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DISTRIBUTION OF *LUTRA MACULICOLLIS* IN RWANDA: ECOLOGICAL CONSTRAINTS

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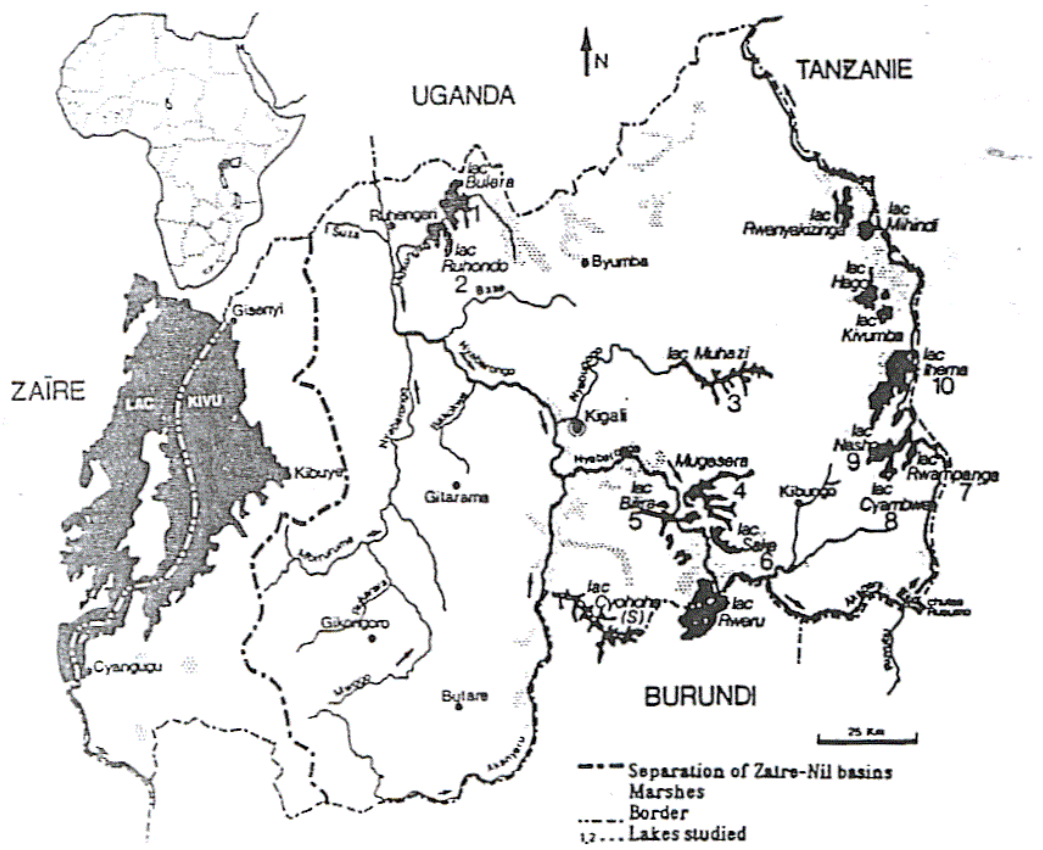
Abstract: The study of 10 rwandese lakes, where there are still quite important populations of *Lutra maculicollis*, has pointed out a few characteristics of the habitat favorable to the survival of these populations. The ecological constraints for the survival of these populations are: the abundance of small fishes, the continuity of the lake side vegetation, the absence of crocodiles and pollution by pesticides, and the low level of predation by man.

INTRODUCTION

Three species of otters still live in Rwanda : Lutra maculicollis (LICHTENSTEIN), Aonyx capensis (SCHINZ) and Aonyx congica. The most abundant is the small spotted necked otter which is named INZIBYI. Contrarily to the Cape Clawless otter (IGIHURA) mainly observed in the marshes, the spotted necked otter lives exclusively in the open waters of the rwandese lakes, where it mainly preys on fish.

