POLICY BRIEF

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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.

Assessing the potential of inland fisheries' contributions to rural livelihoods

South Africa's post 1994 democratic government is under increasing pressure to address the persisting challenges of rural poverty, inequality and unemployment. Therefore, the need to realise the socio-economic potential of South Africa's inland fisheries has become urgent. While it is important to ensure that rural communities derive optimum value from freshwater fisheries, this positive transition needs to be undertaken without jeopardising the sustainability of resource. A recently completed Water Research Commission (WRC) funded project investigated inland fisheries contributions to rural livelihoods by assessing fisheries potential, market value chains and governance arrangements.

Background

Sustainable fishery utilisation is limited by inadequate information on the productive potential of public dams, the economic value of the resource, the potential value chain benefits for rural communities and how to manage the resources sustainably so that they continue to benefit future generations.

A prior baseline and scoping study funded by the WRC recommended that the establishment of fisheries should be based on a developmental approach; on an inclusive approach to deal with historical marginalisation of (small-scale) fishing communities; and on a defensible scientific approach that could ensure biological and socio-economic sustainability of the sector.

In order to contribute towards the development and formalisation of such a sector, the present study approach used three case studies to provide knowledge and information, necessary for implementing sustainable fishery governance and management arrangements in terms of the governments inland fisheries policy, visibly i) an assessment of fish stocks and their potential; ii) description of the market value chains associated with inland fisheries and their economic value; iii) institutional arrangements for the governance of inland fisheries; and iv) strategies for optimising the inland fisheries-based rural livelihoods and rural economies.

Without the sufficient knowledge on the size of fish stocks and the productivity of the dams, it is not possible to institute evidence-based sustainable levels of harvesting and utilization of inland fisheries. Therefore, one of the key objectives of this study was to assess the fish stocks and fisheries potential using a selection of small and large dams in the provinces with the most productive dams, in order to recommend the appropriate harvesting levels and techniques and the process for formulating these.

Past studies indicate that more than 1.5 million people participate in or are involved in freshwater angling activities and value chains in South Africa annually, and that this sector is worth about R9 billion annually. For historical reasons the majority of participants in this sector are white.

Thus, the sector provides potential for broadening participation by the rural poor women and men that have been historically marginalised. The second objective of the project was, therefore, to deepen our understanding the economic value of inland fisheries, and the nature of existing formal and informal Market value chains (MVCs) associated with inland fisheries, and how these could be made more pro-poor.

Without appropriate management and governance of the transformation and transition towards greater participation of and benefits for rural communities, this could result in the destruction of resources, erosion of the benefits and the general devaluation of the ecosystems services provided by public dams. Therefore, the third key objective of the study was to consider the institutional arrangements for

governance and co-management of inland fisheries for sustainable utilisation.

Fisheries potential of South African inland fisheries
Because of the paucity of information on the fish stocks and fisheries potential of South Africa's inland waters the existing predictions require validation. Fishery feasibility assessments were conducted using fishery surveys, resource surveys and stock assessments in order to recommend harvesting levels, strategies and techniques for sustainable utilisation.

Monthly fish surveys were undertaken at Flag Boshielo Dam, while rapid fishery appraisals were conducted at Loskop and Pongolapoort dams. Catch data from all fishing gear were used to determine species composition and biological parameters, viz., growth estimators, age at maturity, and the mortality of candidate species, with gillnet data used specifically to establish the catch-per-unit effort (CPUE) and gillnet selectivity.

The rapid assessment survey of Loskop Dam recorded 1 392 specimens, 15 species from six families. Mozambique tilapia (***Oreochromis mossambicus)*** (58%) and rednose labeo (***Labeo rosae)*** (15%) dominated the biomass captured by gillnets.

A large number of juvenile Mozambique tilapia captured in seine nets was evidence of recent recruitment and a potentially self-sustaining population.

By contrast a year-long monthly assessment survey of Flag Boshielo Dam recorded only 1 376 specimens, 11 species from six families in gillnets. It should be noted that these surveys were conducted during a drought where the impoundment was at less than 50% of full capacity, including long periods at less than 30% of capacity. Rednose labeo (59%) and Mozambique tilapia (21%) dominated the biomass captured by gillnets.

