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Characteristics, structure and resources of the sector

Summary

Aquaculture in the United Republic of Tanzania has a vast but as yet untapped potential. The industry is dominated by freshwater fish farming in which small-scale farmers practice both extensive and semi-intensive fish farming. Small fish ponds of an average size of 10 m x 15 m (150 m²) are integrated with other agricultural activities such as gardening and animal and bird production on small pieces of land. The United Republic of Tanzania is currently estimated to have a total of 14,100 freshwater fishponds scattered across the mainland. In addition, there is a large rainbow trout (Oncorhynchus mykiss) farm with an area of 25 m x 25 m situated in Arusha.

The distribution of fishponds in the country is determined by several factors such as availability of water, suitable land for fish farming, awareness and motivation within the community on the economic potential in fish farming.

Although very profitable internationally, shrimp farming is still in the experimental phase in The United Republic of Tanzania, a number of private companies have acquired plots and permits for the culture of shrimp. Shrimp farming has the potential to be a profitable activity in The United Republic of Tanzania but there are widespread concerns about its potential environmental and socio-economic impacts based on observation of the global industry.

In recent years seaweed farming has become popular in some coastal areas as a means of income generation. Small-scale seaweed farms on suitably selected sites, some of which are run by groups of women and youth, are scattered along the entire coastline of the country, from Tanga in the north to Mtwarra in the south, and in the islands of Mafia and Zanzibar. Seaweed cultivation has rapidly emerged as one of the major cash crops in Tanga and Zanzibar, producing enough income to cover household costs. The species farmed are Kappaphycus cottonii and Eucheuma spinosum. Kappaphycus cottonii is believed to be indigenous while Eucheuma spinosum and E. striatum were originally imported from the Philippines. There is also potential for the farming of other seaweed species
such as *Glacilaria*.

### History and general overview

The history of fish culture in The United Republic of Tanzania is not well documented. According to Balarin (1985) it started in 1949 with experimental work on the culture of tilapia at Korogwe (in Tanga Region) and Malya (in Mwanza Region) during which many ponds were constructed. These ponds ended up being largely non-productive due to lack of proper management and use of incorrect technology coupled with physical problems such as drought and poor infrastructure. According to reports from FAO, 8 000 fishponds had been constructed in The United Republic of Tanzania by 1968. However, some of the ponds were too small in size (at times as small as 20 m$^2$) and with very low production, probably resulting from poor management.

Water reservoirs constructed for use in homes or for livestock, irrigation and factories or for flood-control were stocked with tilapia. This practice started in 1950 and by 1966, 50 percent of the reservoirs in the country had been stocked by the Fisheries Division. In 1967, the government launched a national campaign on fish farming which was unsuccessful, again due to improper management. In 1972, aquaculture was, for the first time, given some importance in the fisheries policy. After that aquaculture was included in the Fisheries Policy, although always as a low priority sector. Several small aid projects have been directed towards the development of aquaculture in the country but have not had the expected success. Interest in mariculture began with early investigations of seaweed farming including work by Mshigeni who introduced the concept from the Philippines. The first seaweed farms in Zanzibar were started in 1989.

The United Republic of Tanzania has a good potential for development of mariculture. In 1996 a survey was conducted along the entire coastline for selection of a preliminary shrimp culture site, with support from the United Nations Economic Commission for Africa (UNECA). The findings indicated that the country has a big potential for shrimp culture which can be developed from the northernmost region of Tanga to the southern most area of Mtwara. The total area identified as suitable for shrimp farming was 3 000 ha from which potential production was estimated at 11 350 tonnes.

However, seaweed farming is so far the only form of mariculture which can be considered an established success in The United Republic of Tanzania.

### Human resources

Aquaculture in The United Republic of Tanzania is still largely a part-time activity. The total number of people involved in the aquaculture subsector is about 17 100, with 14 100 involved in freshwater fish farming and about 3 000 in seaweed farming. The industry is dominated by integrated freshwater fish farming whereby each farmer owns an average of one small fish pond. Mariculture is dominated by seaweed farming where farmers own small farms of an average of 50 ropes of 15-20 metres length. It is still a subsistence operation characterized by household ownership. The farmers in both marine and freshwater systems have low levels of education, having rarely gone beyond primary school. The gender ratio is 70 females: 30 males. Youths play an important role in aquaculture in pond construction, management and distribution of fish. Generally speaking, commercial aquaculture is yet to be established in The United Republic of Tanzania. However, there have been several project proposals, especially for mariculture, with much interest indicated in shrimp culture.

