

# Management of African riverine fish species in Namibia



Directorate Resource Management  
Ministry of Fisheries and Marine Resources  
Private Bag 13 355 Windhoek  
Namibia

T.F. Næsje<sup>1</sup>, C.J. Hay<sup>2</sup>, E.B. Thorstad<sup>1</sup>, F. Økland<sup>1</sup>, B. Chanda<sup>3</sup> and N. Nickanor<sup>2</sup>

<sup>1</sup> Norwegian Institute for Nature Research, Tungasletta 2, NO-7485 Trondheim, Norway.

<sup>2</sup> Ministry of Fisheries and Marine Resources, Private Bag 2116 Mariental, Namibia.

<sup>3</sup> Ministry of Agriculture and Co-operatives, Department of Research and Specialised Services, P. O. Box 350100 Chilanga, Zambia.

The successful management of freshwater fisheries depends on a good understanding of fish migrations, local movements and habitat preferences, especially in complex and variable floodplain ecosystems. Management tasks are further complicated when rivers form international borders between states and/or flow through several countries. This is illustrated by the Zambezi River and its main tributaries, which flow through Zambia, Angola, Namibia, Botswana, Zimbabwe, Malawi, Tanzania and Mozambique, and border several of these countries. As a result, fish move freely between states and are a common resource shared among several countries.

To ensure sustainable fisheries in the Zambezi River, the Namibian Ministry of Fisheries and Marine Resources has in collaboration with the Norwegian Institute for Nature Research, and the Zambian Ministry of Agriculture and Co-Operatives studied the state of the fish resources, the exploitation of these resources (subsistence, recreational and semi-commercial fisheries), and the role of stakeholders, including the socioeconomic infrastructure of local communities. Further, studies were done on the movements and migrations of fish species to determine their availability and presence in the river. In addition, baseline socioeconomic studies were conducted in riparian communities.



Cooperation and expertise for a sustainable future

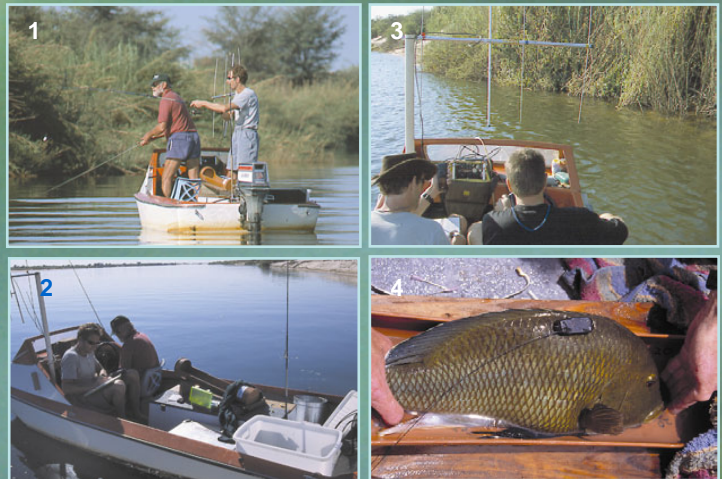
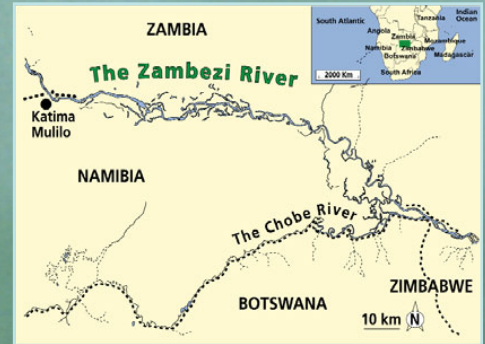


# Management of African riverine fish species in Namibia

Fish species may have different life histories and trophic structures resulting in different behaviour and habitat use. Such differences may call for different management actions to secure sustainable utilisation of the resources. As part of the studies concerning the availability of fisheries resources, radio telemetry has been used to investigate the local and regional movements and the habitat utilization of tigerfish (*Hydrocynus vittatus*), nembwe (*Serranochromis robustus*), threespot tilapia (*Oreochromis andersonii*), African pike (*Hepsetus odoe*), greenhead tilapia (*Oreochromis macrochir*) and pink happy (*Sargochromis giardi*) during 2001-2004. The main objective of the telemetry studies has been to enhance the knowledge base to improve the national and multi-national management of the most important fisheries species in countries bordering the Upper Zambezi River. The information of the species home range, habitat preferences and movement patterns have given important information forming the basis for the new fisheries regulations in Namibia.

