2003 Bonobo Workshop:

Behaviour, Ecology and Conservation of Wild Bonobos

July 22 – 25, 2003
Kyoto University Primate Research Institute
Inuyama, Japan

1st Workshop Final Report

Thompson, J., G. Hohmann, and T. Furuichi (editors)

A Contribution of the Workshop Participants

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Background:

During recent years, the topic of conservation of bonobos and their natural habitat has been addressed in a number of meetings. Most of these meetings were held to encourage discussions between representatives from conservation organizations, potential donors of conservation activities, and delegates from NGO's and Governmental institutions. In contrast, field workers and those who direct field projects are usually underrepresented in such meetings.

In August 2002 Takeshi Furuichi and Gottfried Hohmann met in Kinshasa to discuss their work at Wamba/Luo Scientific Reserve and Lui Kotal/Lomako Forest, respectively. For several decades field research on bonobos was confined to two sites, Wamba and Lomako. Both sites are situated in the northern sector of the species range and are likely to represent a similar part of the habitat spectrum. While these two sites remain the major source of information, work at other sites offer new perspectives into the behaviour and ecology of bonobos. Studies at Lukuru, at the southern limit of the species range, showed for the first time that bonobos are less conservative in their habitat requirements. Although primary lowland forest remains the major type of habitat, occasionally bonobos move out into open savannah.

Recently a number of projects have been established in the Salonga National Park in collaboration with Institut Congolais pour la Conservation de la Nature (ICCN) and new research sites have been undertaken outside the park. Overall independent plans potentially include data collection on the behaviour and ecology of bonobos from multiple sites. Assuming that the different projects at various sites will complement in their research goals, the time had arrived to intensify communication and to encourage collaboration between those who are involved in the different projects. Therefore, Drs Hohmann and Furuichi proposed to organize a workshop to get together those who are actively involved in field research and those who have done so in the recent past to meet for discussions on issues of common interest. In addition, people who are conducting relevant behavioural research on captive bonobos or researchers who have studied topics of chimpanzee or gorilla behaviour that parallels that of bonobo field projects also contributed to the meeting. In 2003 with the return of peace, the establishment of a new government and the emerging return of stability and security it is now possible to return to long-term field presence.

Why hold the workshop at Inuyama, Japan? Initially, the possibility of holding the meeting in Kinshasa was discussed in earnest. However, as the majority of participants were expected to come from places outside the Democratic Republic of Congo (DRC), meeting in Kinshasa would have significantly increased the costs. The majority of contributors were based in Japan. In addition, it was felt that out of respect for the Japanese pioneering contribution to bonobo field research, the open symposium at the conclusion of the workshop should be available to the Primate Research Institute community. This will be the 1st workshop for bonobo field researchers with the implication of continuing to meet on a 4-5 year cycle. Therefore, it was proposed to hold the 1st workshop in Japan and host subsequent meetings at other locations.

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Prof. Uehara and Prof. Mori of the Primate Research Institute, Kyoto University, agreed that the Institute would serve as the general host of the meeting. The Wamba Committee for Bonobo Research and Max-Planck-Institut für Evolutionäre Anthropologie provided rooms where the meeting was conducted, accommodations and meals for participants, travel costs for Congolese participants, and other expenses. Foreign participants, other than those coming from DRC, covered costs to support their own travel. The Primate Research Institute covered the cost for the open symposium on the fourth day.

Introduction:

The aim of the workshop was to find out what the different projects have in common, to discuss the advantages and disadvantages of the different methods used at different sites, and to identify the fields where collaboration between different sites would be most beneficial.

The workshop covered three major topics, each in a daylong session. Those topics included:

- Methods of data collection: As similar topics may be studied at different sites, it is interesting to discuss the following questions: What are the preferred methods and why? Where are the limits of compatibility of data sets that are collected with different methods? Are we able to improve methodologies used to collect field data? (organized by Takeshi Furuichi)
- Cultural behaviour: How can we make an ethogram that can be used for different sutdy sites in common? What is the evidence for the existence of bonobo cultures? What behavioural patterns would we list as candidates of cultures? How can we study culture in bonobos? (organized by Gottfried Hohmann)
- Conservation: What contributions can field projects make to bonobo conservation? What are the requirements to protect bonobos at different sites? What are the potential risks for the survival of bonobos that are involved in research projects? (organized by Jo Thompson)

The focus of the workshop was to (1) report on the latest activities in the field, (2) explore ways to increase compatibility of research, (3) make an ethogram of bonobos and identify candidates of cultural behaviours, (4) identify potential areas for collaboration, and (5) combine efforts to ensure the survival of bonobos in their natural habitat. Accordingly, most time during the meetings was devoted to discussions instead of individual presentations. Eight sites were discussed in detail, including Kokolopori, Lac Tumba, Lomako, Lomami-Lualaba, Lui-Kotal, Lukuru, Parc National de la Salonga, and Wamba.

The number of participants was kept to a minimum and meetings of the first three days were restricted to participants only in order to promote the exchange of

ideas, enhance discussions, and assure flexibility of the time schedule. The fourth day was an open symposium reserved for presentations to the wider audience from the host institute, the Primate Research Institute, offering the opportunity to present the outcome of the closed sessions.

Behaviour Session: abstracts

Cultural behaviour: How can we make an ethogram that can be used for different sutdy sites in common? What is the evidence for the existence of bonobo cultures? What behavioural patterns would we list as candidates of cultures? How can we study culture in bonobos?

Cultural difference of Chimpanzees: Ethogram and Local Behavioral Variations.
Toshisada Nishida, Kyoto University, Japan
Behavioral patterns of chimpanzees could be divided into (1) those common to African great apes, (2) those common to Pan but not to Homo, (3) those common to P. troglodytes but not P. paniscus, (4) those common to P. t. schweinfurthii and P. t. troglodytes, but not to P.t. verus, (5) those common to populations of P.t. schweinfurthii but not to P. t. troglodytes, and (6) those unique to a few local populations of each subspecies. However, this is still theoretical because the ethogram of P.t. troglodytes is virtually unknown. The compilation of ethograms of chimpanzees and bonobos will be important given that the chimpanzee genome project has been begun recently after the human genome project had a considerable success. Moreover, evidence indicating that behavioral differences exist between local chimpanzee populations within the same subspecies has been increasing since wild chimpanzees have been studied in more and more sites across equatorial Africa. For example, a courtship display termed "leaf-clipping", in which a chimpanzee produces conspicuous sounds by repeatedly pulling a leaf between lips by hand thus transmitting his/her intention of mating to an individual of the opposite sex, has been shown by almost all sexually active chimpanzees of Mahale, but not by those of Gombe. Behavioral differences known so far range from food repertoire and food-getting techniques to grooming patterns, courtship gestures, intimidation displays such as rock-throwing gestures, play and vocal communication. Since most of these behavioral differences cannot be explained easily by the environmental differences between the study sites, it is more likely that such behavior was innovated locally by one or a few individual(s) and then transmitted from the innovator to other individuals via social learning process. We are now coming to the age of studying the ethnography of chimpanzees in addition to the study of the ethogram.

Local traditions in bonobos ? A preliminary assessment of behavioural variation.
Gottfried Hohmann[1] and Takeshi Furuichi[2]
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Long-term studies on wild chimpanzees (Pan troglodytes) have revealed extensive behavioural variation within and between local populations. As they live in different habitats across the African continent, they have to cope with a variety of environmental conditions and therefore, the extent of their behavioural variation is not unexpected. Applying criteria such as acquisition by social learning, patterns of transmission within and between groups, and similarity of environmental variables,

some of these patterns are considered as local traditions or cultures. Meanwhile, comparison of the behavioural repertoires of orangutans (Pongo pygmaeus) from different sites reveal a variety of local traditions that are commonly used in one population but absent in another one.
The study reported on here is the first systematic attempt to identify local traditions in bonobos (Pan paniscus) from the two sites where behavioural long-term field research was conducted: Wamba and Lomako. The sites are situated in the same forest block and are separated by about 150 km. Information on vegetation patterns, climate, and geography indicate great similarity. Site-specific differences have been noted that are likely to reflect environmental differences. However, over the years field workers at both sites have noted a number of behavioural variants that are unlikely related to such environmental differences. In this study, we present a catalogues of behaviours from the two sites that are considered as candidates of bonobos culture.
The study has the following goals:
Applying established criteria for classification of culture, we want to identify the dimension of culture in bonobos as compared to other Hominoids.
In addition, data from bonobos facilitate testing of existing hypotheses on the evolution of culture in non-human primates.
Finally, it is hoped to induce interest of researchers working at other sites to contribute to the effort of discover the behavioural diversity of bonobos.

Bonobos dig termite mounds: a field example of tool use by wild bonobos of the Etate, northern sector of the Salonga National Park.
Inogwabini Bila-Isa, Wildlife Conservation Society, DRC Program, Kinshasa, Democratic Republic of Congo
Indirect evidence of bonobos using tools to access termites from the Etate site, Salonga National Park – North Sector was presented.