### Farming systems distribution and characteristics

The distribution of fish ponds in the country is determined by several factors; some of these are availability of water and of suitable land for fish farming, and awareness and motivation of the community in relation to the economic potentials in fish farming.

There are a total of 14 100 fish ponds scattered all over the country with differing potential from one area to another. Most farmers own small ponds of an average size of 150 m$^2$, covering an estimated 221.5 ha. However, there are four regions which have more than 1 000 fish ponds each. These are Ruvuma (4 942), Iringa (3 137), Mbeya (1 176) and Kilimanjaro (1 660).
Use of land for fish farming is restricted to some specified areas. Where water is available its use is not a problem as it is managed by water rights stipulated under the water policy. Fish farmers use animal manure as the main source of fertilizer for their fish ponds. Most farmers use feeds such as domestic leftovers, maize bran, wheat bran, vegetables and wild grass. Production has been low due to small pond size coupled with poor management. Fish ponds are the predominant production system with only one farm using raceways, for the culture of rainbow trout (*Oncorhynchus mykiss*).

## Cultured species

Several species, both indigenous and introduced, are used or have been used in fish farming in the SADC (Southern African Development Community) region as well as in The United Republic of Tanzania. Although there are many similarities in fish farming in both regions, in The United Republic of Tanzania fish farming is almost totally dominated by the tilapias and species belonging to the genus *Oreochromis*. *Oreochromis niloticus* has become the predominant culture species due to its proven superior growth compared to the other species.

Other species with potential for use in aquaculture include some of the other finfish and shellfish in the brackish and marine waters, such as the milkfish (*Chanos chanos*) and the flathead grey mullet (*Mugil cephalus*). In the freshwater areas these include the North African catfish (*Clarias gariepinus*). The culturable shellfish include shrimp of the family *Penaeidae*, molluscs, crabs, oysters and mussels. Trials have recently been conducted for the farming of the milkfish strain (Kuyui in Swahili) in marine waters.

Species of seaweed farmed in the country are the *Eucheuma spinosum*, *Kappaphycus cottonii* and *E. striatum* which was introduced from Zanzibar and originally came from the Phillipines.

## Practices/systems of culture

Culture practices in The United Republic of Tanzania include ponds, small tanks and the single raceway. The average size of the ponds is 150 m², covering a total of 211.5 ha. The total production estimated from extrapolation of these figures is 1 522.80 tonnes. There is only one commercial fish farm that produces the rainbow trout (*Oncorhynchus mykiss*), situated in Arusha. This farm is 25 m by 25 m in size. The production from this farm was 5 tonnes in 2002, 6 tonnes in 2003 and 7 tonnes in 2004. It is expected that production will increase to 15 tonnes by 2006 and 30 tonnes by 2007. Tilapia and catfish are usually farmed in ponds and tanks. Rainbow trout was introduced in the rivers of the northern and southern highlands in the pre-colonial period. The main purpose was to stock the rivers for fishing for sport. In seaweed farming farmers practice the fixed off-bottom method. The raft method has also been tried on an experimental basis in the Tanga region.

### Sector performance

#### Production

According to the Fisheries Division production of freshwater fish is estimated at 1 522.80 tonnes for tilapia, valued at US$ 1 327 637.30, while the actual production of rainbow trout was 7.0 tonnes in 2004, worth US $18 308.63. Production figures for catfish are not known. 1 500 tonnes (dry weight) of seaweed is produced from the marine waters, but it is only for export, from which the earnings are US$ 209 241 (1 US$ = 1 147 TShs, ie, Tanzanian Shillings). Efforts are also underway for cultivation of shrimp and other marine finfish and non-finfish organisms.

The graph below shows total aquaculture production in Tanzania according to FAO statistics:

### Market and trade

The fish produced from aquaculture is consumed locally. Only one farmer is known to export farmed fish.
(rainbow trout) to a neighbouring country. Seaweed is exported in dry form to Denmark and the United States of America. The seaweed exporters buy dry seaweed from farmers and pack and export the product to the importing countries. The price per kilogram varies with species and distance from Dar es Salaam and is approximately between TShs 180 and 220 per dry weight kilogram of *K. cottonii* while that of *E. spinosum* and *E. striatum* varies between TShs 80 and 100.

The New Fisheries Act No. 22 of 2003 provides for labelling and certification of aquaculture products.

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<th>Contribution to the economy</th>
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<td>The contribution of the aquaculture sector to national food security and economic development is still insignificant. Annual farmed fish production is extrapolated at 1,522.80 tonnes. This is about 0.435 percent of the average annual fish landings which is around 350,000 tonnes. The impact on poverty alleviation is therefore also insignificant. However, the possibility of an adverse impact on the environment is minimised since it is still at subsistence level.</td>
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At present aquaculture is largely a subsistence activity practiced by poor households in the coastal and inland areas but the benefits arising from it are several: it contributes to people’s requirements for animal protein, particularly in the rural areas where there are no capture fisheries, and it provides employment opportunities and is a source of income.

