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Nonhuman Primates – a review of diseases of quarantine concern

Margaret Leggoe

This paper is being presented on behalf of Biosecurity Australia. Biosecurity Australia was formerly known as the policy arm of the Australian Quarantine and Inspection Service. The work done by Biosecurity Australia is covered by the *Quarantine Act* 1908. The *Act* has, as its object, the prevention or control of the introduction, establishment or spread of diseases or pests that will or could cause significant damage to human beings, animals, plants or the environment or economic activities. Proclamation 1998 is subordinate to the *Quarantine Act*.

With respect to the importation of live animals, this proclamation essentially prohibits their importation without a permit. The only exemption is for dogs and cats from New Zealand which may be imported without a permit provided they meet requirements laid down in the proclamation.

Australia is a member of the World Trade Organization and, therefore, bound by the Sanitary and Phytosanitary Agreement (SPS). Under SPS, Member countries have the right to take measures necessary for the protection of human, animal or plant health, provided that such measures are applied only to the extent necessary to give such protection. These measures must be based on scientific principles and not maintained without sufficient scientific evidence.

In cases where relevant scientific evidence is insufficient, an SPS Member may provisionally adopt sanitary or phytosanitary measures* on the basis of available pertinent information, including that from the relevant international organizations (such as the World Organisation for Animal Health (OIE)) as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk# and review the sanitary or phytosanitary measure accordingly within a reasonable period of time.

*Provisional sanitary measures for the importation of nonhuman primates, were introduced in 1996, and called “Interim Conditions for the Importation of Nonhuman Primates”. Now, in the light of the current chapter on nonhuman primates in the International Animal Health Code, updated interim conditions are about to be released. These will incorporate recommendations from Chapter 2.10.1 of the Code, headed, Zoonoses Transmissible from Non-human Primates.

Meanwhile, the #additional information referred to above, for a more objective assessment of risk, is being gathered and assessed. This is called an Import Risk Analysis (IRA). It is this assessment that is my job, and that is the subject of my talk today.

The IRA process followed by Biosecurity Australia is a formal structure, based on the risk analysis process outlined in the International Animal Health Code.

At this point, I must acknowledge the work done for us in 1999 by Dr Larry Vogelneust. Larry’s work has given me a tremendous start on a subject about which I previously knew nothing.

The first step in an IRA is to identify those disease agents that have the potential to cause harm in Australia. These are called hazards.

In the hazard identification process we ask a series of questions, and on this basis, either reject the agent as not being a hazard, or retain it for further investigation.

- Does the agent naturally infect NHPs?

We ignore agents that have only infected nonhuman primates as a result of deliberate experimental infection. There must be evidence that an animal will become infected under natural conditions.

- Is the agent pathogenic?
-
-

We ignore curiosities only found in cell cultures and agents such as normal gut flora. There must be evidence that the agent has been associated with pathological changes. If there is uncertainty about the pathogenicity of an agent, as is the case where there may be only one or two reports in the literature. In this case, it is retained until the potential to cause harm, or not, can be reasonably assessed.

- Is the agent present in the country of export?

If an IRA is limited to animals being exported from one or a small number of countries, then this question is highly relevant. However, the nonhuman primate IRA is generic, i.e. it is not limited by country of export. All countries are considered potential countries of export. This question is bypassed at this stage.

- Is the agent endemic in Australia?
 - Yes – no controls, not notifiable – not considered a hazard.
 - Yes – notifiable and control programmes used – considered a potential hazard.
 - No – exotic – considered a potential hazard.

At this stage, you have a list of agents (hazards) that are:

- pathogenic, either to nonhuman primates or man or other animals;
- could be present in the country of export;
- are either exotic, or subject to reporting and controls within Australia.

Infectious agents meeting these criteria, are then subjected to a further process of investigation.

A list of these agents, together with an explanation of our risk analysis methodology will shortly be circulated under the title of the *Technical Issues Paper*.

This process of further investigation is called Risk Assessment. Using published literature, text books and advice from experts in the field, we compile a dossier on each agent considered to be a hazard.

Agent

We look at the taxonomic relationship of agents. Related agents may behave similarly, e.g. herpes viruses usually give rise to persistent infections.

Host range

Some agents have a broad host range, e.g. the tuberculosis bacterium. It might be useful to find out what quarantine measures are considered important in relation to such an agent when it infects other species. Is the nonhuman primate the primary host, or just an incidental host? The host range may be narrow, e.g. some blood parasites are highly host specific.

Geographic distribution

First, there is the natural range, where the agent evolved with the wild nonhuman primate species.

Then there is the dissemination that has taken place through the international transportation of large numbers of NHPs. On reading past literature, the mind boggles at the scale of international transportation of NHPs some 30-40 years ago, often with little or no quarantine practiced.

In the case of primary human pathogens, the geographic distribution of the disease in humans is also of interest.

Pathogenesis

This tells us how a disease agent enters the body, how it multiplies and spreads and what is the incubation period between infection and appearance of clinical signs. It tells us what organs the agent prefers and how the host's immune process work or fail. It tells us whether tissue damage is caused directly by the disease agent or indirectly by the host's immune mechanisms, and finally, whether a carrier state is established.

Understanding the pathogenesis gives us an idea of the severity of a disease, and the potential

for persistent infections.

Clinical signs

This is what the clinician sees. Some disease agents may cause no clinical signs in certain primate species, whilst being fatal in others.

Transmission

The mode of transmission will indicate whether the agent is transmitted by close, contact, such as sexually transmitted herpesviruses.

- It may be transmitted through airborne droplets, (tuberculosis).
- It may be an insect borne infection, (malaria, yellow fever)
- It may have a life cycle through other vertebrate or invertebrate hosts (tapeworms).

The mode of transmission influences type of quarantine measures that will be applied if deemed necessary.

Diagnosis

The ease of diagnosis is important in deciding if it can be used as a quarantine measure. Diagnosis must be accurate, and not permit confusion with other disease agents. Diagnosis should not be made on clinical signs alone, because other disease agents may cause a similar picture. If diagnosis can only be made on post-mortem examination, it is of little value for live animal importations. It helps to know if a diagnostic test indicates active infection. Virus isolation and bacterial cultures will show this.

Does the diagnostic test indicate past exposure to the agent? Tests for antibodies in the blood will do this. Depending on the disease in question, antibodies may or may not indicate that the animal is still infected. The tests should be practical. For instance a test that involves sacrificing one NHP in order to determine the disease status of another is hardly practical. A knowledge of diagnostic tests, their cost and their availability is important for deciding appropriate quarantine measures.

Epidemiology

This essentially looks at the big picture of a disease when a number of animals/people are affected.

- Does the disease affect both wild and captive animals?
- Is it primarily a human disease that affects NHPs or vice versa?
- What factors influence the occurrence of epidemics? Is the reservoir species known?

What other species are involved in maintaining a pool of infection?

- What is the relative prevalence of the agent among different species, different age groups, different populations etc.
- Is overt disease expressed in all infected individuals, or just a small percentage? What is the mortality rate among people/animals that become diseased?
- Is it of importance to human health?

Potential for control, eradication

- Are the insect vectors that spread the disease present in Australia, and if so, can they be controlled?
- Will treatment of individuals be effective?
- What preventative measures are available? e.g. vaccination.
- Is it practical to consider control or eradication measures if the agent is already widely disseminated in the human population?

Up to this point, the work consists of reviewing current knowledge of the agents themselves. It is descriptive work that puts together a picture of the agent in question.

Following on from this comes the determination of the probability of an event occurring.

Even with domestic animals for which there is an abundance of information available, this is

not easy. But for wild animals, there are many gaps in the available information.

When we do these assessments, we initially take the scenario as it would be without import restrictions. We do not make an assumption that certain quarantine measures are already in place. Instead, we assume the opposite, and then decide if quarantine measures are justified.

Release assessment

This estimates, in the absence of any quarantine measures, the probability of a disease agent being brought to, and released in Australia.

Exposure assessment

This estimates, in the absence of any quarantine measures, the probability of animals/people in Australia being exposed to and infected with the agent.

In the case of nonhuman primates, there is often insufficient information on which to calculate mathematical probabilities, and in this IRA, I will not attempt to use figures or percentages. Rather, I will be using expressions such as “high, moderate and low”.

A matrix of ‘rules’ for combining descriptive likelihoods

	High	Moderate	Low	V. low	E. low	Negligible
High	High	Moderate	Low	V. Low	E. Low	Negligible
Moderate		Low	Low	V. Low	E. Low	Negligible
Low			V. low	V. Low	E. Low	Negligible
V. low				E. Low	E. Low	Negligible
E. low					Negligible	Negligible
Negligible						Negligible

Having determined the relative likelihoods of release and exposure, the likelihood of the both events occurring in relation to the same import is determined with the above matrix.

If the likelihood of one event is low, but the likelihood of another is high, the overall likelihood is low.

Consequence assessment

In assessing the consequences, we assume the agent is brought to Australia, and infects and becomes established in Australian animals/people, what are the consequences? This includes consideration of:

a) Direct consequences such as animal infection, disease, and production losses public health consequences.

And it also includes:

b) Indirect consequences surveillance and control costs compensation costs potential trade adve

c) rse consequences to the environment.

In addition, I propose, with the nonhuman primates IRA, to include consideration of consequences to the conservation of endangered species. Thus, consequences that have no adverse affect on the Australian environment, could impact adversely on the conservation of a species of NHP that may have few or no specimens left in the wild.

In deciding whether to apply quarantine measures, we may apply a matrix like the one below. A more sophisticated decision-making model is under development, but I prefer the simple version.

Decision-making matrix.

Consequences of entry and exposure

On the vertical axis, we have the combined likelihood of entry, and exposure of the agent. This is plotted against the consequences of establishment of the disease in Australia.

An extremely low likelihood of the former, coupled with a consequence of little impact would fall in the “green” area. The import would be permitted without quarantine measures being applied.

If the likelihood of an agent being introduced and established is moderate to high, and the consequences of that event are serious, the agent falls in the “red”. In this case, quarantine measures must be applied. These measures must reduce the combined likelihood of release and exposure to a

Likelihood of entry and exposure	<i>High likelihood</i>	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	Extreme risk
	<i>Moderate</i>	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	Extreme risk
	<i>Low</i>	Negligible risk	Negligible risk	Very low risk	Low risk	Moderate risk	High risk
	<i>Very low</i>	Negligible risk	Negligible risk	Negligible risk	Very low risk	Low risk	Moderate risk
	<i>Extremely low</i>	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very low risk	Low risk
	<i>Negligible likelihood</i>	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very low risk
		<i>Negligible</i>	<i>Very low</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>Extreme</i>

level where the risk now falls in the “green”. The importation would not be permitted unless this could be achieved.

Agents falling in the yellow area should be permitted importation without restriction. But when confronted with this situation, one will first go back very carefully over all the information before making a decision, and if still undecided, consult experts.

So now, all that is left to deal with are those agents that fell in the “red”. We consider what quarantine, or risk management measures are available.

Risk management options

Tests for disease

Laboratory tests must be sensitive. That is, they must return a positive result for all infected animals. There must be no false negatives.

It is also desirable, but less important from a quarantine point of view, to have a test that is specific, in that it will not show as positive if related, but different agents are present. False positives would be rejected from importation along with the true positives.

Disease freedom:

We may consider a declaration of disease freedom from the Official Veterinary Service in the country of export. Such a declaration may relate to:

- country freedom,
- regional freedom, or

- institutional freedom

Acceptance of certification will depend on its reliability. There are countries whose veterinary services are of as high a standard as our own, and they have been exporting live animals to Australia for some years. There are other countries about which we know less, and maybe we do not have sufficient confidence in their certification. In this case, we would look for other ways to achieve satisfactory quarantine.

Quarantine

We may decide to isolate, or quarantine the animals for a period. For this to be effective, the incubation period must be short, followed by clinical expression of the disease, or conversion to a positive laboratory test.

If the disease agent can exist in apparently normal animals (carriers), time spent in quarantine alone is not an effective risk management measure. The type of isolation, or quarantine, must also be relevant to the mode of transmission of the agent. For example, if the agent is spread by aerosols, the quarantined animals must be a considerable distance from animals not in quarantine, or in an enclosure that prevents the escape or entry of aerosols. And humans, if susceptible, should wear protective clothing and masks when handling potentially infected animals.