The bonobo's adaptive potential: social relations in captive conditions.
Jeroen Stevens[1,2], Hilde Vervaecke[1,2] and Linda Van Elsacker[1,2]
[1] University of Antwerp, Belgium
[2] Centre for Research and Conservation, Royal Zoological Society of Antwerp, Belgium
Compared to other great apes, bonobos have always been relatively rare in captivity. As breeding success increased since the 1980s and more data became available from wild study sites, zoos have begun to mimic natural group composition since the 1990s, housing adults in a 1:1 sex ratio and leaving sons with their mother, while adolescent females are transferred between groups. Ten years later this results in naturalistic groups that allow us to study the species' "Adaptive potential". This term was introduced by de Waal as "the entire range of conditions to which a species can adjust without compromising its health, biological functions (such as reproduction) or major parts of its behavioural repertoire (such as species-typical communication)". As bonobos now breed well in captivity and show many natural behaviours, their life in captivity offers good opportunities to study their adaptive potential. Although this approach has constraints, it also offers advantages such as continuous visibility of

individuals and relatively easy data gathering.
The first author studied four captive groups (Wuppertal, Planckendael, Apenheul and Twycross) between August 1999 and February 2003 for a total of 1884 study hours. A total of 14 male and 15 female (sub-) adult individuals (7 years or older) and 9 infants and juveniles were studied. Here we focus on social relations between (sub) adult males and females. Infants and juveniles are excluded from the analysis. We analyse data of spatial proximity, grooming and support in conflict within and between the sexes by cluster-analysis and matrix correlation analysis. We investigate whether the study groups show female bonding, inter-sexual bonding or male bonding. These results are then compared with published data on social relations of wild bonobos at Wamba and Lomako.

Behaviour Session: discussion

(organized by Gottfried Hohmann, e-mail: mpi@ic.cd or: hohmann@eva.mpg.de)

As noted above, for several decades field research on bonobos was confined to two sites, Wamba and Lomako. Both sites are situated in the northern sector of the species range and are likely to represent a similar part of the habitat spectrum. With only two long-term research sites providing behavioural data, until recent years we have had poor documentation for considering local bonobo traditions. The research at Wamba has generated the richest data for an ethogram. Based on a literature search, preliminary variation between Wamba and Lomako was revealed in:

- 'stick-scratch' behaviour,
- 'groom-slap' behaviour,
- 'leaf-cover' behaviour, and
- 'up-side-down hanging' behaviour.

Behaviours identified in chimpanzee culture analysis that are observed in Lomako bonobos include:

- 'branch-slap' behaviour,
- 'leaf-clip' by mouth behaviour,
- 'leaf-strip' behaviour, and
- 'hand-clasp' behaviour.

For the purposes of this session a chimpanzee ethogram comprised of a list of 589 behaviours and the corresponding descriptions was prepared for review[1]. Session participants fastidiously discussed each description for level of appropriateness to include in the first effort to present a bonobo ethogram. Culture candidate behaviours were redefined, deleted, added, or modified to better describe the presence or absence of bonobo behaviours recorded at Wamba, Lomako, and Lukuru. Behaviours related to vocalizations were eliminated for the time being until physical features of bonobo vocalizations can be analyzed by sonogram for detail accuracy. Indications supported the identification of "bonobo universal behaviours" in this first-ever attempt to qualify bonobo culture.

A number of important issues were highlighted during the course of the morning paper presentations. Some apparently unique behaviours were presented including leaf-swallowing at Lomako and Lui-Kotal. There was a high density of ground nests and an example of indirect evidence suggesting termite fishing reported from the Etate site, PNS-NS. There was some discussion about the behaviour of eating algae and the potential for comparison across sites and *Pan* species. There is variation in tool use associated with this behaviour in chimps. Professor Nishida illustrated his presentation with a video of a female chimpanzee entering water quadrupedally to reach underwater algae for consumption. It is known that chimpanzees from Bossou, Guinea and Mbeli Bai, Congo Republic use tools to access

[1] Nishida, 1983; Goodall, 1989; Kano, 1998; Kano, unpublished.

sub-aquatic algae. Bonobos at Lukuru advance bipedally and quadrupedally into perennial pools to feed on sub-aquatic foods.

It was pointed out that hunting behaviours have not been included in cultural behaviour analysis. This would be an appropriate area to analyze variations in prey species chosen and techniques of hunting across and between chimpanzee and bonobo populations. Hashimoto reported that bonobos are not more active sexually than chimpanzees, contrary to popular ideology.

Participants agreed to publish an ethogram of bonobos, and a paper on the cultural behaviors of bonobos. Chie Hashimoto will undertake the editing work for the ethogram, and Gottfried Hohmann will prepare the paper on the cultural behaviors.

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Ecology Session: abstracts

Methods of data collection: As similar topics may be studied at different sites, it is interesting to discuss the following questions: What are the preferred methods and why? Where are the limits of compatibility of data sets that are collected with different methods? Are we able to improve methodologies used to collect field data?

Phytosociology for Habitat Assessment in the Southwestern Part of Salonga National Park, DRC.

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The Democratic Republic of Congo is the largest central African country, comprising about 10.000 plant species. A good third has been described in the Flore du Congo Belge et du Ruanda Urundi and the Flore d'Afrique Centrale. Of these roughly one third is said to be endemic to the country. With about 900.000 km² of surface area, the Central Congo Basin is Africa's largest rainforest block and the basis of life for many threatened species such as the bonobo (Pan paniscus).
Presence, number and habitus of plant species vary according to biotope and geographical position. Apart from bonobo population density surveys, viability analyses require evaluations of both habitat quality and forest regeneration potential. Therefore, an assessment of age (size) and abundance of plant-species is needed. Several evaluation methods exist. Here we present a phytosociological method that allows exact classification of the forest by evaluating the number and size of all species. From that, the number of strata as well as the leading species growing in a given habitat or given forest layer can be calculated. In the SW corner of the Salonga National Park (SNP) the Max-Planck study site "Lui Kotal" covers an area of approximately 40 km². Here, we distinguish about six different habitat types by there location and soil: 1) Heterogeneous primary forest on terra firme; 2) Heterogeneous forest periodically inundated; 3) Homogenous forest; 4) Riverine forest permanently inundated; 5) Savannah permanently inundated (Libeke); 6) Dry savannah (Esobe). Three of these habitat types (1-3) were investigated in January and February 2003. Five plots of 50x50m within each type have been established. Here all trees have been registered. On a sub square (25x25m) all small trees and shrubs were taken into account, and on a further sub square (2x2m) within the same square herbs and plants of the soil layer were included. The heterogeneous primary forest on terra firme was characterized by about 148 species that show up in five neatly distinguishable strata. The major strata are dominated by Dialium ssp., Sclorodophloeus zenkeri, Polyalthia suaveolens, Anonidium mannii, and other bonobo-food species. Four strata with about 85 species characterize the periodically inundated heterogeneous forest. Here species like Blighia unijugata, Mitragyna stipulosa are dominating. The homogenous forest on hydromorph soil is characterized by four strata with about 88 species, all of them

dominated by Monopetalanthus microphyllus. The phytosociological method is suitable for a rapid assessment of any given habitat. It allows a quick and reliable validation of satellite imagery as done in the southwestern part of SNP. Together with the knowledge of habitual bonobo feeding plants and nesting trees a sensible habitat viability assessment can be expected.

Phenology at Lui-Kotal, Salonga National Park, DRC.

Valentine Omasombo[1], Etienne Mabonso[2], Espérence Miezi[3], Musuyu Muganza[4] and Barbara Fruth[5]
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In the tropics changes in temperature and rainfall over the year are comparatively small. Nevertheless, seasonality in flowering, fruiting, and leaf appearance are evident and express a cyclic rhythm for individuals, species or communities of plants, that usually follow a 12 months or multiple of 12 months cycle. Some species may also follow a semi-annual cycle. These patterns are of interest in several respects: They help us to better understand 1) how phyto-phases have been shaped over evolutionary time in order to maximize the plant's reproductive success; 2) how food availability looks over the year; and 3) how it is influenced by biotic factors. It is in the proximate sense that we will analyse our data in order to evaluate periods of food-abundance and scarcity our study subjects (Pan paniscus) have to face. Various great-ape field sites have established studies on phenology. Usually trees are randomly chosen and are followed once a month. Sometimes only known feeding trees are in the focus of interest. Although lianas are known to contribute to a large extent to bonobo/chimpanzee diet, they are rarely included into phenology assessments. The Max-Planck Project has established the Lui Kotal research site in the southwestern part of Salonga National Park, covering about 40 km² of evergreen lowland rainforest. Here, 8 km of standardized transect were cut across different habitat types. Within a transect width of 1-2 m, a total of 1001 individual trees above 10cm DBH have been marked (sample surface 2 ha). These trees comprise a representative sample of the overall availability but eclipse rare but regular used bonobo-feeding trees. Therefore, an additional sample of about 200 bonobo feeding trees (BFTs) has been selected and marked. All lianas (N = 1874) associated to the 1001 transect trees have been marked and are included into the survey as well. From April 2002 onwards these roughly 3000 individual plants have been checked twice a months for flowering, fruiting, and leaf flushing. In addition, evidence for food predators was noted for each fruiting tree/vine. Here we present the data of the first year of phenology and evaluate the seasonal influence on the food availability. The methodological approach will be discussed in comparison to other studies.

Vegetation patterns of the northern Salonga with emphasis on a simple method to describe the bonobo habitat.
Inogwabini Bila-Isa, Wildlife Conservation Society, DRC Program, Kinshasa, Democratic Republic of Congo

Comparative methods for survey of bonobo density and fruit productivity.
Takeshi Furuichi, Faculty of International Studies, Meiji-Gakuin University, Japan
During the absence of bonobo field studies at Wamba since 1996, there was a considerable progress in the ecological study of chimpanzees. Various methods for the assessment of party size, nest density, and food production were developed, and comparisons of data from different study sites across Africa revealed the adaptation of chimpanzees to the variety of habitats from rain forest to savanna-woodland. Now that studies of wild bonobos have resumed in many study sites, primate researchers are expecting the input of comparable data on bonobos, which will contribute to illustrate a more comprehensive picture of adaptation and evolution of the African great apes and human ancestor.
This workshop:
1) reviewed the methods for nest census and fruit production that have recently been developed for chimpanzees and gorillas,
2) collected information on study methods currently employed in bonobo study sites, and
3) established methods that can be used for comparisons between bonobo study sites and between chimpanzees and bonobos.
This does not necessarily mean to choose only one method for one purpose. If we have enough discussion of the nature, benefit, and limitation of each method, and if we can add or make minimal changes on the method employed in each field, we can continue to use several methods for comparison of population density or food production depending on the habitat and situation of each field site.

Assessment of party size of chimpanzees and bonobos.
Chie Hashimoto, Primate Research Institute, Kyoto University, Japan
Factors influencing a chimpanzee party size have been studied and four factors are considered to be important: food supply (i.e., fruit abundance and distribution); presence of danger (i.e., the presence of predators); existence of estrous females; and demographic factors (i.e., sex ratio of the group and number of infants). Since bonobos have a fission-fusion social structure (as do chimpanzees), it may be important to study what affects a bonobo party size.
Chimpanzee studies on factors affecting party size have used various definitions of "party", such as the number of individuals observed in single scanning samples, the number of individuals observed in a given hour, and the total number of individuals observed in one day. Different methodologies or definitions of party may yield different results for analysis of party size. Before we resume ecological studies of

bonobos, we need to discuss the definition of party size. I will review the definitions of party size from chimpanzee studies and recommend "1-hour-party" size for comparative studies of bonobos.

Status assessment of bonobos: a collaborative census in Salonga National Park.
Omari Ilambu, Wildlife Conservation Society, DRC Program, Kinshasa, Democratic Republic of Congo
Although some isolated initiatives for bonobo protection have been discussed in order to shield bonobos against human induced threats, the distribution and mainly the relative abundance of the species remains without any adequate answer. The patchy distribution of the species has created a big challenge for conservationists and scientists trying to define their current range of distribution and their population number in order to launch a strategic action plan leading to the preservation of viable populations. The Monitoring of Illegal Killing of Elephant (MIKE) forest surveys program aims to "provide information for elephants range state to make appropriate management and enforcement decision and to build institutional capacity for long-term management of their elephants." This program also includes apes who live in the same wildlife community, and in most cases, face the same threats. Using the benefits of CITES/MIKE forest surveys program, Wildlife Conservation Society (WCS) is pioneering a more cohesive and collaborative way of surveying bonobo populations in identified, including as yet unconfirmed, areas. This systematic fieldwork is a convergence that will significantly contribute to clarify bonobo distribution and abundance. Thus, this partnership is a way to improve our understanding of the bonobo population status, identify viable sub-populations and develop a more strategically oriented and replicable plan to guarantee the survival of this endemic species in its range in the Democratic Republic of Congo. As we learned from the outbreak of war in DRCongo, the burden of a conservation program for bonobos has escalated with the abandonment of few existing research field sites by western researchers, leaving behind bonobos without any elaborated and effective monitoring program. On addition to assessing distribution and population numbers, the MIKE option brings with it a useful collaborative and capacity-building approach that will significantly contribute to promote bonobo protection.

Ecology Session: discussion

(organized by Takeshi Furuichi, e-mail: furuichi@k.meijigakuin.ac.jp)

Prior to the workshop, Dr. Furuichi had prepared an inquiry about methods for ecologcial surveys used at different sites (see questionnaire on pages 17-19). Contributors submitted information on ecological parameters for each site and these data were compiled into a table for comparison review among study sites.

A number of important issues were highlighted during the course of the morning paper presentations including the need to include use of lianas (vines) as a food source (for contribution of fruit, leaves, and flowers) when accessing productivity of the forest as a parameter for conservation. When looking at habitat use, studies from Lukuru and Lui Kotal indicate that savannas are an integral part of bonobo range. Sampling design issues presented several areas of review including:

- estimating party size from one day sample; one hour sample; *ad libidum* moment scan sample; or night nests in a group.
- issue of standard nest count versus marked nest count methods.
- determination of nest decay rate (average life span of a nest) across seasons and habitat type.
- issue of recording estimated fallen fruits versus fruits on the tree.
- deciding what trees are monitored: food species, nest site species, dominant forest species, or random selection across all species.
- issue of counting individual nests (which are nonrandom and clusered) versus nest groups.
- difference between re-use of nests versus re-use of nesting sites.
- question of inclusion of day nests in equations, or how to deal with recording day nests versus night nests. Prof. Kuroda reported that bonobos make more day nests than chimpanzees.
- placement of transests as systematic versus random.

As a result of variation in definitions, there was an expressed need to identify habitat classifications uniformly across sites and standardize terminology. The reasons for censusing are primarily to determine use of different habitat types for that activity or estimating population density.

Of particular interest, in an effort to standardize methodology for adequate comparison of results, methods for surveying were presented and compared. Two methods were described: (1) standard nest count method, and (2) marked new nest count method. The minimum requirements and problems for each method were discussed. The recommendation was made to adopt marked nest count method for density estimation across ongoing research sites.

Inogwabini discussed the implications of forests in the state of transition between past degradation to climax as it impacts bonobos. Information about forests in a pattern of transition may be important information for management planning. For

example where a high density of ground nests were recorded from the Etate site (PNS-NS), the forest profile was in a state of transition which may indicate the need for varied forest habitats for bonobos.
Comparative methods for surveys of fruit productivity were presented. Comparisons vary across (1) estimation by monitoring trees, (2) estimation by enumerating census, or (3) estimation by fallen fruits. Furuichi emphasized that studies in each site may need to provide data on the number of fruiting trees per unit area, using either of the three methods, for the comparative studies.

As for the estimation of bonobo density, we discussed the costs and benefits of the standard nest count and marked nest count methods. We agreed that the marked nest count method is desirable for the study sites where periodical censuses are undertaken on the fixed transects because it can exclude the vagueness resulting from the estimation of life span of nests and the seasonality of nest-building behaviors.

Hashimoto introduced various methods that have been employed for evaluation of the party size, including scanning party size, 1-hour party size, and 1-day party size. We recognized that 1-hour party size may be used in various study sites for the comparative study of feeding ecology, because it will not underestimate the foraging party size as does the scanning party size, and because it does not need individual identification of the group/community members, which is required for the 1-day party size.

In both topic areas, surveys of bonobo density and surveys of fruit productivity, there is a need to standardize terminology

Two efforts have recently been conducted to survey habitat, wildlife occurrence, and human activities within Parc National de la Salonga:

- In accordance with the ICCN & MIKE-CITES programs and in collaboration with other organizations including MPI and the Lukuru Project, Wildlife Conservation Society is currently sampling 948 km (158 km line transects and 790 km reconnaissance transects) during seven months from June 2003-December 2003.
- The Zoological Society of Milwaukee sampled 68 km of line transects across 18 months from October 2000-May 2002 (see Conservation Session Abstracts below). Based on preliminary analysis of a small sample size, ZSM determined that the preferred habitat for bonobo nest building is mixed mature forest with marantacae understorey.

It was cautioned that data generated from a small sample size of a single activity not be used as representative of general bonobo habitat use or general preference. At Wamba and Lukuru the preferred habitat is where different forest types are available such that the bonobos typically nest in old-growth forest but can access secondary forest for day feeding. Habitat variation is preferred rather than expanses of mono-typical forest cover.

Inogwabini asked the group to consider what is our research priority for bonobos. If we strive to collect data for a Population and Habitat Viability Analysis (PHVA), then our priority may be demography. For monitoring we may want to emphasize party size or nest group size. For conservation, we might prioritize habitat fragmentation studies, home range dynamics (direct and indirect impacts of logging

concessions and human encroachment), or record age/class ratio's for population replacement.

Although several contributors mentioned that bonobo abundance may be negatively associated with human presence, Kuroda pointed out that human activity is important where elephants are absent. The texture of the forest changes with elephant presence which makes optimum habitat for bonobos. The clarification needs to be stated that it is hunting pressure, especially the presence of snares, that reduces bonobo presence.

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Thompson-Handler, N. and Malenky, R. 1993. Action Plan for Pan paniscus: Report on Free Ranging Populations and Proposals for their Preservation.” Department of Anthropology, SUNY at Stony Brook, New York.

