



Ecological research and conservation management of otters

General points

Conservation management, of whatever kind, inevitably needs to be based on knowledge of trends and hard facts relating to organism or ecosystem. This will be provided by scientific research – one has to carry out research to establish the needs of animals and plants. For conservation of otters worldwide, research is desperately needed, to guide management efforts, to establish priorities, and to present hard facts to politicians and managers.

The Otter Specialist Group is not a research organization, but is in a good position to promote areas of research that could underpin conservation efforts, and could usefully be undertaken by universities and research institutes. There is a need for good fundamental ecological research in every single species of otter, and one cannot state often enough that conservation efforts need to be based on sound knowledge of these animals, in order to prevent waste of effort and funds, and to direct conservation management where it is needed most. As examples, there is little point in battling the fur trade if otter populations can sustain the losses, or constructing artificial otter dens if the animals do not need them, because their numbers might be limited by something else.

Because of the pervasive influence of people on all aspects of the environment it is no longer possible to let things be and hope that otters will survive. Hence the need for conservation management, which may, amongst many other aspects, involve habitat management and protection, re-introduction or release of otters, legislation or policing the fur trade, or even management of fish populations. Any such conservation management needs to be based on scientific evaluation of species' requirements.

Moreover, as top-predators in aquatic ecosystems, otters influence populations of other organisms, including organisms of economic importance, such as fish (river otters) and crustaceans (sea otters), and conflicts arise with human interests. Otters also affect other endangered species, including several birds. There is a clear need to evaluate this, and the factors that influence such interactions, in order to establish requirements for management.

One can highlight a number of directions of research that would fill important gaps in our present knowledge of such requirements. Important questions include:

- *How does one assess otter populations?*
- *What are the factors that limit otter numbers in a given place?*

- *How do otters affect other organisms?*

There is, of course, a kind of ‘glamour factor’ attached to any otter research, especially in behavioural studies, as it involves highly charismatic species, and the general public often envies those who are able to do research on them and spend time with otters in the field. Scientific research attracts public attention, like good photographs do, and this can be good for the otters.

However, for the OSG it should be more immediately important to encourage research directly relevant to conservation and management problems, to identify factors that actually help otters survive in nature. Often, the most important research questions that have a bearing on otter survival make it necessary to concentrate our effort not on the animals themselves, but on their habitat, including their prey species and otters’ interactions with them, such as on fish, amphibians and crayfish, and on causes of mortality, such as anthropogenic factors, starvation and diseases.

For some otter species, our ignorance is such that we do not even know for large areas whether the animals are present, or whether they might be declining or not. We may know that there is trapping and a trade in their skins, but whether this affects populations or not is often unknown. For the better-known species we still do not know how to census them properly, and whether particular dens (‘holts’) or habitat types are necessary to maintain numbers.

Such basic ignorance urgently needs to be addressed, not only because we, conservationists, happen to be interested in these animals, but also because (a) conservation managers do not want to waste their efforts, and (b) we have to convince decision makers where to spend their money, and whether development projects are fatally harmful to populations or not. We desperately need arguments, arguments which can stand up under scrutiny in court.

Obstacles to research

In planning or advising on field research on otters, one should be aware of a number of potential problems.

1. For several reasons otters are difficult to study, and often unsuitable subjects for student projects: they are usually shy, scarce, often nocturnal, live in difficult habitats, and they have huge home ranges.
2. For all otter species there is a great deal of ‘lore’ in circulation, which is strongly held by many but often plainly wrong (a simple example, ‘otters live in pairs’, or ‘they live in holts, or ‘otters always have plenty of fish available’).
3. Similarly, many existing scientific conclusions are based on uncritical and unconfirmed data and assumptions (e.g., data on diet based on uncritical extrapolation from spraint analyses, survey data of otter usage based on distribution and numbers of spraints (scats)), and such conclusions do not convince decision makers.
4. Legal obstacles: in many countries there are strict laws and regulations in obtaining research permits, particularly if capture, translocation or implantation of transmitter procedures are involved and the otters are listed as endangered.