Treatment

For treatment alone to be an effective quarantine measure, it must achieve elimination of agent from the animal's body. Clinical improvement only – unsatisfactory.

Vaccine

If vaccine prevents infection it is suitable. But if there is a masking of clinical signs, while allowing sub-clinical infections to occur, then it is not suitable as a quarantine measure.

Finally

If quarantine measures can be applied to mitigate risk to an appropriate level, the import will be permitted, subject to those conditions being applied. If, at the end of this process quarantine measures will not provide an appropriate level of protection, then the import will be refused.

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Primates found popping prenatal drug

A Madagascan lemur has been revealed as the first animal known to self-medicate when pregnant. Female sifaka eat plants rich in poisonous tannins in the weeks before giving birth, researchers have discovered.

It is unclear why the sifaka does this. In other mammals, small doses of tannins kill parasites and stimulate milk production. And vets often use tannins to prevent miscarriage, raising the intriguing possibility that by eating the plants the sifaka is protecting its developing baby.

At first sight, a taste for tannins might seem odd whether you are pregnant or not. Plants use them as defensive chemicals to deter herbivores from munching their leaves, as the toxic tannins bind to proteins in the animals' guts.

"The sifakas are doing something that goes against the grain," says Michael Huffman, an expert in primate self-medication at Kyoto University in Japan and a member of the team. "But this probably means they have a good reason for doing it."

Fihamy and kily

His team studied Verreaux's sifakas (*Propithecus verreauxi*) in Kirindy Forest, western Madagascar. Pregnant females ate more of the tannin-rich plants, called fihamy and kily, than other females or males, the authors will report in a future issue of the journal *Primates*. They also found that the sifakas that ate the plants had fewer failed pregnancies than a group of sifakas that did not.

Huffman accepts that he cannot be sure this is down to the tannins, as the sifakas that eat them might simply live in a less stressful habitat. Also, the researchers admit that the animals could be after other useful compounds in the plants.

Numerous primates, including chimps, baboons, black lemurs and capuchins, dip into the jungle pharmacy to combat parasites.

Some 39 species have been observed eating soil, which soaks up toxins in the gut and allows the animals to eat poisonous plants without getting sick. Another trick used by chimps is to swallow bristly leaves whole, which irritate their stomachs and induce diarrhoea, flushing out tapeworms and other gut parasites.

James Randerson 19:00 22 January 03 New Scientist

Chimpanzee sanctuary and wildlife trust.

Pauline Osborn

My name is Pauline Osborn and I have recently returned from working for the Chimpanzee Sanctuary and Wildlife Trust (CSWCT) in Uganda for 6 months. Through Lynette Shanley and 'Primates for Primates', I was sponsored by a very kind donor, which enabled for me to stay for a longer period than I initially thought was financially possible. The sanctuary is located on Ngamba Island, 24 Kms from Entebbe, and is supported by the Jane Goodall Institute and Born Free. 35 chimps have a safe haven on the island which is located on Lake Victoria. Most of the chimps have been confiscated from people trying to sell and illegally export the animals or from captive situations where they have been kept in often appalling and totally inappropriate conditions. Often the chimps are traumatised going through the distress of seeing their mother and family murdered, being confined to extremely small spaces for transportation and suffer starvation, dehydration, infestations of parasites and lose their family security network. The amount of time and money which is spent caring for the chimps is extensive and is needed in a lot of other areas in Uganda. However, chimps are extremely important for the environment as seed disperses and for creating open areas in the canopy for new growth. In addition, many other species within the forest rely on the chimpanzee for their own survival and many forests have become radically degraded due to their loss from the environment.

I lived and worked on the island sanctuary for 3 months as a Keeper, usually for 2 weeks at a time, helping with cleaning of the enclosures, preparing food for the chimps, organising enrichment ideas, nursing sick animals and talking to visitors. While I was on the island there would also be 6-10 other people, usually a cook, a gardener, a guard, 3-4 keepers and sometimes a vet. During the 2nd month, I was joined by a girl from St. Andrews University in Scotland, Vicki Horner, who was conducting some psychological test on the infant chimps. I was able to assist her with the experiments, by distracting the chimp when the experiments were being set up and then videoing the test. It was a lot of fun. One of the babies, Asega, is so clever that we were contemplating sending him to University next year.

At the beginning the second 3 months of my time in Uganda, I received an urgent message

from the mainland office that a young baby chimp had been confiscated. He was discovered in the Northern part of Uganda and would need a full-time carer the next day. I had to be rushed back to the mainland and was confronted with an extremely sweet 2 year old who was named Okech, which means "born in the drought". Looking after an infant chimpanzee, *Pan troglodytes* requires a great deal of patience, energy and 24-hour-a-day dedication. It is necessary for the infant to sleep, eat and perform all necessary ablutions along with the carer (as it would do in the wild with its mother). This is required to provide proper security and supervision for the youngster. It is not a job to be taken on frivolously or with any romantic ideals. Many countries, in both Western and Third World countries, allow primates to be kept as pets within residential areas. The animals are usually kept in totally unsuitable environments and isolated from any other primate companions. The reasons many people give for wanting an infant primate are: as a replacement human child, because they are cute and cuddly, or to impress friends and family. A chimpanzee which has a life span of 40-50 years and cannot meet such demanding requirements. Chimps are menacingly hyperactive, require constant physical and mental activities plus social stimulus; this can only be provided by other chimps in a group situation. When chimps become sexually mature they are 5 times stronger than any human male. Consequently, due to their size, strength and aggression they can become very dangerous.

Fortunately, Okech was not badly traumatised and quickly adapted to his new human environment. Other infant chimps are not so easily rehabilitated and develop severe psychological problems, such as: rocking, eating their faeces, a reluctance to socialise with their peers and aggression. All of these behaviours have been observed in individuals from the island. The effects of trauma is usually more adverse when the animal has experienced horrific events, such as the violent death of their mother. At the age of 3-4 years old the infants are unable to block out traumatic and distressful incidents.

Okech was fortunately, after 3 months of quarantine, integrated into the infant group on Ngamba Island. He is a very healthy individual who was confident and very happy with the lifestyle at the CSWCT office. He had dogs to play rugby with and lots of humans to keep him entertained. He liked the busy lifestyle - but was also a bit sooky at times and needed lots of cuddles. He especially liked to play early in the mornings when he woke up and he would sit and wait until I moved in the bed and then pounce on me from a great height. He loved to climb up on a big set of bookshelves and dive onto me from the top, so it was very necessary to be ready for him. 9kgs of baby chimp flying at you from 2 meters in the air is not something to be taken without a little preparation. Other things that Okech liked was to be tickled, chased and he loved to steal Betty the cooks' morning tea or her vegetables which were being prepared for dinner. He also liked to brush his teeth, wash his face and hands and admire himself in the mirror. If you think that this might all be a bit too sophisticated Okech also had a special relationship with the toilet brush. Sometimes after being put to bed Okech would wake up and find himself alone, while I would be taking a shower or eating dinner. He would charge out of the room, dragging his sheets or towel behind him, crying out for his current mother. Once he was in safe hands, he would quickly calm down and take on the fun to be had - such as a candlelight dinner. If he discovered that there was food to be had he was quite the well-mannered dinner companion and would quickly consume spaghetti bolognese or noodles and was quite capable of feeding himself with a spoon or drinking from a cup.

Within 1-2 years, however, Okech would become too strong and active for this type of human interaction to continue. He will then require keepers and proper facilities to keep him in a captive situation. Ideally, integrating Okech back into the wild with a new family would be the

best plan for his future. However, this is extremely difficult, due to the lack of uninhabited (human and chimp alike) forested land which has large and rich enough resources to sustain a chimpanzee group. In Uganda, and many other areas of Africa, such areas are rare.

After Okech's quarantine was complete, he spent a week or so being integrated by the keepers on the island into the nursery group of other orphaned chimps. The nursery group live together (15 in all) as a social group, with ages ranging from 2-7 years. Okech will form friends and affiliations with individuals in the group and be dominated and harassed by the other older chimps until he finds his correct position within the hierarchical society. This is an important and proper way for Okech to spend his life, with a correct social system, form natural relationships, freedom to wander in the forest, and the opportunity to eat natural chimpanzee foods. Some of the babies from the infant group on the island helped to welcome Okech to their group. Baluku, Asega and Billy were especially friendly to him. After a few days for Okech to get used to his new environment, I had to leave him in the enclosure with some of the more placid individuals. I sat outside the cage - Okech was very upset of course - and for an hour or so he was too distressed to be approached by the others. But the other babies were very concerned about him and kept on trying to make friends. Eventually, Asega came over to him and put his arm around Okech's shoulders and led him away from his horrible mother. The sight was heart-breaking, but I knew then that he would be okay with his new family.

Due to the overpopulation of chimps on the island, a forested section of a different island has been found, where some of the adult chimps will be relocated. Once the new island is set up, targeted for 2003, the nursery group will be able to stay in the forest for a full 12 hour day instead of the normal 2 hour stint. The animals are housed in a covered, open-walled enclosure in the evenings for security and protection from the elements and they are fed their evening porridge and greens.

My job as an infant chimp carer was an interesting and personally rewarding experience. It is, nevertheless, extremely exhausting, arduous, time consuming and should not be necessary. Eventually, Okech would probably have been sold on the black market for a great deal of money. If his location had been undetected, he would have ended up either as a form of entertainment, as a human companion in America or Europe, or even used for research purposes, if he had lived through arduous transport conditions. The selling of primates for these reasons is inhumane, cruel and creates a lot of, usually unforeseen, problems for the owners of the animals. It is only a matter of time before the owner decides that the animal is too old, or no longer cute enough, or perhaps just creating havoc. The poor animal, who is probably used to the human lifestyle and family life is relegated to a cage in the back yard, alone, bored and frustrated only to be fed if the 'loving family' inside decide that they have the time.

A very sad life.

Inside Jakarta's smuggling zoo

Kafil Yamin

JAKARTA - The market is dirty, is chaotic and reeks of animals. Called the Pramuka pet market, its bazaar-like atmosphere, punctuated by the calls of creatures in distress, camouflage well the fact that this untidy sprawl in the eastern part of Indonesia's capital is a key part of a multimillion-dollar smuggling operation.

About 30 kilometers away and, like Pramuka, within the municipal confines of Jakarta is Barito, another pet market. This too has a profusion of birdcages swinging overhead, while hutches containing monkeys, dogs and cats line the narrow walkways.

Most visitors to Pramuka and Barito are bona fide - including local bird lovers in search of bird feed. What few know is that both markets have a global reputation, though a very dubious one indeed, one they got a glimpse of when the Indonesian police struck twice in January to prevent rare and protected animals from being smuggled out.

On January 20, Japanese national Ohashi Masayuki was stopped at Jakarta's Sukarno-Hatta International Airport. Among the 85 animals he was attempting to smuggle out were rare gibbons and endangered squirrels. Just two days later, three Kuwaitis were thwarted in their bid to spirit away rare and protected Indonesian wildlife.

The alarming scale of the smuggling was revealed by a vendor in the Pramuka market, who said he sells an average of 150 rare wild animals every month.

"My regular customers are from Japan, the Middle East and Malaysia," he said. "If we make a deal - which includes a guarantee for delivery - then I send the animals to the airport."

The vendor says the animals come from the forests of Sumatra, East and West Nusatenggara, Papua and Kalimantan provinces. He then spoke of an arrangement that resembles a supply chain: "When we get an order and agree with the prices, then we contact our regular suppliers and tell them what we need."

That chain extends from markets such as Pramuka and Barito outward across the far-flung archipelago. It thrives with impunity despite Indonesia being a party to the Convention on International Trade in Endangered Species (CITES) from 1978.

The criminal practice continues to flourish because of a lack of law enforcement and because of the huge price that rare species command from international buyers. Like narcotics, the "street value" of smuggled endangered species is far higher than what the vendors pay - a rare cockatoo sold in Indonesia for Rp3 million (US\$260) can fetch up to \$2,600 abroad.

