

1.2 Project Idea for Technology 1: Sustainable Inland Culture Based Fisheries (SICF)

Development of Inland Culture Based Fisheries (ICBF) for Enhancing Livelihood and Food Security of Communities Vulnerable to Climate Change in the Dry Zone of Sri Lanka

1.2.1 Introduction and Background

National Food Security Survey of 2009¹ indicates that only 36.4% of households in the poorest quintile reported having had adequate food supply for every day in the past 12 months compared to 91.4% of the richest quintile. Increasing population pressure, decreasing arable agricultural land and poverty are the main challenging issues that render achieving the national level food and nutrition security in Sri Lanka. In spite of these issues rural agriculture sector which holds majority of the poor has been suffering from vulnerable effects of climate change vagaries. Hence, the impending vagaries of CC further accentuate food and nutritional security and trim down agricultural development such as raising agriculture's contribution to economic growth, incomes and living standards of farming community, consumer welfare, and agriculture's sustainability.

In Sri Lanka, 189,941 ha of natural and quasi-natural inland waters are existing including large, medium, minor irrigation reservoirs, non perennial small reservoirs, Mahaweli reservoirs, upland hydroelectric reservoirs and floodplain lakes.² Approximately 12,000 perennial, large reservoirs (<100 ha in surface area) and non-perennial small reservoirs, locally referred to as seasonal tanks, often <20 ha at full supply level (FSL), are mostly located in the dry zone (<187 cm annual rainfall) of the country. These reservoirs, fill during the north-east monsoonal period in October to December and almost completely dry up for 2–3 months (July – September) of the year which could have the potential for development of Inland Culture Based Fisheries without causing impediment on their primary use which is irrigating paddy fields and other uses of bathing cattle and domestic uses. Hence, Inland culture based fisheries have a potential as a non-competitive, complimentary resource to maximize the benefits from freshwater resources and enhances food security for the practitioners and the nation as a whole.

In many Asian countries, fish is one of the most important good quality animal protein food sources and a very good source of long-chain polyunsaturated fatty acids available for human consumption. In Sri Lanka up to 80% of the total animal protein requirement is met by fish products with per capita fish consumption

¹ National Food Security Survey, 2009

² Anon, 2006

increased by 38% in the last two years (Figure 1.1). Statistics also indicate that with the development of inland fishery, per-capita fish consumption in the land-locked regions such as Anuradhapura and Polonnaruwa districts has exceeded the average national per-capita fish consumption.

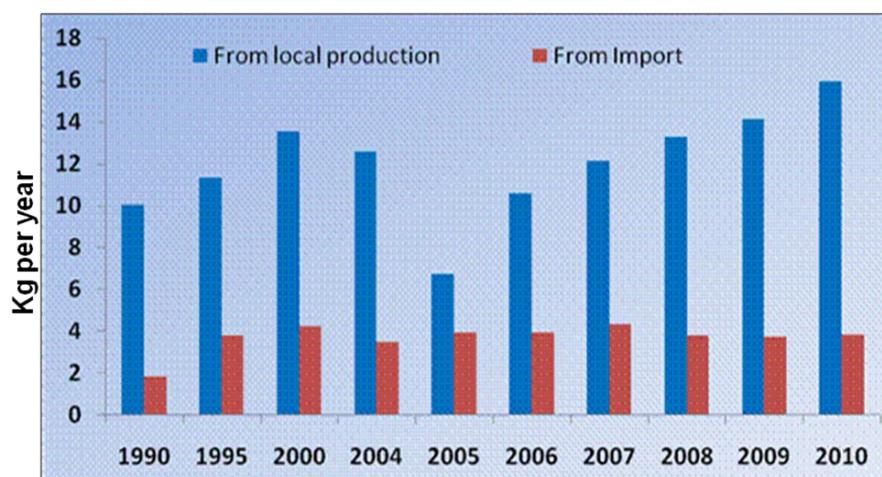


Figure 1.1: Fish Consumption Pattern of Sri Lanka from 1990 - 2010

In Sri Lanka, reservoir fishery as the main aquaculture activity practiced currently provides significant contribution to food and nutritional security especially of the rural areas in the interior regions of the country and has other benefits such as providing supplementary income for farmers by creating new job opportunities in the rural communities, and making available animal protein at affordable prices to avert malnutrition problem in the country.