5. Field work on these species is highly labour-intensive and expensive, because of equipment, vehicle and boat costs, etc.
6. Joint studies are clearly needed, which implies the need to team up with relevant technologists, fish specialists, amphibian people, habitat specialists, disease specialists and others.
7. Catching otters for research purposes is often essential, but does carry risks to the animals. Field competence, care for the otters and an urgent sense of responsibility are vital.

The questions asked by conservation management are immediate, and practical, such as *how does one estimate otter presence and numbers?*, and *how long does a stretch of river need to be in order to encompass a given number of otter home ranges?*. The following is an attempt to outline specific areas of ecological research where first class science can be carried out into causal relationships, whilst also answering some essential questions for conservation management. Fundamental science is required to attract good scientists from the research establishment, but also to provide the bases for answers to immediately applied questions. As examples, one needs to know the ecological and behavioural significance of spraints (scats) before one can reliably use these in survey work, and we need to know the role of otter holts (dens) before we can advise against development plans.

At the same time, in the large majority of otter species we still have to start right at the beginning, and we still need to elucidate the most basic aspects and requirements of populations.

Examples of relevant potential research projects

Most of the following suggestions will be valid for all 13 otter species. However, for each species the priorities will be different, and one has to be realistic about practical limitations, e.g. in low-density populations, tropical areas etc.

- Establishing presence/absence, and home ranges in relation to habitats
- Developing genetic techniques, individual DNA differences, genetic variability in thriving and ailing populations (dangers of inbreeding), use of DNA derived from faeces.
- Developing indirect survey-methods for otter numbers, and evaluating their validity.
- Population Viability Analysis. Mortality factors and their effects on populations. Changes in population densities, and causes ('sustainability of mortality factors'). Exploitation of otters for their skins ('harvesting'), killing for other reasons, traffic victims, pollution, diseases: estimate whether these causes of mortality are sustainable for the otter population
- Factors limiting otter numbers in both scarce and dense populations
- Density, and changes therein, of fish, crustaceans, and amphibian populations, and causal factors
- Fate and ranges of released animals (radio tracking, and DNA)
- Effect of otters on prey populations (incl. commercially important fish or crustaceans)

- Competition with people, incl. otter damage to fish farms and fishing gear
- Competition between different species of otter. Do they exclude or otherwise affect each other?
- Methods of preventing anthropogenic mortality.
- Impacts of human activities

Recommendations for individual species

Eurasian otters and N American river otters often live in highly developed areas, sometimes even in cities. They have been somewhat better-studied most other species, although we still know little about some of their important ecological characteristics. Their conservation is often at loggerheads with development of buildings and roads, and there are legal requirements for incorporating the needs of otters into the planning process that precedes permission for such developments. At present, ecological consultants can often do little more than hazard a guess at parameters of populations, and what the otters need, and there is urgent need for accurate science-based knowledge to underpin ecological impact assessments.

The Eurasian otter, *Lutra lutra* and the North American river otter, *Lontra canadensis*. Research is needed especially on

- Scent marking by otters, incl. validation of spraint survey. What is the social significance of sprainting, where and when do otters deposit spraint, how and why is this a.o. related to habitat, season, individual differences, prey availability, otter density?
- Habitat characteristics (incl. 'holts' = dens) as limiting factors for populations. Effects of vegetation-cover, holts, stream-width, bank-disturbance (incl. behavioural responses).
- Characteristics and usage of holts (= dens).
- Social organization incl. home-range size, variation with habitat and region, with population density and predation differences.
- Fish populations (populations, productivity, population responses to exploitation, seasonal fluctuations) and otters (profitability of foraging).
- Otters in the ecosystem: their effects on fish and bird populations, incl. endangered species, fish farms.
- Amphibian populations and otters.
- Diseases and populations.
- Habituation to people and other hazards.
- Survival after dispersal (natural and after introductions).
- Mortality: what are effects on populations, of different mortality factors such as contaminants, road traffic, diseases, exploitation, starvation, and why mortality increases with age. For the North American otter especially population responses to exploitation.
- Specifically in Asia: competition with other otter species and aquatic predators.
- Detailed geographic range in Asian & N. African countries, incl. altitudinal distribution, habitats as above.

- Conflict with humans in Asian countries: fisheries, skin trade.