With the exception of lake Kivu flowing into the Zaire basin, the twenty small rwandese lakes (from 600 ha to 10.000 ha) are part of the Nile basin through the Nyabarongo and Akagera rivers (see MAP 1.). These numerous lakes harbour more or less abundant populations of spotted necked otters.

These variations of abundance depend on various ecological factors which we will try to point out by a comparative study of ten of these lakes.



Map 1: Lakes of Rwanda

METHODS

As a hydrobiological study of 8 rwandese lakes was undertaken by the "Bureau National d'Etude des Projets" (BUNEP, 1989) in view of the development of their fisheries, we have observed the presence and. the abundance of otters in each of these lakes.

Previously, from 1980 to 1986, an important study of lake Ihema. in the Akagera National Park, was carried out by FRANK & al.(1984), PLISNIER & al. (1988) while we were observing the mammals on the lake sides (LEJEUNE, 1986).

Next an ecological study of lake Muhazi was carried out from 1985 to 1987 by the project "Etude et Amenagement Piscicole du Lac Muhazi" (EAPLM) (FRANK et al, 1986).

Finally a study of the Nyabarongo and Akagera marshes realized by SOGREAH (1989), gives some indications on the presence of *Lutra maculicollis* in these valleys.

The study of these 10 lakes are based on identical methods and are perfectly comparable:

- The transparency is measured by the Secchi disc method.
- The proportions of the different species of fishes are obtained by analysing the results of a standard program of experimental gillnet fishing : 4 nights for each season (4), coastal and pelagic, near the surface or near the bottom of the lake. The battery of monofilament gillnets is composed by 10 sheets of 50 m^2 with mesh sizes varying from 8 mm to 60 mm bar.
- The lake side vegetation is described by a botanist NVUKIYUMWAMI, as part of the BUNEP study.
- The density of human populations are estimated according to 4 zones:
    1. the North zone (Bulera, Luhondo - see MAP 1)

2. the lake Muhazi zone
3. the South-East zone (Sake, Bilira, Mugesera)
4. the East zone (Mpanga, Nasho, Cyambwe)

Lake Ihema is situated inside the Akagera National Park, theoretically without any human population. In fact a few dozen of Banyambo fishermen live in the Akagera marshes on the border between Rwanda and Tanzania and more or less fifty rwandese fishermen work for the Ihema fishery (ORTPN).

- For each lake the presence and the abundance of otters have been estimated by direct observations (for example for the lakes Muhazi, Luhondo, Sake) or by indirect observations (damage of otters to experimental gillnets and enquiries from the local people). The damages of the otters in the experimental nets are easily identified (LEJEUNE, 1989 a): the fishes caught in the gillnets are only partly eaten. These damages are very different of those of crocodiles which swallow the entire fish and tear completely the net.

RESULTS

The otter densities have only been estimated for lake Muhazi where they have been studied for 2 years. Their overall number is situated between 200 and 400 for a lake of 3400 ha bordered by 145 km of shores. The density is about 20 otters for 10 km of shore (14 to 30 otters/10 km). The population of lake Muhazi is thus specially abundant compared with the estimations of ERLINGE (1967) in Sweden (3.6 to 5.6 *Lutra lutra* / !0km of lake shore) and VAN DER ZEE (1982) in South Africa (4 to 7 *Aonyx capensis* / 10 km of coast line).

In all the other rwandese lakes, the otters are less abundant. Observations are made regularly on lake Luhondo, Mugesera, Sake (personal observations and depredation of experimental fishing nets), occasionally on lake Bulera, Birira, Mpanga, Nasho and Cyambwe (no personal observations but presence confirmed by fishermen and local population) and exceptionally on lake Ihema (2 observations in 5 years and no depredation of nets).

Some characteristics of these 10 lakes are presented in TABLE 1.

