Raccoons and their Relatives

The World Conservation Union

Species Survival Commission

IUCN
The World Conservation Union
Foreword

Wild animals and people are both part of the natural environment, and there has always been a close relationship between them. From earliest times, that inter-relationship has ranged from the practical to the aesthetic; from nourishment of the body to nourishment of the spirit. Although most of our animal protein now comes from domesticated species, wild animals are still an important source of protein for local populations in some parts of the world. The same continuity can be seen today in the artistic representation of wildlife found in many societies, which can trace its lineage from Stone Age cave paintings.

From prehistoric times, animal skins and furs have been used for protection and, later, for adornment. The fur trade evolved in response to these needs. Today, 85-90% of the world trade now involves farm-raised species, mainly mink and fox, which are considered part of normal agriculture.

Nevertheless, several wild fur-bearers have dramatically declined in numbers. Conservation is imperative if some of the threatened species are to survive and sustained yields are to be maintained. Indeed, the World Conservation Strategy points out the importance of wild animals and plants as a source of income for rural communities. This is especially true of the wild fur trade in Canada. There are, therefore, very practical reasons for the fur trade becoming involved in conservation, which it has by close association with wildlife management.

Involvement of the fur trade in conservation on a major scale dates from the early 1970s when one particular species was the focus of concern. Following the sharp decline in the flow of leopard skins from producing areas, the International Fur Trade Federation (IFTF) took the unprecedented step of introducing a voluntary ban on handling leopard and some other species - several years, in fact, before the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) came into force.

The fur trade has contributed to funding research into the status of leopard and cheetah in sub-Saharan Africa, in cooperation with IUCN - The World Conservation Union. This interest in cats continued with support for a survey of the status of South American species, again in cooperation with IUCN.

IUCN is pleased to acknowledge the substantial financial support and cooperation of the IFTF, which has made possible the preparation and publication of conservation action plans for fur-bearing mammals, and has also provided for this series of public education booklets. Conservation of the world's biological diversity is dependent upon all of us. We welcome your support.

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ISBN 2-8317-0051-5
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Cover: *Ringtail cat* (Bassariscus astutus)  
Erwin & Peggy Bauer/Bruce Coleman
Red panda (Ailurus fulgens) is perhaps the best known member of the Procyonid family.

One of the most elusive and poorly-known groups of mammals in the world, raccoons and their relatives, have long defied scientific investigation. While certain species such as the raccoons and the diminutive red panda are familiar and easily recognised, others, such as the exotically named cacomistles, olingos, kinkajous and coatis, are much less well-known. All the animals within this family - Procyonidae - are predominantly forest-dwelling, living in eastern Asia and Central and South America. Together they comprise a small group of arboreal and semi-arboreal mammals, most of which are seclusive, nocturnal and solitary. The only exception to this pattern is seen amongst the coatis of South and Central America, which are not only diurnal, but also highly social.
Procyonids, members of the family Procyonidae, belong to the Order Carnivora. None of these species is truly carnivorous: in fact, most species have a strong preference for fruit. Confusion over procyonids' evolutionary pathway has resulted in a tangled taxonomy. Eighteen species are now recognised within this family, although their classification varies considerably according to different scientific sources.

With the exception of the red panda - an eastern Asian species and only member of the genus Ailurus - procyonids are confined to the New World, ranging from Canada south to Argentina. They have adapted to a wide variety of habitats which include tropical rainforest, arid/semi-arid desert regions, and chaparral, a type of scrub vegetation. However, all species are forest- or woodland-dwellers and, when threatened, they attempt to escape by climbing nearby vegetation. All but the prairie-dwelling raccoons have their young in specially constructed nests in the tree canopy.

The Procyonidae are generally thought to comprise six genera: Ailurus, the red panda; Procyon, the raccoons; Nasua, coatis, Potos, kinkajous, Bassaricyon, olingos, Bassariscus, ringtails or cacomistles; and Nasuella, the mountain or little coati.

The procyonids display diverse feeding adaptations: the red panda, for example, survives entirely on a diet of bamboo shoots and leaves. Raccoons, in contrast, not only forage for small crustaceans along stream banks, but may also feed on fruit and small invertebrates. Coatis are skilled foragers of the forest floor; as well as in the tree canopy, while kinkajous, with their prehensile tails, are well adapted for foraging among branches for fruit and small vertebrates. Both the ringtails and olingos are also well adapted for finding food in the forest canopy. The ringtail, with its semi-retractile claws, is particularly adept at moving swiftly through the trees.

Ringtailed cat (Bassariscus astutus), one of the smallest procyonids, Utah, USA.
The Red Panda

The red or lesser panda is the only procyonid represented in the Old World, and is the only member of its genus. Although now overshadowed by the fame of the giant panda (to which it does not appear to be related), the red panda was, for almost 50 years, the only panda known to man. Its long, banded tail, short, pert ears and pointed, masked face closely resemble those of a raccoon.

One of the most distinctive features of the red panda is the striking russet fur, which has earned it the Chinese name of "firefox". This chestnut- and chocolate-coloured fur, tear-streaked face and waddling gait make the animal appealing to the public. Facial stripes and other markings are highly variable and allow individuals to be easily recognised in the wild. Red pandas measure 50-60cm, with a tail length of 30-50cm and body weight of 3.5-5kg.

The red panda is only found in the Himalayan mountains, ranging from Nepal in the west, through southeastern Tibet and the People's Republic of China in the east. Outside China, its range extends to northern India, Nepal, Sikkim, Bhutan and northern Myanmar. Its distribution is restricted to an altitudinal range of between 2,000 and 4,000m.

Little is known about the ecology and behaviour of the red panda in the wild. They are largely solitary, arboreal animals, living in a mixture of spruce and fir forest with a dense understorey of bamboo - their staple diet. Unlike the giant panda, which feeds on both the leaves and stems of the bamboo, the red panda feeds only on fresh, young leaves from the base of the stems. They have been known to catch birds and small mammals, prey on eggs and chicks, and take berries and other fruit.

The only detailed study of this species in the wild has taken place in Nepal. Red pandas appear to be solitary and territorial, with males regularly patrolling the limits of their exclusive protected areas. Females, in contrast, tend to remain within the central part of their territory. A single male's territory,
however, overlaps with those of several females. The Nepalese field study also revealed that males had much larger home ranges (1.7-9.6 km²) than females (1.0-1.5 km²).

The breeding season begins in January and February, during which time females are receptive to mating for a very short time - probably just one to three days. Timing is of the essence in this case and a male regularly monitors the breeding status of "his" females during this period. Once a female is receptive to mating, the male follows her around in between mating bouts. Red pandas engage in a great deal of mutual grooming during courtship, which probably serves to further strengthen the liaison between the pair. Once they have mated, however, the male plays no further role in caring for the female or her young.

The gestation period is thought to be between 90 and 145 days. When the female is ready to give birth, she carefully selects a safe den, often in a hollow tree, cave or a crevice among rocks. This is then lined with branches and leaves. Up to four offspring may be produced, but one or two cubs is probably more common in the wild. Blind at birth, panda cubs are a uniform buff colour until about three months old, when they acquire the adult colouration and distinctive pattern. They feed exclusively on milk until they are about five months of age. They are then gradually weaned onto bamboo leaves.

Weaning always takes place well before winter, both in order to relieve the feeding pressure on the mother (who registers a significant weight loss during lactation and weaning), but also to help ensure that juveniles have a reasonable chance of finding a suitable den and food patch to sustain themselves through the harsh winter months. When they are six months old, juveniles are fully weaned and begin to disperse. Once they leave the maternal home range, juvenile pandas pass through the ranges of many neighbouring pandas until they locate some suitable vacant space where they may remain undisturbed. They are generally unable to defend a territory until they are about 18 months old.

