

Concept Note on Integrating Solar Energy into Shrimp Aquaculture System for Private Shrimp Sector

Context:

Aquaculture is accountable for 50% of the fisheries produced in Bangladesh. It generates 4.4% of GDP, 22.2% of agricultural GDP and 2.7% of foreign exchange. Since the year 1995, the shrimp production in Bangladesh is continuously growing and it has potential to grow even more. The shrimp industry provides direct employment to over 600,000 people including men, women and children who in turn support well over 3.5 Million dependents. About 99% of the pond production area for shrimp and prawn production follows the extensive or improved extensive production system. This means there is ample scope to improve the productivity of shrimps by applying modern technology and good aquaculture practices in its value chain.

Access of electricity being limited to 79% is one of the major hindrances towards cohesive economic development of Bangladesh. Aquaculture sector is not an exception in that regard. Due to the lack of main grid electricity supply in most of the shrimp producing areas of the coastal belt, modern technological options are not being available to the grass root shrimp producers. This results in high mortality rates (60%-80%) of the immature shrimp and prawns. While the government of Bangladesh is promoting the use of solar powered irrigation systems in the agriculture sector all over the country through IDCOL, based on a concept of a mix of subsidies (40% grant and 40% concessional loans, at 6% interest rate) the nation-wide adaptation of solar irrigation systems is moving on a slow rate. Then again, no similar scheme is available for the sector of aquaculture till date.

The major shrimp producing districts are Bagerhat, Satkhira, Pirojpur, Khulna, Cox's Bazar and Chittagong. Recently farmers especially in the Bagerhat and Pirojpur districts have begun shrimp farming in their paddy fields. Traditionally shrimp farming began by trapping tidal waters in nearby coastal enclosures known as 'Gher' where no feed, fertilizers or other inputs were applied, with an increasing demand from both national and international markets farmers started to switch over into improved extensive and semi-intensive systems.

The current intervention aims to introduce RET solution into shrimp culture, especially in shrimp production process, in order to enhance productivity and improve socio-economic conditions of the extensive shrimp farmers of Bangladesh and feasibility study to produce solar energy by partial covering of shrimp pond. This pilot project will accelerate the ongoing transformation process of extensive to improved extensive and semi-intensive systems.

Proposed Intervention Summary:

The pilot intervention is based on the recommendations from a recent scoping study conducted by GIZ, focused into “Scope of incorporating RE technologies in shrimp value chain of the southern Bangladesh”. The pilot intervention will introduce active water supply systems for traditionally clustered ponds by the help of PV technology. Additionally, PV based airlift systems will be incorporated to break the naturally occurring stratification of ‘stagnant’ water bodies. These type of equipment is expected (and proven also in other systems) to support a continuous water circulation with the effect that oxygen balance will be established in all levels of the water body. This will help to remove zones with low Dissolved oxygen (DO) and will have a positive effect on the feed uptake of the shrimps as they find favorable conditions even at the bottom of the pond, where a low DO environment prevails. In accordance with the pond carrying capacity (biomass and related 24/7 oxygen demand of living animals and biomass in decay) a management model has to be passed with a (Post Larva) PL stocking density in the range of up to 10 PL/m² (mortality up to 50 %) which an improved pond management will bring. A monitoring system for common water parameters will also be established (DO, pH, alkalinity) for any pond under operation and results will be recorded. This task will be given to the women in the family as the reading should be done twice daily. Other good aquaculture practices such as pond depth maintenance, regular cleaning, etc will be incorporated too.

The intervention will be taken in consultation with the Ministry of Fisheries and Bangladesh Fish Research Institute (BFRI). At first, 1 pilot project (if possible 2) will be installed in Bagerhat or Satkhira region with a solar panel capacity of 10 kwp , covering medium/large shrimp farmers. M/S Rafid Aquaculture Ltd. has been chosen as one of the potential implementing partner. This firm located at Mongla, Bagherhat and owned by Mr. Salim. He is one of the established aqua culturists in Khulna region. He has around 125 acers of pond. It was found that Mr. Salim’s farm is suitable for piloting in terms of pond size and knowledge of shrimp farming of the owner. He is one of few farmers who could avoid recent EMS outbreak with caution. He is interested to participate in pilot project with his establishment.

In this pilot project one medium surface pump will be installed to create artificial current inside the pond and increase DO. It is expected that artificial current and increased DO will help to increase the productivity of shrimp firm.

Another objective of the pilot is to monitor effect of shadow from Solar panels installed on shrimp pond with support from BFRI. If there are no negative effect or minimum effect found for shadow on pond, those area can be used not only for shrimp firming but also for solar power generation.

Target group(s) and other beneficiaries:

The pilot project will target the farmers producing shrimp in semi intensive production method where the stocking density is 1.2 -3 PL/ m².

Beneficiaries will be the shrimp farmers and technical service providers for shrimp farmers available in southern and eastern part of Bangladesh.

Expected result of pilot project: Successful completion of this pilot project will bring qualitative change of the shrimp farming sector in Bangladesh. Renewable energy use will significantly increase productivity of shrimp farm and create new jobs as technical service provider in this sector. This pilot project will also check the feasibility of producing solar energy using the surface of shrimp pond.

Proposed financial model: It has been found that this RE technology may not economically feasible in compare to diesel based existing technology; however existing financing model for solar powered irrigation pump known as IDCOL model be applied for aquaculture as well.

Proposed technical diagram of pilot project:

