

REPORT

Food Habits of the Hairy-nosed otter (*Lutra sumatrana*) and the Small-clawed otter (*Aonyx cinereus*) in Pru Toa Daeng Peat Swamp Forest, Southern Thailand

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Abstract: Two species of otter, the Hairy-nosed otter (*Lutra sumatrana*) and the Small-clawed otter (*Aonyx cinereus*) were found in Pru Toa Daeng Peat Swamp Forest, Narathiwat province in southern Thailand. Food habits of the Hairy-nosed otter and the Small-clawed otter were studied during 2004 to 2006. Their spraints (scats) were collected and analyzed to compare their diets. Results showed that the Hairy-nosed otter preys on fish, water snake, and crustacean primarily, with fish as the major prey item. The Small-clawed otter preys on crab, snail, water snake, and fish primarily, with crabs as the major prey item. Fish seem to be less important than invertebrates in the Small-clawed otter's spraints. Fish scales and vertebrae in the scat samples of both species were identified. Fish of the families Channidae, Belontiidae, Anabantidae, Notopteridae, Synbranchidae, Clariidae, Nandidae were found in the scat samples. The two most common fish families identified in the scat samples of both otter species were Belontiidae and Channidae. Although 29 families and 100 species of fish were identified in the Pru Toa Daeng Peat Swamp Forest, only 8 fish families were sampled in the otter habitat in the marshes and wetlands of the secondary and evergreen forests. Direct observations of the Hairy-nosed otter's feeding behavior were made at a few scat sites. This species was also observed removing fish from fish traps without damaging the traps. Otter and human conflicts frequently occur outside the protected areas. Hairy-nosed otters were drowned in fish traps and killed by cars when crossing roads. To develop conservation measures for the two species of otters in Pru Toa Daeng Peat Swamp Forest, the distribution of the otters were mapped using their signs, both tracks and spraints. Both otter species utilize the evergreen forest and the secondary forest in the protected areas. Further, their signs were also found in rice paddies and in the secondary forest outside the protected forest. Thus threats to the otters in the Toa Daeng Peat Swamp Forest were estimated to be higher than expected.

Keywords: *Lutra sumatrana*, hairy-nosed otter, *Aonyx cinereus*, Asian small-clawed otter, diet, scat analysis, spraint, threats, road traffic accidents, fish traps

INTRODUCTION

Since the rediscovery of the Hairy-nosed otter in Narathiwat province, southern Thailand in 1999 the same species has also been found in parts of Malaysia, Vietnam, Cambodia, Brunei and Sumatra. Little detailed ecological and biological information is available. Four otter species are found in Thailand. To the uneducated observer, all four otter species look similar and not many people can identify individual otter species correctly. These are the challenges which make the field studies of otters difficult.

The Hairy-nosed otters are a critically endangered species in Thailand (Nabhitabhata and Chanard, 2005) Although their presence was recorded in Khlong Saeng Wildlife Sanctuary in 1984, and in the Khao Ban Thad Wildlife Sanctuary in 2002, the population in Toa Daeng Peat Swamp forest is the largest viable population in Thailand. They are distributed inside and outside the protected area of Chalrem Pra Kiet Wildlife Sanctuary, which covers an area of at least 200 km². The population outside the sanctuary is located in the forest, community areas and on private land.

The Toa Daeng Peat Swamp forest is the largest remaining peat swamp forest in Thailand. It was declared a Ramsar site in 2001. With its unique ecosystem and high biodiversity of flora and fauna, it is an important habitat for many endangered species such as the otter civet, fishing cat, flat-headed cat, etc. (pers. obs.). Two species of otters occur in this wetland, *Lutra sumatrana* and *Aonyx cinereus*. To understand the ecological niches of these sympatric otters, their diet was studied using scat analysis. Direct observations and field surveys were made to study their feeding habits.

STUDY SITE

The Toa Daeng Peat Swamp forest, an area of 200 km², is located on the east coast near the border of Thailand and Malaysia. It is protected and managed by the Wildlife Conservation Office of the Department of National Parks, Wildlife and Plant Conservation. This wetland is composed of two main habitat types, the evergreen forest or peat swamp forest (39%) and degraded peat swamp forest (34%), with secondary peat swamp forest or melaleuca forest (12%), and some rice paddies and aquatic plant communities (15%). The floristic composition of the peat swamp forest is extremely diverse, consisting of 124 families and 470 species of which 109 families and 437 species of flowering plants and 15 families and 33 species of ferns (Phengklai et al., 1991). The dominant tree species in secondary peat swamp forests are *Melaleuca cajuputi* and *Macaranga pruinosa* (Nuyim, 1999). The age of peat in Toa Daeng Peat Swamp forest at a depth of 1-2 meter is about 700-1,000 years old (Sinskul, 1998).

Weather records indicate a tropical rain forest climate, with a mean annual temperature of 28°C, and an annual rainfall of 2,098 mm. The rainy season starts in July and peaks in September to January. The dry season peaks in March to May.

METHODS

The diets of *Lutra sumatrana* and *Aonyx cinereus* were studied using scat analysis. Scats were collected in the secondary peat swamp forest in both dry and rainy seasons, between March 2004 to January 2005. Scats of both otter species at spraint sites were identified by their tracks (Kanchansaka, 2001; Kruuk et al., 1993). Each scat sample was washed through a sieve and spread evenly in a petri-dish, and the contents were examined under a zoom stereomicroscope. The food remains

present in the scats were identified and divided into different order, families, genera, using reference skeletons of vertebrates and invertebrates collected at the study site. Fish scales and vertebrae were used to identify fish at family level.

The composition of the otter diets was presented as percentage frequency (PF), relative frequency (RF) and bulk percentages (BP). Percentage frequency shows the percentage of spraints containing a particular prey item. Relative frequency, which is the number of occurrences of an item, was expressed as the percentage of the occurrences of this particular item compared to the total number of occurrences of all items in the sample (sum is 100%). Bulk percentage was the number assigned to indicate the importance of a particular item in a spraint and was scored visually in relation of spraint volume. The total score for all items in each scat was 100. The values for each item in each spraint were added together and expressed as bulk percentage (Mason and Macdonald, 1986).

Because the evergreen forest was so difficult to access, only the feeding areas of the two species in the secondary peat swamp forest were compared. Spraint sites of the Hairy-nosed otter and the Small-clawed otter were located and the frequency of spraint sites for each species in each habitat was calculated.

To study the feeding behaviour of both species, camera traps were set near their communal spraint sites to record their activities during 2003-2005.

RESULTS

Diet Composition

Three hundred scat samples of the Hairy-nosed otter and one hundred eighty five scat samples of the Small-clawed otter were collected in the secondary peat swamp forest in Toa Daeng. The percentage frequency (PF), relative frequency (RF) and bulk percentage (BP) of the prey items in the Hairy-nosed otters and the Small-clawed otters' remains are listed in Table 1. Bulk percentages indicate that fish was the main prey of the Hairy-nosed otter (85%). Snakes (12%) were also important prey item. Other prey items such as frog, lizard, turtle, crab, mammal and insect were also found in their spraints although they may not important parts of their diet.

The Small-clawed otter seemed to prefer invertebrates. In term of bulk percentage, 41% of the diet was crab and 22% were gastropods. The remainder of their diet consisted of fish (19%), snakes (8%), with frog, lizard, shrimp and insects (4%).

Table 1. Diet composition of *Lutra sumatrana* and *Aonyx cinereus*
PF = Percentage Frequency; RF = Relative Frequency; BP = Bulk Percentage

Prey items	% Prey items of <i>Lutra sumatrana</i>			% Prey items of <i>Aonyx cinereus</i>		
	PF	RF	BP	PF	RF	BP
fish	97.00	71.50	85.50	64.24	19.17	19.30
snake	26.67	19.66	11.70	37.58	11.21	8.40
frog	1.67	1.23	0.50	1.21	0.36	0.10
lizard	0.33	0.25	0.60	0.61	0.18	0.10
turtle	2.33	1.72	0.50	0.00	0.00	0.00
crab	1.00	0.74	0.86	71.52	21.34	40.50
snail	0.00	0.00	0.00	51.52	15.37	22.10
shrimp	0.00	0.00	0.00	2.42	0.72	0.30
insect	3.00	2.21	0.20	38.79	11.57	3.10
mammal	0.00	0.00	0.04	0.00	0.00	0.00
other	3.67	2.70	0.10	67.27	20.07	6.10

Nine species of fish in 6 families identified in the Hairy-nosed otters' spraints and fish in Family Channidae (45%) (Table 2). Belontiidae (33%) were the main prey species. In the Small-clawed otter' spraints, 7 species of fish in 6 families were identified and bulk percentages of fish in the family of Anabantidae and Belontiidae were higher than others (22% and 49%, respectively).

The reptiles identified in the scats of the Hairy-nosed otter and the Small-clawed otter were freshwater snake (*Enhydryis spp.*). Lizards of the genus *Calotes* were found in Small-clawed otters' spraints while baby monitor lizard (*Varanus spp.*) and Snail-eating turtle (*Malayemys subtrijuga*) were found in the Hairy-nosed otters' spraints. The identified invertebrates in the Hairy-nosed otter and the Small-clawed otter spraints were crab (*Potamon smithianus*), snail (*Pomacea spp.*) shrimp (*Macrobrachium spp.*). The insects identified were crickets, diving beetle and water beetle.

Table 2. Fish consumed by the Hairy-nosed otter and Small-clawed otter

Fish species	Bulk percentage	
	<i>Lutra sumatrana</i>	<i>Aonyx cinereus</i>
Grey Featherback (<i>Notopterus notopterus</i>)	6.48	1.83
Walking Catfish (<i>Clarias sp.</i>)	3.69	1.98
Asian Swamp Eel (<i>Monopterus albus</i>)	0.46	4.66
Common Climbing Perch (<i>Anabas testudineus</i>)	4.38	22.30
Malay Combtail (<i>Belontia hasselti</i>)	1.44	0
Three Spot Gourami (<i>Trichogaster trichopterus</i>)	32.59	48.88
Forest Snakehead (<i>Channa lucius</i>)	20.43	0.07
Chevron Snakehead (<i>Channa striata</i>)	24.85	8.62
Indonesian Leaffish (<i>Pristolepsis grootii</i>)	0.31	0
Unknown	5.37	11.68

Fish Abundance

Twelve species of fish in 8 families were recorded during the sampling in 7 areas in the secondary peat swamp forest that included flooded areas in the melaleuca forest, flooded grasslands and various sizes of the canals in Toa Daeng Peat swamp forest (Table 3). Fish of the family Channidae had the highest biomass while the family Belontiidae had the highest number of individuals.

Composition of the diet during different seasons

The Hairy-nosed otter's diet showed less seasonal variation than the Small-clawed otter's diet (Table 4). Fish was the main prey item in both wet and dry seasons but fish diversity in the remains during the wet season was lower than during the dry season. Seven species in five families of fish were found in the wet season. Nine species of seven families of fish were found in the dry season. Three-spot gourami was the main prey item in both seasons while Chevron snakehead as well as Forest snakehead were found in the dry season (Table 5). However, some Asian freshwater eel and Indonesian leaf fish were found only in the dry season. The freshwater eel is a bottom living fish which is difficult to catch when water levels are high.

The diet of the Small-clawed otter showed much more seasonal variation (Table 4). In the wet season crab remains in the spraints were the main prey item (50%). In the dry season, crabs burrowed in deep holes and were difficult to catch. The Small-clawed otter preyed on other items such as fish (28%) snake (13%) and snail (23%). As water levels receded it was easier for the otters to catch fish and water snakes than in the wet season.

Fish variation in the Small-clawed otters' diet was different from the Hairy-nosed otter (Table 5). Bulk percentage of Three-spot gourami was high during the dry season while the common Climbing perch was high during the wet season. As rice fields dry up in summer, the Three-spot gourami became more abundant in melaleuca forest than the Common climbing perch. As the rice paddies dried up, the Small-clawed otter utilized the melaleuca forest more than the agricultural areas. We found a high frequency of Three-spot gourami in the Small-clawed otter's diet during the dry season whereas forest Snakehead (*Channa lucius*) in the family Channidae was found only in wet season.

Table 3. Fish available in the study sites

Fish species	Number (individuals)	Weight (gram)
Family Notopteridae		
<i>Notopterus notopterus</i>	2	145
Family Clariidae		
<i>Clarias macrocephalus</i>	11	735
<i>Clarias meladerma</i>	15	1,210
Family Synbranchidae		
<i>Monopterus albus</i>	6	220
Family Anabantidae		
<i>Anabas testudineus</i>	167	6,097
Family Belontiidae		
<i>Belontia hasselti</i>	65	1,844
<i>Trichogaster pectoralis</i>	1	125
<i>Trichogaster trichopterus</i>	273	5,575
Family Helostomatidae		
<i>Helostoma temmincki</i>	61	5,082
Family Channidae		
<i>Channa lucius</i>	57	9,550
<i>Channa striata</i>	61	12,542
Family Nandidae		
<i>Pristolepis grootii</i>	1	25

Table 4. Seasonal variation in diet of *Lutra sumatrana* and *Aonyx cinereus* (wet and dry seasons)

Prey items	Bulk percentage of prey items			
	<i>Lutra sumatrana</i>		<i>Aonyx cinereus</i>	
	Dry	Wet	Dry	Wet
fish	86.7	83.1	27.6	14.7
snake	11.2	12.8	12.5	6.2
frog	0.4	0.5	0	0.1
lizard	0	1.7	0.7	0
turtle	0.4	0.8	0	0
crab	1.1	0.4	22.8	50.3
snail	0	0	23.4	21.4
shrimp	0	0	0.7	0.1
insect	0.1	0.3	5.8	1.6
mammal	0.1	0	0	0
other	0	0.3	7.1	5.6

Feeding sites

Both otter species utilized the evergreen forest and the secondary peat swamp forest. Due to the difficulty of access in the evergreen forest, only three sites were

visited. Spraint sites of both the Hairy-nosed otter and the Small-clawed otter were located and compared. Results showed that sprainting behavior of the two otter species were related to their diet. As fish was the main item of the Hairy-nosed otter, their spraints were frequently found on aerial tree roots or on fallen logs in the evergreen forest. The Small-clawed otter's spraint sites were found near the base of tree trunks, either a few meters from the canals or in the shallow areas of the swamp forest. Crabs were more abundant in the shallow part of the swamp forest than in the canals so the crab eating otters would feed in the shallow part of the swamp forest more frequently than in the canals.

Table 5. Variation of fish species percentages in spraint, in dry and wet season

Fish species	<i>Lutra sumatrana</i>		<i>Aonyx cinereus</i>	
	Wet	Dry	Wet	Dry
Grey Featherback (<i>Notopterus notopterus</i>)	8.45	5.53	4.08	0.00
Walking Catfish (<i>Clarias sp.</i>)	5.43	2.85	4.08	0.27
Asian Swamp Eel (<i>Monopterus albus</i>)	0.00	0.68	9.62	0.62
Common Climbing Perch (<i>Anabas testudineus</i>)	2.73	5.18	35.26	11.76
Malay Combtail (<i>Belontia hasselti</i>)	0.49	1.91	0.00	0.00
Three-spot Gourami (<i>Trichogaster trichopterus</i>)	34.79	31.52	28.65	65.33
Forest Snakehead (<i>Channa lucius</i>)	16.34	22.42	0.15	0.00
Chevron Snakehead (<i>Channa striata</i>)	27.04	23.79	9.90	7.57
Indonesian Leaffish (<i>Pristolepis grootii</i>)	0.00	0.45	0.00	0.00
Unknown	4.72	5.69	8.27	14.45

To study the feeding habitat of both species in the secondary peat swamp forest, this area were divided into 8 categories as follows; rice paddies, ponds, melaleuca forest, degraded melaleuca forest, mangrove forest, forested area near the road, riparian area along the canal, riparian area along the river. Spraint sites of the Hairy-nosed otter and the Small-clawed otter were located and recorded in each habitat type. The frequency of spraint sites for each species in each habitat was compared. Results showed that the Small-clawed otter focused their activities in rice fields whereas the Hairy-nosed otter did not. The Hairy-nosed otter signs were found primarily in the melaleuca forest which was visited less often by the Small-clawed otter (Fig.1). The fresh spraints of both otters in the melaleuca forest indicated that they frequently feed in the same area but at different times. We found the signs of the Hairy-nosed otter feeding in the melaleuca forest when the ground was flooded and we found signs of the Small-clawed otter in the same area, when the ground was dry.

The high frequency of Small-clawed otter signs in forested areas along roads indicated that this species might tolerate human disturbances better than the shyer Hairy-nosed otter. The high frequency of Hairy-nosed otter signs in ponds and riparian areas along the river may be related to their piscivorous diet.

Feeding behavior

Direct observations of feeding behavior of the Hairy-nosed otters were recorded at one spraint site near a pond in the secondary peat swamp forest. When the Hairy-nosed otter fished in this small pond, it swam very fast and frightened the fish. Fish tried to hide in holes or under submerged roots and some species hid in the bottom of the pond. We also observed the Hairy-nosed otter foraging along riparian areas and surfacing with a fish in its mouth.

