Risky meat from the forests

Jane Bradbury

As long as man has hunted wild animals, says William Karesh (Wildlife Conservation Society, Bronx, NY), people have caught diseases from carcasses. But as the commercialization of tropical forests has increased over the past century, people are coming into close contact with once isolated animal species. As a result, warns Beatrice Hahn (University of Alabama at Birmingham, GA), we are now being exposed to potentially dangerous new infectious agents as never before.

AIDS is a good example of how forest commercialization can disastrously affect human health. The emergence of HIV1 in Africa in the early 20th century coincided with a period of massive human intervention in the forest, explains Rebecca Hardin (McGill University, Montreal). “Between 1900 and 1950, there was the rubber boom, the initiation of logging, and considerable road and rail-road construction”, she says. “Local people had always eaten bushmeat, often as a delicacy, but at that time the forests became laced with hunters and their camps, all there to provide meat for migrant laborers.”

At some point during this period, says Hahn, simian immunodeficiency viruses (SIVs) moved into humans – probably through exposure to infected blood during bushmeat preparation. HIV1’s closest SIV relative is found in chimpanzees and, as Hahn and her collaborators recently reported (Science 2003; 300: 1713), this virus may itself be the result of recombination between two SIVs acquired by chimpanzees from monkey meat.

Both Hahn and Hardin warn that, with the recent commercialization and expansion of the bushmeat trade, other SIVs may also jump to humans. To find out how likely this is, Hahn is developing assays to screen a large archive of monkey sera for SIVs. “If infection rates are high in the wild and we constantly come into contact with these monkeys”, she explains, “then the risk of transmission to people will also be high”, although exposure will not necessarily result in a new human disease.

People can also contract the Ebola virus from wild animals. However, although non-human primates get Ebola – indeed, the current Congo outbreak was detected in great apes in November, 2 months before the first human cases – the identity of the true reservoir species remains unknown. “People can get Ebola directly from this mystery reservoir or by handling another infected animal or person”, explains Karesh. People could therefore contract Ebola by handling any meat caught in the bush, in this case probably during subsistence rather than commercial hunting.

Another recent example of how human diseases can originate in wild meat comes from SARS. People Ben Embarek (World Health Organization) explains that a coronavirus similar to that found in SARS patients has been isolated from masked palm civets and raccoon dogs being sold as delicacies in animal markets in Guangdong, China. “We also know that some of the original cases were people who handled wild animals or food in markets or restaurants”, he continues. “However, we do not know yet whether the true SARS reservoir is either of these species, the badger ferret, in which we discovered viral antibodies, or another animal.”

Wild meat consumption constitutes a substantial risk to human health, concludes Ben Embarek, and the danger is increased as people move into relatively undisturbed forests, where they are exposed to new infectious agents. To minimize the threat, Ben Embarek calls for such moves to be done in an organized way, with minimal disruption of the local ecology. “Conservation and environmental protection are important”, he says, “not only to save biodiversity, but also to protect ourselves from close contact with species that harbor dangerous infectious agents”.

“There is a clear link between the health of great apes and people”, adds Karesh. At the same time as he and his colleagues are training officials in central Africa to monitor the health of great apes, they are also pushing to improve the health of the local people. Vaccination of villagers against childhood diseases such as measles protects both the people and the gorillas, he points out. Furthermore, by explaining to local people how they can get diseases from animals, the researchers have been able to reduce the consumption of primates.

Hardin sees initiatives such as that headed by Karesh as important for both human health and conservation. But, she says, international stakeholders also need to be convinced that it would be wise to put off large-scale exploitation of certain forest regions until infectious agents are more thoroughly researched. “The leadership of influential people is key to building local skills for adequate surveillance and monitoring, if we are to use forests without causing either extinctions or the transmission of new and deadly diseases to the human population”, she concludes.
Tracking tourism in Antarctica

Claire Miller

Antarctica is the last great wilderness, a place where wildlife is still not afraid of humans. Visitor numbers have ballooned over the past decade, from 5000 to 17 000 annually, and the figure is expected to double again in the next decade. However, some members of the 45-nation Antarctic Treaty System believe that burgeoning tourism must be complemented by a proper understanding of its environmental and safety risks.