Red pandas rely heavily on scent marks to convey their identity and reproductive status, as well as to indicate ownership of a particular patch of forest. Both males and females have paired anal glands which release a pungent, oily fluid that is rubbed onto visually prominent objects along tracks. Pores on the base of the feet also release a clear fluid along the branches and trails travelled daily by each animal. Because of their cold, wet environment, which reduces the potential range for dispersing odours, pandas have developed a cluster of highly sensitive receptors on the tips of their tongues which enable them to detect scent depositions through taste, rather than smell.

In addition to scent-marking, pandas also communicate through sound, using snorts, huffs, squeals, barks and bleats. One distinctive call - a loud "wha" sound - used as a contact call, has led local people to refer to this species as "child of the mountain".

Nobody knows how many red pandas remain. However, numbers are thought to be very low and unevenly distributed. Population estimates based on the Nepal study suggest there may be as few as 300 red pandas in that country. Some authorities consider this figure to be biased by the low altitude of the study area and have suggested that red pandas may be fairly common in eastern Nepal at altitudes of 2,500-4,000m, where it is damper and thus better suited to bamboo growth. In Myanmar, its status is unknown but there have been no sightings of red pandas in recent years. Similarly, no data are available on panda populations in Bhutan, Sikkim or Himalayan India. Preliminary field work in China indicates that the species is also rare there.
Olingos

Slender-bodied and short-legged mammals, olingos are found in Central and South America, their geographical range extending from southern Nicaragua, west of the Andes to northern Ecuador. Olingos are also typified by their rather small ears and extremely long tails. They are very agile animals, running and jumping through the branches, feeding as they travel.

Allen’s olingo (Bassaricyon alleni).

Little is known of their ecology or lifestyle. They are thought to feed on fruit, invertebrates and small vertebrates. Olingos often mingle with other procyonids, particularly kinkajous, when feeding in fruit trees, such as figs. However, they travel separately and den individually, usually in hollow trees. With their distinct preference for arboreal foraging, these species are highly dependent upon intact tropical humid forests, especially rainforest. Like the red panda, they are especially vulnerable to deforestation.

Five species of olingo have been described, all of them thought to be solitary, nocturnal animals. The bushy-tailed olingo is known from central Nicaragua, Costa Rica, Panama, West Colombia and West Ecuador, although its precise distribution and conservation status within this region are not known. This species is a honey-brown colour, 370-420mm long, with a tail measuring an additional 380-432mm. The pattern and degree of banding on the tail vary throughout the animal’s range. This species appears to have a preference for evergreen forests, especially primary tropical forest, near water. Some reports suggest that the bushy-tailed olingo can adapt to secondary vegetation or plantations in much the same way as kinkajous.

The habits of Allen’s olingo are similar to those of the bushy-tailed olingo. This species occurs from Ecuador to east of the Andes and from Peru through to Cuzco Province in Bolivia. There are no available estimates of its numbers.

The ecology and distribution of Pocock’s olingo is very poorly known. Similar in appearance to the bushy-tailed olingo, this species has been reported from Venezuela and Brazil, but there are no details on its occurrence or the status of the population in either country. Much of the presumed range of this species is affected by deforestation. In addition, many of the protected areas which might offer sanctuary to this species are under pressure from hunting, agricultural encroachment and illegal mining.

Harris’s olingo is another poorly-known species which appears to have a very limited distribution in Costa Rica, near the source of the Rio Estrella in southern Cartago. Almost nothing is known about this species, but its habits and ecology are assumed to be similar to those of the bushy-tailed olingo.

Another species of olingo with a very limited distribution is the Chiriqui olingo, known only from a small region between Rio Chiriqui Viejo and Rio Colorado in the Chiriqui area of Panama. No other information is available. Its extremely limited distribution, together with deforestation and the recent armed conflict in Panama, have probably had an adverse effect on this species.
Kinkajous

The only member of its genus (Potos), the kinkajou is found throughout the neotropics from Mexico to Bolivia. Its range extends from Mexico to the east and south of the Sierra Madres, along the central and southern Mexican coasts, south through Beni, Bolivia, and deep into Brazil. Its distribution is limited throughout much of Central America.

The kinkajou (Potos flavus) is one of the few carnivores to possess a prehensile tail.

Little is known about the natural history of the kinkajou. It is well adapted to an arboreal lifestyle and requires closed-canopy forest as its habitat. It is one of the few carnivores to possess a prehensile tail; this serves as an additional limb when feeding, allowing the kinkajou to hang from its tail and reach choice, succulent fruit which would otherwise be beyond its reach. In some parts of its range, this habit of feeding while hanging upside down may have led to kinkajous being confused with monkeys. Apart from this modification, kinkajous bear a strong resemblance to olingos and the two species are often difficult to tell apart. On closer examination, however, kinkajous are slightly larger than olingos (the head and body measure an average of 500mm; tail length is about 450mm), have fore-shortened muzzles and short-haired tails. An adult kinkajou weighs about 3kg and has a soft, thick reddish-brown fur, with a yellow-orange underside. The tail often tapers to a black tip.

Kinkajous' diet consists largely of fruit, particularly figs, with the occasional addition of insects. Kinkajous have a long tongue for reaching honey and nectar at the base of certain flowers. Because they range widely through the forest, kinkajous are believed to play an important role in dispersing the seeds of some plant species.

Kinkajous are normally solitary animals. However, when food is especially abundant, several animals may feed together as, for example, in a fruiting fig tree. Very little is known about the lifestyle of these elusive animals. Primarily nocturnal, they spend the daylight hours asleep in a hollow tree. Few observations of breeding behaviour have been reported but females are known to give birth to just a single cub after a gestation period of 112 to 120 days. The social bonds between a mother and her offspring may persist for a long time before the young animals finally disperse to locate and establish their own range.
Ringtails and Cacomistles comprise the genus *Bassaricyon*. Both species have long legs, lithe bodies and long, bushy tails. They have fox-like faces and their ears are larger than the other procyonids; those of the ringtail are rounded, whereas the cacomistle’s are tapered. The ringtail also has semi-retractile claws, a unique feature among procyonids.

One of the smallest procyonids, the **ringtail**, or ring-tailed cat, is also nocturnal and solitary. Weighing just 900g, the body length ranges from 310-380mm, with a tail length of 310-440mm. The ringtail is generally gray or brown, with white spots above and below each eye and on both cheeks. This species feeds predominantly on small vertebrates, fruit and invertebrates. The ringtail is found in western USA, from Oregon and Colorado southwards and throughout Mexico. Its preferred habitat is dry forest, especially along cliffs. Little is known about its ecology.

The **cacomistle** was formerly known from Guerrero and south Veracruz in Mexico, its range extending southwards to western Panama. Today, however, as a result of habitat loss and destruction, cacomistles are thought to be extinct in West Panama. They also seem to have disappeared from much of the Costa Rican plateau. No information is available on their status in Nicaragua, but they are believed to still be fairly common in Honduras, and patchily distributed in Guatemala and Mexico.

The back and sides of a cacomistle are tawny-brown, offset by a yellowish-white underside. The eyes are outlined by black rings, set within a broader, paler circle which gives the face a masked appearance. Cacomistles weigh about 900g and may measure 390-470mm. The ears are particularly large and round. As with other procyonids, the tail is longer than the head and body (400-545mm), thickly furred and strongly banded with black and white/tawny rings.

Cacomistles are arboreal, nocturnal and solitary animals, occupying a home range of about 100ha. Only one male and one female are generally found in the same area. They feed primarily on fruit, insects and small vertebrates, foraging throughout the middle and upper layers of the forest. Their preferred habitat appears to be lowland and montane rainforest, but they have also been recorded in wet evergreen forest, seasonally dry forest, scrub and secondary forest.