The vendor claimed there is "no difficulty" in passing through the customs and airport security. "We just give them some money and they take care of our things," he explained, adding that payoffs are reserved for at least three institutions in the airports: customs, the airport pet quarantine bureau, and forestry officials.

Another pet vendor in the Barito market said that when deals are agreed upon, "agents" in destination countries stand ready to secure the delivery.

"I have been working with a Malaysian company to do this business for two years," he said, claiming that there are international airlines willing to carry such prohibited cargo.

With the stakes spiking up to about a million US dollars a day - the estimate of one customs official of the international value of animals smuggled out of Indonesia in a 24-hour period - the suppliers and vendors control a market that is more lucrative than illegal logging.

In fact, the director general for forest protection and natural conservation, I Made Sumadia

Gelgel, said: "It is estimated the losses [from animal smuggling] are much higher than losses caused by log smuggling."

This translates into an enormous sum. The Forestry Ministry reckons that every year, illegal logging costs Indonesia Rp30 trillion (\$3.4 billion), and that this activity annually destroys 1.6 million hectares of forest.

Compared with the profits to be had from smuggling, the legal trade in animal species - those species not covered by the CITES can be traded legally - is relatively minuscule. Live reptiles, birds, corals, reptile skins, butterflies, and wild orchids earned Indonesia an average of \$20 million per year in the last three years.

The country is the largest exporter of birds in Asia - and is, more surprisingly, the biggest importer in Asia. Among the world's bird-exporting countries it ranks fourth after Senegal, Tanzania, and Argentina.

But contesting the official lament about the plundering of Indonesia's natural wealth is Iwan Setiawan, staff member of the Indonesian Environment Information Center (PILI).

In September, he led a team to research the trafficking in endangered species in the Pramuka and Barito pet markets. He said he found some protected animals on sale and evidence of transactions, and reported his findings to the ministries of Forestry and Environment, the Nature Conservation Body and the police.

The result? Nothing, said Iwan, which has led him to conclude that there is a nexus between the smugglers of endangered species and the authorities.

It is a view that is repeated by the Gibbon Foundation, a conservation group based in Jakarta. A member of the group's office explained that the foundation had at one time entered into a cooperation agreement with the Forestry Ministry to map wild-animal populations using satellite imagery.

The aim was to identify the remaining concentrations of wild species.

"But this invaluable information was leaked out," said the staffer. "Then we found traces of professional hunters in the regions and the animals had gone."

MASSIVE GREAT APE DIE-OFF IN AFRICA—EBOLA SUSPECTED

National Geographic News February 5, 2003

A catastrophic die-off of lowland gorillas and chimpanzees at the very heart of their range in central Africa has been reported by scientists.

Scientists working with the ECOFAC program (an EC-funded regional forest conservation program for central Africa) in northern Republic of Congo said today that they were witnessing what appears to be a massive decline in ape populations in the Lossi Gorilla Sanctuary (about 100 square miles/250 square kilometers) situated about 10 miles (15 square kilometers) to the southwest of the

famous Odzala National Park (5,250 square miles/13,600 square kilometers).

The region is thought to contain the majority of central Africa's lowland gorillas because of its isolation, the presence of several protected areas, and large undisturbed areas of habitat types particularly favored by gorillas.

"Spanish primatologists Magdalena Bermejo and Germain Ilera, who have been studying gorillas at Lossi for the past nine years, report that the eight families (139 individuals) they have been monitoring since 1994, have disappeared from their study area of 40 square kilometers (15 square miles) in the sanctuary," ECOFAC said in a news release today.

The first deaths were reported on November 26, and in mid-December scientists from Gabon's Centre International de Recherches Medicales de Franceville (CIRMF) collected samples from four gorilla and two chimpanzee carcasses and confirmed the presence of Ebola virus in all six cases.

Since then Bermejo and Ilera and their teams of trackers have been combing the area for signs of great apes and have found only one gorilla group of six individuals on the eastern edge of their study area. Two of the missing gorilla families were habituated for tourism viewing. They were the first lowland gorillas ever to be habituated in central Africa and generated much needed revenue for the local villagers, ECOFAC said.

The Lossi Gorilla Sanctuary was created at the request of the villagers when they realized that the long-term benefits from gorilla viewing far outweighed any short-term benefits from hunting. The disappearance of these families is an enormous setback for the villages, ECOFAC said.

"This most recent outbreak at Lossi suggests that the devastating effects of the Ebola virus on great ape populations appears to be moving eastwards.

The forests in and around the Odzala National Park are known to contain the highest known density of lowland gorillas in Africa."

Scientists from Rennes University working with ECOFAC have documented up to 47 families of gorillas visiting a single three-hectare (7.4-acre) forest clearing in the north of Odzala.

The epidemic appears to be spreading from west to east. Scientists from the World Wildlife Fund working in Minkebe National Park in northern Gabon documented the disappearance of great apes from an estimated area of 20,000 square kilometers (7,700 square miles) sometime between 1990 and 2000, and suspected that the Ebola virus might have been the cause. Three Ebola epidemics were recorded in villages in the Minkebe area between 1994 and 1996.

Between November 2001 and June 2002 at least 80 people died during an outbreak of the disease in the cross border area of northeastern Gabon and northwestern Congo (Mekambo-Ekata-Mbomo-Kelle). During this epidemic, scientists from ECOFAC, CIRMF, and WCS (Wildlife Conservation Society) also documented deaths of great apes in the same area and the Ebola virus was confirmed from one carcass. In several cases it was established that handling fresh ape carcasses that they had found in the forest had contaminated humans.

No one knows how the disease entered the first human or ape, said William Karesh, head of the Wildlife Conservation Society's Field Veterinary Program. "But we do know that the virus is subsequently spread from infected animals to other animals and from infected people to other people."

Karesh said that there was no known way to contain the epidemic among animals. "When people are infected we can educate them about the risk of touching or consuming dead or sick animals, and if they are sick, to immediately let authorities know so they can be isolated before they infect other people.

"But for animals, at this time, we have to let the disease run its course in the forest because there are no known treatments besides supportive care for infected humans."

Karesh said it was not known whether infected humans could be spreading the disease to apes.

"This has not been the case as far as we know, but sick individuals who refuse to remain in quarantine and move to other areas will take the disease with them and infect the people they come in contact with. There is a chance that if they were seriously ill and unable to continue travelling through the forest, in theory they could be found by chimpanzees or gorillas who could, again in theory, contract the disease from the infected human or their body fluids."

"Humans definitely are the major source of spreading the disease among humans. The typical Ebola outbreak involves one or maybe two or three people contracting the disease from some source in the forest and then infecting family members and neighbours in a chain that can grow to hundreds of people. Similarly, our understanding of the social nature of chimps and gorillas suggests that the same happens to them. One or a few chimps or gorillas become ill and then infect the other members of their family group. As the group is dying, some individuals infected later may be left to wander off and join another group or may be found dead by a member of another family group, allowing this cycle to continue."

Named after the Ebola River, in the Democratic Republic of Congo, the site of an outbreak of the virus in 1976, Ebola is an RNA virus of African origin that causes an often fatal hemorrhagic fever.

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The Bushmeat Crisis

The fact that virtually all species are subjected to over hunting implies that where the populations of key species, such as the primates and duikers, which are pollinators and seed dispersal agents, are drastically reduced, they can no longer play their ecological functions of facilitating forest regeneration.

The apparent loss of the habitat of some of these species could be attributed to this tendency. It is therefore obvious that modern conservation practices, such as the existing legislation alone cannot be effective in ensuring sustainable utilization of the wildlife resources. There is therefore the need to consider a combination of both modern and traditional practices that are sensitive to biodiversity conservation, while providing adequate levels of sustainable utilization that could also enhance food security.

Most preferred Bushmeat in Ghana

It is worthy to note that of all the eleven (11) wild animals listed in terms of Bushmeat preference, during the surveys, the grasscutter (*Thryonomis swinderamus*) was the most preferred, accounting for 65.1 percent of the total preference (fig 4). This was confirmed by the fact that it was the most sought after consumed Bushmeat in the restaurants and chop bars throughout the country. It is also the most abundant in all the markets surveyed. This conforms to the assertion by Ntiamoa Baidu

(1997) that it remains the most important Bushmeat species throughout West Africa in terms of volume of trade and preference. It is also an indication of an over-dependence of consumers on a single species. Such over-dependencies probably resulting in the over exploitation of this species as some of the traders had reported that such smaller sizes are now being hunted and sold, as compared to previous years. Even though the species breeds prolifically and is reported to be a destructive farm pest, the current rate of exploitation could be more than what the reproductive capacity of the populations in the wild could sustain.

The high dependence of consumers on this single species provides justification for the promotion of the grasscutter (*Thryonomis swinderanus*) domestication programme. This is because there is currently, adequate demand for the meat of this species and any investment is most likely to readily pay off and contribute enormously to reducing the high market demand on other wild animal species.

The preference of Grasscutter is followed by Maxwell's duiker (*Cephalophus maxwellii*) (19.9 percent) and not Royal antelope (*Neotragus pgmaeus*), as was noted by Ntiamoa-Baidu (1997). This could be attributed to the fact that the hunting pressure had impacted the populations of the latter more than the former. Caspay (2001) observed that most exploited species were those considered to cause damage to agricultural areas. Incidentally, all the eleven (11) preferred species, except the Pangolin (*Manis sp*), were farm pests eating maize cassava, cocoyam among others. Altogether, they constituted more than 80% of all the Bushmeat sold in the markets and the restaurants. That probably justified why they were the most exploited and sought after.

Another issue worth noting is the fact that primates were not a favoured species for human consumption. This is because traditionally people do not prefer primates as a source of protein. Therefore the apparent disappearance of the primates in their natural habitats, especially the Miss Waldron's Red Colobus (*Procolobus badius waldronii*), could not be solely attributed to Bushmeat consumption alone, but to other causal factors such as habitat destruction and changes in ecological conditions.

Sources of Supply

The results of the survey have revealed that Bushmeat dealers in Ghana received their supplies from all the regions of Ghana. This indicates that all the regions are involved in the Bushmeat trade even during the closed season. Bushmeat is sent to the major markets either smoked or fresh. Those using Bushmeat for medicinal purposes cut the meat into various parts (bones, skull, skin, hair, tails, jaws intestines, limbs) and dry them for their clientele.

Standards for Bush meat processing and marketing vary from one area to the other. There seems to be absolutely no rules or standards for the Bush meat trade in Ghana and the quality of Bush meat offered for sale on the markets varies widely. While there may be standards set to ensure domestic meat hygiene, these either do not seem to apply to bush meat or are totally ignored when it comes to bush meat marketing and processing.

The bush meat trade has evolved over a long period of time and developed into an intricate network of hunters, wholesalers (queen mothers, middlemen), retailers (restaurant /chop bar operators) and consumers. Hunters kill the animals and either transport them long distances to the marketing centres for sale to middlemen or the queen mothers travel to the farm gates to buy the bulk of bush meat killed. It is common for animals killed on night hunting trips to be kept till day break before they are sold. Animals caught in traps may stay in the traps for up to three days if trappers do not

visit their traps regularly for one reason or another. Sometimes such carcasses are almost beginning to decompose, but they will be collected and either sold as 'fresh' bush meat or smoked for sale (Ntiamoah-Baidu, 1997). There also seem to be no standards for smoked bushmeat and it is common to find improperly smoked bushmeat offered for sale on the markets.

The queen mothers sell the bushmeat to the retailer in the state in which they bought them. The retailers mostly restaurant/chop bar operators, process the bushmeat for sale to consumers.

METHODS OF HUNTING

The survey recorded six main methods of hunting wildlife. These methods include the use of guns(60%), chemicals(32.5%), fire (3.2%), dogs (2.8%)cutlasses/clubs (1.3%) and traps (0.2%). Of the six (^) methods of hunting recorded during the survey, only guns and traps are legally approved by LI685 of 1971 (WD, 1999)

The Use of Guns

Despite all the controls on weapon possession in Ghana, the use of guns for hunting accounts for 60 percent of the bushmeat supply on the Ghanaian markets. The high percentage use of guns as a method of hunting as against the traditional sanctioned methods of hunting such as trapping is of critical concern to conservationists. Even more disturbing was the reported use of automatic weapons rather than shot-guns. The former promoted mass killing of wild animals at a time, especially the gregarious ones such as the monkeys and those savanna ungulates that occur in herds.