At a June meeting in Madrid, Australia, New Zealand, and other parties suggested that tighter controls might be needed. Options include capping visitor numbers in certain places, guidelines for adventure tourism, accreditation of tour companies, insurance for cleanups and rescues, and an Antarctic Code of Shipping that adopts the International Maritime Organization’s Arctic safety standards.

Tony Press, director of the

Is Viagra saving species?

Leslie Bienen

Seals, seahorses, deer, sea cucumbers, green turtles, and many other animals are threatened, in part, by their use in traditional Chinese medicine as male potency aids. Last year, researchers Frank and William von Hippel suggested that help might be coming from an unexpected source: the impotency drug Viagra, which was introduced in 1998. The brothers published a paper in *Environmental Conservation* (2002; 29: 227–81) hypothesizing that large declines in sales of reindeer antler velvet and seal genitalia that year were partially attributable to the widespread availability of Viagra.

In response, they received a volley of criticism from conservation groups. “Data from other species used in traditional Chinese medicines to treat erectile dysfunction, such as sea horses and sea cucumbers, do not support the von Hippels’ argument”, says Simon Habel, Director of TRAFFIC North America, the world’s largest wildlife trade monitoring group. The influence of Viagra on trade in wildlife species is difficult to tease out, because data on illegal trade are notoriously inaccurate.

Now, the von Hippels have completed a second study, showing that in Hong Kong apothecaries, sales in species they predicted would benefit from the availability of Viagra were down relative to species they predicted would not. The effect was small but statistically significant. “We’re hoping to do another follow-up study in Hong Kong before we publish these results”, says Frank von Hippel. The researchers expect that their new data, as well as a forthcoming publication in *Environmental Conservation* criticizing their work, will set off another debate on the topic.

Organizations that work on wildlife trade issues worry that looking to solutions such as Viagra will diminish other wildlife protection measures. However, TRAFFIC has also focused efforts on promoting the idea of substitutes for some traditional Chinese medicines. In 1997, the member countries of the Convention on International Trade in Endangered Species adopted two resolutions calling for the study and promotion of viable substitutes for medicines that rely on threatened species.

The von Hippels agree that whether or not Viagra is having a significant effect on demand for traditional remedies, other conservation efforts should not be abandoned. “We think Viagra is reducing the demand for certain species of conservation concern”, concludes Frank von Hippel, “but it is only one of many solutions needed to save these species from extinction”. 

Antarctic Peninsula on cruise boats, but little is being done to check whether their activities on land are having an environmental impact. Some ships have more than 1000 berths and their hulls are not strengthened, increasing the potential for oil spills and other accidents.

Adventure expeditions such as yachting and mountain climbing are more evenly dispersed over the landscape, but they are also smaller and not always adequately supported or equipped to get themselves out of trouble. Mounting rescues is starting to cost national scientific bases valuable time, money, and resources.

According to Press, tourist numbers overall are still low, but it is important that the treaty parties are ahead of the game, given Antarctica’s scientific and environmental significance. "Besides the fact that it is an inherently awesome and beautiful place", he says, "it is incredibly important for research. So it is also vital to manage any impacts that might affect its pristine nature. It is one of the few unspoiled places left.”
A cleaner catalyst for hydrogen

Kathryn Senior

One day we may live in a “hydrogen society” in which fuel cells produce most of our electrical power. That day has been brought closer by the work of James Dumesic and colleagues at the University of Wisconsin (Madison, WI), who have developed a new catalyst that can facilitate the production of hydrogen from hydrocarbons derived from biomass. “The production of hydrogen from biomass will be one of a number of very important routes to future low-emissions energy systems”, says David Hart, Head of Fuel Cells and Hydrogen Research at the Imperial College Centre for Energy Policy and Technology (London, UK).

A combination of fundamental and high-throughput studies identified a non-precious metal catalyst system from 300 candidates. Named the Raney-NiSn catalyst, the material shows catalytic activity, selectivity, and stability for hydrogen production comparable to the performance of a platinum/aluminum oxide catalyst. “We have discovered a heterogeneous catalyst based on nickel, tin, and aluminum that is active and selective for the production of hydrogen by the process of aqueous-phase reforming (APR)”, explains Dumesic. The process uses ethylene glycol, glycerol, and sorbitol, all readily available hydrocarbons, as substrates. Relative to other catalysts, Raney-NiSn can perform for long periods and at lower temperatures. “This makes the production process more environmentally friendly and many times cheaper than the platinum catalysts currently in use”, he continues (Science 27; 2075–77).

