July 2013
The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

TECHNICAL BRIEF

Community health

Establishing the fishery potential of Lake Nandoni, Limpopo

A WRC-funded study investigated the potential of Nandoni Dam, in Limpopo Province, to support the surrounding rural communities through fishery and aquaculture.

Background

It is often stated that inland fisheries can provide an essential contribution to local and regional economies as well as sustainable livelihoods. Throughout Africa natural and artificial inland water bodies are regarded as valuable and integral parts of the lives of many people.

Being a semi-arid country, South Africa depends on man-made reservoirs rather than natural lakes for water supply. These reservoirs potentially contain fish that can be utilised as a source of food. Historically these fish resources were generally not considered sources of protein and as such not commercially harvested.

To determine whether fish can be harvested, or a fishery industry be established, an assessment should be done to determine the status of the resource and establish safe levels of sustainable exploitation. In such an assessment it should be investigated how the fish population would respond to harvest. This would include determining the fish biomass and the fisheries potential, including the catch per unit effort and size selectivity of the gear to the used.

Nandoni Dam

Based on its size and geographic location, the Nandoni Dam is ideally suited to allow for both commercial harvesting and aquaculture. For sustainable utilisation these activities should be managed based on sound knowledge of the fishery potential of the impoundment. To answer this call for knowledge, the WRC subsequently launched the study into the fishery potential of Lake Nandoni.

During the project, undertaken by researchers from the University of Venda, data were gathered on the aspects regarding the biological, ecological and physical aspects of a selection of fish in the dam so that this could be used as a guideline for a management plan for inland fisheries.

Methodology

Study sites were selected in the main body of the impoundment, at the inflow into the impoundment and upstream in the rivers that flow into the impoundment. The sites in the impoundment were used to investigate the limnology, establish the water quality and collect samples of fish as well as zooplankton and phytoplankton. Surveys were conducted monthly for a year, which was followed by three independent surveys, starting in September 2009 and ending in June 2011.

To investigate the limnology selected physico-chemical parameters were recorded in situ at the sites in the

University of Venda students collecting fish samples from Lake Nandoni.

impoundment. These included dissolved oxygen, electrical conductivity, total dissolved substances, pH and temperature. At the site occurring at the dam's deepest point impoundment sampling was done at one metre intervals to establish whether stratification and overturn occurred.

Results

At this point in time, Lake Nandoni provides an excellent habitat for fish. Not only are most of the water quality characteristics within anticipated parameters, but the upper levels of the water throughout the main body of the impoundment are sufficiently oxygenated. The fact that the observed oxygen and temperature stratification was followed by turnover, and mixing of the hypo- and epilimnion, can lead to proper distribution of nutrients within the water body. In turn, this can lead to sustainable production.

Some issues of concern have been raised, especially with regards to rising levels of pollution, particularly in the form of nutrients and phosphates. If the level of pollution, particularly in the Mvudi River, is not controlled, there is reason to believe that Nandoni Dam will become eutrophic.

Fish catches were dominated by ***Schilbe intermedius***, ***Labeobarbus marequensis*** and ***Oreochromis mossambicus***. The latter species is currently targeted by local fishermen. The population structure of the dominant species was natural, with both juveniles and adults present. Due to the small sample size of ***L. marequensis*** the reproductive strategy could not be studied in detail, but results were obtained for the other two species, which correlated with breeding data found in literature.

Results show that the potential yield of the impoundment is higher than similar water bodies in adjacent areas and suggest that a sustainable harvest could be in the region of 26 kg/ha. The results obtained regarding net selectivity is of interest as it supplies an indication of the net sizes that can be employed successfully. The overall condition and health of the fish was good and no obvious external signs or blood parameters indicated that the fish are stressed.

Future management strategy

Based on the finding of the report the deteriorating quality and the possibility of eutrophication were identified as potential threats to sustainable fishing in Lake Nandoni. In addition, uncontrolled harvesting of fish needs to be controlled to prevent a collapse of any proposed fishery.

Recommendations for a management plan incorporated in the final WRC study report include Government setting clearly formulated and communicated aims, ensuring buy-in of affected parties, stakeholder involvement and the setting of prescribed quotas and, in particular, the enforcement thereof.

Further reading:
To order the report, ***Establishing the fishery potential of Lake Nandoni in the Luvuvhu River, Limpopo Province*** (**Report No. 1925/1/12**) contact Publications at Tel: (012) 330-0340, Email: orders@wrc.org.za, or Visit: www.wrc.org.za to download a free copy.