Molade (2002) noted that most urban professional hunters use rifles and other licensed automatic weapons. Such weapons have a more devastating effect on wild animal populations as compared to the use of shot-guns larger species with slow reproductive rates are particularly vulnerable, and tend to disappear first where they are subjected to severe hunting pressure. Lahm (1993) also noted that within a population of about 130 people in a village in north eastern Gabon, the ratio of gun ownership was 1:6.5. This observation could be similar to the present situation in Ghana. In the past flint-licks were used and these were made by local blacksmiths. Currently 12 gauge shot guns as well as locally made and imported rifles are commonly used (Ntiamoah -Baidu, 1997). Most professional hunters own a gun and it is common for a younger part time hunter to rent/borrow a gun from an older hunter and pay a portion of his catch for the use of the gun.

This method of hunting is therefore likely to be one of the major factors largely responsible for the scarcity of the primate species in the wild and low representation in the bushmeat trade. Because mass killing could easily be effected with automatic weapons, such a method of hunting has serious implications on food security and biodiversity conservation. This is because it does not favour the sustainable exploitation of wildlife resources as an important socio-economic commodity, which supports the livelihood of both rural and urban populations.

The use of guns as the predominant method of hunting is also of great concern as it poses a threat to national security. It is a reflection of the fact that a large number of people especially in rural areas possess guns. There is therefore the likelihood that such weapons could easily be used to cause civil strife, which could result in political instability as has happened in Sierra Leone and Liberia (BSP, 2001). The displacement of human populations who tend to depend largely on natural resources, eventually leads to destruction of biodiversity. Armed conflicts tend to prevent local people from growing basic food crops for their survival and hence could result in a greater dependency on

wild food such as bushmeat and wild food plants. It is therefore not only a potential threat to national security, but also to the volatile food security situation of the country.

The Use of Chemicals

One significant revelation of the survey is the widespread use of chemicals for bushmeat hunting. This method of hunting is illegal as stated in part 1 Section 5 of the Wildlife Conservation Regulation LI 685 of 1971 (WD, 1998). This is a further indication that there is no adherence to the law.

According to the survey, the use of chemicals for hunting of wildlife constitutes about 32.5 percent of the bushmeat supplies to markets in Ghana. This method is particularly dangerous since it poses health hazards to consumers of bushmeat. Available records of some chemicals used for hunting bushmeat have resulted in the death of consumers. This suggests that the chemicals are harmful not only to animals but to humans as well.

The chemicals are of two types: Imported chemicals and Traditional preparations.

Laboratory analysis carried out on some bushmeat sold on the Ghanaian markets by the Standard Board of Ghana has revealed the presence of organophosphates and organochlorine traces in the samples. This attests to the use of such imported toxic chemicals for hunting bushmeat in Ghana.

One of such imported toxic chemicals is referred to locally as 'sharp' because of its ability to kill large numbers of rodents that eat it. Their death occurs minutes after contact with a 'sharp' contaminated food. 'Sharp' is normally placed on a cocoyam leaf, folded and tied in anticipation that bush pigs that consume cocoyam leaves would, in addition, eat the contaminated leaves as well. The 'sharp' chemical is also used by sprinkling the chemical on the leaves of bent maize plants. Rodents that eat the contaminated maize plant die instantly in large numbers.

Different traditional preparations are used for hunting bushmeat in Ghana. One such preparation is made by grinding the roots and bark of an indigenous tree (Nkradadua) and broken bottles. The ground materials are then mixed with a quantity of urine which has been kept for two weeks. This preparation is then smeared on cassava chips. A large population of wild animals, particularly rodents die after eating the contaminated cassava chips.

Another method employed is the introduction of a chemical known locally as 'Tangen' which is introduced into a semi ripe banana and the bunch landed on a tree. Primates are particularly attracted to banana and they die in great numbers after eating the contaminated food. This method of hunting leaves behind a residue of harmful chemicals and this poses great threat to the environment and human health.

The Use of Fire and Dogs in Hunting

The survey revealed that the use of fire accounts for 3.2 percent of the major bushmeat hunting methods used in Ghana. The use of fire in hunting is more common in the grassland savannah areas and is mostly done in groups. Members of the group are positioned strategically around a patch of grassland known to contain wild animals. The area is set then on fire and animals are killed with cutlasses and clubs as they run out of the area to escape the fire. This method has far reaching consequences for the environment since the process results in the destruction of vegetation, soil fauna and flora and hastens in the drying of water bodies.

Hunting with dogs play a significant role in the hunting of wild animals. The bushmeat survey revealed that hunting with dogs constitutes 2.8 percent of the major methods of hunting in Ghana

The Use of Traps and Cutlasses/Clubs

The most dominant traditionally sanctioned method of hunting is the use of traps. Others such as the use of dogs, fire and cutlasses have no legal backing (WD, 1998). Most hunters who hunt with guns also set traps. Traps may also be set by farmers who do not hunt with guns. The survey recorded a 0.2 percent in the use of traps for hunting wild life. Traps are set in the forest in areas known to be used by wild animals or along trails and at feeding grounds. Trapping is non-selective but less destructive to wild animal populations as compared to the use of guns such as the automatic weapons. Traps end up killing all animals including those that may not be of any nutritive value to the hunter. In some Ghanaian communities snakes are not considered as food and therefore allowed to rot when captured by a trap.

Traps are also set in and around farms; often a fence is constructed around a farm and traps are set at intervals along the fence.

This system is primarily a crop protection measure and the primary objective is to reduce damage to crops by wild animals particularly rodents. This could explain the reason behind the low level of the use of this method. In addition, the irregular visit to the traps results in the decay of the bushmeat it has trapped and killed.

The use of cutlasses/ clubs as a hunting method is also captured by the survey. This method constitutes 1.3 percent of the major hunting methods in Ghana.

Some of these traditional resource utilization tools that are less destructive to wildlife could be modified and promoted to replace those that facilitate mass destruction.

Trade in Bushmeat during the Year

Out of 300 retailers who were interviewed, 61.4% stated that they received and sold bushmeat throughout the year. However, 38.6% indicated that they were engaged in the trade only during times of the year when they cannot find any income generating alternatives. It is therefore apparent that the former were in full-time employment while the latter only on part-time basis.

REVIEW OF THE 'CLOSE SEASON' POLICY

The annual closed season on hunting, originated from the traditional practice of avoiding hunting during the rainy season, in order to allow wild animals to breed without hunting pressure. The Annual Closed Season on Hunting, as prescribed by the wildlife conservation regulations, legislative instrument 685 of 1971, was thus intended to facilitate the successful breeding of wild animals and prevent their over exploitation, by ensuring that no hunting took place during the period 1st August to 1st December. The hunting of other animals could only be allowed for justifiable reasons (WD1999). However, the survey has revealed that all animals regardless of the conservation statuses are hunted and marketed publicly.

The open display of as many as fourteen (14) wholly protected wildlife species on the open

market during the Annual Closed Season, indicates that the hunters and traders do not differentiate between the animals whose hunting and trade is prohibited and the ones that are allowed for hunting. Therefore if no restraint is exercised in the choice of the animals that are legally protected at all times, then there is virtually no protection for all wild animals in the country. There is therefore the need to review the wildlife laws, strengthen the enforcement and improve upon awareness campaign.

Ntiamoah-Baidu (1997) estimated that the total volume of bushmeat traded in Ghana annually is 38;4000 metric tonnes worth about \$350million. Since the grasscutter (*Thryonomis swinderianus*) remains the most preferred bushmeat (65.1%) of the animals listed in terms of volume of trade and preference, not only in Ghana but the rest of West Africa, the species needs to be considered as a very important economic commodity. The management and utilization of the species should therefore be given more attention.

Even though the species is of such high economic importance, its contribution to the economic development of the nation is not reflected in the national accounting system. One way to cater for that and to sustain the high consumer dependence is to constitute a body such as Grasscutter Utilization Board that could be assigned responsibilities for the sustainable management ,harvesting and marketing of the commodity similar to cocoa and timber.

The shift in preference from Royal Antelope to Maxwell's Duiker is a good indicator of consumer's behaviour with regards to the demand and supply of bushmeat. The latter was probably an equally good substitute that was also readily available. Domestication scheme should therefore not only focus on single species such as the grasscutter, but on a variety of species so that the pressure of bushmeat consumption could be distributed among several and not borne by a few species. This could enable the populations of such species to thrive well in the wild.

The fact that primates are not a traditionally preferred bushmeat is worth noting by conservation practitioners. This means that the population of primates stand the best chance of recovery where traditional conservation norms are respected; there is therefore the hope that should this opportunity be pursued, the population of species such as the Miss Waldron's Red Colobus (*Procolobus badius waldronii*) and other endangered primates could recover significantly. Whoever, there is still the need to investigate the possible changes in other ecological factors which could be contributing to the decline of the primate populations.

The survey also revealed that some totems such as the crested Porcupine (*Hystrix sp*) and buffalo (*Syncerus caffer*), were also being hunted and sold. This practice was traditionally prohibited, as totems were revered as sacred animals by some members of society, especially clan members and chiefs. Traditionally, it is maintained that the welfare of an individual or lineage depended on its members maintaining a relation of respect towards a particular species of animal (Ntiamoah-Baidu, 1997). As such they refrained from killing and eating such totems. It is worth noting that such traditional practices affirmed the ecological truth that human welfare is dependant on plant and animal welfare (BSP, 1993). It is therefore obvious that modern conservation practices, such as legislation alone cannot be effective in ensuring sustainable utilization of the wildlife resources. There is therefore the need to consider a combination of both modern and traditional practices that are sensitive to biodiversity conservation, while providing adequate levels of sustainable utilization that could also enhance food security.

The Appropriateness of the Annual Closed Season on Hunting

The idea of closed season on hunting had its origin from the traditional knowledge of the reproduction of wild animals, especially in the forest zone of Ghana. It is therefore not surprising that the current prescribed period of the Annual Closed Season on Hunting appears to favour only the large-bodied mammals of the forest zone of the country. The law is therefore of limited coverage as a few species, such as the forest ungulates were the targets, the greater part of the wild animals in Ghana, especially the ungulates, wild pigs and primates of the savanna zone were not adequately catered for by the law since most of them breed soon after the closed season. There is therefore an urgent need for a scientific review of the regulations on the existing prescribed period of the Annual Closed Season on hunting, to ensure a wider coverage based on a combination of indigenous knowledge and modern ecologically sound practices that could promote sustainable utilization, food security and at the same time protect a greater number of the wild animal species.

Kormos and Bakarr (2001) noted that Ghana's wildlife legislation had failed to maintain an appropriate balance between use and conservation, focused mainly on hunting licenses, and protection of individual species. The existing legislation was thus considered to be more of a constraint rather than a tool for conservation. This view is particularly applicable to the current legislative instrument (Wildlife Reserves Regulation, LI 685,1971) on the closed season on hunting, since it is limited in species coverage, lacks enforcement and does not in any way promote biodiversity conservation. There is therefore the need for a review of such legislation to ensure that they are sensitive to biodiversity conservation and the promotion of food security.

Bushmeat Trade as a Means of Livelihood

A greater number (61.4%) of all the traders interviewed, indicated that they traded in bushmeat throughout the year. This revealed that most of them depended on this trade as a full-time occupation. Their persistence in the trade during the Closed Season could be due to non-availability of suitable alternative income generating options, the volume of bushmeat available in all the markets confirmed the assertion (Molade, 2000) that despite the decline in the population of some key species in the wild, the supply to the markets remained stable. This also confirmed that there had been an increase in the hunting effort to maintain the regular supply.

On the other hand the increasing number of traders in full-time could be a contributory fact. According to some of the full-time traders who were interviewed, in their effort to stay in business throughout the year, some of them engaged and paid for the services of commercial hunters who provided them with their regular supplies. Such hunters aimed at killing the large-bodied mammals which could afford them the greatest return in monetary terms. This high level of dependence on the bushmeat trade as a regular means of livelihood could therefore easily be used to facilitate any possible wild animal domestication programme.

Evaluation of Pre-survey Awareness Programme

The fact that the bushmeat trade was still thriving during the period of the Annual Closed Season, attested to the fact that Wildlife Conservation regulations, LI 685 of 1971, together with all the amendments are not known by civil society as a whole. Despite all the efforts made by Conservation International to create awareness through Radio and Television programmes, very little impact was made on the bushmeat trade during the period. All the respondents indicated that they were not supposed to trade in bushmeat, except the Grasscutter (*Thryonomis swinderanus*) during the period. However, those involved in hunting perceived it as a threat to their source of livelihood.

The most noteworthy impact was the reports on the consumer boycott of bushmeat, as reported by the traders themselves. This confirmed that CI's awareness campaign made positive impact on consumers as compared to the traders. Some of the consumers, who had decided to boycott the bushmeat, were probably made aware of the dangerous health implications. Should its trend be sustained, there is the likelihood that, both the bushmeat hunters and traders may go into the domestication of some of the preferred species as an alternative option.

CONCLUSION

The persistence of the bushmeat trade during the Annual Closed Season on Hunting indicates that bushmeat still remains an important source of protein in Ghana, however the ineffectiveness of the existing regulatory mechanism has largely contributed to the escalation of the bushmeat crisis, thus posing a major threat to efforts to ensure food security and effective wildlife conservation.

While enormous efforts are being made to ensure that the exploitation of other natural resources, such as timber and mineral deposits, are effectively regulated, no such attempts have been extended to the bushmeat trade. Even though the legally recognised Annual Closed Season on hunting has been in place over more than thirty (30) years, there has been virtually no efforts at awareness creation effective enforcement and hence virtually no adherence.

Conservation International welcomes the Closed Season on Hunting and is of the opinion that if well implemented, it has the potential to facilitate the successful breeding of a number of endangered and rare species. However, the lack of awareness and enforcement could be contributing to the bushmeat crisis, since hunting and sale of bushmeat continued during the Closed Season and could completely disrupt the recruitment and the replacement generation of a number of key species of wild animals. The lack of enforcement of such a law has serious implications on biodiversity conservation and food security in rural communities and suggests a low perception of the economic importance of this commodity on the part of decision-makers.

RECOMMENDATIONS

The Annual Closed Season on hunting is ineffective and should be reviewed and strengthened with incentives for compliance and surveillance.

The use of toxic chemicals for hunting bushmeat is very significant and must be stopped through awareness programmes and prosecution in courts in order to avoid wildlife extinction.

Awareness creation should be intended to ensure that consumers are well informed about the health implications of bushmeat consumption in order to promote consumer boycott.

1. Apart from the Grasscutter (*Thryonomis swinderanus*), which is already being domesticated, the others which were recommended for domestication, such as the Maxwell's Duiker (*Cephalohus maxwellii*)_ should be actively promoted.

2. There is the need for an ecological assessment of the appropriateness of the period for the Annual Closed Season on Hunting.

3. The possession of guns, especially automatic weapons in the local communities, is not only a threat to wildlife conservation but also national security. In order to reduce such threats, appropri-

ate action should be taken to retrieve unauthorized weapons in the society.

4. Age old traditional conservation norms, such as sanctions and taboos that prohibit the hunting of totems and other sacred animals, need to be promoted by assisting the Traditional Authorities to enact them into bye-laws at the District Assemblies .

5. Community Resource Wildlife management areas should be promoted to provide sustainable protein sources for the rural communities and study tour to Zimbabwe and Sri Lanka understudy similar local initiative.

6. Alternative and sustainable protein sources should be identified and promoted to reduce demand on the wildlife are sources

7. There is also the need to train hunters in the use of safe hunting methods.

Congolese Cooks Shun Bush Meat for Fear of Ebola

BRAZZAVILLE, Congo, March 6, 2003 (ENS) - Bush meat vendors in Ouessou, the largest town in the Republic of Congo's region of Sangha, have reported a sharp drop in sales due to consumers having been frightened by the Ebola virus ravaging a nearby area, a market administrator says. This situation has created new consumer patterns with people switching to fish, beef or chicken, Odi-Aya, a teacher in Ouessou, said Tuesday. They are avoiding bush meat animals such as bonobos and other primates that might be infected.

Outbreaks of Ebola hemorrhagic fever have been associated with people eating primates infected with the virus. An infected person will suffer from high fever, diarrhoea, blood loss, and intense fatigue. The virus is transmitted through direct contact with the body fluids of infected persons or of primates. There is no cure, and prevention, prompt detection, as well as isolation of suspected cases, are considered the best way of halting its spread.

The Congolese government has sent a medical team to the Cuvette-Ouest region to investigate the disease. So far, the disease has been confined to this region, especially in its districts of Mbomo and Kelle. The government has sent food for the communities in these districts, some 700 kilometers (440 miles) north of the country's capital, Brazzaville. As of Wednesday, 89 of the 110 people registered with Ebola in Cuvette-Ouest had died, the World Health Organization (WHO) reported.

There had been an equally devastating impact on primates, Pierre Agnangoye, the coordinator of project to protect the forest ecosystems of Central Africa, said. "Of the 800 gorillas alive in the Odzala Park and the Lossi Sanctuary, just 200 are left," he noted.

The International Red Cross says the Congolese Red Cross Society will need US\$130,000 to help it fight the outbreak. The local Red Cross has already trained 62 volunteers to perform this task. During a meeting with President Denis Sassou-Nguesso on February 26, the newly arrived U.S. ambassador to the Republic of Congo, Robin Renee Sanders, offered to send a U.S. medical team to help fight the disease. The Congolese Ministry of Health, WHO and an international team from the Global Outbreak Alert and Response Network are training local health workers in clinical management of the disease, carrying out active case finding and contact tracing, and providing protective

clothing and essential medical equipment. They are developing public health education messages about Ebola with local leaders through the local radio and print media, and, with volunteers from the national Red Cross Society, working to increase community awareness and understanding of Ebola.

Several times since 1976, when the disease was first identified, it has broken out in Sudan, the Ivory Coast, Uganda, Gabon and the Congo Basin.

"Ebola is a killer virus," said Dr. Hakan Sandbladh, emergency health coordinator for the International Federation of Red Cross and Red Crescent Societies in December 2001. "Up to 90 percent of those contaminated lose their lives. It is enough to touch an animal or a person infected with Ebola to catch the disease."

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Ecotours hope to save Uganda chimp habitat

Yomiuri Shimbun

A chimpanzee habitat in Uganda will be protected from deforestation thanks to an ecotourism project proposed by Japanese researchers, The Yomiuri Shimbun learned Wednesday.

According to the researchers, including Chie Hashimoto of the Primate Research Institute of Kyoto University, revenue raised from ecotours of the forest will compensate local residents for halting their logging of Kalinzu Forest, in the southwest of the African nation. Construction of a museum to introduce the local environment to ecotourists was to commence Thursday. The museum will be funded by a grant provided by the Japanese government to nongovernmental organizations involved in the project, the researchers said. The ecotours will officially start this summer.

The researchers have confirmed that 200 to 300 chimpanzees are currently living in the 14,000-hectare forest, which is about the size of Kawasaki. The forest has been a source of protection for the chimps as the local residents do not eat monkeys, a practice of some other African cultures, the researchers said. However, a company that purchased logging rights from the Ugandan government started cutting down the forest's trees in 1998. The logging reduced the chimps' habitat as the forest was denuded of trees, resulting in a large drop in their population, the researchers said.

Although the Ugandan government is estimated to earn only 500,000 yen a year from the logging, the effects of the deforestation are serious for the forest's wildlife. After lengthy negotiations, the Japanese researchers finally reached an agreement on the project with the Ugandan government's forestry office last March. A centerpiece of the ecotourism project will be a tour guided by the researchers in which participants will be able to observe the chimps' behavior in their natural environment for more than a week, the researchers said.

"This will be a totally different kind of tour," Hashimoto said. "The participants will gain a

real feeling for the natural setting that only the researchers have been able to experience up to now."

Wildlife on the Menu: The Bushmeat Crisis is Emptying Africa's Forests

Paul Clarke

Deep in the heart of the Congo River Basin, the tropical forest is lush and full of life. Immense Sapelli and Okoumé trees tower over the forest floor, and small antelopes called duikers plunge through the undergrowth while the calls of bonobos and sooty mangabeys sound from the leafy canopy. At least, that's the way it was before the bushmeat hunters arrived.

In forests throughout Central and West Africa, virtually every type of wild animal is being hunted, frequently illegally, for use as food. But while indigenous peoples such as the Bantu pygmies have sustainably hunted this "bushmeat" for centuries, the level of hunting has skyrocketed in the past two decades. Today, species ranging from cane rats to elephants are being hunted at unprecedented levels, and recent estimates suggest a bushmeat harvest of between one and five million metric tons each year—a level that is literally emptying forests of wildlife.

The situation is most dire for primates such as bonobos, chimpanzees and gorillas. "As a group, great apes tend to be very much at risk because they breed so slowly," says Elizabeth Bennett, director of the hunting and wildlife trade program at the Wildlife Conservation Society (WCS). To be hunted sustainably, some ape species could lose no more than one member per square kilometer every 20 years, but bushmeat hunters are annually killing 6,000 western lowland gorillas (from a total population of less than 100,000), along with 15,000 chimpanzees. Smaller primates wind up on the table, too, with approximately 7.5 million red colobus monkeys being killed for food each year.

"The numbers are just huge," Bennett says, especially when hoofed animals are taken into account: WCS estimates that 28 million bay duikers are killed annually, as are 16 million blue duikers. "And these are conservative figures." The problem has reached such tremendous proportions that last summer, at a meeting of gorilla experts in Germany, scientists from WCS and other institutions said that poaching has surpassed habitat loss as the most immediate threat facing western lowland gorillas, and could lead to their extinction in the next 20 years.

At the root of the problem is a growing population and a tumultuous economy. "Africa's population went up eight times in the 20th century," Bennett says. "That means you have eight times more consumption than you did 100 years ago." Today, more than 30 million people live within forested regions of Cameroon, Gabon, Equatorial Guinea and other Central African nations, and these inhabitants eat about the same amount of meat each year as most North Americans. More than 60 percent of this meat comes from local wildlife.

Until recently, much of the forest was inaccessible to hunters. This changed in the 1980s, when international logging companies expanded into Central African forests. Roads were built to accommodate logging trucks, carving the forest into easily traversed parcels. Armies of workers followed, many bringing their families, and almost overnight formerly pristine areas were flooded with people.

"Areas that had been previously unexploited and unpopulated are suddenly inundated, and every worker may bring eight or 10 individuals who are dependent on that salary," says Heather Eves, direc-

tor of the Bushmeat Crisis Task Force (BCTF), a consortium of more than 30 organizations and institutions formed in 1999 to address the looming problem. "This brings lots of people together who need to be fed, and the forests just open up."

Logging roads have also allowed the influx of shotguns and steel cable for snares, and have enabled hunters to carry more carcasses out of the forest. As a result, a burgeoning commercial bushmeat market now stretches far beyond the Congo Basin.

"Bushmeat has always been a commodity in this region and used at varying levels of trade, but wildlife is now being exploited for export to urban centers," Eves says. The reason for this is economic: Bushmeat hunters can earn the equivalent of \$300 to \$1,000 per year, more than the region's average household income. The hunters find eager buyers in large cities, where many inhabitants purchase the meat as a way to reconnect to their village origins, or to show off their newly acquired wealth. In Libreville, the Gabonese capital, around 1,200 metric tons of bushmeat arrives in the markets each day, and in Pointe Noire, the second-largest city of the Congo, an estimated 150,000 metric tons is consumed each year.

And the markets are not limited to Africa. In 2001, two London shopkeepers were jailed for operating a business that sold meat from monkeys, anteaters and other animals. They offered to custom-order whole lions for around \$8,000 each. "Bushmeat hunting has become so commercialized that we're now finding stores and restaurants in Europe and the United States where bushmeat is available," Eves says.