The catalyst will continue to be developed for large-scale use. A collaboration has been set up with Virent Energy Systems in Wisconsin, as part of a National Science Foundation Small Business Technology Transfer program. “We are now working to elucidate the surface reactions that control the performance of the Raney-NiSn catalyst”, says Dumesic, “with the aim of designing even better catalysts for the APR process”.

“The generation of hydrogen from renewable sources is a critical barrier that needs to be overcome if the promise of a hydrogen economy and fuel cell vehicles is to be achieved”, says Joseph Norbeck, Director of the Center for Environmental Research and Technology at the Bourns College of Engineering (University of California, Riverside, CA). Since these results provide a potentially inexpensive and environmentally clean pathway to do just that, he says, they are very interesting and exciting. “The problem of converting all carbonaceous matter to hydrogen, carbon dioxide, and other energetic gases has not been completely demonstrated here”, he concludes, “but it is a giant step forward”.

Bats and robins

Adrian Burton

Spanish scientists are to use radar in an attempt to solve a macabre mystery surrounding the greater noctule (Nyctalus lasiopterus), Europe’s largest bat.

Like all good European bats, the greater noctule should be prowling the night skies in search of moths and mosquitoes, but examination of several thousand fecal pellets has shown that this species has more on its menu: night-flying migratory birds.

“We’ve found the feathers of small migratory birds in these pellets, including those of robins and warblers, and there is a pattern showing more birds are eaten during the major migration months”, explains Carlos Ibáñez (Doñana Biological Research Station, Spain). “Some tropical bats are known to attack birds when they are roosting, but the echolocation characteristics of this bat, and the shape of its wings, strongly suggest that it captures – and perhaps eats – these birds in flight.”

How a 50g bat can capture a fast-moving bird, particularly one that can be up to a third its size, is a mystery, albeit one that may soon be solved. The Spanish Army has donated a radar system named Super Fledermaus, or “Super Bat”, to track the bats’ feeding sorties. The same system has been used by Swiss ornithologists to track migrating flocks of birds, but it is sensitive enough to pick up and lock onto a single animal 4 km away.

“The idea is to learn their flight patterns and to see whether they really do make these aerial attacks”, explains Ibáñez. “Although we can only track one bat at a time in this operational mode, if a bat homes in on a bird and makes a strike, we would expect a major change in [the bat’s] flight pattern, perhaps including the animal’s falling as it grapples with its prey. Carrying a victim that size must surely alter the bat’s flight characteristics.”

“It would be interesting to know exactly what birds these bats are taking”, adds Gonzalo Pérez Suarez (Alcalá University, Alcalá de Henares, Spain). “[Molecular techniques such as] PCR might be able to identify some of the grizzly remains.”
Protecting the prairie

Eric Ness

With environmental funds shrinking at state and federal levels, the opening of the new Grassland Reserve Program of the Natural Resources Conservation Service (NRCS) on June 30 was a cause for minor celebration on the prairie. Some $49.9 million will be disbursed before September 30.

The Grassland Reserve Program seeks to emulate the successes of the Wetland Reserve Program, which had 1,276,619 acres enrolled in 2002. Unlike the wetland program, where land is taken out of production, haying and grazing of eligible lands will be permitted under conservation management. The limited money will prioritize grazing support, biodiversity, and protecting land at greatest threat of conversion.

Grasslands dominate American private land, covering more than 525 million acres. They are also among the most prone to development. Some 23 million acres of grassland and shrubland were converted to crops between 1982 and 1997, and another 6 million acres were developed, according to the 1997 Natural Resources Inventory.

An Attwater’s prairie chicken struts in safety.

“Bait bites back

Mary Weideman

Scientists in the northern US and Canada are changing long-held views of earthworms as strictly beneficial. "In essence, they are accelerating the decomposition of forest leaves or detritus”, explains José Amador (University of Rhode Island, Kingston, RI). “What you see in the woods is an invading front where the forest floor has disappeared”, adds Lee Frelich (University of Minnesota, St. Paul, MN). “Just bare, hardened mineral soil is left.”

