

1. INTRODUCTION

The state of West Bengal (lies in between $21^{\circ} 38' \text{N}$ to $27^{\circ} 10' \text{N}$ and $85^{\circ} 38' \text{E}$ to $89^{\circ} 50' \text{E}$) having a lot of perennial freshwater bodies of lentic and lotic water categories. The lentic category (contain stagnant waters or retain water permanently) includes temporary ponds, fish culture ponds, pools, ditches, paddy fields, ponds, lakes, dams or reservoirs etc. Whereas the lotic categories includes (contain flowing waters) rivers (with peak head water zone, mountain torrent zone and fool hill torrent zone), streams (with permanent streams of non mountainous part and streams of rocky mountain region), canals (like irrigation canals, and drainage systems of urban and semi urban areas) etc. These water-bodies accumulate many varieties limno-fauna, of which “Molluscs” constitute an important, weighty benthic macro-fauna. There are nearly 199 fresh water and saline water molluscs observed throughout the West Bengal and India (Thakur *et.al.*, 1992). Among such numbers of mollusc, only eight freshwater species have commercial market values (edible and non edible value) to many sections of people who inhabit in the rural, semi urban and urban areas of West Bengal. Few of them have great demand to the people. For example, first of all like, *Bellamyia bengalensis* (edible as well as medicinal value, non edible value added importance i.e. good demand in lime industry, making of several handmade showpieces etc); secondly, *Lamellidence* spp (edible value and posses good demand in jewelry market for the production of pearl etc); thirdly, *Pomacea* spp (has demand in ornamental fish market, due to its attracting colour) etc. (Mukherjee and Basu, 2008).

1.1 Availability and area wise commercial importance of molluscs in West Bengal

As per the availability and commercial importance in West Bengal, the details of some fresh water molluscs are described (Subba and Mitra 1982, Mukherjee and Basu,2008, Mahata, 2012), in Table 1.

Table 1: Availability of fresh water “Molluscs” and their importance in the state of West Bengal.

| Sl. No. | Name of the species | Local Name (Bengali / Regional Dist. language) | Area wise market demand | Importance |
|---------|-------------------------------|---|---|--|
| 1 | <i>Bellamyia bengalensis</i> | Ganri/Googli/Samukh | In all over West Bengal it has market value. But it has good & steady market demand, mainly in south-western part of West Bengal like; Purulia, Bankura, East and West Midnapore, Hoogly, Howrah, Burdwan, Kolkata, North and South 24 pgs etc. | 1. It has a great edible value. 2. The shell of this snail are used in making several kinds of showpieces and room decorative items. 3. Its shell has great demand in lime industry and poultry feed industry. |
| 2 | <i>Pila globosa</i> | Apple shamukh / Shamukh | -do- | 1. It has edible value. 2. Its shell part are used in lime industry and poultry feed industry. |
| 3 | <i>Pomacea canaliculata</i> | Sonali apple shamukh / Golden apple snail | All over West Bengal | 1. Due to its attracting colour, it is kept in aquarium and thus it posses a good market value in ornamental fish world. |
| 4. | <i>P. bridgesii</i> | -do- | -do- | -do- |
| 5. | <i>Brotia costuila</i> | Chenkal/ Chikangbook | Upper part of West Bengal like Darjeeling etc. | 1. Its occurrence and edibility is centralized only in northern part of West Bengal. |
| 6. | <i>Lamellidenc merginalis</i> | Jhinuk/ Katli | Purulia, Bankura, East and West Midnapore, Howrah, Kolkata, North and South 24 pgs etc. | 1. It has edible value. 2.This bivalve has significant importance due to the production of “Pearl”, which has a good and steady market demand in jewelry industry. |
| 7. | <i>Lamellidenc corrianus</i> | -do- | -do- | -do- |
| 8. | <i>Indonia caerulea</i> | Nadi chachni /Nadi sunti | Mainly western part of Purulia and Bankura. | 1. Its occurrence & edibility is centralized only in western part of West Bengal. |