## Further reading:

- Abbott, J., C. Hay, M. Kalonga, T. Næsje, and J. Purvis. 2003. 2002 Joint frame survey of the Upper Zambezi River (Namibia/Zambia). Ministry of Environment and Tourism, Windhoek, Namibia. 39 pp.
- Abbott, J., C. Hay, S. Kapirika, T.F. Næsje and J. Purvis. Shared Fisheries Resource Management on the Zambezi/Chobe River Systems: Interim Report of the Ngweze/Katima Mulilo Fish Market Survey. April 2002 to January 2003. Ministry of Fisheries and Marine Resources, Windhoek, Namibia. 21 pp.
- Hay, C.J., T.F. Næsje, J. Breistein, K. Hårsaker, J. Kolding, O.T. Sandlund and B. v. Zyl 2000. Fish populations, gill net selectivity, and artisanal fisheries in the Okavango River, Namibia. Recommendations for a sustainable fishery. NINA-NIKU Project Report 010. 105 pp.
- Hay, C.J., T.F. Næsje, J. Breistein, K. Hårsaker, J. Kolding, O.T. Sandlund and B. v. Zyl 2000. Fish populations, gill net selectivity, and artisanal fisheries in the Okavango River, Namibia. Executive summary and recommendations. NINA-NIKU Project Report 012. 8 pp.
- Hay, C.J., T.F. Næsje, S. Kapirika, J. H. Koekemoer, R. Strand, E.B. Thorstad and K. Hårsaker. 2002. Fish populations, gill net catches and gill net selectivity in the Zambezi and Chobe Rivers, Namibia, from 1997 to 2002. NINA Project Report 17. 79 pp.
- Hay, C.J., T.F. Næsje, F. Økland and E.B. Thorstad 2002. Radio telemetry tracking of fish in the Zambezi River. Tight Lines, Tackle Publications CC., Silverton, South Africa, May 2002: 26-29.
- Næsje, T.F., C.J. Hay, S. Kapirika, O.T. Sandlund and E.B. Thorstad 2001. Some ecological and socio-economic impacts of an angling competition in the Zambezi River, Namibia. NINA-NIKU Project Report 014. 31 pp.
- Næsje, T.F., C. Hay, J. Purvis, H. Hamukuaya, S. Kapirika and J. Abbott. 2002. Shared resource management on the Zambezi/Chobe systems in northeast Namibia: Current practices and future opportunities. Report of first river survey and collection of information from fish markets, including survey manuals and forms. NINA-NIKU Project Report 18. 72 pp.
- Næsje, T.F., R. Strand, C. Hay, J. Purvis, E.B. Thorstad, J. Abbott and N. Nickanor. 2002. Shared Resource Management on the Zambezi/Chobe Systems in Northeast Namibia: Current Practices and Future Opportunities River Survey. February-August 2002. Ministry of Fisheries and Marine Resources, Windhoek, Namibia. 24 pp.
- Næsje, T.F., R. Strand, C. Hay, J. Purvis, E.B. Thorstad, J. Abbott and N. Nickanor. 2003. Shared Resource Management on the Zambezi/Chobe Systems in Northeast Namibia: Current Practices and Future Opportunities River fisheries study: February 2002-February 2003. Ministry of Fisheries and Marine Resources, Windhoek, Namibia. 52 pp.
- Næsje, T.F., C.J. Hay, N. Nickanor, J.H. Koekemoer, R. Strand and E.B. Thorstad. 2004. Fish populations, gill net catches and gill net selectivity in the Kwando River, Namibia. NINA Project Report 27. 64 pp.
- Purvis, J., J. Abbott, T. Næsje, and C. Hay. 2003. Shared resource management on the Zambezi/Chobe systems in northeast Namibia: Current practices and future opportunities. Existing fishery management systems and implications for future management. Ministry of Fisheries and Marine Resources, Windhoek, Namibia. 31 pp.
- Sandlund, O.T. and I. Tvedten. 1992. Pre-feasibility study on Namibian freshwater fish management. NINA, Trondheim and CMI, Bergen. Report. 54 pp.
- Thorstad, E.B., C.J. Hay, T.F. Næsje and F. Økland. 2001. Movements and habitat utilization of three cichlid species in the Zambezi River, Namibia. Ecology of Freshwater Fish 10: 238-246.