The cacomistle has never been a common species and, as a result of past and ongoing destruction and disturbance of its forest habitat, it is probably now seriously threatened over much of its range, apart from Mexico. In Honduras and Mexico, cacomistles are hunted for their fur and also because they are thought to kill domestic fowl. Some indigenous people, such as the Lacandones, hunt them for food.
Coatis

Coatis (genus *Nasua*) are found in forested habitats ranging from tropical rainforest and gallery forest, to *chaco*, *cerrado* and dry scrub. Their range extends from Arizona and Texas, south through Central America and South America, to Argentina and Uruguay, although they appear to be absent from the *llanos* of Venezuela. Coatis are omnivorous animals, eating a great deal of fruit when available. They are also opportunistic predators on invertebrates and small animals.

Like many other species, white-nosed coatis (*Nasua narica*) are threatened by loss of habitat.

Coatis have strong forelimbs and long claws which assist them in climbing or searching for prey. These versatile animals may search for fruit high in the forest canopy or forage on the forest floor for animal prey, poking their long noses into crevices, pushing over rocks, or ripping apart dead logs with their claws. Unlike their relatives the kinkajous, cacomistles, olingos and ringtails, coatis are highly sociable and mainly active during daylight hours. When foraging on the ground, their long, patterned tails are held aloft like antennae. It is thought that this behaviour may help group members keep together when moving through dense undergrowth. When alarmed, all members of the group seek refuge in trees, where they also usually sleep, probably for safety reasons. Like the other species of this family, coatis are primarily threatened by habitat loss as a result of deforestation, through clearance for agriculture and logging.
Coatis display a very distinctive pattern of social behaviour which is not seen in other procyonids. Females form permanent groups of up to 12 individuals, including young. For much of the year, adult males are solitary, joining these family groups only briefly during the breeding season, when females are less aggressive towards intruding animals. A single male, normally the dominant animal in the region, breeds with each female of a particular group. One reason given for such aggressive behaviour by the females is that males may occasionally try to kill the offspring of other rival males. If a female does not have offspring, it is likely that she will then be receptive to breeding. Intruding males may therefore kill existing offspring in the hope of mating with the females of a group and thus siring additional young. Such separation of lifestyles greatly confused early biologists and local tribespeople who described the solitary males as a separate species - “coimundí”, meaning “lone coati”.

Shortly after mating, the male is once again expelled from the group. Several weeks before a female is due to give birth, she too leaves the group and begins construction of a nest, high in the tree tops. Coatis bear a litter of 3-5 poorly-developed young. Apart from brief feeding excursions, the mother remains with her young for 5-6 weeks before finally bringing them down to join the group of adult and sub-adult coatis. Here, they will be inspected and groomed by each member of the group which will, in future, serve as their extended family, helping to raise and protect the offspring of different females. This strategy of family grouping and sharing of responsibilities appears to be designed to enable coati mothers to devote more time to searching for food, rather than having to individually protect their young.

The white-nosed coati (Nasua narica) with strong forelimbs and long claws is well adapted for arboreal life and is able to reverse its ankles to descend from trees head first.
The result is greater security for juveniles and a reduced level of mortality overall.

Shortly after the females and their offspring rejoin the main group, the male which bred with those females is again allowed to briefly visit the group. On such occasions, all group members participate in mutual grooming, which probably serves to strengthen individual bonds. For the males, these brief visits allow them to identify their own offspring, and thereby avoid killing them at some future encounter.

Three species of coati have been described. The white-nosed coati occurs in Arizona and parts of southern New Mexico, through Mexico (except the Baja Peninsula) and Central America to Panama and to the west coasts of Colombia, Ecuador and Peru. Some solitary male coatis have been recorded in southwest Texas, but the species is not thought to breed in this region. The conservation status of the white-nosed coati is poorly known but its numbers are thought to have declined recently.

White-nosed coatis are easily distinguished from other procyonids. The colour of their fur ranges from pale brown to reddish tones. The shoulder region of adult males may also have yellow or white hairs. The tail is long and banded with alternate yellow and brown markings. The head is pointed and the eyes are bordered by a mask which varies from a reddish to brown colour. Their ears are short, the rostrum is narrow and the snout is mobile. Head and body measure 430-700mm long, and the tail 420-680mm.

White-nosed coatis inhabit woodland and open forest and are rarely seen in open grassland. Although essentially terrestrial, white-nosed coatis are good climbers. They are an adaptable species but always require a certain amount of forest cover, probably to serve as shelter from predators. They also sleep in trees at night. They are omnivorous, searching for food both on the forest floor and in the forest canopy. They prey actively on soil arthropods such as beetles and worms, using their sensitive snout to probe the forest litter. In good habitats, white-nosed coatis make regular use of a fixed home range which may be up to 2km² in size.

Coatis are hunted by man throughout their range, both for their fur and their meat. In the USA, they are occasionally caught in traps set for other species, or may fall victim to other predator control programmes. Coatis are also susceptible to canine distemper and rabies. White-nosed coatis are classified as an endangered species in New Mexico where they receive total protection. In Arizona, however, where most of the US coatis live, they are subject to year-round hunting. The coati population in the USA is gradually becoming genetically isolated from populations further south as a result of dwindling populations in Mexico. This could eventually lead to local extinction of the coati in North America. Elsewhere in their range, coatis do not appear to receive any official protection.

The range of the South American coati comprises South America east of the Andes in all countries, from Colombia and Venezuela, south to Argentina and Uruguay. Like the white-nosed coati, this species has a narrow head and long, mobile snout. The fur of the South American coati is highly variable in colour, ranging from almost black with a gray face to a reddish-orange colour. Usually they are a dark-brown-to-reddish colour with a long, tapering tail that is blackish-brown with a series of yellow rings. The chin and throat are an off-white colour, blending into a pale yellow underside. Their basic ecology is thought to be quite similar to that of the white-nosed coati, the most obvious feature again being the formation of groups of adult females and their offspring.
The third species of coati, the Cozumel Island coati, is, as its name suggests, found on the island of Cozumel, which lies off the coast of the Yucatan Peninsula in Mexico. This species is found throughout the interior of the island. Almost nothing is known about its ecology or habitat requirements, but it is thought to be similar to that of the white-nosed coati. However, the Cozumel Island coati is generally smaller and has a silkier fur.

With such a limited distribution, this species faces considerable risks. Cozumel is a popular holiday resort and substantial development has already taken place on the island. Such development could threaten the future of this, and other species, including the Cozumel raccoon, which is also dependent on the restricted and fragile forest habitat. Another potential threat is the introduction of pet white-nosed coatis to the island. Should these escape, or be abandoned, they could contaminate the gene pool of the insular, and more severely-threatened, Cozumel Island coati.

South American coati (Nasua nasua).

Mountain coati

The mountain, or little coati, is about half the size of the white-nosed coati and is placed in a distinct genus, Nasuella. Its head and body are 360-390mm long and the tail 200-240mm. This species is usually a gray-brown colour, with darker legs and feet, and banded tail.

The mountain coati differs from other coatis in several ways. It is smaller and thinner than the other species - modifications which are often seen in animals adapted to living at high altitudes. In addition, its dentition indicates that it is possibly more insectivorous than other coatis.

This species, which occurs in montane habitats from northern Colombia and Venezuela to Peru, has the most restricted range of all procyonids. It is a high-altitude specialist preferring elevations over 2,000m. The mountain coati has not been the subject of any detailed study and little is therefore known of its ecology and behaviour. Over much of its range, cloud forest is being converted to agricultural lands and the paramo is being planted with pine forest. These pressures are particularly serious for the mountain coati on account of its restricted range.
Perhaps the most commonly-known and certainly most widely-distributed members of the Family Procyonidae are the mischievous raccoons. Members of this genus, *Procyon*, are widely distributed from Canada to Argentina. Six species are recognised, of which just two - the common and crab-eating raccoon - are relatively common. The remainder are confined to separate islands. One other species, the Barbados raccoon, was last seen alive in 1964 and is now considered extinct.