1.2 Socio-economic importance of *Bellamya bengalensis*

“Mollusc”, is one of the definitely characterized and successful groups of animal, which have a very potential imperative role in economical development of the society. Among these all fresh water molluscs in West Bengal, *B. bengalensis* carries a potential role in socio-economical growth. Because, this snail interacts more intimately with the local indigenous people than other group of molluscs of West Bengal. And thus in West Bengal *B. bengalensis* has an admirable demand which contributes a good and steady market potentiality, mainly in south western part of West Bengal i.e. East and West Midnapore, Purulia, Bankura, Hoogly, Howrah, etc. Depending those markets, a large quantity of people, able to capture their daily livelihood as well as maintain their family. It was reported, these fresh water snails contribute a very cheap source of protein (Baby *et.al*,2010), particular to those class of people (such as tribal community and people belonging under BPL level) who cannot able to buy fishes, meats etc, regarding economical setback condition. Not only that, people (basically, East and West Midnapore, Bankura, Purulia, Howrah, Hooghly etc) belonging under middle class, higher middle class and higher class, they also consume *B. bengalensis* almost in regular basis. Doctors often recommend this snail for consumption to those people who are suffering from vision problem, bone related problems, stomach upsets etc. So, in this regards it can be stated that, regarding this noble nutritional values of *B. bengalensis* , its edibility is very much accepted to the different economical class of consumers in West Bengal.

1.3 Potential Bio-economical importance of *Bellamya bengalensis*

Food security which is a flexible concept, originated in the mid-1970s, at the national and international level, regarding food crisis for assuring the availability and price stable basic foodstuffs. According to very recent data, it was noticed, in many states of India, there almost one in two children shows stunted growth with underweight. Along with, women are also facing anemic and others nutrition oriented disorders. (GOIPC, 2013). Even also it was also realized that the rates of pseudo nutritional requirements is increasing rapidly among the people, belonging under high economical background. Not only that, people also facing impurity within their daily feedstuff. Beside these, statistical report, it was also observed (2011-12) that the poverty ratio of India was 21.9% and in West Bengal it was 19.98 % (GOIPC, 2013). If this data was separated as rural and urban poverty ratio in West Bengal, then it would be 22.52 % and 14.66 % (GOIPC, 2013) respectively. So, in these circumstances, people always search for those nutritious food items, which carry adequate level of macro and micronutrients in terms of cheap rate that is indicating about the price stable basic foodstuffs.

It was narrated that, *Bellamya bengalensis* has potential nutritional and medicinal value. Generally people who are living, north-eastern part of India (Bihar, Nepal, West Bengal, Bangladesh, Assam etc), consume this snail on the believe that, they can able to get rid from several diseases, such as- rheumatism, cardiac diseases, controlling blood pressure, asthma, rickets, calcium metabolism, nervousness, vision deficiencies, gastric problems etc (Mahata, 2002 ; Mukherjee *et. al.*, 2008, Pravakar and Roy, 2009; Baby *et al.*, 2010, Chakraborty, Mukherjee and Maity, 2015). As demand: resource ratio is mounting day by day, availability of common animal nutritional resources (i.e. fish,

chicken, mutton etc) are showing decreasing trend, side by side product (mainly edible common consumable animal sources) price is showing increasing trend. For these issues people cannot be capable to procure their desirable food items. In these circumstances, *B.bengalensis* can be a solution against these present food security problems. Because *B.bengalensis* can act as an easily available source of low cost animal nutrient, which can provide several indispensable micro and macro nutrition, to all economical class of consumers of our society.

1.4 Potential importance of value addition of *Bellamya bengalensis*

Good entrepreneurs always look for opportunities to “add values” or “enhancement of values” to their products (before offering the product to customers) which increases their selling price as well as level profit of by selling same product. So, value addition refers to the "Extra" feature(s) of an item of interest (product, service, person etc.) that go beyond the standard expectations and provide something "more", even if the cost is higher to the client or purchaser, for example; converting fruit into jams, pickles, fruit leather, cider and various bakery goods etc.