The culprits behind this litter loss and soil depletion are exotic earthworms native to Europe and Asia. European varieties include the deep-burrowing night crawler (Lumbricus terrestris), commonly used as fish bait, and the litter-dwelling Lumbricus rubellus, which arrived in North America in the 16th and 17th century. Their Asian cousins, such as Aminthus gracilis, arrived in the US and Canada approximately 30 years ago. These cold-intolerant species are frequently used in composting, and can be purchased over the Internet.

Why worms and why now? “They’re very popular as fishing bait”, explains Frelich. “They are [now] reaching critical mass in remote areas where unused excess is left behind.”

Earthworms eat leaf litter and its product, humus, which is full of nutrients that support plant life. “Earthworms also disturb the soil, which stimulates the degradation of humus by microbes”, explains Peter Groffman (Institute of Ecosystem Studies, Millbrook, NY). The net result is soil that is diminished in its ability to store carbon and is also possibly nitrogen-depleted, and the loss of litter-dependent organisms such as wildflowers, insects, centipedes, and salamanders.

Freligh, Amador, Groffman, and others are busy tracking the impact of worms on our woods. Freligh is also exploring various methods to control earthworms, including the use of electroshock to force them to the surface for easy removal. For now, the best bet is getting the word out. “In Minnesota”, he adds, “we have started an education campaign aimed at shops that sell live bait. We are telling people to bring their bait back, not dump it in the woods”.

Bait bites back

Mary Weideman

Scientists in the northern US and Canada are changing long-held views of earthworms as strictly beneficial. “In essence, they are accelerating the decomposition of forest leaves or detritus”, explains José Amador (University of Rhode Island, Kingston, RI). “What you see in the woods is an invading front where the forest floor has disappeared”, adds Lee Frelich (University of Minnesota, St. Paul, MN). “Just bare, hardened mineral soil is left.”

The culprits behind this litter loss and soil depletion are exotic earthworms native to Europe and Asia. European varieties include the deep-burrowing night crawler (Lumbricus terrestris), commonly used as fish bait, and the litter-dwelling Lumbricus rubellus, which arrived in North America in the 16th and 17th century. Their Asian cousins, such as Aminthus gracilis, arrived in the US and Canada approximately 30 years ago. These cold-intolerant species are frequently used in composting, and can be purchased over the Internet.

Why worms and why now? “They’re very popular as fishing bait”, explains Frelich. “They are [now] reaching critical mass in remote areas where unused excess is left behind.”

Earthworms eat leaf litter and its product, humus, which is full of nutrients that support plant life. “Earthworms also disturb the soil, which stimulates the degradation of humus by microbes”, explains Peter Groffman (Institute of Ecosystem Studies, Millbrook, NY). The net result is soil that is diminished in its ability to store carbon and is also possibly nitrogen-depleted, and the loss of litter-dependent organisms such as wildflowers, insects, centipedes, and salamanders.

Freligh, Amador, Groffman, and others are busy tracking the impact of worms on our woods. Freligh is also exploring various methods to control earthworms, including the use of electroshock to force them to the surface for easy removal. For now, the best bet is getting the word out. “In Minnesota”, he adds, “we have started an education campaign aimed at shops that sell live bait. We are telling people to bring their bait back, not dump it in the woods”.

Protecting the prairie

Eric Ness

With environmental funds shrinking at state and federal levels, the opening of the new Grassland Reserve Program of the Natural Resources Conservation Service (NRCS) on June 30 was a cause for minor celebration on the prairie. Some $49.9 million will be disbursed before September 30.

The Grassland Reserve Program seeks to emulate the successes of the Wetland Reserve Program, which had 1,276,619 acres enrolled in 2002. Unlike the wetland program, where land is taken out of production, haying and grazing of eligible lands will be permitted under conservation management. The limited money will prioritize grazing support, biodiversity, and protecting land at greatest threat of conversion.

Grasslands dominate American private land, covering more than 525 million acres. They are also among the most prone to development. Some 23 million acres of grassland and shrubland were converted to crops between 1982 and 1997, and another 6 million acres were developed, according to the 1997 Natural Resources Inventory.