Ecology Session: questionnaire

INQUIRY ABOUT METHODS FOR ECOLOGICAL SURVEY

Name(s) of informant: _____

Location of study site: _____

Period of the study (e.g., Feb. 1998 - present): _____ - _____

I. General questions

1. Are you carrying our (or, did you carry out) periodical census on the transect lines or in the quadrates? _____

2. If yes, how frequent is the censuses (once a week, twice a month, once a year, etc)? _____

3. Which kind of data do you collect in the census (nest density, encounter rate with monkeys, fruit production, etc.)? _____

4. Which kind of systems do you use for the census?
   ( ) Line transects
   ( ) Quadrates
   ( ) Others _____

5. Do you have data of density and DBH of each species of trees in the study site? _____

6. If yes, describe briefly the method used for the enumerating census
._____
_____

II. Questions for those who use transect lines

1. How many transect lines do you use? _____

2. How long is each transect? _____

3. How long is the transect lines in total? _____

4. How do you set the transect lines (parallel, random, arbitrary, etc.)? _____

III. Question for people using the quadrates

1. How many quadrates do you use? _____

2. How large is each quadrate? _____

3. How large is the total area covered? _____

4. How do you set the quadrates (random, arbitrary, etc.)? _____

IV. Questions about the methods for estimating food availability

1. Are you recording seasonal changes in food availability? _____

2. Availability of which kind of foods are you recording?
   - ( ) fruit of trees
   - ( ) fruit of vines
   - ( ) fruit of herb
   - ( ) flower
   - ( ) young leaf
   - ( ) THV shoot, stem, and/or leaves
   - ( ) insects
   - ( ) others: _____

V. Questions about the methods for estimating tree fruit availability

1. Which kind of tree species are you recording availability for?
   - ( ) All major tree species in the study area
   - ( ) All major tree species eaten by bonobos
   - ( ) All major tree species eaten by primates
   - ( ) Others _____

2. Are you recording ripe and young fruits separately? _____

3. How do you estimate the fruit availability?
   - ( ) By checking phenology of fixed monitor tree
     - How many trees are you monitoring?
       _____ in total, and about _____ trees per species
   - ( ) By checking phenology of trees on the transects
     - Do you check trees within how many meters from the transect?
       _____
   - ( ) By checking phenology of trees in the quadrates
   - ( ) By checking fallen fruits
     - How do you count fallen fruits?
       ( ) on the transect

( ) in the quadrates
( ) in the fruit traps?

4. How do you evaluate the abundance of fruits in each tree?
( ) Evaluate by ____ grades.
( ) One-zero evaluation

VI. Questions about methods for nest count survey

1. Did you estimate the bonobo density by the nest count survey?

2. Are you carrying out the nest count survey periodically in the same area?

3. If yes, how frequently (once for several years, once for each season, etc.)?
_____

4. In the estimation of bonobo density, are you using method based on the individual nests or on the nest groups? _____

5. Do you estimate nest density based on one-time survey (cf., Ghiglieri or Tutin) or by using marked nest count (cf., Plumptre or Hashimoto)? _____

6. How do you estimate the nest decay rate?
( ) Using data of other study sites (_____)
( ) Estimate by monitoring nests in own study site

7. How do you treat the number of nests made per day per individual?
( ) Using data of other study sites (_____)
( ) Estimate by following individuals from dawn till evening
( ) It is assumed to be 1 because _____

VII. Questions about the survey on other animals.

1. Are you estimating density of animals other than bonobos? _____

2. If yes, which kind of animals are you estimating density for:
( ) Primates
( ) Elephants
( ) Duikers
( ) Other mammals _____
( ) Birds
( ) Others_____

3. Describe briefly the methods for estimating the animal density:
_____

Conservation Session: abstracts

Conservation: What contributions can field projects make to bonobo conservation? What are the requirements to protect bonobos at different sites? What are the potential risks for the survival of bonobos that are/were involved in research projects?

The crossing of species borders: bonobo-chimpanzee hybridisation in captivity.

Hilde Vervaecke[1,2]; Jeroen Stevens [1,2]; Linda Van Elsacker[1,2]
[1] University of Antwerp, Belgium
[2] Centre for Research and Conservation, Royal Zoological Society of Antwerp, Belgium

From historical accounts it appears that natural populations of bonobos and chimpanzees have been allopatric since their phylogenetic separation. There are no accounts of hybridisation under natural conditions. There is, however, evidence for interbreeding between bonobos and chimpanzees in captivity. Studies on Pan in the seventies and eighties emphasised discontinuity between the two species, contrasting bonobo versus chimpanzee anatomy and behaviour. In more recent studies the continuity among Pan is increasingly being documented. In this respect, the hybrids form an interesting testcase. We will define several species-specific parental traits and study their expression in seven different hybrids. We illustrate their morphology and behaviour with photographic and video material. The hybrids have been naturally procreated by a bonobo father and two chimpanzee mothers. It will become apparent that the hybrids show individual variation in degree of expression of typical chimpanzee- or bonobo features. The existence of hybrids poses an interesting challenge to the traditional biological species concept. Their existence also challenges our tendency for binary thinking.
[editorial note: for history see Vervaecke and Van Elsacker, 1992]

The Proposed Lomako Forest Reserve.

Jef Dupain[1] , Karl Amman, Kerry Bowman. and Linda Van Elsacker[1,2]
[1] Centre for Research and Conservation, Royal Zoological Society of Antwerp, Belgium
[2] University of Antwerp, Belgium

The Lomako forest (Equateur Province) is considered a priority zone for bonobo conservation. Yet very little is known about the 3600km² proposed Lomako Forest Reserve (PLFR). First reports in 1996 warned of increased permanent human settlement within the PLFR. In November 1998, the last remaining bonobo research team left the PLFR due to war conditions. The Lomako Forest remained inaccessible to bonobo researchers because of the ongoing war and lack of funding. In November 2002, we finally succeeded in a 3 week expedition to the Lomako Forest. We visited the Iyema Research site (Royal Zoological Society of Antwerp) and some surrounding settlements. Nest counts on former transects indicate a 75% decrease in bonobo density. This might be the result of bonobos nesting away from existing transects that are potentially being used by hunters. Yet the local population confirms

that bonobos have been hunted and killed during the last year. Evidence has been collected of prominent hunting throughout the PLFR by different ethnic groups and by soldiers. If one takes seriously the proposal for creating the PLFR in order to safeguard the human population, the bonobos and the fauna in general, delaying a multidisciplinary and more regional approach can no longer be justified.

The local commitment: a conservation concession success story.

Jo Thompson[1] and Mvula Lomba[2]
[1] Lukuru Wildlife Research Project, USA
[2] Lukuru Wildlife Research Project, Democratic Republic of Congo

The history of my experience with the Bososandja bonobo community will be presented. Due to a series of events between 1996-1997 that had serious ramifications on the conservation of bonobos in the Lukuru Project area, immediate and drastic action had to be taken. In order to improve existing local levels and create additional avenues of protection for the local wildlife community, especially the bonobo and its habitat, the Lukuru Project purchased land rights, through traditional adjudicated law, of a conservation concession corresponding to the range of the Bososandja bonobo community. This conservation concession is called the Bososandja Faunal Reserve. This tract of land is managed under civil authority.

The international community responded with opposition when informed that the concession is recognized and maintain at the local level. The decisions implemented in this process will be presented. In 2002 Lukuru Project staff confirmed that during the course of the four-year (1998-2002) war there were no losses of wildlife under civil society protection. The community-based project involves local participation and commitment … and ultimately, local success resulting in efforts to expand the territorial boundaries. In 2003 this project was reviewed with Institut Congolais pour la Conservation de la Nature and efforts began to elevate its status to a nationally recognized Community Forest protected area.

Threats and Actions: Examples from Salonga National Park.

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[1] Max-Planck-Institute for Evolutionary Anthropology, Leipzig, Germany
[2] Max-Planck-Institute for Behavioural Ecology, Starnberg, Germany

The Cuvette Centrale is part of the territory of the Democratic Republic of Congo (DRC). Research and conservation on flora and fauna is under the jurisdiction of this country. Several reserves exist at the north-eastern border of the DRC, but the largest protected area, is the Salonga National Park (SNP) in the centre of the country. Covering an area of more than 36,000 km², this park includes different types of vegetation such as swamp, riverine, and upland forests in a mosaic with savannah islands. It is the only designated area of protection for the endemic fauna and flora of the lowland basin and the only national park where bonobos (Pan paniscus) live. Although the park is legally protected, bonobos are hunted and get trapped in snares. At some places, hunter's use automatic weapons and have access to large amounts of ammunition. Using this technique, larger groups of bonobos and other prey can be extinguished in a very short time. Wildlife authorities are not in the position to control

access to the park and prevent activities by hunting teams. After a new study site was established in the south-west of the Salonga at Lui Kotal, research activities were complemented by various actions to improve regional conservation. Activities are the outcome of discussions with the population of neighbouring villages and are coordinated with the authorities of the Institut Congolaise pour la Conservation de la Nature. Specific efforts aim on (a) improving the reputation of the park, (b) economic development, and (c) decreasing hunting of endangered species such as bonobos. Activities are designed to address different groups: One group are local hunters who use the forest in a traditional way that could be sustainable if forest products are not traded. The other group concerns hunting teams that are based in distant places and operate within the park without authorization from local populations. In our presentation, we will give information on the current status of Salonga National Park, describe immediate actions to improve conservation and concepts for long-term conservation in the region.

Genetic diversity in bonobos and its implication for conservation.

Jonas. Eriksson[1,2], H. Siedel[1], Gottfried Hohmann[1], Christophe Boesch[1], and Linda Vigilant[1].
[1]Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany
[2]Evolutionary Biology Centre, Uppsala University, Sweden.