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<th>Promotion and management of the sector</th>
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<tr>
<td>The Fisheries Division is vested with administrative control and management of aquaculture. Its specific responsibilities are formulation and implementation of policy; formulation of the Fisheries Act and associated regulations; enforcement of fisheries-related legislation; management of fisheries resources for sustainable utilization; and involvement of fisheries stakeholders, including those involved in aquaculture, in all aspects of resource management. The Director of Fisheries is assisted by Assistant Directors of Fisheries in the areas of Development and Planning, which includes the aquaculture sub sector; Research Training and Statistics; Surveillance and Control and in Quality Control.</td>
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The role of and support to the private sector associations include creation of awareness on the rational utilization of resources through seminars, workshops and sectoral meetings and informal training of the private sector on key issues such as fisheries resource utilization.

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<th>The governing regulations</th>
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<td>Aquaculture is managed under the Fisheries Policy of 1997, the Fisheries Act No. 6 of 1970 that was amended to Act No. 22 of 2003 and the Principal Fisheries Regulations, 2004. There are also other related acts and regulations. The purpose of these regulations is to protect the environment, the producers and other resource users and ensure the safety of aquaculture products. The main regulations governing aquaculture therefore include the following Fisheries Legislation, international protocols to which The United Republic of Tanzania is a signatory or a member by accreditation (e.g. CCRF - Aquaculture, i.e. the aquaculture section of the FAO Code of Conduct for Responsible Fisheries) and all other legislation on environmental and water resources management.</td>
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Several measures have been adopted to attain the objectives relating to better management. These include creation of awareness in the community on sustainable aquaculture through seminars, meetings and workshops and provision of low interest loans and a three-year tax-free period for investors in commercial aquaculture through the National Investment Center (NIC). Other initiatives include the amendment of the Fisheries Act No. 6 of 1970 to include aquaculture, development of mariculture guidelines, production of a fish farming booklet and training of aquaculture personnel at different levels.
The Fisheries Division is responsible for the formulation of policy and legislation. It is also required to provide support for the implementation and enforcement of the fisheries policy and the fisheries legislation. All these are executed in collaboration with entities such as the local government, research institutions, non-governmental organizations and the fisher community.

### Applied research, education and training

The United Republic of Tanzania has several institutions responsible for fisheries research, education and training. The Tanzania Fisheries Research Institute (TAFIMA) has overall responsibility for all the research on fisheries; the Faculty of Aquatic Sciences and Technology (FAST) at the University of Dar Es Salaam and the Sokoine University of Agriculture (SUA) are both responsible for carrying out research and training on fisheries. The Mbegani Fisheries Development Centre and the Nyegezi Fisheries Institute are involved in training.

The government sets research priorities through the research institutions. Decisions are based on both long term criteria, for planned development, and short term requirements, such as an issue that calls for an immediate response. Government institutions are involved in setting research priorities, in funding research and disseminating research findings and in training of researchers.

Non-governmental institutions also fund research and collaborate with farmers on developing and implementing research projects and information delivery systems.

On-farm participatory research on aquaculture is not yet practiced because the industry is still at the subsistence level.

### Trends, issues and development

The Fisheries Policy was formally Endorsed in December 1997. This document establishes the development priorities of the aquaculture sub sector and was followed in 2003 by the amendment of the Fisheries Act No. 6 of 1970. Subsequently the Fisheries Regulations were also amended, in 2004.

The Fisheries Division has developed a strategic plan that subsumes an action plan which is reviewed annually. Studies and trials have been undertaken to assess the viability of expanding aquaculture through diversifying production into other species, and developing the export market. The only aquaculture product exported is seaweed, which has shown an upward trend. However, the vast potential for mariculture is so far largely untapped. There has not yet been any move to integrate aquaculture with other sectors such as the environment because the industry is still at subsistence level. However, in anticipation of the projected development of commercial aquaculture and the possibilities of its negative impact on the environment several management measures have been proposed and already put in place.

### References

**Bibliography**

FAO publications related to aquaculture for Tanzania.


Government of Tanzania. Background document on mariculture issue profile


Government of Tanzania. Tanzania Coastline Survey - For Preliminary Shrimp Culture Site Selection (First preliminary report)

### Related links

FAO FishStatJ – Universal software for fishery statistical time series