Table 1. Characteristics of 10 Rwandese lakes

Lake	Altitude m	Depth (max) m (mean)	Transparency cm	Fishes Haplochromis %W,N, TW (kg)[1]	Lakeside Vegetation[2]	Human Population inh/km^2)	Crocodiles	Otters
1 Bulera	1862	173 (100)	120<	W 47% N 97% TW 62	P. maur (2m) exploited	378	0	++
2 Luhondo	1764	68 (40)	74-120	W 83% N 99% TW 209	P. maur T. lat exploited	378	0	+++
3 Muhazi	1443	12 (6)	65-70	W 78% N 99% TW 189	P. maur (5m) T. lat, M. vio. C. pap.	230	0	++++
4 Mugasera	1350	4 (4)	30-50	W 64% N 96% TW 231	C. pap. (4m<) E. pyr.	260	++	+++
5 Bilira	1350	6.5 (6)	39-49	W 13% N 60% TW 9	E. pyr.(3m) P.rec.	260	++	++
6 Sake	1350	4.3 (4)	40-78	W 41% N 71% TW 127	C. pap. (40m<) E. pyr.	260	++	+++
7 Rwampanga	1250	7 (5)	64-90	W 23% N 58% TW 194	Forest gallery	90	+++	++

8	Cyambwe	1290	6.7 (4)	35-70	W N TW	33% 72% 199	Forest gallery	90	+++ ++
9	Nasho	1290	6.3 (3)	48-65	W N TW	41% 91% 153	C. pap. (1m) + P. rec., E. pyr.	90	++ ++
10	Ihema	1290	7 (4.8)	55-60	W N TW	28% 58% 148	A. ela	<5	+++ +

[1]W = Weight; N = Number; TW = Total Weight (16 nights fishing)

[2]P. maur Phragmites mauritianus

T.lat Typha latifolius

C. pap. Cyperus papyrus

E. pyr. Echinochlos pyramidalis

P. rec. Phoenix reclinata

A. ela. Aeschinomene elaphroxylon

Density (1985) Rwanda mean = 240 inh/km^2

Abundance

0	Absence
+	Very Rare
++	Rare
+++	Abundant
++++	Very Abundant

We shall try and point out the main factors influencing the high density of otters in lake Muhazi :

1. The altitude of lake Muhazi (1443 m) is "mean" compared with the other rwandese lakes (1290 to 1862 m).
2. The depth is rather shallow (5 to 12 m) compared with the great depths of the Northern lakes, although lake Muhazi is deeper than the lakes of the Akagera valley.
3. The transparency of the water does not seem to be a key factor as the water of the lake Muhazi, very rich in phytoplankton, is turbid (mean transparency : 65-70 cm). The Northern lakes which have clear waters only support very few otters.
4. On the other hand the relative abundance of *Haplochromis sp*, most preferred prey of *Lutra maculicollis* (LEJEUNE, in press) should play a most important role. These small cichlids, underexploited by the local fishermen, make up for 75% of the ichtyomassa of lakes Muhazi and Luhonda.
   During 16 nights of experimental fishing, we have captured respectively 189 kg, 209 kg, 231 kg and 172 kg in the lakes Muhazi, Luhondo, Mugesera and Sake against only 62 kg and 9 kg for the lakes Bulera and Bilira. The Akagera lakes are also very rich in small cichlids but other ecological factors seem to limit the otter density: lakeside vegetation and crocodiles.
5. The vegetation of the lake side seems to be an essential factor. The otter spends at least 16 hours out of 24 in this vegetation, for cover and reproduction (LEJEUNE, 1989 b). The shores of lake Muhazi are fringed with a thick row (2 to 7m) of *Phragmites mauritianus*. At the end of the lake arms, marshes of *Cyperus papyrus*, *Typha latifolia*, *Miscanthidium violaceum* replace the fringe of *Phragmites*.
   On the otter hand, the banks of the Northern lakes are bare following the overexploitation of the *Phragmites* by the peasants for constructions, fences, ... The *Phragmites* are sold at 1.5 to 2 RwF/piece (85 RwF = 1 US $). The vegetation of the Eastern lakes is very different: the marshes of *Cyperus papyrus* alternate with meadows of *Echinochloa pyramidalis* or with forest galleries of *Phoenix reclinata* and *Aeschinomene elaphroxylon*.
6. The impact of the human population on the density of otters is quite relative as the lake Muhazi basin bears a density of 230 inhabitants/km^2, for only 5 inhabitants/km^2 around lake Ihema. Man becomes a limiting factor if his activities harms the otters: clearing of shores, overexploitation of the fishes chased by the otters, hunting of otters for their pelts... Until 1973, the spotted necked otter was intensively hunted in Rwanda; more or less one thousand pelts were bought yearly at 300 RwF/piece by a private tannery in Gisenyi (DEWALQUE, pers. com.). Since