The emergence of zoonotic diseases, such as the SIVcpz-HIV-1 complex of viruses, highlights the necessity to understand the apportionment of genetic variation in wild populations of the two Pan species. Furthermore, knowledge of gene flow among different population of a species is valuable in order to design a cost effective conservation plan in that it may influence the size, shape and number of protected areas. Relative to the chimpanzee, far fewer genetic studies have been conducted on bonobos and previous research has been limited to single communities in the wild or to a small number of captive individuals of unknown geographic origin. In this study we investigate genetic diversity, population structure male/female mediated gene flow of bonobos by analyzing ~400 bp of the mtDNA control region and 12 variable Y-STR's. DNA was extracted from non-invasively collected fecal samples from 150 individuals estimated to represent 8 different communities across the species' geographical range. Preliminary results from mtDNA analysis show very little geographical patterning of the variation observed. These results will be compared with similar data from chimpanzees including 5 newly sampled populations from the Northern DR Congo, representing a similar geographical range as the sampled bonobo populations.

The human needs approach to bonobo conservation.

Jo Thompson[1], Ilonga Djema Willy[2], and Tshobo[3]
[1] Lukuru Wildlife Research Project, USA
[2] Lukuru Wildlife Research Project, Democratic Republic of Congo
[3] Institut Congolais pour la Conservation de la Nature, Kinshasa, Democratic Republic of Congo

Since 1998 the living standards in the Lukuru declined rapidly due to effects of the war. Malnutrition, food insecurity, disease, deterioration of infrastructure, and traumatizing events has shaped the daily lives of the local people. All external systems of support (missionary and aide programs) withdrew from the region. Conflict, political upheaval, fear, and active fighting became familiar aspects of life. Many families and individuals fled the region or took up residence hiding in the forest. Emergency assistance and response to basic human needs was the only alternative for continuing long-term bonobo conservation in the area. The Lukuru Project accepts as true that local support for conservation depends on addressing issues that have meaning for human life and livelihoods as part of our program. Emergency accomplishments achieved by the Lukuru Project will be presented. Beyond responding to critical needs, the Lukuru Project has expanded its mission to include sustainable strategies for livelihoods, community needs, and improved quality of life through appropriate technology projects. Recent initiatives and proposed projects for the Lukuru will be presented. In addition, I will review some ideas from other research sites for community development outside Protected Areas but in response to human needs for those local people living alongside bonobos.

Assessing bonobos (pan paniscus) in the Salonga National Park: effects of forest type and human presence.

Gay E. Reinartz[1], Inogwabini Bila-Isia[2], Mafuta Ngamonkosi[3] and Lisalama Wema Wema[3]
[1] Zoological Society of Milwaukee, USA
[2] Wildlife Conservation Society, DRC Program, Kinshasa, Democratic Republic of Congo
[3] Institut Congolais pour la Conservation de la Nature, Kinshasa, Democratic Republic of Congo

This study assesses the population status of the bonobo (Pan paniscus) in the Salonga National Park as it relates to ecological and human factors across multiple geographic sites and forest types. From October 2000 through May 2002, 11 sites throughout Salonga were explored. Nine sites were systematically sampled using line transects to estimate bonobo density (by nest counts and distance sampling techniques), the proportion of forest types, the intensity of human activity, and relative abundance of other large mammals. Forests were classified by broad forest types, understory conditions, canopy cover, and hydrology; forest type was recorded at 100m intervals along transects. Encounter rates were calculated for bonobo, human, and large mammal signs.

Bonobo signs occurred in nine out of 11 locations but varied widely in frequency. Mean density within the nine sites sampled was estimated as 0.73 nest-builders/sq km, but density was not uniform across sites (range = 0 to 4.2 nest-builders/km2). The most common forest types encountered were mixed mature with an herbaceous (Marantaceae) understory (Mm/m: 36.8%), mixed mature with a woody understory (Mm/w: 23.6%), and old secondary with Marantaceae understory (Os/m: 10.5%). The proportion of forest types was not uniform among sites. Bonobo nest sites occurred only within these most common forest types, and thus, bonobo density was highest in

locations where greater than 67% of the forest was the Mm/m/w and Os/m (R2=0.75). Food remains were found in other forest types. Bonobo nest sites had a significantly greater than expected occurrence in Mm/m compared to Mm/w and Os/m (G-test, X2 =13.00, df=1, p<0.001). Estimates of bonobo density (nest builders/km2) in each forest type were: Mm/m= 1.62; Mm/w= 0.70; Os/m = 0.30. Mean group size also varied across locations and was positively correlated with proportion of combined Mm/m/w and Os/m forest types (R2=0.88), suggesting that increased resource availability (nests sites and food) may lead to larger group size. There is a significant inverse association between bonobo density and human presence (Hadj=8.66, df=2, p<0.025). Bonobo encounter rates were lower where there was evidence of even low levels of human presence: similar patterns were observed for elephant and other large mammal encounter rates indicating that hunting affected distribution.
In the Salonga National Park, bonobo nests have a patchy distribution determined largely by the proportion of mixed mature semi-deciduous forest with a Marantaceae understory. As has been demonstrated for other great ape species, this study confirms that bonobo distribution and abundance is negatively altered by human presence related to hunting. To estimate the total bonobo population size for Salonga, further studies must refine estimates of the proportion of the park covered by Mm/m, Mm/w and Os/m forest types and determine the current and historical level of hunting activity.

Newly Confirmed Population of Bonobos Around Lac Tumba

Mwanza Ndunda[1,2] , Mbangi Mulavwa[1,2]
[1] Centre de Recherche en Ecologie et Foresterie (CREF), Democratic Republic of Congo
[2] Réserve de Mabali, Democratic Republic of Congo

According to the surveys of Arthur D. Horn in 1973-1974, Nishida, T. in 1972, Mbangi Mulavwa et al. in 1981, and Mbangi Mulavwa et al. in 2002, we confirm the presence of bonobos in the region west of Lac Tumba. The last survey in Malinda / Mantuna, Eboya / Lwaka, Bobele and Nkamba and others forests in this part of the Congo Basin showed that bonobos are wide ranging in the region. Our most recent work included 383 minutes of direct observation. Size of groups, some data on feeding behavior, human pressure, fauna and flora of this region are presented and discussed. Some suggestions for the future research and the conservation of bonobo in this region are given.

Conservation Session: discussion

(organized by Jo Thompson, e-mail: jat434@aol.com)

A number of important issues were highlighted during the course of the morning paper presentations. Of particular interest, MPI and GTZ have collaborated on satellite imagery mapping of the entire Parc National de la Salonga. The map is based on 2003 data at 1 X 50,000 resolution with verification from ground-truthing and aerial pre-fixed route photography of sensitive places for fine grade interpretation of the satellite map. This process will be repeated every two years for monitoring. The map is available through ICCN to its partner organizations.

We were very encouraged by the report from the Centre de Recherche en Ecologie et Foresterie (CREF) team providing evidence that bonobos still exist west of Lac Tumba considering the human pressures and open access to this area since early work was conducted there thirty years ago. The presence of bonobos has persisted as evidenced by several expeditions conducted by CREF team member Mr. Mbangi confirm bonobos between 1981 and 2002.

After the six years absence due to the war, studies on bonobos were resumed at Wamba, Luo Scientific Reserve, in 2002. With the support of National Geographic Society, researchers of Wamba Committee for Bonobo Research are regularly visiting the site, and researchers of CREF are undertaking continual research. Though some bonobos of the main study group were lost during the war, by poaching urged by soldiers, most of the members are still alive and are well habituated.

To begin the conservation session discussion, we all agreed that there is an important need to present responsible estimates of the bonobo population number, geographic range, and impact of logging based on actual field experience in order to impede the proliferation of unfounded assumptions and scenarios. These indicator numbers are important for broad-based monitoring of the population and comparison with other species. They have been the foundation for any conservation activity, typically determining priority species for funding.

Various surface area estimates have been presented to represent the geographic range of the bonobo. Here also there is a need to clarify terminology. It is important to clearly express whether the surface area estimate reflects area of identified presence (termed "area of occupancy" by IUCN, 2000[2]) or maximum assumed area of bonobo range indicating the surface area that could be occupied by bonobos but has not been confirmed to date. For assumed area of bonobo range various reports describe:

- 840,400 km^2 (the largest area)[3]
- 472,000 km^2 excluding the southwest corner triangle formed as Lukolela/Bandundu/and the confluence of the Congo and Kasai Rivers[4].

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[2] International Union for the Conservation of Nature and Natural Resources. 2000. *The IUCN red list categories*. Gland, Switzerland.

[3] Reinartz as presented during the 2003 Bonobo Workshop; Dupain, Van Krunkelsven, Van Elsacker, and Verheyen, 2000; Coxe, Rosen, Miller, and Seal, 2000; Thompson-Handler, Malenky, and Reinartz 1995.

- 80,000 km^2 (the smallest area)[5]

Based on the combined field experience of participants, we agreed to work from the estimate of 500,000 km^2 for the assumed area of bonobo range. This number will allow for inclusion of the southwest corner triangle Lukolela/Bandundu/confluence of the Congo and Kasai Rivers and for inclusion of mosaic habitat outside the lowland moist forest.