As *B. bengalensis* has potential marketing importance and can provide desirable nutrition in terms of cheap rate, compare to other commodities. So, here are ample of scope to produce several value added items (mainly edible product) by utilizing this snail. As this snail is occurred with very low investment of money, so, here it can be used to formulate more than a few nutritional value added edible items, in the both form of ready to eat and ready to cook food products. These food products can be act as the good source of protein and other required essential nutritional parameters in the form of soup, protein powder, curry, canning, pickle, smoking product etc. Among the non edible forms, this

snail can be used in lime industry, using its shell an assortment of showpieces, room decorative items etc can be prepared. Not only that, shell-dust of this snail, can be used in poultry feed industries, as a ready source of calcium and others minerals, lime industry etc. So here, it can be assumed that, if proper value added product can be made from *B bengalensis* like curing, canning and other varieties of edible food products, pharmaceuticals and medicinal product, handmade product, showpieces, etc, the door can be opened to generate several small scale as well as large scale industry, and that should be able to produce a real economic growth of our society.

1.5 Requirement of sustainable aquaculture of *Bellamyia bengalensis*

Generally, demand of any product makes direct relationship with supply, where price become constant. But, when demand is constant, if supply source indicates by some means of its decreasing trend, there price makes inverse relationship with supply. So, here it can be enlighten that, to make direct relationship of supply, with demand,(which means to make availability of *B. bengalensis* with its constant rate of demand) sustainable development is essential. There are some reasons behind it:-

- (i) At the present time, due to the aggression trend of urbanization, natural water bodies is decreasing day by day, regarding this condition natural collection of *B. bengalensis* may be hampered in future.
- (ii) Moreover, to keep supply of *B. bengalensis* against the constant demand, the availability of this snail may be once limited. So, to cope up these problems, mass culture shall become the only solution, to keep its constant supply chain against the demand.

- (iii) People are now being conscious, about its nutritional and ethno medicinal importance. So, in future, this snail can be utilized to formulate in some form of pharmaceuticals, medicinal and other commercial value added items. So, to keep its invariable supply in these regards, scientific culture practices is to be needed to initiate.

Not any scientific culture practices (neither as experimental trial basis nor commercial scale) of *B. bengalensis* has been initiated in this state as well as other part of India. Whereas, the culture and management practices of different types of fishes, shrimp/prawn, crab and other marine form of oysters and clam etc were already standardized. More over lack of study was carried out on its behavioral patterns. So, proper sustainable development of *B. bengalensis* with the aid of proper scientific culture methods, may be a compulsory task for future generation. And that's why before initiation of mass culture practices by encompassing *B. bengalensis*, it is very essential to have a sound knowledge about its behavioral pattern, like, breeding, feeding, maturation status etc. Hence, it can be proposed that, beside to make available with its increasing demand, this mass culture or sustainable aquaculture shall able to form or generate a small as well as large-scale industry. Moreover, around this industry a community, which are economically lagging behind, may get their economic benefit.

1.6 Industrial Prospect of *Bellamyia bengalensis*

Industrial prospect of any biological organism consist, which have a good biological/organic values (manly nutritional and other kinds, which can fall under human requirements) values and that can be channelized, to achieve the marketing goal. Now, *B. bengalensis* is confined (marketing and other things) mainly within the rural class of

people. And if production, value addition etc. can be started around these groups of people, they should be able to make an economic benefit for themselves. That will lead to open the door, to generate several small and large scale industries to the fisher folk as well as poor people also (Mukherjee and Basu, 2008). From these ideas, it can be believed, if proper utilization of *B. bengalensis* can be possible systematically and scientifically, with a concept of **industrialization**, a real rural development may be initiated and will lead to create advancement and improvement of our society. So, this present study based on the invention of that goal which can be able to bring a novel model, towards the “Scio-economic improvement” in this society.