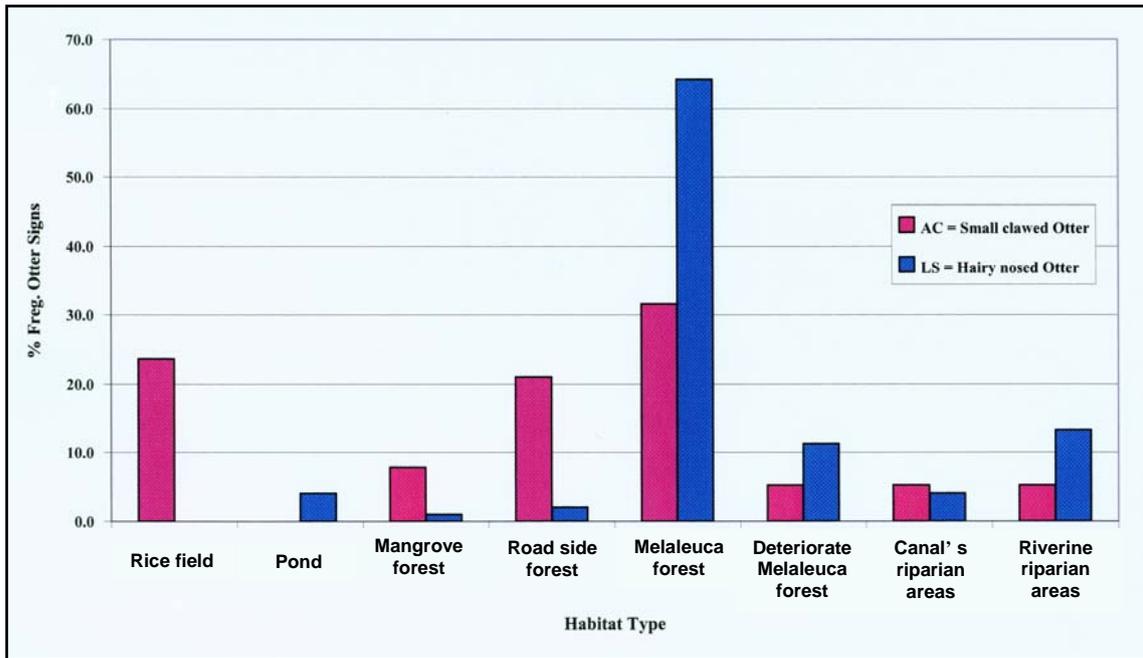


Fig. 1. Feeding habitat comparison in Secondary Peat Swamp Forest

Otters entered fishing traps to steal fish. They would enter the trap, grab a fish and exit without damaging the trap. Snake-headed fish and Walking catfish were the species most often removed from these traps. Fish in the family Belontiidae and Anabantidae were left behind in the traps. Fishermen reported that otters stole fish in their traps usually during the wet season. In the wet season, the fish are scattered throughout the flooded forest so they are more difficult to catch, whereas in the dry season fish are isolated in pools where they are more vulnerable and the fish in traps are then largely ignored.