The **Sea otter**, *Enhydra lutris* is by far the best-studied species of otter, but has also been closest to extermination, and is clearly vulnerable, despite populations being thriving at present. Outstanding research needs are

- Diseases: effects in ecosystems
- Impact of ocean acidification
- Predation on sea otters and effects on populations
- Population effects of human activities: fisheries, oil spills and skin trade in Alaska

The **Giant otter**, *Pteronura brasiliensis* is more accessible to study than other Latin American species, but is also under more serious threats [though *Lontra provocax* and *L. felina* also face serious anthropogenic threats]. There is a special need for further knowledge on

- Causes of mortality, and effects on populations, including impact of artisanal gold mining
- Habituation to people and other hazards
- Ecology and behaviour during rainy season in flooded forests

The **Neotropical otter**, *Lontra longicaudis*, has a large geographical range in Latin America, but we know little about its exact occurrence and its vulnerabilities. Projects are needed on

- Habitat selection
- Competition with other otter species, esp. with Giant otter

The **Southern river otter or huillin**, *Lontra provocax* is little known, especially

- Geographical range: effects of fragmentation and loss of habitat
- Causes of mortality, and effects on populations
- Potential competition with *L. felina* in coastal zones

The **Marine otter**, *Lontra felina* needs studies on

- Habitat selection, incl. fresh water requirements
- Competition with humans/fisheries conflicts
- Potential conflict with *L. provocax* in coastal zones

The **Hairy-nosed otter**, *Lutra sumatrana* occurs in difficult and isolated habitats in SE Asia, and much more research is needed on

- Geographical range: effects of fragmentation and loss of habitat
- Competition with other otter species
- Mortality: effects on populations of different mortality factors including hunting by people, fisheries
- Habitat selection and use
- Prey populations and changes therein
- Interaction & conflict with human rural populations

The **Smooth otter**, *Lutrogale perspicillata* occurs often in areas where conflict with people is likely, and research is needed on

- Geographical range, present distribution and population densities

- Effects of hunting and skin trade on populations
- Fish populations and their limitations, effects on otters, interaction with human fisheries
- Habitat use and requirements (incl. mangrove & other coastal, dams), habitat change & effects on populations
- Competition with other otters
- Role in ecosystems

The **Small-clawed otter**, *Aonyx cinereus* is the species most often found in zoo collections, but little is known about its ecology and interaction with mankind. Field research is required on

- Geographical range, changes therein & causes
- Habitat use and requirements (incl. mangrove & other coastal, rice paddies, dams), habitat change & effects on populations
- Role in ecosystems, incl. ecological impact in rice paddies
- Effects of hunting and skin trade on populations
- Competition with other otters
- Prey populations & changes

In Africa the **Cape clawless otter**, *Aonyx capensis* is the best known, but further research is needed on

- Causes of mortality, and their impact on populations
- Prey populations incl. crabs and invasive species, and limiting factors
- Home ranges in different habitats
- Developing genetic techniques for identifying individual DNA
- Effects of man-induced habitat change on populations

The **Congo clawless otter**, *Aonyx congicus* appears to be very similar to the Cape clawless, but almost nothing is known on its ecology, and there is a need for studies on

- Geographical range
- Home ranges, & habitat selection
- Diet, interaction with prey species & fisheries
- Competition with other otter species
- Causes of mortality (incl bush-meat trade), and their impact on populations
- Developing genetic techniques individ. DNA
- Effects of man-induced habitat change on populations

The **Spotted-necked otter**, *Lutra maculicollis* shares its geographical range with other otter species, and also for this much more information is needed, including

- Regional variation in social organization, and its causes
- Competition with *Aonyx* species
- Habitat selection, incl. marine habitats
- Interaction with fisheries
- Mortality: effects on populations of mortality factors such as hunting by people, fisheries, contaminants, road traffic, predation.

What is presented here are some of the main outstanding problem areas, where lack of knowledge confronts conservation management. The list is my no means exhaustive, but it is hoped that it will (a) stimulate interest in the scientific community, (b) direct new research programs towards contributing to effective conservation of these important species, and (c) encourage potential new projects to contact IUCN Otter Specialist Group members for further advice.

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