Model results indicate that for a gillnet fishery to be initiated for these two species in Flag Boshielo Dam, an initial mesh size restriction of 100 mm would be necessary to minimise the risk of stock collapse. However, the use of a 100 mm mesh net could result in low catch rates at Flag Boshielo Dam since the overall catch rate for a hypothetical fishery for both species is shown to decrease with an increase in mesh size.

The absence of larger specimens of both species in Flag Boshielo Dam indicates that the fishery is likely to be already fully exploited by the current small-scale informal gillnet fishery. As a result, the current harvest rates of these informal fisheries need to be considered when planning for future fisheries development.
Given that models indicate limited room for growth in the Flag Boshielo fishery, managers should focus on working with existing fishers to increase yield by, for example, adjusting fishing effort and gillnet mesh sizes to improve yields.

Several studies have revealed that fish from the Olifants River System have been contaminated by heavy metals and prolonged consumption of these fish poses a long-term risk to human health. This, in itself, has serious implications for individuals trading and consuming fish from water bodies in this system. Should fisheries be established at either impoundment, the risks associated with consuming fish from these impoundments need to be determined periodically and clear advisories developed.

Using market value chains to enhance the contribution of inland fisheries to rural livelihoods in South Africa
Markets are a useful instrument for transferring products to people who are willing to pay more for them. In the context of natural resources, this may provide options to enhance rural livelihoods using less primary resource and generate funds for protecting threatened ecosystems.

Rural communities are often uninformed about their comparative advantage in harnessing indigenous knowledge to produce high-valued commodities for extended market value chains. Accordingly, the project team investigated the market value chains of inland fisheries at selected dams, namely Pongola in KwaZulu-Natal Province, Flag Boshielo in Limpopo Province and Voëlvlei in the Western Cape Province.

The study found that market value chains involving small-scale fishers were generally short. The value chains were estimated to generate a monthly profit of R28,500 for gill-net fishers and R6,600 for fish vendors at Pongola Dam; R1,500 for line fishers and R11,500 for gill-net fishers at Flag Boshielo Dam, and R500 for line fishers at Voëlvlei Dam.

Small-scale fishers and fish vendors can improve this situation by: (i) adding greater value by processing fish products (salted, dried and smoked) and marketing to urban communities; (ii) using weight-based pricing to generate more revenue from produce; and (iii) getting organised to create monopoly power and sell to niche markets e.g. lodges, fish shops.

In any case, the main value of the inland fisheries is not just the commodity value of the tonnage landed by small-

scale fishers, but lies in the food security and sustainable livelihood benefits to rural communities and the socio-economic benefits of the tourism and equipment supply associated with recreational fishing.

There are opportunities for benefit sharing schemes with local communities in respect of output or expenditures associated with recreational fishing. The Inland Fisheries policy needs to facilitate the recognition of all values associated with inland fisheries and craft mechanisms for sustainable inclusion of small-scale fisheries and rural communities living in the vicinity of dams.

Inland fisheries could contribute to improved rural livelihoods if small-scale fishers and their communities were pro-actively integrated into all the value chains on public dams and other natural freshwater resources. Such integration could also prove beneficial in times of crisis such as downturn of the economy due to Covid-19.

Figure 1. *Weighing of catch by anglers.*

The study found that there are currently no national estimates for the economic value of inland fisheries for South Africa and that deriving such assessments would require valuations across the three subsectors, namely small-scale fishing (for the subsistence fishing component of this sector, the value of the fish should ideally be measured in terms of food security metrics including income, nutritional status, and welfare savings by the state), recreational fishing and commercial fishing.

Total Use Value (TUV) for South African inland fisheries can be estimated at about US$630 million per year. Thus, there is a need to find ways to allow the small-scale fishers to tap some of the value from inland fisheries including recreational fishing. Such opportunities can be investigated by looking at the inland fisheries value chains and identifying opportunities for upgrading small-scale fishers.

