didn't last, however, farmers found that kudzu, as forage, had serious drawbacks. It was easily overgrazed and much of the vine is woody stem, useless as hay. Further, it could be mowed for hay only once a year and still remain healthy. (In fact, overgrazing and too-frequent mowing are about the only ways of controlling kudzu's spread in pastures or cultivated fields, short of using chemical herbicides.)

Thus, as the serious soil erosion problems of the 1920-40s diminished, government agencies slowly became disenchanted with kudzu, especially as the vine continued to spread—and spread—and spread. In fact, by the mid-1950s state highway departments were employing chemical herbicides to eradicate kudzu stands along rights-ofway.

In 1953, the U.S. Department of Agriculture (USDA) removed the plant from the list of cover crops permissible under the Agricultural Conservation Program. In 1962 the SCS began limiting its recommendations of kudzu planting to areas widely separated from orchards, forests, fences, farm buildings, and other properties that could be overrun by the vine. The crowning blow came in 1970 when USDA finally listed kudzu as a common weed in the southern states!

True, some farmers still use kudzu as forage for livestock. However, the more affluent agriculturalist has turned to other, more productive feed crops such as bahia grass, coastal bermuda, and fescue despite the fact that such vegetation requires fertilizing and more of the farmer's attention.

Thus, although kudzu can still control soil erosion, stabilize soil, and grow well in nutrient-deficient soils, its aggressive growing behavior has become an overwhelming liability. Many tree farmers, orchard growers, woodlot owners, and the wood products industry are especially critical of kudzu's tendency to engulf all vegetation in its path. Trees both large and small, mature or sapling, are stifled and eventually killed.

So that is the story of kudzu. Once not long ago—highly acclaimed, it has fallen into disrepute. No longer do southern towns stage "kudzu festivals" or elect "kudzu queens." Like water hyacinth and other exotic (introduced) plants which eventually proved to do more harm than good, kudzu is a pest. Its almost uncanny ability to grow and spread under the most adverse conditions—the very characteristic that once made it so popular, especially in reducing sedimentation and controlling soil erosion —now poses a problem for the South.

Unfortunately, the vine has spread so widely throughout the South that only a massive eradication effort involving, among other things, extensive use of chemical agents, could be effective. However, the great economic and environmental costs associated with such a campaign make its undertaking highly unlikely.

Interestingly, kudzu is still considered a useful plant in China and Japan. The Chinese, for example, greatly value the plant's root, which contains a starch used in making a popular kind of flour. Also, the ancient Chinese revered the plant for its alleged medicinal values. It was used apparently to treat such ailments as influenza, dysentery, and snake bite!

The resourceful Japanese, who permit kudzu to grow wild on steep, uncultivated slopes, use the entire plant. Besides making hay from the leaves and using them as forage, the Japanese make a coarse cloth from the stem and derive a starch from the root. The starch is then used in making noodles and candy.

Thus, although unlikely, it's possible that American researchers, too, will identify new uses for kudzu. It remains effective in stabilizing steep road cuts and stream banks, partly because of the plant's deep roots. Because of the vine's ability to grow in poor soil, it is also useful in revegetating denuded strip-mined areas. But each of these uses also depends on that same characteristic of kudzu that resulted in its classification as a pest plant in the first place the vine's rate of growth!

Is it difficult to locate "the vine" as you drive through the South? Hardly. During the growing season, it would be almost impossible to miss the many distinctive patches of leafy vines blanketing road banks, covering road fields and shrouding trees beside the region's highways. But if you stop along the road to examine the plant more closely, watch out! Don't get too close or tarry too long or you might get more wrapped up in kudzu than you intended!—Ken Hampton, National Wildlife Federation.

No Longer a Wilderness Of Monkeys

The world's primates are in trouble. As a species, *Homo sapiens* appear to be one of the few primates with a relatively secure future. The reasons for concern are varied but they generally all stem from human actions.