In addition to the obvious loss of prey species, the bushmeat trade has far-reaching consequences. According to the Central Africa Regional Program for the Environment (CARPE), the bushmeat trade threatens forest carnivores such as leopards and crowned eagles by depleting their main prey species. The forest itself is threatened as well, in that the loss of seed-dispersing animals is permanently changing the forest's composition and structure. Indigenous pygmies are losing the forests and animals they've depended on for centuries. And even the bushmeat hunters and consumers are at risk: according to BCTF, the hunting, butchering and consumption of bushmeat, especially primates, is placing people at increased risk of contracting virulent animal-borne diseases. Ebola outbreaks have been linked to exposure to gorilla carcasses, and evidence of simian immunodeficiency virus (SIV) infection has been found in 26 different species of primates, including chimpanzees and sooty mangabeys, which many researchers believe may be a link to HIV/AIDS.

Despite the severity of the problem, some remedial steps are showing signs of success. In northern Congo, WCS has been working with the Ministry of Forestry Economy and a logging company, Congolaise Industrielle des Bois (CIB), to reduce bushmeat hunting in a 4.5 million-acre logging concession. The project supplies forest workers with alternative forms of protein, and provides for enforcement by groups of. But to significantly reduce bushmeat hunting, many groups are taking the message directly to consumers. Last year in Ghana, Conservation International undertook a national bushmeat education campaign that BCTF says has been very effective in changing behaviors. "People have an incredibly deep cultural link with wildlife in Africa," Eves says. "Talking about bushmeat as a loss of cultural heritage resonates there."

Until these changes become widespread, though, sections of the Congo Basin continue to be identified as suffering from "Empty Forest Syndrome"-filled with trees, but devoid of large animals.

It's a new situation, but one that has become disturbingly familiar. "It's a really odd feeling to walk through a forest that's literally silent," says Eves.

Animal Health: Gorillas and Human Diseases

United Press International via COMTEX

Fewer than 400 mountain gorillas are left in the world in central Africa, but despite a bloody civil war in Rwanda and loss of habitat, the biggest threat to the endangered species remains disease from humans.

Actually that number "is a huge turnaround and it has been a tremendous success," Amy Vedder, one of the founders of the Mountain Gorilla Project, told UPI's Animal Tales.

In 1981, the number of mountain gorillas -- one of the closest living relatives to the human species -- was 248, down from 450 in 1959. "But they were back to 360 in 2001," Vedder said.

Now, the mountain gorilla's survival depends on a precarious balance. A conservation program that brings tourists to observe the primates at the Volcanoes National Park -- on the border of Rwanda, Uganda and the Democratic Republic of the Congo -- also creates the potential for diseases that can be deadly to the giant primates.

Vedder and her husband, Bill Weber, in cooperation with the World Wildlife Fund and the Wildlife Conservation Society and with the approval of the Rwandan government, initiated the Mountain Gorilla Project in 1979.

Weber and Vedder have described their experiences with the mountain gorillas and noted researcher Dian Fossey in their book, "In the Kingdom of Gorillas:Fragile Species in a Dangerous World." More than just an account of the mountain gorillas over the past 25 years -- the book is an adventure and a page-turner.

The project's priorities were protection of the fauna and flora of the park, creation of "gorilla tourism" and education of local people in the gorilla species.

"The Rwandan government didn't realize the resource they had in the gorillas and it was considering cutting some of the forest where the gorillas lived for cattle ranching on the recommendation of economic advisers from Europe," Vedder said. "We knew something else had to be done so we persuaded the government to look at the tourism potential. They had no idea that people from all over the world would travel to Rwanda to spend one hour with the gorillas."

At present, the tourism program grants daily permits to a maximum of 32 people, who can view the gorillas in groups of eight for one hour.

It is an opportunity for tourists to have the same type of "Gorillas in the Mist" experience shown in the feature film, the book and the National Geographic films based on Fossey's work.

"Trackers are sent out in advance, they follow the gorillas in the morning when they are moving and eating and in midday when the gorillas rest, the tourists are then brought to them by other trackers," Vedder said. "Tourists cannot get closer than seven yards to avoid transmission of disease."

Many of the gorillas have been habituated -- when wild animals lose their desire to flee from humans -- as a result of the studies of Fossey, Vedder and others.

"The juvenile gorillas are very curious and they often break the ice with humans and may wander closer to the tourists, but the trackers are supposed to divert them," Vedder said. "But sometimes there is closer contact because of overzealous tourists or gorillas."

In recent years -- following the civil war, when some gorillas were lost in the crossfire and an estimated 1 million people perished - - the gorillas have been thriving. In 1999 the Volcanoes

National Park reopened and tourism resumed. A permit for one person over the age of 15 costs \$250.

"It's a tremendous experience," Vedder said. "A person has to hike into the park sometimes for hours on the deep hill, in the cold, rain and mud so you start to feel a bit like a gorilla. The gorillas are gentle and not a threat to the humans -- however, if they feel threatened a male gorilla will beat his chest, roar, give a series of hoots and most impressive of all, the 450-pound male will race straight toward you, however at the last minute he will divert."

A male gorilla once charged Vedder and she lowered her head and her body to act submissively as instructed by American zoologist George Schaller, who first studied the mountain gorilla in the 1960s. Although gorillas have been known to injure or kill other animals and humans, they are herbivores, gentle by nature and normally do not attack. Their capacity for human-like compassion was demonstrated in August 1996, when Binti Juna, a female lowland gorilla, made headlines when she rescued and gently treated an injured child who had fallen into her zoo exhibit near Chicago.

A similar incident had happened a few years earlier when a seven-foot-tall silverback named Jambo left unharmed and seemed to demonstrate concern for a young boy who had fallen into his exhibit.

Unfortunate, but such non-aggressive behavior represents a danger to the gorillas because they will allow humans to approach them closely.

"Our fear is that someone who appears healthy but is contagious with something like influenza will have contact with the gorillas and they will get sick," Mike Cranfield, director of the Mountain Gorilla Veterinary Project and director of animal management and resource conservation at the Baltimore Zoo, told UPI's Animal Tales. "I'm hopeful, but I'm leery, because one case of influenza or measles could wipe many of them out."

Established by the Morris Animal Foundation in 1986, the Mountain Gorilla Veterinary Project employs field veterinarians who attempt to protect the health of the mountain gorillas. It is one of few conservation programs to provide medical care and treatment to an endangered species in its natural habitat.

"There are no mountain gorillas in captivity and it is illegal to own a great ape anywhere in the world. Those seen in zoos are from the western lowlands," Cranfield said. "Gorillas travel, eat, play, and sleep in stable family groups ranging from several individuals to up to 49, but a typical family consists of one or two adult males, three or four unrelated females and juveniles."

With the close proximity, diseases can jump easily among family members and a pathogen such as measles could be transmitted to the gorillas from a person's clothing, Cranfield said.

"Ninety-four people in the park have been vaccinated for measles, as have 60 gorillas, but we can't vaccinate all the people that have access to people that work in the park," he said.

Disease also can travel from livestock to people to the gorillas.

"While gorillas not susceptible to the AIDS virus, where there is AIDS there is tuberculosis and there aren't a lot of anti-viral drugs in Rwanda to treat people, so exposure to TB is another concern," he said. "Ultimately, improving health care for the people living outside the park will reduce the accidental transmission of disease via the tourists and the trackers."

Another group of about 300 mountain gorillas has been discovered in central Africa but there is debate on whether they share the exact same genetic material, Vedder said.

"There is 25 miles of farmland that divides the two groups so there is no genetic exchange," Cranfield said. "Another threat to the mountain gorilla is poaching -- 10 gorillas have been killed to get to a baby gorilla for private menageries."

Poachers have to kill the mother of a baby gorilla to get to the juvenile, because the juvenile will stay close to the mother for about four years -- both males and females will leave the family when they reach breeding age -- about 9.

"Snares are another medical problem for gorillas," Cranfield added. "Traps are set for antelope

but since they are often set by wires the gorillas can get a hand or foot caught in a snare and it can lose a hand or foot in the process and die from infection if left untreated."

Chimpanzees with little or no human contact found in remote African rain-forest

<http://news-info.wustl.edu/tips/2003/culture-living/chimp.html>

Washington University--St. Louis

It's been called "The Last Place on Earth" by National Geographic magazine, and Time describes it as the "Last Eden."

The Goualougo Triangle, nestled between two rivers in a Central African rain forest, is so remote that primate researchers who traveled 34 miles, mostly by foot, from the nearest village through dense forests and swampland to get there, have discovered a rare find: chimpanzees that have had very little or no contact at all with humans.

The chimpanzees' behavior when first coming in contact with the researchers was a telltale sign of lack of human exposure -- the chimpanzees didn't run and hide.

Unlike chimpanzees in the zoo that seem to appreciate being the center of human attention, chimpanzees in the wild need to be habituated to the presence of humans, a process that can take several years.

Dave Morgan, a field researcher with the Wildlife Conservation Society, Republic of Congo, and Crickette Sanz, a doctoral candidate in anthropology in Arts & Sciences at Washington University in St. Louis, report their study of "Naïve Encounters With Chimpanzees in the Goualougo Triangle" in the April 2003 issue of the International Journal of Primatology.

During two field seasons in the Goualougo Triangle (February-December 1999 and June 2000-June 2001), Morgan and Sanz encountered chimpanzees on 218 different occasions, totaling 365 hours of direct observation. Their goal, as with other researchers at various field sites in Africa, was to directly observe the full repertoire of chimpanzee behavior, which includes eating meat, sharing food, grooming, mating and using tools, such as large pounding sticks to break open bee hives and leaf sponges to gather water.

During Morgan and Sanz's first five minutes observing individual chimpanzees at their field site, curiosity was the most common response the researchers recorded from 84 percent of the chimpanzees. The curious responses from the chimpanzees included staring at the human observers, crouching and moving closer to get a better view of them, slapping tree trunks or throwing branches down to elicit a response, and making inquisitive vocalizations.

"Such an overwhelmingly curious response to the arrival of researchers had never been reported from another chimpanzee study site," says Sanz.

"Researchers have occasionally described encounters with apes who showed curious behaviors toward them. However, these encounters were rare and usually consisted of only a few individuals."

She says that chimpanzees at these other study sites most often fled from human observers during their initial contacts. Those researchers only had glimpses of individual chimpanzees as they rapidly departed.

Researchers have dedicated years at other field sites to habituating wild chimpanzees to human presence so that the chimpanzees regard the humans in their midst as neutral elements not to be feared. Morgan and Sanz often times were accepted at first meeting.

"Behaviors such as tool use and relaxed social interactions were only seen after years of patient habituation efforts," Morgan says of the other field studies, including Jane Goodall's site in the Gombe Stream National Park in East Africa. "Yet these behaviors were sometimes observed during our initial contacts with chimpanzees in the Goulougo Triangle.

"And many of our initial contacts lasted for more than two hours -- some up to seven hours -- and ended only when we chose to leave the chimpanzees to continue our surveys. Often times when we were leaving the chimpanzees, they would follow us through the forest canopy."

Often the chimpanzees continued to exhibit behaviors indicating their naïveté toward humans after their initial curious responses. Morgan and Sanz define "naïve" contacts as those in which the chimpanzees in a group showed interest in their observers throughout an entire encounter, other chimpanzees joined the group being observed, and they stayed for a relatively prolonged time, with the average encounter lasting 136 minutes. These "naïve" contacts accounted for 69 percent of all chimpanzee encounters.

Other types of encounters occurred, Sanz notes, but much less frequently.

Of the 218 encounters, during 12 percent of them the chimpanzees showed signs of nervousness, including hiding behind vegetation or climbing higher in the canopy; 11 percent departed; and eight percent ignored the observers.

"The high frequency of curious responses to our arrival and the naïve contacts suggest that the chimpanzees had had little or no contact with humans," says Sanz. "They certainly had not formed negative associations between human presence and potential threats such as poaching, hunting and habitat destruction.

Preserving a pristine habitat

"During our research presence in the Goulougo Triangle, we've never encountered any other humans or even their traces, such as villages, campsites or paths," adds Sanz. "Because of the low human density in northern Congo and the remote location of the Goulougo Triangle, it is unlikely that these chimpanzees had ever encountered humans."

