-scale societies (Dahlberg 1983), women are the indisputable basis of household’s subsistence and integrity. It is only at this household level that their voice and opinions are taken for granted, but it is forged during collective women assemblies operating surreptitiously, out of sight of men, for instance during collective fishing activities.

Fishing expeditions are essential moments justified by gender differentiation of activity, when women debate freely problems and mutually take decisions that are aimed to maintain the social cohesion of the community. The resilience of Baka lifestyle and livelihood lies in the persistence of subsistence activities. But, as already argued by Joiris (1992), these activities are not solely meant to procure food; they also officiate as basements of social cohesion. This collective strength, which is common trait to all African hunter-gatherer societies (Lewis 2014), is revealed in other aspects of Baka
subsistence economy, including hunting expeditions. Fortune of men during hunting is solicited during songs and dances that are performed by groups of women. The elephant hunting is certainly the most enlightening expression of the role that women play in managing the tenuous agreement between hunters, animals, and supernatural forces. According to the Baka, the success of an elephant hunting depends largely on the group of women initiated to the yéli, who stay in the village and will perform rituals, songs and dances all along the expedition (Joiris 1992). Women take part in the success of several subsistence events carried out by men, without participating actively to the expedition. Therefore, the performance of subsistence activity may imply several other social and cultural aspects essential for the maintenance of the local livelihood.

Conclusion

Among the Baka, and certainly among other forest hunter-gatherers in the Congo Basin, fishing is much more than just a subsistence activity that should be considered through all its social and cultural dimensions. By contrast to cynecetic activities, which are predominantly carried out by men, fishing activities among the Baka are first and foremost performed by women, who are generally assisted by children. With regard to the provision of protein-rich foods, fishing activities do not occupy a prominent position in Baka daily life, when compared to other subsistence activities, like hunting. However, a closer look at the sociocultural outcomes of these activities reveals that fishing expeditions are fundamental channels of children’s education and of women’s empowerment that is essential for maintaining the social cohesion of this forager society.

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NOTES

1. As an illustration of this activity, watch the short documentary film made by Laurent Maget (2016) showing the setting up of a dam during a fishing expedition in the studied area: https://www.canal-u.tv/video/smm/chronique_des_pygmees_baka_peche_au_barrage_campement_du_serpent.23340

ABSTRACTS

For long, the importance of fishing for forest societies has been hiding behind the term “hunter-gatherers”. Whereas the importance of hunting is commonly recognized among such societies, some research has also highlighted that fishing is a primordial resource for subsistence, as well as a key element in the cosmology of several forest societies. However, very few studies — and less so among Central African forest societies — have focused on fishing practices and their social, cultural and symbolic complexity. To contribute to fill this gap, we analyze fishing activities among two Baka communities from southeastern Cameroon, particularly focusing on fishing productivity as well as the ethnoecological specificities and the socio-cultural role of fishing. Data were collected through interviews and systematic observations of fishing activities carried out with children and adults and weekly interviews on productivity carried out during twelve months (n = 272 individuals). Results of this study highlight that fishing, and most specifically dam fishing, a collective women fishing technique, bears a specific place in Baka society. In contrast with hunting, whose value is mostly associated to the cultural valorization of the wild meat, the cultural importance of fishing is largely based on the activity in itself, through its socio-cultural dimension. Dam fishing creates a specific space where, in the absence of men, women create social cohesion through exchanges and sharing. Furthermore, dam fishing represents a privileged space for learning, because it allows not only the transmission of ethnoichthyological knowledge, but also the transmission of other aspects of cultural knowledge that shape the early gender differentiation between boys and girls. This paper aims to highlight
the socio-cultural value of fishing activities in the livelihood of contemporary forest hunter-gatherers.

La place de la pêche dans les sociétés forestières a souvent été occultée derrière le terme de « chasseurs-cueilleurs ». Alors qu’il est d’usage de reconnaître la chasse comme une activité majeure, il a été montré que la pêche est une ressource de subsistance primordiale, tout comme un élément clé de la cosmologie de nombreuses sociétés forestières. Cependant, très peu d’études se sont attachées à analyser la pêche dans sa complexité écologique, sociale et symbolique, notamment au sein des populations forestières d’Afrique Centrale. Dans ce sens, notre étude analyse la place réservée à cette activité au sein des communautés Baka du Sud-est Cameroun, à travers sa productivité, ses spécificités ethnoécologiques ainsi que son rôle socioculturel. Pour cela, cette étude se base sur des données relatives à l’ethnoécologie de la pêche, collectées à travers des entretiens et des suivis systématiques des activités de pêche auprès d’adultes et enfants, mais également par des entretiens systématiques hebdomadaires pendant douze mois afin d’estimer la productivité de cette activité auprès de 272 individus. Nos résultats mettent en évidence que la pêche, et tout particulièrement la pêche au barrage — pêche collaborative entre femmes — témoigne d’une place particulière au sein des Baka. À l’inverse de la chasse, dont la valeur est fondée sur la valorisation de la faune sauvage, l’importance culturelle de la pêche est davantage basée sur l’activité en elle-même, au travers de ses aspects socioculturels. La pêche au barrage crée un espace spécifique, loin des hommes, permettant le maintien de la cohésion sociale par les échanges entre femmes. Par ailleurs, elle représente un espace d’apprentissage d’une grande richesse allant au-delà de la transmission de savoirs ethno-ichtyologiques propres à cette activité, mais également d’apprentissage culturel, tout particulièrement en lien avec la construction du genre. Ainsi, notre étude permet de replacer la valeur socioculturelle de la pêche dans le mode de vie actuel d’une population forestière de chasseurs-cueilleurs.

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