15 years the trade of otter pelts is forbidden in Rwanda and they are only rarely seen in the tanneries. The traditional hunting of otters (on a canoe with a spear) has been replaced by the hunting of small predators such as civets and genets. This type of hunting, using dogs causes the death of a few dozens of otters each year around lake Muhazi.

7. The presence of crocodiles (*Crocodilus niloticus*} could also be a limiting factor for the otter population. If the small crocodiles eat mainly insects, the greater specimens prey on fishes and mammals. It is very probable that the otters, sharing the same habitat, are often predated by crocodiles. In the Nyabarongo and Akagera valleys (Eastern lakes) crocodiles are still quite abundant. On the other hand, they are totally absent from lakes Muhazi, Bulera and Luhondo.

DISCUSSION

They are only very few informations on the dispersion of Lutra maculicollis in Africa (ROWE-ROWE, 1989) and the characteristics of their habitats.

ROWE-ROWE (1977, 1985) comparing 2 species of otters (*Lutra maculicollis* and *Aonyx capensis*) in South Africa concludes that L. maculicollis chases by sight and needs transparent waters, unpolluted and rich in small fishes, crabs and frogs. The pollution of rivers by agriculture and industry would be the first cause for the disappearance of spotted necked otters (STUART, 1985).

The abundance of otters in the turbid waters of some of the rwandese lakes seems to counter this hypothesis. It is necessary to distinguish here turbid waters with a low transparency from polluted waters. The low transparency of the rwandese lakes is caused by an abundant phytoplankton and suspended organic matters, but is not the result of any industrial or agricultural pollution, still absent in Rwanda.

This pollution as described in South Africa on the Orange River (STUART, 1985) might be responsible for the decline of otters in this region but - in our opinion - not because the water has become less transparent but rather because of the decline of fish stocks or the concentration of pesticides in the tissues of the otters at the top of the alimentary chain (ROWE-ROWE, 1989).

The development of the gillnet fishery in Africa does not seem to be a limiting factor as it was supposed by STUART (1985) or MONFORT (1985). At lake Muhazi, where the gillnet fishery is very intensive, the numerous otters are only very rarely caught in these nets (one observation in 5 years). Furthermore otters have learnt very well to take profit of this type of fishing by eating part of the fishes caught by this static gear (LEJEUNE. 1989 a). The presence of man is not either directly a limiting factor for the otters in Rwanda as these are very rare in the Akagera National Park, a region protected of human influence and very abundant in lake Muhazi situated in a very highly populated area. On the other hand, the abundance of fishes of small size (genus *Haplochromis*} is an essential factor. Small fishes are in fact easier preys than big ones (ROWE-ROWE, 1977; LEJEUNE, in press).
Even if they eat big fishes (*Clarias gariepinus* and *Tilapia nilotica*) coming from gillnets, the main part of their diet is composed of fishes under 15 cm total length. These little fishes must be available in very great quantities so as to compensate the small biomass of each prey (mean weight = 3.9g). It only takes two dives for the otter to capture one prey (LEJEUNE, 1989 b).

Finally, an important fringe of vegetation all along the shoreline of the lake gives a good cover necessary to the rest and the breeding of the otters. The draining of marshes for new farmlands, the harnessing of rivers and streams (for roads, for electricity generating,...) and the overexploitation of the lake side vegetation are as many threats for the important populations of *Lutra maculicollis* in Central Africa.