Sustainable Inland Culture-Based Fisheries technology was favored by the MCDA process and ranked as the most promising adaptation options for Sri Lanka. This technology has been around for long periods and cost less to implement, but have not been fully utilized due to various constraints that exist in the operational/institutional area.

1.2.2 Objectives

- The primary objective of the project is to increase the livelihoods of 30,000 beneficiaries engaged in the production of inland culture-based fishery in 3,000 minor perennial (<100 ha at FSL) and small non perennial reservoirs (<20 ha at FSL) in the Monaragala, Hammbanthota, Anuradapura, Kurunegala, Vavuniya and Kilinochchi districts in the dry zone of Sri Lanka.
- To increase annual household incomes of beneficiaries by 100%
- To reduce pressure on land and introduce CBF as an alternative and supplementary source of income in the targeted rural communities.

1.2.3 Outputs of the proposed project

To achieve the targeted increase in production, the project will set up the following infrastructure:

- Five fish breeding farms with 2,000 m² tank area
- Ten hatcheries with 20,000 m² fry to fingerling raising operations
- Supply of 200 fishing vessels
- Provided fishing gear for CBF communities
- Improved marketing networks of inland fisheries

It will also produce the following;

- Manual of operations with guidelines on codes, standards and procedures
- Training manual on best hatchery management practices and fry to fingerling production
- Make available of extension materials for farmers and hatchery owners
- Status reports

1.2.4 Relationship to the country's sustainable development priorities

Mahinda Chinthana – Vision for the New Future is the Government of Sri Lanka's Ten Year Development Policy Framework³. The plan for the Fisheries and Aquatic Resources Sector 2007–2016 places high priority on inland fisheries and aquaculture production. It proposes to increase aquaculture production from 36,530 mt in 2006 to 74,450 mt in 2016, an increase of 104%.

The plan identifies the following strategies to develop culture-based fisheries in inland waters and to achieve this targeted increase in production:

- Increase fish production in minor perennial reservoirs and seasonal tanks through
- culture based fisheries;
- Increase Indian carp production through stock enhancement programmes in major and medium perennial reservoirs

Fish is the primary source of animal protein consumed in the country. The per capita fish consumption increased from 11.4 kg in 2009 to 15.7 kg within two years. The Ministry of Fisheries and Aquatic Resources Development expect to increase the per capita fish consumption to 22 kg by 2016 to eliminate malnutrition from the country.

As such, the project is in line with national interests and development priorities.

1.2.5 Project Deliverables

- The project will increase the production of culture-based fishery from the current level of about 5,400 mt to 9,000 mt in 10 years (by 2023)
- Culture based fishery will be introduced to 3,000 seasonal and minor perennial reservoirs with a cumulative surface area of 30,000 ha in the country
- To increase fish breeding centers and hatcheries and produce 75 million fingerlings within 10 years. (2013 -2023).
- Create 10 – 12,000 livelihoods in fish marketing.

³ Mahinda Chinthana Policy Framework, 2005.

The main beneficiaries of the project will comprise of farmers who hold land and cultivate them under the minor irrigation reservoirs selected for project interventions. The village fishing communities, fish vendors will be the primary beneficiaries while those participants in the value chain such as transporters, ice suppliers, other service providers and retailers will also benefit from increased production.

Much of the project beneficiaries will come from very poor background as those who depend on seasonal minor tanks for a livelihood are among the poorest in the country. They farm very small holdings of rice and other food crop land and often subjected to vagaries of weather due to climate change and depletion of catchment forests due to clearing for other economic uses. Village women will have opportunities to increase their incomes by engaging in post-harvest activities such as fish drying and Maldives-fish making. Also, some project districts are in the areas where the residents come from ethnic Tamil minority whose livelihoods have been severely disturbed by damage from the Sri Lanka's civil war.