Of the 166 species of primates living today, nearly a third are considered endangered. Primates are subject to a wider variety of population pressures than any other mammals. Not only do they have to cope with the severe problem of habitat loss, but they are also subjected to subsistence hunting for food, trapping for zoos and medical research, and for sale as pets. Primates, as other large advanced mammals, are slow to mature and breed, resulting in slow recovery of depleted wild populations.

The most serious problem confronting the world's primates is loss of their habitat to development, heightening the severity of the previously mentioned factors. Zoologist Jaclyn Wolfheim states, "The destruction of habitat overshadows all other proximate factors that influence the survival of primate populations. No degree of adaptability or regulation of trade in animals can save a species if all of its habitat has been bombed with napalm, razed by bulldozers or planted in soybeans. Conversely it is difficult to hunt a species to extinction if its original habitat is left intact."

The above quote especially applies to the prosimians, one of two suborders of primates, that includes lemurs, indrises, lorises, tarsiers, and the aye-aye. Prosimians, which have never been in demand for pets, food, or research, have experienced radical population declines almost exclusively in response to their loss of habitat. They are strictly Old World species living on the island of Madagascar and in some parts of Africa and Southeast Asia. This geographical restriction, their high degree of specialization, and their dependence on trees has been their downfall.

Lemurs, indrises, and the aye-aye, all limited to Madagascar and to the nearby Comoro Islands, have lost the trees upon which they depend for food and shelter (85 percent of Madagascar has been deforested). Exotic introductions have edged out Madagascar's prosimians, unable to compete with other mammals because the island's isolation prevented adaptations to selective pressures.

Mainland prosimians, such as tarsiers and lorises, have better succeeded in adapting to changing habits, perhaps because they have been subjected to a wider variety of pressures throughout their development.

The future of the anthropoids, the other primate suborder, is closely linked to the fate of tropical forests in Africa, South America, and Asia. Anthropoid species, including the marmoset, monkey, ape, and human families, are considered more flexible than the prosimians; they have adapted to changing environments and their habitats are not as restricted.

But the world's tropical forests are currently under an alarming seige by developers to provide charcoal, lumber, and agricultural land in Third World nations to promote rapid economic expansion. Gibbons, gorillas, orangutans, marmosets, and many monkey species are losing the large tracts of forest they need to live. Habitat deforestation has placed three marmoset species under extreme pressure throughout their restricted range in Brazil. Several agricultural development schemes threaten the remaining habitat of the golden lion marmoset (Leontopithecus rosalia rosalia), the most acutely endangered subspecies. Negotiations are underway to try to preserve an adequate portion of this dwindling habitat for the 400 golden lion marmosets remaining in the wild. This subspecies breeds well in captivity, and reintroductions will be conducted as soon as suitable areas are identified.

The Research Controversy

The use of anthropoid primates in medical research has long been a point of controversy among conservationists, medical researchers and humane activists. Primates, closer to humans phylogenetically than any other animal, are very well suited for research in a variety of physiological, morphological, and behavioral studies. For some pathological and neurological research no alternatives exist.

The chimpanzee (Pan troglodytes) is the only animal other than humans that is susceptible to hepatitis B, making it invaluable for vaccine development and testing. The U.S. Center for Disease Control in Atlanta estimates an incidence of 150,000 cases of hepatitis B for 1976, of which 1,500 were fatal. Chimpanzees are also the only animal model available for research on non-A, non-B hepatitis which is responsible for more than 80 percent of the post-transfusion hepatitis diagnosed in the U.S. Chimps are also important in research on other infectious diseases such as malaria, gonorrhea, and trypanosomiasis.

Two macaque species, the rhesus macaque (Macaca mulatta) and the longtailed macaque (Macaca fasicularis), have long been the most popular general purpose primates for experimental use. The rhesus macaque has been the most widely used primate for the safety testing of poliomyelitis and other vaccines. It was also used in the discovery of the Rh factor, an indicator of a blood disorder that can affect the developing human fetus. Baboons (Papio spp.) are also important as research models particularly in the areas of surgical technique development and neurophysiology.