CONCLUSION

The abundance of small fishes in the lakes, the unbroken vegetal cover along the shores, the absence of crocodiles and also certainly the ban on the trading of pelts are the main factors for sustaining or even increasing the populations of spotted necked otters in Rwanda.

REFERENCES

BUNEP (1988) Etude pour la Développpement de la pêche et l'empoissonement des lacs du Nord et de l'Est du Rwanda. Dossier technique et scientifique. Kigali (B.P. 1337), 230 pp + annexes

BUNEP (1989). Etude pour la Développpement de la pêche et l'empoissonement des lacs du Nord et de l'Est du Rwanda. Projet d'appui à la production piscicole. Kigali (B.P. 1337), 67 pp + annexes

DUHAMIC-ADRI (1987). Etude des possibilités d'amélioration de la productivité piscicole et de l'organisation de la pêche sur le lac Mukazi. Kigali (B.P. 1080), 54 p.+ annexes.

Erlinge, S (1967) Home range of the otter, *Lutra lutra*, in Southern Sweden. Oikos, 18: 186-209.

Frank, V, Bizimana, F, Plisnier, PD and Lejeune, A (1986). Projet "Etude et Aménagement piscicole du lac Muhazi". Rapport Annuel 1986, Minagri, 117 p.

Frank, V, Micha, J-C, Gillet, A and Plisnier, PD (1984). Etude de la biologie des espèces de poissons exploités dans le lac Ihema (bassin de l'Akagera) au Rwanda. UNECED (FUNDP) Namur, 134 pp

Kanangire, K (1988) Typologie des lacs rwandais sur base de leurs caractéristiques abiotiques et biotiques. UNECED (FUNDP), Namur, 81 pp.

Lejeune, A (1986) Exploration du parc national de l'Akagera. Contribution à l'étude des variations écologiques et sociales des babouins. FFRSA, Bruxelles, 184 pp

Lejeune, A (1989a) Les loutres, *Lutra (Hydrictis) maculicollis* Lichtenstein, et la pêche atisanale. *Revue Zool. Afric., J. Zool. Afric*. **103**: 215 - 223

Lejeune, A (1989b) Ethologie des loutres *Hydrictis maculicollis* au lac Muhazi. *Mammalia*, 53: 191 - 202

Lejeune, A (1990) Ecologie alimentaire de la loutre *Hydrictis maculicolli*s au lac Muhazi. *Mammalia*, in press

Monfort, N (1985) Les Mammiféres du Rwanda. Rotary Club (B.P. 180), Kigali, 143 pp

Nvukiyumwami, J (1987) Etude de la végetation des lacs du Rwanda. Rapport Bunep, non publié, Kigali, 94 pp

Plisnier, PD, Micha, J-C and Frank, V (1988) Biologie et exploitation des poissons du lac Ihema (Bassin de l'Akagera, Rwanda). Presses Universitaires de Namur, 212 pp

Plisnier, PD (1989) Etude hydrobiologique et développement de la pêche du lac Muhazl (Bassin de l'Akagera, Rwanda). UNECED (FUNDP), Namur, 179 p.

Rowe-Rowe, DT (1977) Prey capture and feeding behaviour of South African Otters *The Lammergeyer*, **23** : 13-21.

Rowe-Rowe, DT (1985) Facts about otters. Wildlife Management, Natal Park Board, 2 p.

Rowe-Rowe, DT (1989) Status of otters in Africa. V International Otter Colloquium, unpublished.

SOGREAH (1989) Etude du plan directeur d'aménagement et de mise en valeur des vallées de la Nyabarongo et de l'Akanyaru. Environmental Study. MINAGRI, Kigali, 78 p.

Stuart, CT (1983) The status of two endangered Carnivores occurring in the Cape Province, South Africa, *Felis serval* and *Lutra maculicollis*. *Biolog. Conserv.*, **32** : 373 - 382.

Zee, D. van der, 1982. Density of Cape clawless otters *Aonyx capensis* (Schinz, 1821) in the Tsitsikama Coastal National Park. *S. Afr. J. Wildl. Res*., 12 : 8-13.