Development of SICBF in seasonal and perennial reservoirs provides job opportunities; ensure availability of fish for affordable prices as a protein source. The employment generated from seasonal village tank fish culture currently estimated to be around 6, 000 of which 13 percent are women (Siriwardena and Jayakody, 2003). Thus SICBF benefit to improve socio economic situation significantly of the poor sectors of the rural community. The project is expected to provide 30 days of additional work per year to 6,000 members from village fishery communities and part-time employment to 200 people in fish marketing and transportation etc.

Furthermore, Rearing of fish will require farmers to work together to make decisions about the fish-rearing calendar, protecting fish, harvesting etc thereby strengthening the collaboration among them. SICBF is an environmentally friendly activity because there is little or no manipulation of the environment due to adoption of SICBF. However, as it will enhance benefits derived by the local communities from village tanks, SICBF can encourage villagers to protect the surrounding forests that serve as catchments for the tanks and conserve water.

1.2.6 Project Scope and Possible Implementation

The CBF project will make use of the extensive network of minor perennial reservoirs and the seasonal (non-perennial) reservoirs in the dry zone currently used for irrigation purposes to increase culture based fish production. The technology has been successfully practiced with many tanks in the dry zone and the expansion is limited by the capacity to produce fingerlings which is addressed by the project.

In the recent decades, variability of the rainfall patterns is increased and as a result, water scarcity and timing have become a recurrent problem for ICBF in Sri Lanka. ICBF can be impacted by the timing of water availability and the issue can be solved if the fingerling production is coincided when the water is available for stocking.

1.2.9 Budget/Resource requirements

Realizing the target set out for the ICBF development requires undertaking a series of activities covering a range of complex activities that needs to be well coordinated. Therefore, the implementation of them has to be designed as a project implemented over a 10-year period. Requirements of technical assistance, physical developments and financing, operational, project management interventions for each of the key project components were estimated and costed individually to develop the budget.

It is envisaged that the Government will seek donor funds to undertake and finance major activities of the project that will be implemented under the Ministry of Fisheries. National and international technical expertise will be engaged to implement activities in which the agency capacity is limited.

The table below (table 1.3) shows the approximate costs of implementation using a project modality as discussed above:

Table 1.3: Approximate Cost for Implementation of the Proposed Activities of Project 1

| Activity | Cost US \$ million |
|------------------------------------|---------------------------|
| 1. Fingerlings production | 10.00 |
| 2. R&D and Training Facilities | 15.00 |
| 3. Financing and risk management | 10.00 |
| 4. Consumer and producer awareness | 3.00 |
| 5. Marketing Improvement | 10.00 |
| 6. Improve Policy Coordination | 1.00 |
| 7. Project Management | 5.00 |
| Total Cost | 54.00 |

1.2.10 Measurement/Evaluation

The Logical Framework Matrix of the project will contain a detailed Performance Measurement Framework to track implementation progress and monitor and evaluate it during the course of the project life. Such an arrangement will permit identifying problems and undertaking necessary on-course corrections to remedy any problems. The monitoring framework will involve internal monitoring (quarterly) as well as periodic external evaluations (annual or bi-annual) to support the implementation process. End of project result evaluation will be undertaken and incorporated to a Project Completion Report.