Further, we discussed the misinterpretation and errors published about the impact of logging in the range of the bonobo. On the website of the World Resource Institute/Global Forest Watch[6] (WRI/GFW) a map of logging concessions is presented. WRI/GFW responsibly cautions that the data they collected for the map are not based on solid information and must not be used to make projections that could misrepresent the situation. It is widely known that pre-2000 concessions could be (and often were) granted as political favors. In these cases, logging activity was not advanced within the concession. When accessing the website map WRI/GFW clearly post a disclaimer stating that the "concessions for the Democratic Republic of Congo date from a 1996 map and are known to be incomplete." The technical notes of the WRI/GFW report indicate that the DRC data was already out of date when the map was prepared and point out the difficulties one has to get accurate and up-to-date data at a national or regional scale[7].

The Forest Monitor website[8] presents a report on the international forestry organizations working in central Africa. The Forest Monitor confirms that "timber production by SIFORCO (see discussion below) began decreasing in 1996 and continued to decline until 1999 when the society stopped their activities in DRC because fighting and civil unrest increased in the region[9]." In DRC movement of timber is conducted principally by rafting logs down navigable water routes to market centers, therefore opening of roads is typically confined to the area around and within the concessions. The overland infrastructure has largely been in disrepair and deteriorating since 1960. So, river access has principally facilitated routes from the concession to market centers for uncontrolled hunting in DRC.

In 2002 the forestry sector was reactivated. The government forestry sector has initially put a prohibition on new concession allocations and they have cancelled previous contracts covering millions of hectares. The surface area within bonobo range currently under commitment (either as authorization for prospecting; letter of

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[4] Myers Thompson, 1997; WWF reports the Central Congolian lowland forest located under the arc of the Congo River in the Cuvette Centrale is 414,800 km^2 not including forest/savanna mosaic habitat. See website: (http://www.worldwildlife.org/wildworld/profiles/terrestrial/at/at0104_full.html).

[5] Kano, 1984.

[6] http://www.globalforestwatch.org/english/interactive.maps/centralafrica.htm

[7] JG Collomb, written correspondence to author (J. Thompson), July 2002; JG Collomb, personal communication with author (J. Thompson), February 2002.

[8] http://www.forestsmonitor.org/reports/priseenotage/part3b.htm

[9] La Forêt.Prise en Otage: La nécessité de contrôler les sociétés forestières transnationes: une étude européenne , March 2001.

intent; or guaranteed provision for concession) for logging concessions is 119,748 km^2 (2003 data provided by Service Permanent d'Inventaire d'Amenagement Forestier) or approximately 24 percent. This area is committed in 63 concessions under 34 companies. It was unanimously agreed by workshop participants that these data would now be used to better reflect the situation impacting bonobo status (see map on page 38). Further, those of us working in the field are in good positions to monitor activities that impact our research sites and encourage responsible land management practices that will promote wildlife management within the concessions.

The two companies with the greatest timber harvesting impact in the bonobos range are the German SIFORCO (Société Industrielle et Forestière du Congo) and the Swiss SODEFOR (Société de Développement des Forêts). SODEFOR currently has the largest amount of surface area guaranteed for timber harvest (1,742,894 km^2 across nine concessions) within the range of the bonobo. SIFORCO holds the largest single concession at 764,800 km^2 on the right bank of the Yekokora River (the second largest concession in bonobo range at 292,486 km^2 is also held by SIFORCO). SIFORCO currently has 1,279,622 km^2 of surface area guaranteed for timber harvest across three concessions.

Inogwabini lead a brief discussion about zoonotic (a disease communicable from animals to humans under natural conditions) disease transmission. Inogwabini identified major disease occurrences that may impact bonobo conservation, including an increase in sleeping sickness, ebola, monkey pox, and SIV. He asked us all to be alert to these possibilities and record any relative information.

Those areas that currently have some degree of protection, many associated with bonobo research field sites, were identified. Parc National de la Salonga and the Luo Scientific Reserve are the only nationally protected areas within the bonobos range and provide globally important intact forest blocks of natural wildlife and habitat communities. Three of the identified areas are currently proposed for expansion: Bososandja, Luo, and Parc National de la Salonga[10].

Those sites and the surface area of protection include:

Site	**Km^2**	**National**	**Local**
Bososandja Community Forest[A] (proposed)	34		34
Lomako Forest Reserve[B] (proposed)	3,600		3,600
Lomami-Lualaba Conservation Site (proposed[C])	10,000		10,000
Luo Scientific Reserve[D]	358	358	
Mabali Scientific Reserve[E]	19		19
Parc National de la Salonga[F]	36,560	36,560	
TOTAL	**50,571**	**36,918**	**13,653**

[10] As presented during the 2003 Bonobo Workshop, the Max Planck Institute team have proposed to add 20,000 km^2 to the west territory of PNS-South Sector, which would place the Lui Kotal research site under national protection.

A. awarded in 1998 through traditional convention adjudication associated with the Lukuru Project research site; proposed for expansion and elevation to Community Forest status.
B. first set aside as 500 km^2 around the Lomako Forest Pygmy Chimpanzee Project site by SIFORZAL in the early 1980s when SIFORZAL officials met with R. Susman and R. Mittermeier (R. Malenky, personal communication with author). Later expanded in association with the Lomako research sites Iyema (Royal Zoological Society of Antwerp) and Isamondje (Max-Planck-Institute).
C. proposed in 1988 IUCN (see below).
D. awarded in 1989 CRSN in association with the Wamba Committee for Bonobo Research site; proposed for expansion.
E. associated with Centre de Recherche en Ecologie et Foresterie (CREF); also known as Botende-Tumba Reserve where Botende is the primary protected area on the east shore of Lac Tumba and Tumba is the secondary protected area on the west shore of Lac Tumba.
F. gazetted in November 1970.

[*N.B. Outside the Bonobo Workshop the authors estimated the minimum surface area of intact natural habitat required to support a viable population of bonobos. MSA is the "minimum surface area" required to support a sufficiently large enough viable bonobo population. This number is important for the protected areas that are proposed for expansion.*
Population viability assumes migration between groups such that the surface area includes either corridors between areas totaling the MSA or a single block area for a viable population. Accordingly, for a minimum viable bonobo population there should be a minimum of 5 groups, each with 60 members = minimum 300 individuals in a viable population. The estimate was derived at by dividing the minimum number of individuals (300) by the average density of bonobos (0.5 to 1.0 individuals per km^{2-}), which gives 300 to 600 km^2 as the MSA. Thus, under the assumption that the average density of bonobos is 0.5 to 1.0 individuals per km^2, the ***minimum viable surface area for each individual population is estimated to be 300 to 600 km^2****. This figure does not include consideration of population threats and would have to be refined based on the local situation. This figure has not been discussed with or agreed upon by workshop participants. They are not responsible for this estimation.*]

Keeping in mind the multiple, repetitive meetings about ape conservation that have been/are going on resulting in varying presentations of urgent actions, master plans, priority lists, conservation recommendations, identified most important areas, and lists of goals, we determined to agree on collaborative, doable activities … and then do them. Our goal was to conclude with activities where collaboration between different sites would be most beneficial to ensure the survival of bonobos in their natural habitat. In addition, we felt it was important to include activities regarding the conservation of critical biodiversity associated with the bonobo in DRCongo.

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Behaviour, Ecology and Conservation of Wild Bonobos
July 22 – 25, 2003
Kyoto University Primate Reseach Institute
Inuyama, Japan
Workshop Final Report

It is important to report that in general the situation for bonobos is encouraging (except see abstract for Lomako on page 20), the population has not suffered extensively nor has it been decimated.

In the Conservation Session we were able to successfully achieve three unified activities:

- one highlighting each research field site independently,
- the second offering collaborative action towards an effort that will benefit all the research field sites equally,
- and the third provided collaborative action to ensure the survival of bonobos in their natural habitat without impacting any of our research sites.

We all agreed that there is an increasing need to promote bonobo awareness in the general population both nationally and internationally.

I. First, we evaluated the current situation in the area of bonobo range. Contrary to the widely held perception that all bonobo conservation stopped, the unrest and insecurity on the ground since 1998 has not suspended our activities. All workshop contributors have visited their respective research sites in the recent year, at the very least, and implications resulting from the civil unrest and insecurity since 1998 were included. We have all continued to take action on behalf of our respective research sites and/or biodiversity conservation in DRC. We have maintained contact with our local staffs and all worked in country (including from Kinshasa) during the period of crisis. The needs of the different sites vary and the activities that are planned to meet these requirements are diverse. Please see page 39 for site contact person. The points are not listed in order of priority.

Participants briefly presented the most current:

- threats,
- activities,
- and plans

for the respective sites (see below).

Priority Threats by Site (not in order of impact):

Site	**Threats**	**$**
Kokolopori	Subsistence hunting Poaching by military Cultivation Absence of eating taboo	$
Lac Tumba (west)	Subsistence hunting Commercial hunting Logging Agriculture fields Transport access on river	$
Lomako	Subsistence hunting Commercial hunting Human immigration	$
Lomami-Lualaba	Commercial hunting Logging in the north Human movement	$
Lui Kotal	Subsistence hunting Commercial hunting Logging Proximate mining	
Lukuru	Subsistence hunting Commercial hunting Logging Mining	$
Parc National de la Salonga	Poaching Cultivation Illegal human habitation Proximate logging Proximate mining	$
Wamba	Subsistence hunting Coffee plantations Agriculture fields	$

$ indicates sites that still require financial support and funding.