- 1 Survey team catching nembwe for radiotagging. All fish were caught with rod and line.
- 2 Tagging personnel in survey boat with tagging equipment.
- 3 Survey team tracking radio-tagged nembwe and recording the exact position with GPS. The habitat of the nembwe was also described.
- 4 External tagging after anaesthetisation of nembwe.

- Thorstad, E.B., C.J. Hay, T.F. Næsje, B. Chanda and F. Økland. 2002. Movements and habitat utilisation of tigerfish (*Hydrocynus vittatus*) in the Upper Zambezi River. Implications for fisheries management. NINA-NIKU Project Report 019: 28 pp.
- Thorstad, E.B., C.J. Hay, T.F. Næsje, B. Chanda and F. Økland. 2003. Movements and habitat utilisation of threespot tilapia in the Upper Zambezi River. Implications for fisheries management. NINA Project Report 23. 22 pp.
- Thorstad, E.B., C.J. Hay, T.F. Næsje, B. Chanda and F. Økland. 2003. Space use and habitat utilisation of tigerfish and the two cichlids nembwe and threespot tilapia in the Upper Zambezi River. Implications for fisheries management. NINA Project Report 24. 22 pp.
- Thorstad, E.B., C. J. Hay, T. F. Næsje, B. Chanda, and F. Økland. 2004. Effects of catch-and-release angling on large cichlids in the subtropical Zambezi River. Fisheries Research 69: 141-144.
- Thorstad, E.B., C.J. Hay, T.F. Næsje, B. Chanda and F. Økland. 2005. Movements and habitat utilisation of nembwe (*Serranochromis robustus* Günther, 1984) during low, rising and high water levels in the Upper Zambezi River. African Zoology: (In press)
- Økland, F., C.J. Hay, T.F. Næsje and E.B. Thorstad 2000. Movements and habitat utilisation of cichlids in the Zambezi River, Namibia. A radio telemetry study in 1999-2000. NINA-NIKU Project Report 011. 18 pp.
- Økland, F., C.J. Hay, T.F. Næsje, E.B. Thorstad and N. Nickanor 2001. Movements and habitat utilisation of radio tagged carp (*Cyprinus carpio*) in a reservoir in the Fish River, Namibia. NINA-NIKU Project Report 013. 28 pp.
- Økland, F., C.J. Hay, T.F. Næsje, B. Chanda and E.B. Thorstad. 2002. Movements and habitat utilisation of nembwe (*Serranochromis robustus*) in the Upper Zambezi River. Implications for fisheries management. NINA-NIKU Project Report no. 20. 25 pp.
- Økland, F., C.J. Hay, T.F. Næsje, N. Nickanor and E.B. Thorstad. 2003. Learning from unsuccessful radio tagging of carp in a Namibian reservoir. J. Fish Biol. 62: 735-739.
- Økland, F., E.B. Thorstad, C. J. Hay, T. F. Næsje and B. Chanda. 2004. Movements and habitat utilisation of tigerfish (*Hydrocynus vittatus*) in the Upper Zambezi River. Ecology of Freshwater Fish 14: 79-86