*Raccoons* (Procyon lotor) is a well-known and highly versatile procyonid species which now occurs in many urban areas of Canada and the United States where it successfully co-exists with humans.

The raccoon (Procyon lotor) is a well-known and highly versatile procyonid species which now occurs in many urban areas of Canada and the United States where it successfully co-exists with humans.

Raccoons are striking in appearance; their head is broad with a pointed, fox-like snout. Most are a brownish colour, with black-tipped guard hairs scattered through the fur. The tail is much shorter than the head and body and is banded alternatively with dark brown and contrasting gray to yellow-orange bands. A black mask generally surrounds the eyes, contrasting vividly with the paler fur on the face. The soles of the feet are hairless and the toes are long.

The common raccoon is found across Canada from Nova Scotia to British Columbia, throughout the United States (except for the Rocky Mountains and the Great Basin) and south through Mexico and Central America. In recent years, its range has extended northwards, coincident with increasing land clearance for agriculture and a gradually warming climate. It has also been introduced to fur farms in parts of Europe and Asia. Animals escaping from these farms have succeeded in establishing wild populations.

Raccoons are a highly versatile species capable of living almost wherever free-standing water occurs. They are most abundant in hardwood swamps, mangroves, flooded forests and marshes. These adaptable animals have no aversion to living near humans and sometimes seek shelter in farm buildings and beneath dwelling houses. They now occur in many urban areas and their nocturnal raids on
rubbish bins are a source of annoyance to many people. Their general habitat preference, however, is for forested regions, usually near running water. Raccoons generally forage singly or in groups composed of females and their young. In most areas, raccoons forage at night, searching streams and marshes for frogs, crayfish, fish, birds and eggs. Their keen sense of touch enables them to catch frogs and crustaceans by feeling among the substrate below the surface of the water. They can forage in the trees as well as on the ground. A raccoon’s movements are not, however, restricted to wetlands and they may also forage in upland areas for rodents, fruit, nuts and insects. They also raid crops, particularly fruit and corn, which has resulted in some persecution from farmers.

In captivity, raccoons are renowned for their fastidious behaviour of washing their food before eating it. This has resulted in the species' scientific name Procyon lotor (“he who washes his food”), as well as other appropriate common names in German (Waschbar), Spanish (osito lavador) and French (raton laveur). Such behaviour has not, however, been recorded in the wild. Scientists now believe that this results from captive animals being fed, literally, on a plate; although the animals do not have to forage for their food, they still go through the motions of searching for the food in the water, where much of their natural food originates.

Male raccoons are considerably larger than females. The head and body length averages 500mm, while the tail is another 300mm long. The outer fur is coarse, with a distinct grizzled appearance; the underfur, in contrast, is soft and dense. Raccoons generally shelter in hollow trees, but may also make use of burrows created by other animals such as armadillos, badgers or foxes. Common raccoons are not territorial but occupy a relatively stable home range throughout the year. Home ranges cover 4,000-5,000ha, depending on the species’ density and the quality of habitat. Males occupy larger ranges (typically 65ha) than females (40ha). Raccoons are probably polygynous animals, with one male patrolling the ranges of two or three females. Home ranges of adult females overlap but adult males seldom occur in the same range, except when food is seasonally abundant.

Six-week old raccoons (Procyon lotor), USA; litters of 3-7 young are usually born in April.
Crab-eating raccoons (Procyon cancrivorus) like many of their relatives, are threatened by habitat destruction, collection for the pet-trade, target practice and over-hunting on a local scale.

The mating season occurs during late January and early February, but the timing of onset of breeding varies according to the locality. Three-to-seven young are born after a 60-day gestation period. Cubs are born with a coat of fuzzy hair and already possess the typical black face mask at this early age. The eyes open when they are 2-3 weeks old. The first solid food is taken at seven weeks and weaning is accomplished at 16 weeks. Females suckle their young by lounging back, in the same position as a bear, rather than on their sides like most other mammals. For the first year of their lives, juveniles generally forage with, or near, their mother. In southern areas, juveniles leave the mother’s range during the autumn. At more northern latitudes, however, juveniles usually remain with their mother through the winter months, dispersing only when the next litter is due in the spring. Generally only one litter is produced each year.

Hunting is one of the main causes of mortality for the common raccoon. The sport of “coon hunting” is common from September to December each year, especially in eastern North America. Night-time hunting with specially-bred hounds is a common event in some parts of the country. Elsewhere, raccoons are also trapped for their fur. The raccoon, however, is an adaptable species which is not threatened over much of its range. Greater efforts are required to ensure the protection of the various subspecies of raccoons, particularly those found on islands.

The crab-eating raccoon is distributed from southern Costa Rica to northern Argentina. It also occurs on the island of Trinidad and, possibly, some of the other Caribbean islands. Less grizzled in appearance than the common raccoon, this species also has a much thinner coat, making the animal appear smaller. Head and body length may reach 900mm while the tail length averages 350mm.

The crab-eating raccoon is nocturnal, solitary and predominantly terrestrial. Its diet consists of molluscs, fish, crabs, insects and amphibians. Very little is known about
(clockwise from top left)
Ringtail in tree den, showing the large eyes typical of this nocturnal group.
Red panda “tasting” rather than sniffing scent mark.
The prehensile-tailed kinkajou using its long tongue in feeding.
Raccoon capturing crustacea in shallow water.
White-nosed coatis, exceptional amongst procyonids for their sociability.
its ecology or behaviour in the wild. This species is often thought to be limited to coastal and riverbank habitats but it has also been recorded in non-aquatic sites at certain times of the year. It is rarely found deep within the rainforest, but does occur on the llanos, as well as in deciduous and evergreen forest.

This species is naturally rare in some parts of its range and does not appear to be as adaptable to human activities as the common raccoon. The main threats to its survival in the wild include over-hunting on a local scale for its fur, use as target practice, collection of juveniles for the pet trade and, in some areas, destruction of forest habitat.

The Très Marias Islands raccoon occurs on the Très Marias Islands, off the western coast of Mexico, Maria Madre Island and Maria Magdalene Island. This species is not common and has probably never been numerous. No investigation has been conducted on the ecology and habitat preferences of this species, but they are thought to be quite similar to those of the common raccoon. The major threats to this species are its limited distribution, hunting, and capture for pets by the local people. The Três Marias Islands raccoon is not protected on these islands, nor are there any protected areas which might offer it some degree of long-term security in the wild.

Another island species, the Bahamas raccoon is restricted to the Bahamas. There are no data available on its numbers but it was formerly thought to be rare. It is now believed to be in danger of extinction. The commercial development of several islands within the Bahamas group has undoubtedly had an impact on this species.

The Guadeloupe raccoon is confined to the mangroves and remaining stands of rainforest on the island of Guadeloupe. The conservation status of this species is also unknown, but it is thought to be rare. The Guadeloupe raccoon is hunted for food. Changes in land-use have also resulted in considerable destruction and loss of native habitat on the island. The long-term security of this species may also be threatened by the recent appearance of the crab-eating raccoon which has been introduced to Trinidad and Tobago. The Guadeloupe raccoon does not receive any specific legal protection, but it is thought to occur in the Parc National de Guadeloupe.

The Cozumel raccoon is confined to Cozumel Island, lying off the coast of the Yucatan Peninsula, Mexico. The smallest member of this genus, often weighing just 3-4kg, the Cozumel raccoon lives in mangrove swamps. Almost nothing is known about its ecology or behaviour. In recent years, Cozumel Island has been substantially developed for tourism, particularly around the coastline, often close to mangroves. The species is not legally protected and there are no protected areas on the island.