An Attwater’s prairie chicken struts in safety.
Poachers and parrots
Claudia Orellana

The scarlet macaws (Ara macao) that inhabit Guatemala’s Laguna del Tigre National Park are facing extermination. According to Fernando Castro of the National Council for Protected Areas (CONAP), based in Guatemala City, 51 of 53 nesting sites were pillaged by poachers or burned this year, and recent forest fires have decimated the birds’ feeding area.

The scarlet macaw appears on Appendix I of the CITES list of endangered species. Although it also lives in Brazil and Costa Rica, isolated populations in Guatemala, Belize, Honduras, and southern Mexico have evolved into a subspecies (Ara macao cyanoptera). Laguna del Tigre is part of the Maya Biosphere Reserve in the northern Guatemalan province of Peten, and contains the main nesting area for the subspecies.

Unfortunately, macaws are worth hundreds of dollars each on the US black market. In late May, US biologists working for the Wildlife Conservation Society (WCS) had to flee the park when confronted by armed poachers. This was not the first such confrontation. “This area is the domain of poachers and timber traffickers”, says Castro. “They threaten and frighten anyone working in the area not to see or hear what is happening. There is no law here.”

Carlos Albacete, director of Tropico Verde, a Guatemalan environmental NGO, sees settlement and agriculture as the principal threats to the macaw’s survival. “Most of this year’s fires were started deliberately”, he says. “In recent years the bird’s habitat has declined by 30%, thanks to the fragmentation caused by subsistence and cattle farming. Our investigations show that the big cattle ranchers intend to appropriate this region because, unlike other parts of the country, pasture continues to grow during the dry season.”

The scientists who remain at the park’s Las Guacamayas Biological Station are studying the birds’ migration patterns. Electronic collars have been fitted on the birds, says Michelle Catalan, the station’s research coordinator. “We want to know how and why they move, and we hope this knowledge will enable us to protect them. Only one chick has survived this year”, she adds. “Luckily, some poachers were captured. The birds [they caught] have been put in a rescue station and may be reintroduced.”

Forests for the future
Martina Habeck

Trees have a new market value – they can now be planted in exchange for carbon credits to help industrialized countries meet their requirements under the 1997 Kyoto Protocol. However, at a recent climate conference in Bonn, Germany (June 2003), scientists demanded the introduction of strict criteria for the evaluation of ecological and social benefits of forestry projects in developing countries, to avoid negative impacts on local residents and biodiversity.

The Protocol aims to combat climate change by calling on richer countries to reduce their emissions of CO₂ and other greenhouse gases to legally binding target levels. It establishes three mechanisms to help industrialized countries meet those targets at lower costs. One of these, the clean development mechanism (CDM), allows industrialized countries to buy emission rights (carbon credits) by funding environmentally friendly projects in the developing world. Countries can also earn carbon credits by planting forests, since these can act as carbon sinks by absorbing CO₂ from the atmosphere.

The concept is controversial, however. “We are very concerned about the desire of some countries to use CDM sinks projects instead of reducing their emissions at home”, says Kate Hampton, Climate Campaigner for Friends of the Earth International. She adds that many of the CDM sinks projects that have been proposed are large-scale plantations of fast-growing trees, and these come with their own set of problems. “We are worried about the social and environmental impact in developing countries”, she says.

Carbon researchers share these concerns. A group of scientists participating in the CarboEurope cluster (a framework for coordinating carbon research in Europe) have therefore developed an approval and monitoring system for CDM sinks projects. “Our study shows a decision tree model to help assess project eligibility by considering various criteria, including sustainability, additionality, whether the project complies with national law, and whether the local population and biodiversity were taken into account”, explains CarboEurope coordinator Annette Freibauer (Max Planck Institute for Biogeochemistry, Jena, Germany).

Freibauer and colleagues presented their model to climate change negotiators at the Bonn meeting in order to prepare the ground for the UN Climate Summit in December in Milan, Italy, where the rules for CDM sinks projects are to be decided.

At the Bonn meeting, the CDM’s Executive Board signaled that they favor strict approval criteria. After reviewing the methodologies of 15 proposed CDM projects, including a wind farm in South Africa and a landfill plant in Jamaica, they rejected 14 because they did not meet minimum standards.

Results of illegal burning in the Laguna del Tigre National Park.
Upsurge in Tibetan wildlife
Dinesh C Sharma

Several wildlife species from the Tibetan plateau, including the Tibetan antelope (chiru) slaughtered by poachers to make luxury “shahtoosh” shawls, have increased in number over the past decade, according to a recent count by biologist George Schaller of the New York-based Wildlife Conservation Society (WCS). Better enforcement by local wildlife authorities is cited as the main reason for the recovery.

After a trip to Tibet in March and April 2003, Schaller reported an increase in local populations of chiru, Tibetan gazelles, wild asses, and wild yaks, compared to the results of surveys he conducted a decade ago around the Chang Tang reserve. The chiru population rose from an estimated 3900 in 1991 to 5890 in 2003, while the number of wild asses (kiang) jumped from 1224 to 2241. Tibetan gazelles increased from 352 to 487, and wild yak numbers grew from 13 to an estimated 187. Scientists from the Tibet Forestry Department, Peking University, and Shanghai’s East China Normal University also participated in the survey.

Chiru were brought to the world’s attention as news spread that they were being killed in large numbers for their wool, which is woven into shawls in the Indian states of Jammu and Kashmir. Although these luxury shahtoosh shawls were popular in India, the US, and the UK, the Indian government sided with conservationists and banned the trade in 1998. Educational campaigns have helped. “If demand goes down, poaching goes down”, points out Urvashi Dogra of the Wildlife Trust of India, an Indian NGO that campaigns against the shahtoosh trade.

“If a decrease occurred during the early 1990s due to poaching”, says Schaller, “chiru numbers appear to have recovered and the population is reproductively healthy. The Tibet Forestry Department has made a successful effort to protect wildlife in the area. Patrols search for poachers, guns have been confiscated, and education has created awareness about wildlife laws among nomads and officials”.

Wildlife management must now follow protection, adds Schaller, because as certain species have increased in number or have changed behavior, they are being perceived as problems by local people.

New Biosafety Protocol launched
Virginia Gewin

Once the tiny Pacific island nation of Palau ratified the Cartagena Protocol on Biosafety in mid-June, the necessary 50 nations were amassed to enforce the international agreement on the trade of “living modified organisms” (LMOs). As of September 11, 2003, the Protocol will provide a regulatory framework for the transboundary movement of LMOs entering the environment or food chain.

The Biosafety Protocol – the first enforceable measure to come out of the 1992 Convention on Biological Diversity (CBD) – is designed to protect biological diversity from the potential risks posed by living, genetically altered organisms, including gene flow into nearby natural populations. The essence of the Protocol is advance consent: importing countries must receive detailed written descriptions of the organisms in question and their genetic characteristics.

An established Biosafety Clearinghouse will make available the scientific, environmental, and legal risk information necessary for the importing country to make an informed decision prior to shipment. Only the first transboundary movement of an LMO to be released into the environment, such as seeds or live fish, is subject to the procedure. Separate rules apply to LMOs used as food or animal feed.

To prepare for the Protocol’s enforcement, says CBD Executive Secretary Hamdallah Zedan, “more than 100 developing countries are in the process of creating national biosafety frameworks”. Developed countries are also adjusting their existing laws to complement the Protocol.

Although booming with biotechnology-driven industries, the US has still not ratified either the Biosafety Protocol or the CBD. US State Department officials fear that the possible inclusion of labeling and traceability provisions, motivated by the EU, could negatively impact the US. “[We have] participated to make sure documentation requirements – the crux of the Protocol – are not trade disruptive”, said a State Department spokesperson.

Avoiding trade conflicts was a primary consideration of the Secretariat, says Zedan. “The Protocol attempts to reconcile the respective needs of trade and environmental protection with the rapidly growing biotechnology industry”, he adds.

While the Biosafety Protocol is the first CBD-driven legislative success, former CBD executive secretary Calestous Juma feels it has diverted attention from more pressing threats to biodiversity, such as ecosystem destruction. “There is a vacuum in terms of international leadership on biodiversity”, he says. Zedan disagrees, and points out that this measure fulfills provisions for three separate articles of the CBD.