Tougher To Get

Several recent developments have caused heated debates among factions interested in the use and supply of experimental primates. Continued population declines of chimpanzees, rhesus macagues, and other primate species have led to reevaluation of the use of these primates and of their capture methods. In April, 1978 India banned the export of rhesus macaques, citing severe population declines and the violation of an agreement with the U.S. that rhesus macaques would not be used for research involving nuclear arms. Suddenly the U.S. was left without a supplier of its most heavily used primate. It was hoped that Bangladesh would be able to supply some macaques, but for various reasons this has not been the case. Since captive stocks are limited, many researchers are attempting to replace the rhesus with longtailed macaques but are finding these in short supply also.

A major U.S. pharmaceutical company wants to purchase 125 chimpanzees from suppliers in Sierra Leone, in western Africa. Trade in primates is regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) requiring permits for the importing company from the importing and/or exporting nation. So far the U.S. Fish and Wildlife Service's Wildlife Permit Office has refused the permit on the basis that not enough information is available on Sierra Leone's chimp population and also

captive bred primates. A captive bred chimp, for example, may cost \$5,000 to \$10,000. Its wild counterpart may run less than half that amount. Also, researchers are only beginning to learn about primate social behavior, a prime determinant of breeding success.

Because primates generally breed and mature slowly, large colonies would be needed to keep pace with yearly demands and to ensure genetic diversity and correct social unit size. The Southwest Foundation for Research and Education's (SFRE) baboon colony in San Antonio, TX, the world's largest, contains more than 1,100 baboons (Papio cynocephalus). SFRE also maintains small chimpanzee and squirrel monkey colonies. Although SFRE's colonies are noncommercial, the Charles River Breeding Laboratories' Florida Keys facility is. Charles River has established a colony of 2,500 rhesus macaques on an island previously uninhabited by primates. This year Charles River will sell its surplus of 560 primates to researchers for \$500 to \$1,000 each. Before India's rhesus ban, wild macaques could be purchased for less than

Species Rhesus macaque (Macaca mulatta)	Number Required 1977 14,000	Availability Unavailable from the wild. Limited domestic production.
Long-tailed macaque (Macaca fascicularis)	6,000	Wild specimens commercially available.
Chimpanzee (Pan troglodytes)	200	Commercial trade only by special permit. Limited domestic production.
Baboons (Papio spp.)	1,300	Wild specimens commercially available.
African green monkey (Cercopithecus aethiops)	2,100	Wild specimens commercially available.
Squirrel monkey Saimiri sciureus)	4,500	Wild specimens commercially available.

that unsound collection methods would be used.

A major point of contention in this permit application and in wild primate collection in general is the common methods of capture. Wild primates, given their agility, intelligence, and their often rugged habitat, are difficult to capture. Often they are trapped in snares and nets, resulting in the deaths of numerous animals. Sometimes the mother is killed to capture the young. Since most primates bear and raise only one or two of the young at a time, many adults may be killed to fill an order.

One possible solution to the supply problem is development of captive breeding programs. So far, the success of these programs has been limited, primarily because they have not been encouraged. Until recently, the supply of wild primates was adequate, and they were less expensive than

\$300. Continued primate behavior research may allow more colonies similar to SFRE's and Charles River's to be established.

In 1974 the National Institutes of Health established the Interagency Primate Steering Committee (IPSC). Composed of representatives from the National Science Foundation, the Department of Defense, the Department of Health, Education and Welfare, and the NIH, the committee's stated goal is " . . . to develop a unified approach to assure both short and long-term supplies of non-human primates for biomedical research activities." IPSC has developed a "National Primate Plan" which outlines future requirements for government agencies and proposes methods for obtaining primates. By coordinating use, it is hoped that sufficient experimental primate supplies can be maintained.

-John Hallagan, Conservation News.



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