Raccoon (Procyon lotor) in tree den.
Procyonids have played a restricted, but definite role in human culture and religion. Some species have played a limited role in the economy as fur-bearers but the fur itself is usually not a highly valued or prized commodity, the main exception being that of the raccoon which is one of the most economically important fur-bearers in the United States. Some species are hunted as food by some indigenous tribal peoples: others are persecuted for crop-raiding and chicken-killing. In general, however, these animals are of greater value to science than to any particular culture or economy.

Although few direct associations appear to have been established between man and procyonids in either the Old or New World, one noteworthy example concerns the ringtail (Bassariscus astutus) and the early miners of the great American outback. Also known as the “miner’s cat”, ringtails were once kept in gold and coal mines to control rodents since they were supposed to be better mousers than cats.

Human culture

Historically, the coati is thought to have been a fertility symbol for the Maya people of South America, and was maintained both as a pet and as a source of food. It has been suggested that the Cozumel coati may have been brought to that island by the Maya themselves, since Cozumel was an important location for the worship of Ix Chel, the goddess of fertility.

Other indications of the coati’s significance for indigenous people of the Americas is found in their local names. The name cacomistle is derived from the name “Tlacomizti” of the Mexican Nahuaatl Indians, meaning “half mountain lion”; the word coati is derived from ‘Kuat-l’, used by the indigenous Guarani Indians; “raccoon” is derived from a North American Indian
word *aroughcan* which, roughly translated, means “he who scratches with his hands”.

The red panda has been recognised in early human cultures in Asia for much longer than those of related species in the west. The earliest such depiction is a 13th century Chinese pen and ink scroll showing a hunting scene. More recently, and with greater ceremony, the red panda has been adopted as the national animal of Sikkim (Northeast India) and was also the mascot of the International Tea Festival in Darjeeling.

The New World procyonids, with the exception of raccoons and ringtails in the USA, have little commercial value except for occasional sales to zoos, or for capture for the pet trade. As only the common species are normally caught and sold, this commercial traffic probably has no major importance except, possibly, for rare insular forms. The sale of live red pandas to zoos was formerly quite prevalent. However, improved legislation and enforcement are thought to have limited this practice in recent years.

The common and crab-eating raccoons are sometimes accused of damaging agricultural crops, and killing domestic poultry. Coatis, too, have been known to attack poultry. Raccoons may also cause local declines in wild species such as muskrat, waterfowl, shorebirds and sea turtle eggs and hatchlings. However, such damage is usually temporary and localised.

The common raccoon is the major rabies vector in the southeastern United States and, in recent years, raccoon rabies has spread northwards to Virginia and Maryland. The same species is also hunted for sport in several parts of North America.

**The scientific value of procyonids**

Raccoons and their relatives are of considerable interest to man in scientific terms. Few species have been fully studied, largely because of their nocturnal and arboreal habits which make them difficult to follow and observe in the wild. All these species are so dependent on natural forest habitats that the current rate of loss of these ecosystems is bound to have a major impact on their future distribution and status.

Being fruit-eaters, raccoons and their relatives probably play an important role in dispersing the seeds of many fruit trees throughout the forest, thereby contributing to the intricate, complex nature of the forest. The seeds of many fruiting trees cannot germinate if they fall beneath their parent plant. A close relationship has therefore evolved between many fruit trees and a spectrum of mammals, birds, reptiles, fish and insects, in which the animal eating the fruit benefits from a juicy, nutritious meal. Meanwhile, as these animals move around the forest, the thousands of seeds they have ingested will be deposited at random intervals, wherever the animals defecate. If these natural dispersal agents were eliminated, for example through excessive hunting or habitat alteration, fewer seeds would be transferred, resulting in fewer fruiting trees. In the long-term, the entire structure of the forest could change, affecting countless other species.

Recently, there has been an interest in the taxonomic status of the red panda, and its relationship with the giant panda. Techniques used to examine this relationship have included examination of skull and dental characteristics, and a search for genetic and biochemical affinities. The results have so far been equivocal, at best, and are often contradictory. They have variously indicated that the red panda is allied to the procyonids, or to the bears or, again, that it should be classified on its own in a sister group to the bears. Finally, some scientists have recommended that both pandas be classified together in their own separate family or sub-family.
There are several existing and potential threats to wild-living procyonids. Of these, the most important is the destruction or degradation of their habitat. This is mainly caused by human encroachment for agriculture and logging, as well as the expansion of human settlements, drainage of wetlands and over-hunting. The natural habitat of procyonids has become seriously degraded and disturbed over much of their range, often leading to fragmentation of forest habitat and isolation of small populations of animals.

Hunting

Procyonids are hunted throughout their geographical range, primarily for their attractive fur, but occasionally for meat. Kinkajous, olingos, raccoons and coatis are widely hunted throughout their range for their fur. Some tribal people also use the skins of kinkajous to cover ceremonial drums. In Peru, parts of the coati are eaten for their supposed aphrodisiacal powers. Coatis, ringtails, raccoons and, possibly cacomistles, are killed to prevent crop raiding.

The common raccoon is the most important wild, fur-bearing animal in North America in terms of revenue, with income reaching a peak of US$100 million in 1982, when over five million raccoons were killed. In the early 1980s, each pelt was worth about US$20. As the price declined to less than US$10, so too did the number of animals killed, totalling about three million by the mid-1980s. Most raccoon pelts were exported to Europe, especially West Germany, where they were often sheared, dyed and sold as imitation mink, otter and seal. However, despite the large number of animals killed for fur and for population control, raccoons in North America have expanded their range over the past 50 years and have maintained high population levels overall.

The ringtail is legally trapped for the fur trade in Arizona, New Mexico, Colorado and Texas. Many are also caught incidentally in traps set for other valuable fur-bearers, such as foxes and raccoons. In recent years, about 4,000 ringtails have been taken annually in Arizona, and about 1,000 in New Mexico. In Texas, some 45,000-50,000 ringtails were trapped each year from 1979 to 1985. As in the case of raccoons, the number of ringtails trapped for fur has declined since a peak in trade in 1979, when approximately 135,000 pelts were sold. Ringtail fur is of poor quality (thin, non-durable and subject to fading) and pelts
have usually sold for less than US$5 each, although they have been known to reach as much as US$12. The justification for trapping ringtails for their fur is weak, especially since there is insufficient knowledge of population levels and trends for establishing harvest regulations.

Although their fur is commercially worthless, coatis in Arizona are also caught accidentally in traps set for other fur-bearers. Such coatis are legally required to be released, but they are frequently killed and discarded by trappers. Given the small, unstable coati populations in the USA, serious efforts should be made to discourage this killing through trapper education courses.

The red panda has also been hunted for its fur which is sold in local markets. Many animals are thought to have been accidentally caught in snares set to catch other animals, particularly musk deer, which are killed for their valuable musk which is used in perfume and medicinal practices in China.

**Trade**

Apart from their limited role in the fur trade, raccoons and their relatives have not been the subjects of commercial trade. The red panda is one of the few species displayed in zoos worldwide; a major international effort to breed from these animals is now underway, with animals being registered in an international studbook. Nonetheless, in recent years, many live red pandas - not previously registered by western zoological gardens - have appeared in some zoos, leading to some concern regarding their origin. For conservation purposes, it is essential that no additional, live pandas be taken from the wild to supplement existing collections in zoos or elsewhere. Instead, it is imperative that they and their mountainous habitat be protected through improved research techniques and better management of the environment.

Many young procyonids are kept as pets in the New World. Species include the bushy-tailed olingo, Trés Marías Islands raccoon, Cozumel Island raccoon, ringtail, common raccoon and Cozumel Island coati. At present, few details are available on the origin, capture and fate of these animals.