Figure 2: *Small scale fishers*

Management and governance arrangements for South African inland fisheries

Central government departments hold the mandates and responsibilities for ensuring the sustainable utilisation of natural resources and maintenance of biodiversity in public dams and their dam catchment areas on behalf of society. These mandates are provided for through appropriate legislation and policies such as the NWA, NEMA, NEMBA, SAMSA, future Inland Fisheries Policy, Tourism Act, Food and Nutrition policies, etc.

In most instances, the central government mandates are implemented by their provincial departments and local governments, which usually involves decentralisation of authority. Historically, the management of biodiversity on public dams had been done through provincial legislation and through provincial departments of the environment or parastals (for example Ezemvelo KZN Wildlife in KwaZulu-Natal and Cape Nature in the Western Cape).

The proposed Inland fisheries policy is based on centralising legislative mandate for inland fisheries into the hands of the Department of Environmental Affairs and Fisheries: branch Fisheries. This would ensure one overarching policy and legislation from which provinces can derive decentralised authority and responsibility, and for the co-management bodies at bottom (which is actually the coal face management) devolutionary authority and responsibility.

There are many stakeholders that benefit from the ecosystem services that are provided by dams. Key among these are domestic and industrial water provisioning, small-scale fishers, recreational anglers, irrigation farmers, tourism operators such Lodge owners, etc. In addition, these economic activities provide employment to people that act as part of the value chain actors, supporters, suppliers and influencers.

Thus, these activities extend benefits along the value chains (vertical) and value networks (horizontal). Consumers of the various ecological products at the top tier of the value chains create demand for the products and services.

For inclusive and legitimate co-governance, most of the key stakeholders will need to be involved. This can vary based on scale and/or level and also on who the stakeholders on a specific dam are. In most instances, the primary stakeholders (those that have a direct involvement and therefore stake in a dam) will need to be included in the ground level co-management arrangements that directly impact on their activities and benefits.

Some level of vested involvement is essential for legitimacy and effectiveness of co-management arrangements since ultimately, primary users control whether a management system will work or not. Hence, if direct users cannot live with a regulatory system and its framework, it hardly matters what other interests think or find appropriate. Without such active involvement by primary stakeholders and vested interests, the legitimacy and strength of co-management arrangements is diluted.

Towards development of an inclusive sustainable small-scale inland fisheries sector

In order to develop and formalise an inland fisheries sector in South Africa, there is a need to establish a Fisheries Management Regime (FMR) for the sector comprised of Fisheries Management Systems (FMSs), Monitoring Control and Surveillance systems and a Fisheries Judicial Systems.

These are some of the key questions that this FMR we will need to deal with visibly:

1. How should inland fisheries be organised in terms of FMSs in practice and reality, and what criteria should be used for the establishment of these management systems?;
2. What types of input and technical regulations are necessary for each FMS (or each impoundment?) for sustainable utilization?;
3. Will output regulations be used in the sector, and if so what procedures would be used for determining the annual upper limits?;
4. What management procedures and processes would be required for the sustainable utilization of inland fisheries in each FMS?;
5. What type of rights would be appropriate for equitable sustainable utilisation of inland fisheries, and how would these be distributed?;
6. What institutional and organisational arrangements would be appropriate for inclusive and equitable management of inland fisheries?;
7. How should management of inland fisheries be funded?; and
8. What legislative changes would be necessary for recognition of the sector; and how could communities organise themselves better for improved access to inland fisheries value chains?

Recommendations for action and suggestions for future research

The recommendations and suggested areas for further research are those that could progress the development and formalisation of a sustainable inland fisheries sector. These aspects are around geographic management areas, programmes of routine data and information collection for decision-making, the types of fishing rights, how fishers and vendors could organise themselves for enhanced benefits, benefits in the form of social economic values and the creation of niche markets by fishers and vendors for increased benefits.

Related project

Inland fisheries contributions to rural livelihoods: An assessment of fisheries potential, market value chains and governance arrangements (**WRC Report No. 2497/1/20**). To download this report, Visit: www.wrc.org.za