1.2.11 Possible Complications/Challenges

Potential challenges to the project implementation will arise from disturbances relating to the natural environment as well as those activities connected to them, which will lower the capacity of the project to reach targets. Identifying such impacts early and undertaking necessary mitigation measures will minimize

disturbances to project implementation. The main anticipated challenges to the project implementation are given below;

a. Water availability: Water levels of minor perennial reservoirs and the seasonal (non-perennial) reservoirs which are used for SICBF depends on the rainfall received from two monsoons and inter-monsoons. Generally, 8-9 months optimum water retention period and 2-2.5 m depth of water at the water body is required for fish to reach marketable size. Unpredictable rainfall changes and changes in rainfall pattern may cause adverse impacts on the availability of water in the reservoirs which may affect on two main sectors of the ICBF; fingerling production and marketing as well as grow out period of the stocked fingerlings in seasonal reservoirs.

b. Scheduling Fingerling production: Climate factors such as temperature, day length modify the growth of fish and thereby can alter the length of the culture period and duration taken for fingerling production. Improved ability to predict changing climate parameters is necessary to understand the nature of such changes and to develop appropriate management techniques to attain improved performance of CBF.

c. Timely Availability of fingerlings: Fish fingerlings have to be made available from fish hatcheries and nurseries in required combination of fish species to stock the tanks at the correct time. Timely availability is critical to ensure right length of growing period to reach the required marketable size. The stocking period arrives soon reservoir is filled from monsoonal rains, and delays can reduce the length of growing period minimizing quality and quantity of harvest.

1.2.12 Responsibilities and Coordination

The Ministry of Fisheries would be the executing agency of the proposed project. **Implementing agency would be the National Aquaculture Development Authority** as the agency directly overseeing the subject and it will host the project. The project management arrangements will have coordination and decision making responsibilities involving all key stakeholders. The establishment of a **Project Steering Committee** under the chairmanship of the Ministry of Fisheries and membership of agency heads of key stakeholder organizations, and a **Project Management Committee** involving staff more closely involved with supervising field monitoring can provide the necessary guidance and troubleshooting.

List of other Stakeholders involved:

- a. Ministry of Agriculture
- b. Ministry of Agrarian Development
- c. Department of Agrarian Development
- d. Ministry of Irrigation and Water Resources
- e. Farmer Organization
- f. Universities – Wayamba, Kelaniya, Ruhuna
- g. National Aquatic Research & Development Agency
- h. Fisheries Societies

- i. Community Based Organization
- j. Central Environment Authority
- k. Sri Lanka Standard Institute

1.2.13 List of References

1. Amrasinghe, U.S. & Weerakoon, D.E.M. (2008) Present status and future strategies for the management of reservoir fisheries in Sri Lanka. Paper presented at the planning meeting of regional project on Asian reservoir fisheries development and management, 14–16 January 2008, Network of Aquaculture Centres in Asia-Pacific, Bangkok.
2. http://www.naqda.gov.lk/fish_production.php
3. http://www.fisheries.gov.lk/English_link/Idiri%20Dekma_DOC.pdf
4. Siriwardena, P.P.G.S. and Jayakody, D.S. (2003) Aquaculture technologies and fishing practices of Sri Lanka. Report submitted to ICLARM on the Strategies and option for increasing and sustaining fisheries and aquaculture production to benefit poor households in Asia. ADB-RETA 5945 Project. Sri Lanka.
5. The National Fisheries and Aquatic Resources Policy, 2006.

1.3: Project Idea for Technology 2: Sustainable Land Management (SLM)

Restoration and Preservation of Highland Productivity Using Sustainable Land Management Practices to Increase Climate Change Adaptability

1.3.1 Introduction/Background

Land degradation problems of varying intensity are experienced in all 48 agro-ecological zones in Sri Lanka due to a variety of contributing factors. The pressure factors that cause land degradation are high population density (330 persons per km²), low per capita land availability (0.13 ha arable land per head) and 33% of the labour force engaged in agriculture⁴. About 17% of the land area is comprised of hilly and mountainous terrain having steep slopes and narrow valleys that makes it highly susceptible to land degradation due to high rates of soil loss (over 100 tons/ha/yr in intensively cultivated land)⁵. Being a food deficit country there is a great deal of effort to increase domestic food production and the high dependence of rural populations on agriculture has driven to exploit agricultural land use as means of poverty alleviation.

⁴ CBSL, 2011 & DC&S, 2002

⁵ Upper watershed Management Project, Final Report, 1997