**Legislation**

Most procyonids have been so neglected by science that few recommendations have been made to protect them or their habitats. The main exception to this is the red panda which is listed in Appendix I of CITES - the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Species included in this category are essentially those which could be threatened with extinction if trade is not strictly controlled. At the national level, the panda is protected in Nepal and China - two of the most important countries for its distribution. Because of its similar habitat preferences, in China the red panda also benefits from the large, existing system of parks and reserves established for the giant panda. Whether these protected areas hold viable populations of red pandas is, however, still unknown. In Myanmar, pandas are protected under the Forest Act, which means that they are protected in the same way as all other forest products are protected. They are not, however, covered by the more stringent protection of the Wildlife Protection Act. The legal situation in other countries where red panda are found is unclear.

**Habitat loss and degradation**

As procyonids are essentially arboreal, or at least forest-dwellers, any serious element of deforestation or habitat disturbance has a direct impact on these species. Deforestation is a major threat to all Central American species. Vast areas of pristine forests have
been destroyed to feed overseas timber markets. Roads built to facilitate removal of these timbers have resulted in further destruction, through additional loss of forest habitat, increased run-off of fragile soils, and sedimentation of rivers and lakes. As logging companies have opened up the interior of the forest, a steady flow of settlers has followed, resulting in additional destruction to the environment. Slash-and-burn agriculturalists rely on the immediate, short-term availability of nutrients in forest soils. Once an area has been cleared through burning, crops are planted and harvested for one or two years before the farmers abandon the land and move on to burn and clear yet another site. Improved access to forests also means that hunters are better able to penetrate these areas, often leading to the development of semi-organised hunting parties supplying wild game to local markets. Sport and game hunting activities threaten local wildlife populations and also disrupt the natural regeneration of the many wildlife populations which fulfil an important role for indigenous communities and contribute to the overall diversity and welfare of the forest ecosystem.

In Asia, expansion of agricultural land, collection of fuelwood and construction materials from hill sides, as well as overgrazing by domestic livestock, are major threats to the home of the red panda. Loss of forest habitat can also lead to loss of bamboo, the animal’s staple diet. Detailed studies in China have indicated that where areas of forest are clear-cut, later forest regeneration leads to conditions which are not conducive to bamboo growth, probably because of some delicate interaction of light, moisture and nutrient levels. Thus, once the bamboo flowers, as each species does once in its lifetime, it does not regenerate in previously clear-cut forest.

**Habitat fragmentation**

The selective felling of timber and clearance of vegetation for agriculture result in habitat fragmentation, so that remaining patches of forest are no longer connected. Animals inhabiting these forest “islands” are essentially isolated from each other since few are willing or able to cross the clear, open spaces between them. This phenomenon has been well described for the giant panda, but it is undoubtedly of major concern also to the diminutive red panda. A study of the red panda in Langtang National Park, Nepal, has shown that four separate populations exist. If they remain isolated from each other, these small populations will suffer from inbreeding and loss of genetic variation due to genetic drift. This renders them highly vulnerable to extinction.

Another concern in the case of an extreme food specialist, such as the red panda, is that habitat fragmentation can also lead to starvation. By preventing pandas from migrating to new areas when their local food source is lost as, for example, when the bamboo flowers and dies off, the animals are

*Loss of forest habitat can also lead to loss of bamboo, the staple diet of the red panda.*
likely to be seriously threatened. Efforts to join together already isolated patches of forest, and hence pandas, include the artificial construction of migration corridors between neighbouring areas of intact forest. By replanting cleared areas with native bamboo and a selection of tree species, scientists are hopeful that outlying groups of pandas may once again be able to communicate with one another and, in the eventuality of a food shortage, move to another area where food would be available.

Other threats

One of the greatest long-term threats to free-living procyonids is large, or rapidly growing human populations, particularly in Central America, Nepal and China. Land is therefore at a premium, both as a living space, as well as for agricultural purposes. There has never been a greater need to set aside and maintain large areas of pristine habitat for species conservation. However, the people living around these sites must derive some positive benefits in order to remain motivated in protecting them. Benefits could include employment as park guards, the development of local industries (particularly crafts and other cottage industries using traditional expertise and materials) which are not environmentally destructive, the provision of clean, safe water supplies, improved medical care for children, and primary school facilities.

In addition to hunting, deforestation and loss of habitat, armed conflict has undoubtedly had serious repercussions for wildlife in several countries, particularly in Central America. Direct effects of warfare include deforestation, killing of wildlife (both for food and target practice), widespread habitat destruction, and pollution of the land and water by chemicals. In parts of Central America, war damage is exacerbated by the vulnerability of the environment where fighting is taking place. The dry forests of El Salvador, for example, have already been threatened by fires sparked off by napalm and phosphorus bombs used in the civil war. Scorched earth policies have also been implemented by government forces in Guatemala and El Salvador. Herbicides such as Agent Orange and Round Up have reportedly been used to defoliate vegetation in Guatemala. It is difficult to estimate the level of environmental damage caused by warfare but, for locally-threatened species, any such destruction poses a major threat to their survival in the wild.

There is an urgent need to set aside and maintain large areas of pristine habitat for species conservation.
The current lack of data on the lifestyle and habitat requirements of almost every species of procyonid is probably one of the greatest threats to their immediate survival in the wild.

Without adequate knowledge of the species concerned, it is virtually impossible to design and implement a conservation strategy that will guarantee the long-term survival of these species in their natural environment. Moreover, there is a risk that certain measures taken to protect these species may, in the long-term, turn out to be inappropriate for the species' actual needs. It is therefore imperative that current and future research efforts focus on determining the basic ecological requirements of these species, so that adequate protection measures can be implemented without further delay and loss.
Species research: a "who's who" for procyonids

As previously mentioned, the taxonomic confusion encountered in some of the genera under consideration adds to the difficulty of designing a conservation strategy for procyonids: it is uncertain in many cases whether one is dealing with a species or sub-species, while the generic and familial status of some species, notably the mountain coati and red panda, is also unclear. A taxonomic review of the procyonid genera is therefore of prime importance and, in many cases, a prerequisite to establishing a priority rating for conservation action for the various species.

Habitat and species management

Many countries have already made considerable advances in establishing specially designated protected areas which are intended to conserve a portion of the country's natural heritage. Because the procyonids are so poorly known, however, it is not clear as to how well these protected areas serve these animals. In the meantime, protected areas which are established on behalf of other, more obvious and charismatic species, such as the jaguar or giant panda, should also benefit many of the procyonids. In the long term, however, it might not be enough to assume that large areas of undisturbed natural forest are sufficient to protect these species. Most would benefit from detailed ecological surveys to determine their precise habitat requirements. Knowledge regarding the distribution and availability of such habitat is also important since it would contribute to the design of a suitable conservation strategy. Behavioural and captive breeding research is also needed. While the species lists of the various protected areas often include raccoons, coatis and kinkajous, other procyonids such as olingos, cacomistles and mountain coatis are rarely mentioned. The local people, and more importantly the national parks personnel, should be made aware of these species and encouraged to become more involved with conservation initiatives.

The red panda, for example, is known to occur in several existing protected areas in Nepal and Sikkim. No red pandas have been recorded from protected areas in Bhutan, while Myanmar has no protected areas in the Himalayan region. In China, red pandas have been studied in the Wolong National Park and have also been observed in several other protected areas. Throughout this species' range, however, actual numbers and the conservation status of individual panda populations - even in these protected areas - is unknown. In some area, such as the Langtang National Park in Nepal, the activities of the cattle herders within the park boundaries is known to have had an adverse effect on the red panda population. Likewise, in China, villagers entering protected areas to hunt deer, collect firewood, building materials, medicinal plants and fruit, also represent a
continuous threat to small, isolated populations of pandas.

In addition to the red panda, basic ecological information is already available only for the common raccoon, white-nosed coati and cacomistle. Yet, even for these species, many specific aspects of their biology should be investigated in more detail to help ensure their long-term survival. For the remaining species of procyonid, particularly the olingos, ringtail, kinkajou, South American coati, Cozumel Island coati, mountain coati and all island forms of the raccoon, much more detailed ecological studies are still required.