Priority Activities by Site (not in order of importance):

Site	**Activities**	**$**
Kokolopori	Survey Confirmed bonobos	$
Lac Tumba (west)	Survey Confirmed bonobos Informal sensitization program	$
Lomako	Status assessment International public awareness documentary	$
Lomami-Lualaba	Reconnaissance survey	$
Lui Kotal	Economic development micro projects Research	
Lukuru	Economic development Community relations Infrastructure building Reclassify status and expand Bososandja Forest	$
Parc National de la Salonga	Status assessment mapping Ground-truth images Inventory and survey Infrastructure rehabilitation Research	$
Wamba	Reestablished research School support Poaching patrols	$

$ indicates sites that still require financial support and funding.

Priority Plans by Site (not in any specific order):

Site	**Plans**	**$**
Kokolopori	Continue to survey Expand research Build research station	$
Lac Tumba (west)	Continue to survey Formalize sensitization program Build research station	$
Lomako	Preliminary surveys Management plan for Reserve Reestablish research site Isamondje	$
Lomami-Lualaba	Revitalize conservation site Upgrade protected area status	$
Lui Kotal	Extend park boundaries to encompass site Establish a center Build infrastructure Hire more personnel Continue research	
Lukuru	Continue community relations Continue economic development Reestablish research Build infrastructure Logging concession sensitization Bososandja Community Forest	$
Parc National de la Salonga	Build infrastructure Provide appropriate equipment Identify borders Support and train personnel Management plan Continue research	$
Wamba	Construct school Support dispensary Build infrastructure (roads & bridges) Expand Luo Scientific Reserve Employee more people in conservation Continue research	$

$ indicates sites that still require financial support and funding.

II. Responding to the 1999 Yaounde Declaration[11] and the 2000 ecorgional priority-setting workshop for the Congo Basin [12], in an effort to elevate conservation efforts in the Congo Basin 11 priority landscapes were identified for intervention. The plan was officially launched at the 2002 World Summit for Sustainable Development[13] declaring that the five sponsoring governments will work with World Bank and a number of NGO partners[14] in these areas of high conservation value. This effort was implemented as the Congo Basin Forest Partnership (CBFP)[15].

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[11] The "Summit of Central African Heads of State on the Conservation and Sustainable Management of Tropical Forests" was a sub-regional level meeting held in Yaounde, Cameroon on 17th March 1999. The meeting saw the adoption of what is now commonly referred to as the Yaounde Declaration. The Heads of State from six countries: Cameroon, Republic of the Congo, Gabon, Equatorial Guinea, Central African Republic, and Chad signed a declaration on matters relating to the conservation and sustainable management of forest ecosystems. The document calls upon the heads of state to set up protected trans-border zones and to adopt harmonized forestry policies. In addition, the parties agreed to work to eliminate large-scale poaching and other non-sustainable exploitation of forest resources, to promote forums for information exchange and experience on sustainable forest management, and to create networks to connect forest research and development institutions in the region.
See: http://www.panda.org/forestsummit/declaration.html

[12] "Biological Priorities for Conservation in the Guinean-Congolian Forest and Freshwater Region" region-wide assessment for seven countries including Nigeria, Cameroon, Gabon, Equatorial Guinea, Central African Republic, Republic of Congo and Democratic Republic of Congo. This workshop was held 30 March – 2 April, 2000 in Libreville, Gabon (co-financed by CARPE, BSP and WWF-US) and resulted in the designation of 77 terrestrial and 50 freshwater priority areas.
See: http://www.worldwildlife.org/ecoregions/congo_report_pdf.

[13] Johannesburg Summit 2002 – the World Summit on Sustainable Development – brought together tens of thousands of participants, including heads of State and Government, national delegates and leaders from non-governmental organizations (NGOs), businesses and other major groups to focus the world's attention and direct action toward meeting difficult challenges, including improving people's lives and conserving our natural resources.
See: http://www.johannesburgsummit.org/html/basic_info/basicinfo.html

[14] The CBFP partners are the six governments of the Congo Basin: Cameroon, Central African Republic, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Republic of Congo; The governments of the United States, the United Kingdom, Japan, Germany, France, and South Africa; European Commission; NGOs, including Conservation International, Wildlife Conservation Society, World Wildlife Fund, World Resources Institute, Forest Trends, and the Society of American

For bonobo conservation the relevant Congo Basin Forest Partnership landscapes are:

- the Salonga - Lukenie - Sankuru Forest Landscape,
- the Lac Tele-Lac Tumba Swamp Forest Landscape on the left (east) bank of the Congo River, and
- the Maringa/Lopori - Wamba Forest Landscape.

All the active research sites and protected areas benefit from intervention across these three landscapes, as follows:

- the Salonga - Lukenie - Sankuru Forest Landscape encompasses Parc National de la Salonga, the Lui-Kotal research site, and the Lukuru Project research site/Bososandja Forest;
- the Lac Tele-Lac Tumba Swamp Forest Landscape encompasses the Lac Tumba research site/ Mabali Scientific Reserve; and
- the Maringa/Lopori - Wamba Forest Landscape encompasses the Lomako Forest Reserve, Lomako research sites (Isamondja and Iyema), Kokolopori, and the Wamba research site/Luo Scientific Reserve.

However, the Congo Basin Forest Partnership (see below) does not make provisions to intervene in the landscape encompassing the block between the Lomami and Lualaba Rivers.

In the spirit of the CBFP, we proposed that forest lands currently designated for timber harvest within the three "priority landscapes for intervention" south of the Congo River be purchased back in order to regain habitat for bonobos and protect against irreversible degradation of extensive areas of viable bonobo habitat. Ideally, such areas will be assigned as new protected areas recognized at the national level. Our proposal includes the same financial arrangement (including up-front cost, annual payments, employee requirements as # of employees based on surface area, etcetera) made for logging concessions applies to these buy-back lands for conservation to ensure no financial penalty regarding ongoing benefits to the country.

During the conservation session discussion, concern was presented about a number of issues in this proposal, including:

- who will 'own' these conservation concessions?
- which logging concessions will be bought?

The determination of which logging concessions to purchase is based entirely on the boundaries described for each CBFP landscape. In order to calculate the surface area and some initial cost for the buy-back, the designated boundaries/descriptions of these

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Foresters; U.S. and international business, including the American Forest and Paper Association and the Association Technique Internationale des Bois Tropicaux-ATIBT; international organizations, including the World Bank and the International Tropical Timber Organization.

[15] US Secretary Powell launched the Congo Basin Forest Partnership at the United Nations World Summit on Sustainable Development (WSSD) in Johannesburg on September 4, 2002, the closing day of the summit.

three areas was requested. WRI/GFW calculated the area for each of the landscapes based on the map coordinates available from the base files created by WWF, dated 13 February 2003.

According to base files, the CBFP areas relative to bonobo range are:

- nearly half of the Lac Tele-Lac Tumba Swamp Forest landscape = 43,000 km^2
- Salonga-Lukenie-Sankuru Forest landscape = 102,233.44 km^2
- Maringa/Lopori-Wamba Forest landscape = 42,229.55 km^2

The Salonga-Lukenie-Sankuru Forest landscape includes 36,560 km^2 currently covered under Parc National de la Salonga.

In preparation for this publication, it was discovered that these landscapes do not have an official description or secure delineation. A number of different maps have been generated, many adjusted to meet the agenda of the source. The descriptions were left vague so that USAID and other funding sources could provide opportunities to "refine the boundaries as they see fit[16]" based on information from the ground.

Prior to proposing this project to the DRCongo government, we determined to first secure a commitment for the financial means to undertake the purchase of concessions for conservation land. Before the close of the workshop, we prepared a letter of intent inviting a potential funding source to indicate their willingness, capacity, and desired level of involvement to proceed with the opportunity to participate in the buy-back of timber concessions for bonobo conservation in DRC.

III. The Lomami-Lualaba conservation site (Province Orientale du Kivu) was first proposed to IUCN[17] as a 10,000 km^2 forest situated in the northern block between the Lomami and Lualaba Rivers, east of the railway and on the left bank (south) of the Lobaye River. In this area fieldwork was carried out between 1980-1988 by the Department of Ecology and Conservation of the Environment, University of Kisangani. Over the past 50 years a number of expeditions have confirmed the presence of bonobos in this area, several efforts occurring in recent years. Although this area clearly needs to be prioritized for conservation, the Congo Basin Forest Partnership (see above) excluded this area of critical biodiversity for intervention

[16] Andre Kamdem-Toham, written correspondence to author (J. Thompson), August 2003.

[17] IUCN 1989. La Conservation des ecosystems forestiers d'Afrique centrale. IUCN, Gland and Cambridge; Doumenge, Charles 1990. “La conservation des ecosystémes forestiers du Zaire.” IUCN – Tropical Forest Programme, Gland, Switzerland; Colyn, Marc 1987. "Les Primates des forests ombrophiles de la cuvette du Zaire: interpretations zoogeographiques des modeles de distribution" in *Revue de Zoologie Africaine*.

leaving it exposed to the onslaught of environmental degradation. The hydrology of the Lomami and Lualaba River systems creates an exceptional ecological opportunity for a distinct assemblage of species.

The Bonobo Workshop participants and contributors unanimously agreed that it is useful to revitalize the proposal creating a Lomami-Lualaba protected area. Thus, one result of our meeting was a letter to the Ministries of

- Environment and Conservation of Nature,
- Interior,
- Fundamental Business,
- Agriculture, Farming and Fishing, and
- Mines,

strongly supporting and strengthening their efforts to officially protect the Lomami-Lualaba site under a national protected area classification. Currently (2003) there are two logging concessions that impact the activities within the original Lomami-Lualaba conservation site. Bordering the two rivers at their confluence are two concessions totaling a surface area of 3,612 km^2 (see map on page 38).