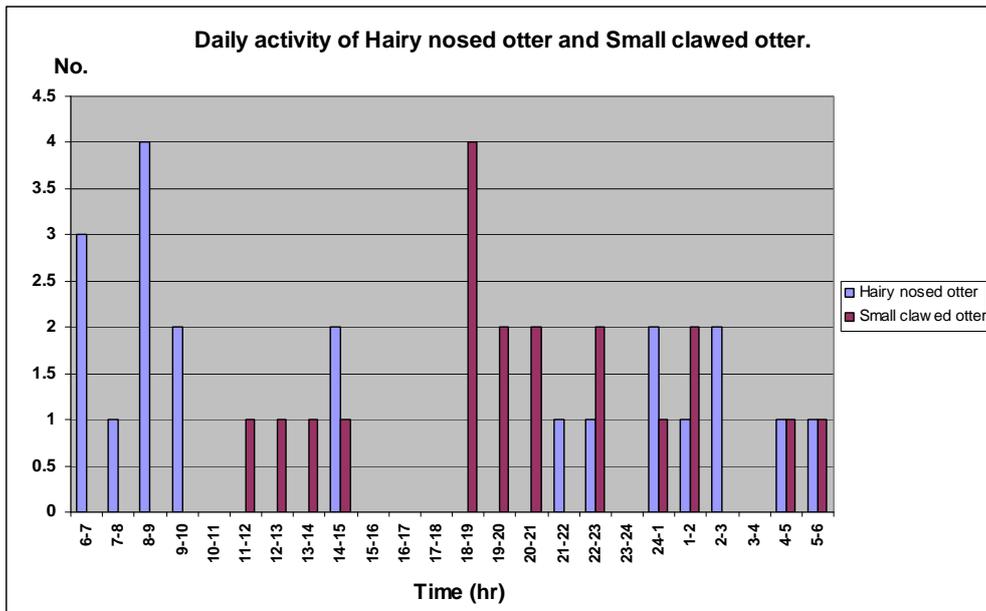


Fig. 2. Feeding activity of both species

No direct observations of the feeding behaviour of the Small-clawed otter were made as this species is more nocturnal than the Hairy-nosed otter (Fig. 2) Their nocturnal behaviour may be related to their preference for open fields and rice paddy habitats where potential encounters with humans are more frequent. Fishermen report dead Short-clawed otters in fish traps and nets.

DISCUSSION

Diet composition of the Hairy-nosed otter, based on spraint analysis, in the Toa Daeng Peat swamp forest in 2000 (Kanchansaka, 2001) and in 2004 were similar. Fish and snakes were the primary prey items in both periods. It would confirm that the Hairy-nosed otter is largely piscivorous and has similar food habits as *Lutra lutra* and *Lutrogale perspicillata* (Sulkava, 1996; Kruuk et al., 1994; Kanchanasaka, 1997). Bulk percentage indicated that Three-spot gourami (Belontiidae) and Snakehead (Channidae) were the main prey items in all seasons. Fish sampling at the study site showed that the Three-spot gourami and Snakehead were the most abundant fish species (Table 3).

Prey items that occur in the otter's diet may vary according to the species of otter involved, the time and the place. This depends on what prey species are available and it is possible that otters also have a preference for certain types of prey (Chanin, 1985). Nevertheless, a study on the feeding preferences of captive otters reported that the choice of prey was determined largely by its availability and vulnerability (Erlinge, 1968). Although, direct observation of fish traps showed that the Hairy-nosed otter preferred Snakehead fish to the Three-spot gourami. Snakeheads were normally more difficult to catch in the natural habitat outside the traps. Therefore, Three-spot gourami that was easily found and captured, would appear to be the more available prey.

The high quantity and diversity of fish in the Hairy-nosed otters' spraint in the dry season might be related to the high vulnerability of fish trapped as ponds were drying up. However, bulk percentage of major fish species consumed in both seasons was not that different. Three-spot gourami, Chevron Snakehead and Forest Snakehead were the main prey species in both wet and dry seasons (Table 5). Some species, such as Asian swamp eel and Indonesian leaf fish, found only in the dry season, when their presence may be related to their high vulnerability during that period. Asian swamp eel was more difficult to catch in the melaleuca forest than in the rice field because there were many places for them to hide from the otters. Therefore, their vulnerability in the dry season would be higher than in the wet season, as the melaleuca forest was the main feeding habitat for the Hairy-nosed otter.

Otters have evolved two distinct foraging modes: piscivory and invertebrate foraging. *Lutra* species (seven species) are largely piscivorous whereas *Aonyx* species (three species) are invertebrate feeders (Estes, 1989). This conclusion is similar to our finding that the Small-clawed otter's diet was composed largely of invertebrates. While the lack of claws on their forepaws might appear to hinder them in catching larger fish, the bulk percentage of fish found in their spraints indicated that they could capture a variety of small fish. The diversity of fish species consumed by the Small-clawed otter was less than those consumed by the Hairy-nosed otter. Since rice paddies and grasslands were the preferred habitat for the Small-clawed otter in the secondary peat swamp forest, where Malay combtail, Forest Snakehead and Indonesian leaf fish species are largely absent - hence their absence in the otters' spraint.

The records of larger fish species in their sprints also reflected their fishing behavior. Therefore, the presence of some larger fish such as Snakehead might be due to the otters raiding a fish trap or net.

CONSERVATION PROBLEMS

The problems affecting the conservation of otters in the Tao Daeng Peat Swamp came from two major threats.

Hunting pressure

Although, hunting pressure in that area was not high because most of the population was Muslim it did occur occasionally especially in the secondary peat swamp forest. Many fishermen consider otters to be their fishing competitors. Although part of the Tao Daeng Peat Swamp Forest was protected, the area surrounding the evergreen forest or peat swamp forest was frequently used by local people for fishing, logging for firewood in the melaleuca forest, and cattle grazing etc. Therefore, hunting of both otter species occasionally occurred especially in the fishing areas used by fishermen.