Another fundamental requirement is the development of population estimation techniques for these species, even if they are just relative measures of population abundance. This would enable scientists to monitor future population trends. In addition to determining population figures, there is an urgent need to investigate the impact of hunting - both deliberate and accidental - on all populations of wild procyonids.

Finally, it is also necessary to investigate the limits of co-existence between these species and man. This is of particular importance for some of the island forms, as well as for the red panda, whose habitat is coming under increasing pressure from sprawling settlements, subsistence farmers and logging companies.

Captive breeding

Captive breeding programmes are designed to maintain and breed selected threatened species in captivity, with the intention of releasing future offspring back to their natural habitat at some future point, either to boost dwindling numbers of a localised population, or to re-introduce animals to some region where they previously occurred. Although it is no substitute for the conservation of species in nature, captive breeding yields a great deal of information about a species’ natural history, particularly behavioural patterns. This should not, however, be viewed as an alternative to field studies, but merely as a means of increasing and improving existing information on the many elusive, poorly-known species, such as procyonids.

Some of these species are already breeding well in captivity, while others show considerable promise on account of recent successes with closely related taxa. However, some of the most seriously threatened species still require considerable research into their basic natural history and physiology before they can be successfully maintained and bred in captivity.

Styan’s red panda (Ailurus fulgens styani) is an endangered Chinese sub-species which is the subject of captive breeding programmes.

The red panda can, and does, breed in captivity with reasonable success, as long as a number of simple husbandry and management guidelines are followed. There are already several successful regional breeding programmes for this species (one in North America, two in
Europe, one in Australia, one in Japan and one just starting in China) which are currently being coordinated into a global management programme under the auspices of an international studbook and the International Red Panda Management Group. There is therefore a very real possibility that a viable population of red pandas can be maintained in zoological gardens. This has important consequences for promoting public awareness through zoos throughout the world, and also means that no additional red pandas should need to be taken from the wild for exhibition purposes.

Many zoos have already had some success in breeding the common raccoon. It is therefore reasonable to assume that the techniques developed for this species could be equally successful for the various island forms. In the cases of the Trés Marias Islands raccoon and the Cozumel Island raccoon, there are known to be a number of specimens (presumed to be the indigenous forms) kept as pets on the islands. This may also be true for the Guadalupe and Bahamas raccoons. An inventory of raccoons held as pets on these islands should therefore be carried out. If necessary, these animals could then form the nucleus of a captive breeding programme.

Other species which are already maintained in zoological collections include the white-nosed coati and the Cozumel coati. The possibility of establishing further captive populations of these species needs to be considered. Prior to this, however, a survey needs to be undertaken of the numbers of different species and subspecies maintained in captivity, their origins and past breeding records.

Some of the most seriously threatened species still require considerable research into their basic natural history and physiology before they can be successfully maintained and bred in captivity. The International Red Panda Management Group already has several successful regional breeding programmes for the red panda.
Allen's olingo (Bassaricyon alleni). Whilst captive specimens play an important role in increasing the general public's awareness of the need to conserve procyonids, conservation education programmes must also be directed towards the rural communities where these endangered species live.

Public awareness and education

Improved public awareness is an essential part of any future conservation programme for procyonids. At present, the only way that this is achieved is through visitors to zoos watching the playful antics of these wild animals and reading about their lifestyles on specially designed exhibition plates. While such exhibits are certainly of considerable benefit to increasing the general public's awareness of the needs for conservation for procyonids, the major audience for such messages is still not being addressed. Conservation education should be taken to the rural people of South and Central America and parts of eastern Asia. Local people need to be made aware of the various procyonid species and how they interact with the environment. In carrying out such campaign work, specific audiences should be targeted using different approaches, since their interests and concerns will differ widely. Government ministers, for example, should be made aware of the wider environmental effects of logging and development programmes and should be encouraged to favour habitat management programmes which promote the sustainable use of natural resources for the benefit of local people. Rural dwellers, on the other hand, need to be made aware of the short- and long-term perils of over-exploiting natural resources through hunting or excessive clearing of natural forests.

Through such a unified approach to conservation education, scientists and planners can then start to communicate with rural people and design protected areas which would benefit not only the local wildlife, but also the immediate and long-term future for many rural-based communities.
Conservation in Action

Procyonids are probably among the most fascinating species yet to be fully "discovered" by scientists. Their secretive, nocturnal and arboreal habits have so far prevented many investigations into their behaviour and ecological requirements. Today, unfortunately, much of their once-pristine habitat is being destroyed at an unprecedented rate. Failure to save the remaining vestiges of these natural forests and the wealth of biological diversity which they contain, will result in the disappearance of an intriguing species.

Protection in existing reserves needs to be seriously reinforced through improved and more regular patrols, as well as more strictly enforced legislation. In addition, there is a need to quantify the extent and intensity of present threats such as forest cutting, agricultural land development and livestock grazing.

Urgent action needs to be taken to limit deforestation. Low elevation habitat corridors need to be established to join areas already fragmented by agricultural clearing, and more research carried out on the dynamics of the bamboo-forest system (in the case of the red panda) and the effects of different cutting regimes on forest growth. For many species, the extent of hunting also needs to be determined and, where required, the capture of procyonids as pets, sale of live animals to zoological institutions and the sale of skins monitored and limited accordingly. Finally, more reliable information needs to be obtained concerning the limits of these species' tolerance to human activity.

As we approach the end of the 20th century, the future of the raccoons and their relatives in their natural environment is far from secure. In response to the growing threats to these species, the IUCN/SSC Procyonid Specialist Group has been established to draw attention to the many problems facing some species of procyonid. Through its research and network of dedicated specialists, this Group has identified those species in most urgent need of conservation action.

These include:

- the red panda, on account of its unique taxonomic position;
- four of the five species of olingo, in view of their limited distribution and threats of habitat disturbance;
- the cacomistle, which is also facing habitat destruction;
- the white-nosed coati, which is threatened through fragmented distribution, habitat loss and hunting pressure;
- the Cozumel Island coati, because of its insular distribution and the development on the island;
- the mountain coati, due to its unique taxonomic status, limited distribution and because it is almost completely unknown to scientists; and
- all island-based species of raccoon, given the extensive commercial development taking place on each of the islands.

By identifying current threats to these species, as well as promoting additional research and dialogue with local people in Asia and the Americas, the SSC Procyonid Specialist Group fulfils an important niche in highlighting the plight of these fascinating animals and, more importantly, in organizing and taking actions to help ensure that these delightful species will always have a secure place in their natural environment.
## The Procyonid Family