The study site's history substantiates this conclusion, says Morgan. People residing in Bomassa village, the closest village at 34 miles away, claim that they had not visited the Goulougo Triangle until initial surveys were conducted in 1993 by Michael Fay, a conservationist with the New-York based Wildlife Conservation Society (WCS). At the time, Fay, who received his doctorate in anthropology from Washington University in 1997, was part of a WCS team documenting the importance of the Goulougo Triangle to conservation and science.

The 100-square-mile Goulougo Triangle is on the southern end of the Nouabalé-Ndoki National Park. When the park was created in 1993, the Goulougo Triangle was left out because it was a part of a logging concession.

After discovering this naïve chimpanzee population and their trust in humans -- as well as having had naïve contacts with other primate species like gorillas and monkeys that would be vulnerable to poachers and logging -- Morgan and Sanz felt an obligation to ensure their long-term protection.

Naïve encounters with the chimpanzees put the Goulougo Triangle at the top of the WCS' list of priority conservation projects, says Morgan.

The chimpanzees' unique behavior helped persuade Congolese government officials and the local logging company, which had legal rights to the forest rich in mahogany and other valuable hardwoods, to preserve the pristine habitat.

In July 2001, representatives of the WCS, Congolese government and the logging company announced during a news conference that the Goulougo Triangle was to be annexed to the park and

its intact ecosystem and undisturbed animal populations would be protected forever.

Goodall visits site

"Dave and Crickette's work on this chimpanzee population is simply amazing," says renowned primatologist Robert W. Sussman, Ph.D., a professor of anthropology at Washington University and Sanz and Fay's doctoral advisor. "There is no doubt in my mind that this research will lead to a much better understanding of chimpanzee ecology and behavior, and will set the stage for data collection for years to come. I also believe that this research also may lead to better models of the evolution of human evolution because these chimpanzees are so free from human interference."

Jane Goodall, considered the world's foremost authority on chimpanzees, also found Morgan and Sanz's discovery of a naïve chimpanzee population of such great interest that she visited the site last summer. In nearly 45 years of observing chimpanzees' behavior in their environment and working to gain their trust, Goodall's visit to Goulougo Triangle was the first at another study site other than her own in the forests of the Gombe National Park.

Goodall was curious to see the naïve chimpanzees that she had heard showed no fear of humans as well as interested in observing how these chimpanzees differed from those living at Gombe. Within the last few years, Goodall and other researchers have been comparing chimpanzee behaviors such as tool use and social traditions that are passed on from one individual to another through social learning.

The study of these "chimpanzee cultures" was limited to sites in East and West Africa, Sanz notes, because of political instability and logistical difficulties of setting up long-term field sites in Central Africa.

"Prior to the Goulougo Chimpanzee Project," Morgan says, "there were no sites where researchers could conduct direct observations of the behavior and ecology of the central subspecies of chimpanzee residing in the largest tracts of undisturbed forest remaining in equatorial Africa."

As a result of her visit to the Goulougo Triangle -- which National Geographic magazine covered and will feature in its April 2003 issue -- Goodall has extended her conservation efforts into Central Africa. The Jane Goodall Institute recently launched a fund-raising "Campaign to Save the Rainforest of the Congo Basin."

After her visit to the Goulougo Triangle, Goodall wrote to the National Geographic Society: "This study is of the utmost importance -- it is the first such work to be undertaken in a rainforest that has not been exploited by humans, where the chimpanzees, initially, had never seen human beings. Such places are becoming increasingly rare, and the information that has already come out of the research is both fascinating and important."

"It was such an honor to have Jane Goodall in our camp," Sanz says. "Our field site is going on four years and her site has been active for that many decades! But as we enter our fourth year in the Goulougo Triangle, we have accomplished a lot within a relatively short research presence, including collecting detailed behavioral data, and beginning to describe the social structure of several communities within the study area.

"Although we will continue to census individual chimpanzees throughout the area," Sanz continues, "we hope to habituate only a few communities in the core of the study area. The other communities will be left to live their lives free from human contact."

Elusive African Apes: Giant Chimps or New Species?

John Roach for National Geographic News

April 14, 2003

A mysterious group of apes found in the war-torn Democratic Republic of Congo in central Africa has scientists and conservationists scratching their heads. The apes nest on the ground like gorillas but have a diet and features characteristic of chimpanzees.

The apes are most likely a group of giant chimpanzees that display gorilla-like behavior. A far more remote possibility is that they represent a new subspecies of great ape. Researchers plan to return to the region later this month to collect more clues to help resolve the mystery.

A remote camera trap captured this shot of a "Bondo mystery ape" in the Democratic Republic of Congo. Most experts believe the unusual band of apes are giant chimpanzees that display gorilla-like behavior. One countervailing theory, however, holds that the band represents a new subspecies of great ape.

The detective story began in 1908 when a Belgian army officer returned home with several gorilla skulls from near the town of Bili on the Uele River and gave them to the Belgium's Royal Museum for Central Africa in Tervuren. In 1927 the museum's curator classified the skulls as a new subspecies of gorilla, *Gorilla gorilla uellensis*.

Intrigued by the subspecies, Colin Groves, now an anthropologist at the Australian National University in Canberra, examined the skulls in 1970 and determined that they were indistinguishable from western gorillas, one of the two known species of gorilla. No further specimens of this gorilla from Bili have since been found.

In 1996, Swiss-born, Kenya-based wildlife photographer and conservationist Karl Amman embarked on a quest to rediscover the mysterious gorillas.

To date, Amman has not found the gorilla. But he has collected a wealth of information including skulls, ground nests, hair and fecal samples, footprints, and, most recently, photographs of what appears to be a chimpanzee that behaves like a gorilla.

Scientific analysis of this data is still being conducted. Amman awaits the results before making an official announcement about the finds. Meanwhile, he continues to recruit scientists to study the case.

Shelly Williams, an independent primate behavior specialist in Atlanta, Georgia, who has a doctorate in experimental psychology, spent two months in the northern Democratic Republic of Congo last year trying to determine the identity of these apes. She said "at the very least, we have either a new culture of chimps that are unusually large or hybrids with unusual behaviors."

Williams and Groves will meet Amman in Kenya this month before travelling to the Congo to conduct further studies on the mysterious apes.

Ground Nesting Chimp?

Since Amman launched his quest, he has led expeditions into the Bili forest in the northern Democratic Republic of Congo where the original skulls were recovered. On his first trip, Amman recovered a skull which had a pronounced ridge on its forehead characteristic of gorilla. The rest of the measurements link the skull to that of a chimpanzee.

For the next several years civil war in the Democratic Republic of Congo made travel to the Bili forest difficult. Amman recruited a bush meat hunter from Cameroon to visit and survey the area. The hunter returned with photographs and reports of gorilla ground nests in an area north of Bili.

In 2000, Amman returned to the area described by the bush meat hunter with a group of ape researchers. Although they did not find a live ape, the group did stumble across several well-worn ground nests in swampy river beds.

Ground nests are characteristic of gorillas. Chimpanzees are thought to prefer to sleep in trees.

However, an analysis of feces found in the nests suggests that whatever left them was eating a diet rich in fruits, a diet characteristic of chimpanzees, not gorillas.

Other evidence collected from the site includes hair samples, which have been sent out to various laboratories for DNA analysis. The initial results indicate they belong to a chimpanzee. All of this evidence is causing the researchers to believe that what Amman has found is a chimpanzee that behaves like a gorilla.

"It is a chimpanzee," said Esteban Sarmiento, a functional anatomist at the American Museum of Natural History in New York who travelled to the region with Amman in 2000. "There are presently three recognised subspecies of common chimpanzee *Pan troglodytes* and it could represent a fourth subspecies or change our present understanding of where to draw the divisions between subspecies."

Giant Chimps

Local hunters in the region added to the mystery when they told Amman and his colleagues about two kinds of chimpanzees in the region. Normal chimps, so-called "tree-beaters," are easily killed with poisonous arrows when they feed in trees.

Another, large chimpanzee seldom climbs trees and does not succumb to the poison arrows shot by the hunters. Called "lion killers," these big chimpanzees flee through the thick forest and disappear when shot at by hunters.

Evidence for these giant chimpanzees collected by Amman includes a photograph of a cadaver alongside the hunter that killed it and casts of some large footprints. The pronounced ridge, called a sagittal crest, on the skull that Amman found in 1996 is thought to be formed to support large jaw muscles, an indication of large body size.

"Giant chimpanzees occasionally occur here and there in the central and eastern subspecies, but evidence so far indicates that Karl [Amman] may have a population of giants in his area," said Groves. "Presumably their giantism is relevant to their ground nesting behavior."

This group of what appear to be a distinct culture of ground-nesting chimpanzees is the now focus of Amman's research. "Work has started on habituating one of the ground nesting chimp groups. This is done by provisioning them with sugar cane," he said.

This habituation will allow the researchers to document this new culture of chimpanzee as the researchers await the results of nuclear DNA analysis to determine if what they have is indeed a new subspecies of chimpanzee or simply a unique culture. Either way, the scientists are intrigued.

"Discovering an isolated group of apes exhibiting unusual cultural behaviors is just as important as identifying new DNA profiles. That's why continuous observation, habituation, and surveying are so important," said Williams.

Additionally, researchers have not yet given up on the possibility of finding gorillas in the area.

"I would think there is a strong possibility that south of Bili on the other side of the Uele River there may be gorillas, and this would seem an important area to turn our attention to," said Sarmiento.

A crusade to save a rare species

Ben Stocking,

Mercury News Vietnam Bureau

In the 1960s, roughly 2,500 Cat Ba Langurs lived on the island that gives the monkeys their name.

CAT BA ISLAND, Vietnam - Residents of this spectacular-but-impooverished island don't want to be known as the people who killed off one of the world's rarest monkeys. They also don't want to strangle their suddenly booming tourist economy. They believe the Cat Ba langur and the Cat Ba tourist can coexist, maybe even become fast friends. But Rosi Stenke, the field biologist who is devoting her life to saving the langurs, believes they are more likely to end up on the dinner plates of tourists who think eating wild game is a status symbol.

If the langurs are wiped out, they will be only the second monkey species to disappear from the face of the Earth in nearly three centuries -- a dubious distinction for an island trying to market itself as a vacation paradise.

Cat Ba officials will proudly tell you that 25 new hotels are being erected in town at once, and incomes are rising with them. But Stenke wishes they would slow the construction -- or stop it altogether. She has come all the way from Munich, Germany, to wage a battle of conservation vs. development that is taking place in various corners of Vietnam, where rare species of wildlife must compete for habitat in a nation crammed with people.

"Vietnam has some extraordinary biodiversity, but the level of threats is tremendous," said Craig Leisher, program adviser for WWF Indochina, the largest environmental organization in Southeast Asia. "This is a country with 80 million people living in an area the size of New Mexico. There are very few areas left for wildlife."

Several species that have lived in Vietnam for centuries are on the brink of oblivion. The nation's population of Javan rhinos -- the world's rarest large mammal -- has dwindled to about six. The Indochinese tiger now numbers fewer than 50 in Vietnam, the Asian elephant fewer than 100. The Black gibbon, the Tonkin snub-nosed monkey and the Ha Tinh langur are all perilously close to extinction. And the Cat Ba langur, which numbered more than 2,500 just 40 years ago, is down to 50 or so, with the population falling by roughly half in just the past three years. The species could soon disappear. But there are just enough animals left that they could still be saved -- if Stenke and her allies play their cards right.

Stenke's work is sponsored by the Munich-based Zoological Society for the Conservation of Species and Populations and the Munster Zoo in northern Germany. Her job requires that she live like a monk among the monkeys, cut off from anyone who understands her or her culture. She must confront gun-wielding poachers who have been known to pummel and stab the rangers with whom she works. And she must persuade Vietnamese people who have endured war and poverty for generations that economic development isn't always a good thing. It is lonely, difficult work.

"I often ask myself what might possibly be wrong with me, to live in complete isolation on a small island, working seven days a week for a low salary," said Stenke, 41, who puts in 12-hour days and sleeps in her small office at the Cat Ba National Park.