Habitat degradation

In the past, Tao Daeng peat swamp forest was degraded by agricultural land developing. Irrigation canals were excavated in the bordering area of peat swamp forest to channel the water to the sea in order to maintain the rice fields in the rainy season. However, those concrete canals proved useless. Until now, land encroachment has increased in the outer area of the wildlife sanctuary, in the melaleuca forest and degraded forest area located near the road. This threat increased due to the civil unrest in the far south of Thailand. Encroachment for palm oil and rubber plantations were happen frequently and became sensitive problems that are difficult to resolve.

REFERENCES

- Chanin, P. (1985).** The natural history of otters. Croom Helm, London & Sydney.
- Estes, J.A. (1989).** Adaptations for aquatic living by carnivores in Carnivore behavior, ecology and evolution, Ed. Gittleman, J.L. Chapman and Hall, London.
- Erlinge, S. (1968).** Food Studies on Captive Otters (*Lutra lutra*) *Oikos* **19**:259-270.
- Kanchanasaka, B. (1997).** Ecology of Otters in the Upper Khawae Yai River, Thung Yai Naresuan Wildlife Sanctuary, Thailand. *Nat. Hist. Bull. Soc.* **45**:79-92.
- Kanchanasaka, B. (2001).** Tracks and other signs of the Hairy-nosed otter (*Lutra sumatrana*), *IUCN Otter Specialist Group. Bull.* **18**(2):57-62.
- Kruuk, H., Kanchanasaka, B., O'Sullivan S., Wonghongsa, S. (1994).** Niche Separation in three Sympatric Otter, *Lutra perspicillata*, *L.lutra* and *Aonyx cinerea* in Huai Kha Khaeng, *Biological Conservation* **69**:115-120.
- Kruuk, H., Kanchanasaka, B., O'Sullivan S., Wonghongsa, S. (1993).** Identification of tracks and other sign of three species of otter, *Lutra lutra*, *L. perspicillata* and *Aonyx cinerea* in Thailand. *Nat. Hist. Siam. Soc.* **41**:23-30.
- Mason, C.F., Macdonald, S.M. (1986).** Otters: Conservation and Ecology. Cambridge University Press, Cambridge.
- Nabhitabhata, J., Chanard, T. (2005).** Thailand Red Data: Mammals Reptiles and Amphibians. Integrated Promotion Technology Co., Ltd.
- Nuyim, T. (1999).** Whole Aspect on Nature and Management of Peat Swamp Forest in Thailand, Proceeding of the International Symposium on Tropical Peat lands, Bogor, Indonesia, 22-23 Nov 1999.
- Phengkklai, C., Niyomdhum, C., Ueachirakan, W. (1991).** Flora in Peat Swamp Areas of Narathiwat, Thailand, Phikulthong Study center.
- Sinskul, S. (1998).** Basic Geology of Toe-Dang Peat Swamp. Geology Department. 4 pp. (sheet)
- Sulkava, R. (1996).** Diet of otters *Lutra lutra* in Central Finland. *Acta Theriologica* **41**:395-408.

RÉSUMÉ

HABITUDES ALIMENTAIRES DE LA LOUTRE DE SUMATRA (*Lutra sumatrana*) ET DE LA LOUTRE CENDREE (*Aonyx cinereus*) DANS LA FORET MARECAGEUSE DE PRU TOA DAENG, SUD DE LA THAÏLANDE

Deux espèces de loutres ont été recensées dans la forêt marécageuse de Pru Toa Daeng Peat, province de Narathiwat dans le sud de la Thaïlande: la Loutre de Sumatra (*Lutra sumatrana*) et la Loutre cendrée (*Aonyx cinereus*). Les habitudes alimentaires de la Loutre de Sumatra et de la Loutre cendrée ont été étudiées sur la période 2004-2006. Leurs épreintes ont été recueillies et analysées afin de comparer leurs régimes. Les résultats ont montré que les proies principales de la Loutre de Sumatra sont principalement le poisson puis le serpent d'eau et les crustacés. Les proies de la Loutre cendrée sont principalement le crabe puis l'escargot, le serpent d'eau et les poissons. Les poissons semblent moins présents que les invertébrés dans les épreintes de la Loutre cendrée. Les écailles et les vertèbres de poissons ont été identifiées permettant de définir les familles de proies suivantes: les Channidae, Belontiidae, Anabantidae, Notopteridae, Synbranchidae, Clariidae, Nandidae. Les deux familles de poissons les plus communes dans les échantillons des deux espèces sont les Belontiidae et les Channidae. Bien que 29 familles et 100 espèces de poissons aient été identifiées dans la forêt marécageuse de Pru Toa Daeng Peat, seulement 8 familles de poissons ont été échantillonnées dans l'habitat secondaire de la loutre que sont les marais et les zones humides des forêts à feuilles persistantes. Des observations directes du comportement alimentaire de la Loutre de Sumatra ont été faites sur quelques sites de marquage révélant que cette espèce est capable de retirer les poissons des pièges à poissons sans endommager les pièges. Des conflits entre loutres et humains se produisent fréquemment en dehors des zones protégées. Des loutres de Sumatra ont été retrouvées noyées dans des pièges à poissons ou tuées par des voitures en traversant les routes. Pour élaborer des mesures de conservation pour les deux espèces de loutres dans la forêt marécageuse de Pru Toa Daeng Peat, leurs répartitions ont été cartographiées à l'aide de leurs indices, de leurs pistes et de leurs épreintes. Les deux espèces utilisent la forêt sempervirente et la forêt secondaire dans les zones protégées. En outre, des indices ont également été trouvés dans les rizières et dans la forêt secondaire en dehors de la forêt protégée. Au final, les menaces qui pèsent sur les loutres dans la forêt marécageuse de Toa Daeng Peat sont estimées bien plus élevées que prévu.

RESUMEN

LOS HÁBITOS ALIMENTARIOS DE LA NUTRIA DE NARIZ PELUDA (*Lutra sumatrana*) Y LA NUTRIA PEQUEÑA DE GARRA (*Aonyx cinereus*) EN EL BOSQUE PANTANOSO PRU TOA DAENG PEAT SUR DE TAILANDIA

Dos especies de nutria, la nutria de Sumatra (*Lutra sumatrana*) y la nutria inerm asiática (*Aonyx cinereus*) fueron encontrados en Pru Toa Daeng Peat Swamp Forest (Bosque Pantanoso de Pru Toa Daeng), provincia de en el sur de Tailandia. Los hábitos alimentarios de la nutria de Sumatra y la nutria inerm asiática fueron estudiados durante 2004 al 2006. Sus heces fueron recogidos y analizados para comparar sus dietas. Los resultados mostraron que la nutria de Sumatra depredan sobre peces, serpientes acuáticas, y crustáceos principalmente, con peces como la presa principal. Las nutria inerm asiática se alimenta de cangrejos, caracoles, serpientes acuáticas, y el pescado principalmente, con los cangrejos como la presa principal. Los pescados parecen ser menos importantes que los invertebrados en las

heces de la nutria inermis asiática. Las escamas de pescado y las vértebras en las muestras fecales de ambas especies fueron identificadas. Peces de las familias Channidae, Belontiidae, Anabantidae, Notopteridae, Synbranchidae, Clariidae, Nandidae fueron encontrados en las muestras de heces. Las dos familias de peces más comunes identificados en las muestras fecales de las dos especies de nutrias fueron Belontiidae y Channidae. A pesar de que 29 familias y 100 especies de peces fueron identificados en el Pru Toa Daeng, sólo 8 familias de peces fueron muestreados en el hábitat de las nutrias en los pantanos y los humedales de los bosques secundarios y siempreverde. Observaciones directas de la conducta de alimentación de la nutria de Sumatra se hicieron en algunos de sus letrinas. También se observó la especie quitando los peces de trampas sin dañar las trampas. Conflictos entre las nutrias y se producen con frecuencia fuera de las áreas protegidas. Las nutria de Sumatra se ahogaron en las trampas para peces y fueron matados por carros mientras cruzaban las carreteras. Para desarrollar medidas de conservación para las dos especies de nutrias en el Pru Toa Daeng Peat Swamp Forest, la distribución de las nutrias fueron registrados en un mapa mediante sus signos, ambos huellas y heces. Ambas especies de nutrias utilizan el bosque siempreverde y el bosque secundario en las áreas protegidas. Además, sus signos se encuentran también en los campos de arroz y en el bosque secundario fuera del bosque protegido. Así, las amenazas a las nutrias en el Pru Toa Daeng Peat Swamp Forest se estima que sea mayor de lo esperado.