We determined that this unique and biologically important proposed protected area should be expanded to include the left bank, as well as the right bank of the Lualaba River and be situated south to avoid the two concessions committed to logging and the current level of habitat already modified shouldering these rivers. This conservation site revision reflects our improved understanding of the situation on the ground and captures important habitat and biodiversity. This refined description located south of Ubundu, east of Opala, west of Punia, and north of Lokandu harbors representative species including bonobos, gorillas, chimpanzees, okapi, Congo peacock, and forest elephants. Thus, the Lomami-Lualaba conservation area will be the only place in the world that protects such an unprecedented and distinct assemblage of wildlife. Through this action the workshop participants collaboratively chose to make a strong statement backing the designation of the Lomami-Lualaba protected area.

Further supporting our action, according to preliminary DNA analysis presented during this workshop[18] looking at Y-Msat, analysis of the Y-chromosome for wild bonobos shows clear geographic structure even distinguishing between populations within regions. The implications for conservation indicate that the genetic unit (sub-population) between the Lomami-Lualaba Rivers differentiates from the rest of the bonobo population.

During the conservation session discussion, concern was presented about what will happen to the people living in the Lomami-Lualaba protected area? This issue will require rigorous monitoring and will largely depend on the protected area classification awarded to this block. Only the classification of "national park" warrants relocation of affected people.

[18] see Conservation Session abstract "Genetic diversity in bonobos and its implication for conservation." by J. Eriksson, H. Siedel, G. Hohmann, C. Boesch, and L.Vigilant.

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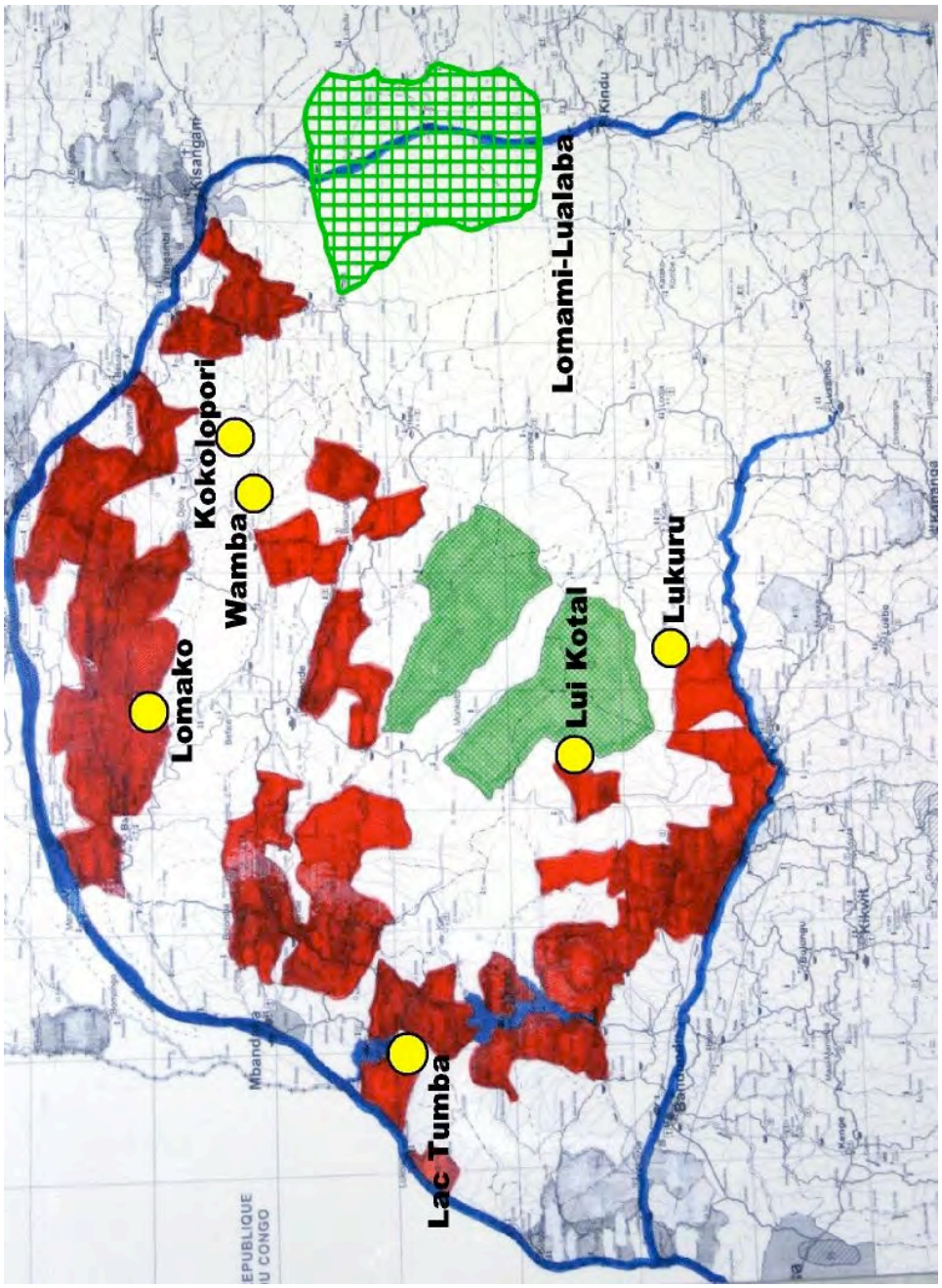
Map:



- Indicates the location of research sites discussed in text.
- Solid green blocks represent Parc National de la Salonga, North and South Blocks.
- Hatched green block indicates location of proposed Lomami-Lualaba protected area.
- Solid red blocks represent 2003 logging concession data provided by Service Permanent d'Inventaire d'Amenagement Forestier.

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Lomami-Lualaba	
Lui Kotal	Gottfried Hohmann, mpi@ic.cd , hohmann@eva.mpg.de
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Associated Species of Special Interest:

Black and White Colobus (*Colobus angolensis*)
Thollon's Red Colobus (*Procolobus tholloni*)
Black Mangabey (*Cercocebus aterrimus*)
Golden-bellied Mangabey (*Cercocebus galeritus chrysogaster*)
Salongo Guenon (*Cercopithecus Dryas*)
Allen's Swamp Monkey (*Allenopithecus nigroviridis*)
Talapoin (*Miopithecus talapoin*)
Congo Clawless Otter (*Aonyx congica*)
Spotted-necked Otter (*Lutra maculicollis)*
Congo Peafowl (*Afropavo congensis*)
Gray Parrot (*Psittacus erithacus*)
Giant Pangolin (*Manis gigantean*)
Sitatunga (*Tragelaphus spekei*)
Aadvark (*Orycteropus afer*)

Appendix I (letter to Ministers supporting Lomami-Lualaba):

English translation

His Excellence Mr. the Minister of Environment
His Excellence Mr. the Minister of the Interior
His Excellence Mr. the Minister of Fundamental Business
His Excellence Mr. the Minister of Agriculture, Farming and Fishing
His Excellence Mr. the Minister of Mines,

To His Excellence Mr. the Minister of the Environment and Conservation of Nature

24 July 2003

Excellence,

It is an honor for us today to write to you to submit an important recommendation regarding the conservation of critical biodiversity associated with the bonobo in DRCongo.

During the conference 22-25 July 2003 titled "Behaviour, Ecology and Conservation of Wild Bonobo's: Current Activities and Plans for the Future" held in Inuyama, Japan, we found that it will be useful to revitalize the proposal creating a Lomami-Lualaba protected area.

Field researchers representing seven sites met to report on latest activities in the field, explore ways to increase compatibility of research, identify potential areas for collaboration, and combine efforts to ensure the survival of bonobos in their natural habitat.

The result of our meeting was unanimous agreement to support your efforts to protect the Lomami-Lualaba site under your official arm. This unique protected area should include the left bank, as well as the right bank of the Lualaba River. This area located south of Ubundu, east of Opala, west of Punia, and north of Lokandu harbors representative species including bonobos, gorillas, chimpanzees, okapi, Congo peacock, and forest elephants. This will be the only place in the world that protects this unprecedented assemblage.

For your information, we have attached the prioritized threats, activities, and plans for our respective sites as identified during the conservation session of the conference.

It is our wish to make a strong statement backing the designation of the Lomami-Lualaba protected area.

Signed by all participants

Participant List (in alphabetical order by second name):

Inogwabini Bila-Isia, Wildlife Conservation Society, MIKE-CITES, PN Salonga

Jef Dupain, RZSA-Center for Research & Conservation, Lomako

Jonas Eriksson, Max Planck Institute, Lomako et Lui Kotal/ PN Salonga

Takeshi Furuichi, Meiji-Gakuin University, Réserve Scientifique Luo-Wamba

Chie Hashimoto, Kyoto University, Réserve Scientifique Luo-Wamba

Gottfried Hohmann, Max Planck Institute, Lomako et Lui Kotal/ PN Salonga

Michael Huffman, Kyoto University, Primate Research Institute

Genichi Idani, Great Ape Research Institute, Réserve Scientifique Luo-Wamba

Hiroshi Ihobe, Sugiyama Jogakuen University, Primate Research Institute

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