Some of the locals -- and some of her environmentalist peers -- think that Stenke's no-growth philosophy is unrealistic in a town that craves a higher standard of living. "She doesn't want any development at all on the island," said Pham Xuan Hoe, vice chairman of the Cat Ba People's Committee. "We've been trying to persuade her that we still need to develop tourism."

Tourists drawn to area

Stenke and the langurs live in one of the most spectacular corners of Vietnam, in a limestone archipelago with lush jungles and dramatic seaside cliffs that draw thousands of tourists every year. And the local government wants those tourists to keep coming. These days, Cat Ba town, a small commercial center nestled alongside a bustling harbor, feels like one massive construction site, with piles of bricks and cement on virtually every corner and the clang of hammers echoing off surrounding limestone peaks.

"We are still encouraging more investors to come to the island to build luxury hotels," said Hoe of the People's Committee. He notes proudly that one of the hotels will be 17 stories tall.

At night, the sound of hammers is replaced by thumping techno music that pulsates from two new discos. On a hill above shines a red neon monument to Ho Chi Minh, founder of Vietnam's ruling Communist Party, which, in its modern incarnation, speaks the same language of commerce in which Cat Ba has become fluent. A new road is under construction that will link the town to a small village on the northern edge of the island. From there, Cat Ba will be connected via ferry to another popular tourist destination, Ha Long Bay. For Stenke, the road is too close for comfort. It runs just along the western border of the park, and it will soon be filled with busloads of tourists -- some of whom, she fears, might encourage more illegal hunting of langurs.

She fears that some tourists, in their quest for status, might want to eat the monkeys, even though their meat smells ghastly. "We buy a BMW. They go to eat exotic meals," she says.

And many Asian men regard a special balm made from the langurs as a sort of natural Viagra. A hunter can earn up to \$50 from a single monkey, not a bad take in a place where annual per capita income is less than \$350, significantly less than the national average. To prevent the langurs from landing in a kettle or being turned into an aphrodisiac, Stenke has undertaken a public-awareness campaign and recruited teams of unarmed langur "bodyguards" who comb Cat Ba for poachers. The hunters regard the park rangers as a direct threat to their livelihood and they sometimes try to intimidate them with violence. A ranger's tooth was knocked out by club-wielding hunters, Stenke said, and several have been stabbed.

The violence started shortly after the national park was established in 1986, Stenke said. By the 1990s, the rangers had become too frightened, and hunters plied their trade with impunity.

Stenke came to Cat Ba in December 2000. In the nine months before she arrived, poachers killed 30 langurs, she said. They have killed just three since.

The remaining langurs live in six isolated areas in small groups of two to six monkeys. Two of those groups have only females, and one group with a male hasn't reproduced for six years. Two groups recently had babies. But langur groups traditionally have just one male. "If they shoot the males, that's it," Stenke says.

With long black tails, white rumps and fur rising in a peak on their heads, the langurs look as though they are wearing yellow wool ski caps. They live on the sides of Cat Ba's glorious mountains, eating a vegetarian diet of shrubs and sleeping in caves high up the limestone cliffs.

Finding them isn't easy, but a determined hunter can do it if he devotes two to four weeks.

"The hunters are professionals," says Stenke, who wears wire-rimmed glasses and camouflage pants. "You wouldn't believe how they can climb."

Not many hunters are willing to invest the time it takes to track a langur these days, so more often than not, the animals are captured by chance by people hunting other illegal prey, Stenke said. "The langur is there. The gun is also there. Bang!"

Tracking down hunters

Sometimes Stenke discovers hunting camps in the park. "Whatever we find, we cut it into pieces and burn it," she says, smiling.

Stenke has organized several public meetings to enlighten local officials and villagers, many of whom didn't know the langur species existed only on Cat Ba and was nearly extinct. She has persuaded the local government to designate part of the island outside the national park as protected

habitat. She has even recruited a few former hunters such as Vu Huu Tinh to join her crusade.

Tinh, the vice mayor of Gia Luan village, says he has killed too many langurs to count: "We'd eat them. They tasted awful, but when you put shrimp sauce on them, they would taste good."

He is now the proud chief of Gia Luan's Forest Protection Group and leader of its Langur Patrol Group.

America's war in Vietnam contributed greatly to the Cat Ba langur's demise, said Tinh, who remembers U.S. bombs dropping on Cat Ba, one of which almost killed him. Money and food were scarce in those days, Tinh said, but guns were abundant. "The local people were very hungry. They had to go to the jungle to get something to eat," he said.

When a species is as close to extinction as the langur, biologists often turn to captive breeding programs to try to boost the creature's numbers. Stenke favors trying to set up captive breeding on Cat Ba, but for a variety of complicated reasons, the national government opposes this idea, preferring to let langurs live in natural conditions as long as possible.

Stenke thinks it is still conceivable that the langurs could survive, without captive breeding. This would require strict vigilance to prevent poaching and, in her opinion, very strict limits on development. She is also trying to take steps to encourage geographically isolated langur subgroups to find one another, so that those with no males could match up with subgroups that do have males. Stenke has also created local intelligence networks, with informants telling her who the hunters are and when they intend to hunt. But it's still hard to distinguish her friends from her foes. Everyone in town seems to speak the language of conservation these days, but sometimes they are simply telling Stenke what they think she wants to hear.

For his part, the vice chairman of the Cat Ba People's Committee has developed the vocabulary of an Audubon Society chairman, touting the need to protect the island's biodiversity. He acknowledges that Cat Ba officials didn't try hard enough to protect the langurs before "Rosi the German" showed up. No more.

"We really place a high priority on conserving the environment," Hoe said. "We need to strike the right balance between development and conservation."

Endangered black-capped gibbon population on rise in China

Xinhua News

The number of endangered black-capped gibbons, found only in south China's Hainan Island province, has risen to 24.

The growing population was resultant from China's intensified efforts to protect the species, said an official with the 64-sq km heavily forested Bawangling state nature reserve, where the primates live.

In the 1950s, about 2,000 black-headed gibbons roamed the primitive tropical forests on Hainan island's central and western parts. But the figure had dropped to seven by 1980 when a nature reserve around Bawangling was set up, due to excessive tree felling and poaching, according to the official. A range of measures has been taken to protect the endangered primate since the nature reserve was set up. And a ban on wanton tree felling and severe penalties for poachers have been introduced.

To step up observation of the primates, 20 more workers joined the nature reserve this July, boosting the previous three observation centers to eight. The protection measures have led to a better natural habitat for the timid gibbons, which in turn has contributed to the increase in their numbers. In a rare sighting, a baby gibbon was spotted in late November this year, said the official.

Gibbons receive top state protection in China. The State Postal Bureau issued a special set of four stamps featuring the small ape on Dec. 7 in a bid to raise people's awareness of their protected status.

Continuing the list of the World's top 25 most endangered species of primates

Buff-headed Capuchin *Cebus xanthosternos*

Brazil

Unlike most of the more than 30 types of capuchin monkeys that inhabit the New World tropics, which are relatively common and abundant, this endemic species of Brazil's Atlantic Forest region is seriously threatened with extinction. There are no reliable estimates of remaining populations, but the buff-headed capuchin is believed to be declining throughout its restricted range primarily due to loss of forest habitat, as well as to hunting and live capture as pets. Adult animals are relatively large (about 6 pounds) and provide sufficient meat to warrant the cost of a shotgun shell, while young animals are popular as pets. Surveys conducted in the early 1990s confirmed this species' restricted distribution in the eastern Brazilian state of Bahia (and possibly northern Minas Gerais), and its occurrence in the Una Biological Reserve and at least two biological stations. It has, however, been extirpated over a large part of its former range.

Brazilian biologist Cecilia Kierulff of Conservation International, who has successfully translocated small, unprotected and non-viable groups of golden lion tamarins to form a larger, protected population, has recently embarked on a survey and census of *Cebus xanthosternos*. Her project is also receiving financial support from a number of European zoos at which this species is exhibited and has bred

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Black-faced Lion Tamarin *Leontopithecus caissara*

Brazil

Save for rediscovery of the yellow-tailed woolly monkey in the Peruvian Andes in the 1970s, the discovery of Brazil's black-faced lion tamarin in 1990 was perhaps the most newsworthy event in Neotropical primatology of the 20th century. Despite extensive exploration and development in the Atlantic forest region of southeastern Brazil, this diminutive, yet conspicuous, species remained undetected in coastal forests that are incredibly close to São Paulo, South America's largest city. The discovery was made in Superagüi National Park, a protected island in the Brazilian state of Paraná and still the single most important stronghold for this species more than a decade after it was found. Surveys in the mainland forests of Paraná and the neighboring state of São Paulo have dismissed earlier claims of populations in Jacupiranga State Park and have narrowed the presumed range of this lion tamarin.

Population estimates remain in the low hundreds, but there is hope that continued field research will lead to the discovery of new mainland populations. The little that we do know about black-faced lion tamarin conservation status, ecology and behavior is based upon studies conducted by the Brazilian non-governmental organization, Instituto Pesquisas Ecológicas (IPÊ), directed by Claudio and

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Northern Muriqui *Brachyteles hypoxanthus*

Brazil

The northern muriqui is the most threatened of the two critically endangered muriquis, its total numbers being lower and its populations being smaller and more fragmented than those of the southern muriqui (*Brachyteles arachnoides*). These are the largest primates in South America and both are endemic to Brazil's Atlantic Forest region. The most significant population of northern muriquis is found in the forests of Fazenda Montes Claros in the state of Minas Gerais, where more than 100 animals were protected for the last 50 years by Senhor Feliciano Miguel Abdala, a private landowner who also made a tremendous contribution to our knowledge of the muriqui's ecology and behavior by establishing the Caratinga Biological Station in 1983. Shortly after Senhor Abdala's death last year, the forests of Caratinga became a permanent private reserve under Brazilian law, and will be protected in the years ahead by local non-governmental organizations. Dr. Karen Strier (University of Wisconsin-Madison) continues to supervise field studies at Caratinga with the assistance of Brazilian colleague Eduardo Veado. A couple of years ago, only eight populations of northern muriqui could be documented, at least two of them containing less than 10 individuals and very likely being non-viable. Recent surveys by Brazilian primatologist Sérgio Mendes, however, have helped identify nine new populations in the state of Espirito Santo and have increased our estimate of the total population from about 300 to 400 or more.

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Miss Waldron's Red Colobus *Procolobus badius waldroni*

Côte d'Ivoire

This monkey is teetering on the very brink of extinction. Primatologists have been searching its-known range in eastern Côte d'Ivoire and western Ghana since 1993, but have failed to see a living animal. A single skin found by Dr. Scott McGraw (Ohio State University) in possession of a hunter in southeastern Côte d'Ivoire in early 2002 has raised hopes that at least one population of Miss Waldron's red colobus still hangs on, but if it does a heroic effort will be needed to ensure its survival. Conservation International will support continued searches for living animals. The plight of this monkey highlights threats faced by red colobus generally. Several distinct forms inhabit the forests of Africa, but they have patchy distributions and are particularly vulnerable to human hunters. Many red colobus are endangered, including three other forms in West Africa: Pennant's red colobus (*Procolobus pennantii pennantii*) of Bioko Island, Preuss's red colobus (*P. p. preussi*) of Cameroon, and the Niger River Delta red colobus (*P. p. epieni*). In addition, Bouvier's red colobus (*P. p. bouvieri*) from the Congo Republic has not been seen for 30 years.

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Natuna Banded Leaf Monkey *Presbytis natunae*

Indonesia

Indonesia's Natuna Islands, located approximately midway between Borneo and the Malay Peninsula in the South China Sea, are home to a highly threatened and endemic colobine monkey.

Originally considered a subspecies of *Presbytis siamensis*, the banded leaf monkey of North Natuna Island is now regarded as a full species.

Unfortunately, little is known about its conservation status. It is reported to survive in a range of habitats, even including rubber plantations. However, no protected forest areas currently exist and pressure on remaining forests continues to grow as the result of ill-planned development and failed trans-migration programs. There is a very strong military presence on Natuna and the island is the site of a large natural gas extraction project. Anticipated profits from gas production might actually provide the opportunity for saving some of the leaf monkey's tropical forest habitat from future logging operations.