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Geographical distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red (lesser) panda</td>
<td><em>Ailurus fulgens</em></td>
<td>Nepal, Bhutan, Sikkim, N. India, N. Myanmar, China, Tibet</td>
</tr>
<tr>
<td>Bushy-tailed olingo</td>
<td><em>Bassaricyon gabbii</em></td>
<td>C. Nicaragua, Costa Rica, Panama, W. Colombia, W. Ecuador</td>
</tr>
<tr>
<td>Allen's olingo</td>
<td><em>B. alleni</em></td>
<td>Ecuador, Peru, Bolivia, Venezuela</td>
</tr>
<tr>
<td>Pocock's olingo</td>
<td><em>B. beddardi</em></td>
<td>Guyana, Venezuela, Brazil</td>
</tr>
<tr>
<td>Harris's olingo</td>
<td><em>B. lasius</em></td>
<td>Costa Rica</td>
</tr>
<tr>
<td>Chiriqui olingo</td>
<td><em>B. pauli</em></td>
<td>Panama</td>
</tr>
<tr>
<td>Cacomistle</td>
<td><em>Bassariscus sumichrasti</em></td>
<td>Nicaragua, Honduras, Guatemala, Mexico</td>
</tr>
<tr>
<td>Ringtail</td>
<td><em>B. astutus</em></td>
<td>Western USA to Mexico</td>
</tr>
<tr>
<td>Kinkajou</td>
<td><em>Potos flavus</em></td>
<td>Central and South America: S. Mexico south to Mato Grosso, Brazil</td>
</tr>
<tr>
<td>White-nosed coati</td>
<td><em>Nasua narica</em></td>
<td>From Arizona and S. New Mexico through Central America to Panama; into S. America west of the Andes</td>
</tr>
<tr>
<td>South American coati</td>
<td><em>N. nasua</em></td>
<td>South America: east of the Andes in all countries from Colombia and Venezuela south to Argentina and Uruguay</td>
</tr>
<tr>
<td>Cozumel Island coati</td>
<td><em>N. nelsoni</em></td>
<td>Cozumel Island</td>
</tr>
<tr>
<td>Mountain (little) coati</td>
<td><em>Nasuaola olivacea</em></td>
<td>Colombia, W. Venezuela, Ecuador, N. Peru</td>
</tr>
<tr>
<td>Common raccoon</td>
<td><em>Procyon lotor</em></td>
<td>North and Central America; S. Canada south to Chiriqi, Panama</td>
</tr>
<tr>
<td>Crab-eating raccoon</td>
<td><em>P. cancrivorus</em></td>
<td>Central and South America: E. Costa Rica and Panama south to Uruguay and NE Argentina</td>
</tr>
<tr>
<td>Trés Marías Islands raccoon</td>
<td><em>P. insularis</em></td>
<td>Trés Marías Islands, Maria Madre Island and Maria Magdalene island</td>
</tr>
<tr>
<td>Bahamas raccoon</td>
<td><em>P. maynardi</em></td>
<td>Bahamas</td>
</tr>
<tr>
<td>Guadeloupe raccoon</td>
<td><em>P. minor</em></td>
<td>Guadeloupe</td>
</tr>
<tr>
<td>Cozumel raccoon</td>
<td><em>P. pygmaeus</em></td>
<td>Cozumel Island</td>
</tr>
<tr>
<td>Barbados raccoon</td>
<td><em>P. gloveralleni</em></td>
<td>Barbados (now believed extinct)</td>
</tr>
</tbody>
</table>

### Further Reading

Glossary of Terms

Arboreal: a species which may live and find its food above ground level in shrubs and trees.

Cerrado: an arid region of Brazil characterised by dense, closed shrub-woodlands, dry forest and evergreen gallery forest.

Chaco: a large flat area of Brazil, Paraguay and part of Bolivia with dry shrub woodlands, marshes, evergreen gallery forest and palm savannas.

Crepuscular: an animal which is most active at dusk and dawn.

Ecosystem: a term used to describe the interdependence of species with one another and the environment.

Home range: the space usually occupied by an animal, within which it is able to meet all its needs.

Llanos: large grassland areas of Brazil, Colombia and Venezuela that are partly flooded with standing water during the rainy season.

Neotropics: a zoogeographical region comprising South America and North America south of the Tropic of Cancer.

Nocturnal: an animal which is active during the night.

Omnivore: an animal which eats both animal and vegetable matter.

Prehensile tail: a muscular tail which can wrap around objects and grab them tightly, supporting the weight of the body. An adaptation of many arboreal animals.

Rostrum: the snout-like, forward projection of the head.

Sustainable utilization: ensuring the conservation of the world’s biological diversity through the careful management of natural resources.

Territory: a space, often the entire home range of an animal, that is actively defended by its owner.

Acknowledgements

Picture credits:

2 Gerald Cubitt/WWF, 3 Bob & Clara Calhoun/Bruce Coleman, 4 Bruce Coleman, 6 Rod Williams/Bruce Coleman, 7 Erwin & Peggy Bauer/Bruce Coleman, 8 John Cancalosi/Bruce Coleman, 9 Norman Myers/Bruce Coleman, 10 Tony Rath/WWF, 12 Rod Williams/Bruce Coleman, 13 Bob & Clara Calhoun/Bruce Coleman, 14 Erwin & Peggy Bauer/Bruce Coleman, 15 Waina Cheng Ward/Bruce Coleman, 16 Leonard Lee Rue/Bruce Coleman, 17 Bob & Clara Calhoun/Bruce Coleman, 21 R de Bruin, 23 Norman Tomalin/Bruce Coleman, 24 Don Reid/WWF, 25 Erwin & Peggy Bauer/Bruce Coleman, 26 E. A James/NHPA, 27 Erwin & Peggy Bauer/Bruce Coleman, 28 David Langdon, 29 Rod Williams/Bruce Coleman.

Centre page illustration: Priscilla Barrett.

Text: David Stone.

Design and production: International Centre for Conservation Education, United Kingdom.
IUCN

Founded in 1948, IUCN - The World Conservation Union - is a membership organisation comprising governments, non-governmental organisations (NGOs), research institutions, and conservation agencies in 120 countries. The Union's objective is to promote and encourage the protection and sustainable utilisation of living resources.

Several thousand scientists and experts from all continents form part of a network supporting the work of its six commissions: threatened species, protected areas, ecology, sustainable development, environmental education and training. Its thematic programme includes tropical forests, wetlands, marine ecosystems, plants, the Sahel, Antarctica, population and sustainable development, and women in conservation. These activities enable IUCN and its members to develop sound policies and programmes for the conservation of biological diversity and sustainable development of natural resources.

Species Survival Commission

Role of the SSC

The Species Survival Commission (SSC) is IUCN's primary source of the scientific and technical information required for the maintenance of biological diversity through the conservation of endangered and valuable species of fauna and flora, whilst recommending and promoting measures for their conservation, and for the management of other species of conservation concern. Its objective is to mobilise action to prevent the extinction of species, sub-species and discrete populations of fauna and flora, thereby not only maintaining biological diversity but improving the status of endangered and vulnerable species.

Objectives of the SSC

1. To participate in the further development, promotion and implementation of the World Conservation Strategy; to advise on the development of IUCN's Conservation Programme; to support the implementation of the programme; and to assist in the development, screening, and monitoring of projects for conservation action.
2. To maintain an international network of independent volunteer members selected for their expertise in species conservation and to provide a forum for the exchange of views and scientific information on species and populations of conservation concern.
3. To cooperate with the World Conservation Monitoring Centre (WCMC) in developing and evaluating a database on the status of, and trade in, wild flora and fauna, and to provide policy guidance to WCMC.
4. To provide advice, information, and expertise to the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and other international agreements affecting conservation of species or biological diversity.
5. To carry out specific tasks on behalf of the Union, including:
   - coordination of a programme of activities for the conservation of biological diversity within the framework of the IUCN Conservation Programme.
   - promotion of the maintenance of biological diversity by monitoring the status of species and populations of conservation concern.
   - development and review of conservation action plans and priorities for species and their populations.
   - promotion of implementation of species-oriented conservation action plans and response to related issues.
   - provision of guidelines, advice and policy recommendations to government, other agencies and organisations with respect to conservation and management of species and their populations.
   - periodic evaluation of the status of species and biological diversity conservation initiatives.
IUCN - The World Conservation Union

Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 800 members in all, spread across some 125 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. A central secretariat coordinates the IUCN Programme and serves the Union membership, representing their views on the world stage and providing them with the strategies, services, scientific knowledge and technical support they need to achieve their goals. Through its six Commissions, IUCN draws together over 6,000 expert volunteers in project teams and action groups, focusing in particular on species and biodiversity conservation and the management of habitats and natural resources. The Union has helped many countries to prepare National Conservation Strategies, and demonstrates the application of its knowledge through field projects it supervises. Operations are increasingly decentralized and are carried forward by an expanding network of regional and country offices, located principally in developing countries.

The World Conservation Union builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.