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INDIGENOUS KNOWLEDGE ASSOCIATED WITH CONSERVATION OF CHOCOLATE MAHSEER *(NEOLISSOCHEILUS HEXAGONOLEPIS)* BY THE WAR-JAINTIA COMMUNITY PRACTICED IN MEGHALAYA

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ABSTRACT : The present study aimed at documenting the traditional knowledge of the tribal peoples of Meghalaya and to explores the extent of conservation effort of a threatened fish species namely *Neolissocheilus hexagonolepis* by the War-jaintia community of Meghalaya by being backed up by the traditional knowledge . This is an important game fishes which were abundant in the streams and rivers of Meghalaya but now a days the fish population has declined to a great extent due mainly to anthropogenic activities. As a primary effort the War-jaintia community initiated conservation of chocolate Mahseer by earmarking in a small stretch of the stream where prohibition of fishing is effectively implemented and help providing a congenial habitat for normal propagation . Conservation of Mahseer can also provide an opportunity for the people to propagate these fishes for commercialisation along with the advancement of science and technology. The application of modern scientific knowledge could further enhance the conservation techniques. Moreover, the efforts is thus effective in arresting the lost of biodiversity which could be adopted in various part of the country.It is interesting to note that population decline of a species invoke conservation ethic among tribal community with the appraisal that decline of such a species will not only effect their livelihood but ultimately affect the entire animal community.It is encouraging to other hilly communities also by being aware of the conservation activities of the War-jaintia community.

Keywords: Chocolate Mahseer, Conservation, Threatened fish, War-jaintia community

INTRODUCTION:

Conservation of biodiversity and other natural resources in Meghalaya over a long period of time is the outcome of consolidated efforts of the cultural, spiritual and other likely social institutions that have guided the local communities in understanding the importance of natural resources on their daily life. Despite richness of indigenous knowledge among tribal communities, and efforts of sustaining local biodiversity through several institutions, though informal but it is interesting to note such an interesting and relevant information never given due attention by any institution or are not focused in research journal, even there is dearth of any attempt to

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start any sustainable programme. (Ramakrishnan,2007). The North-Eastern states of India lying at the foothill of Eastern Himalaya is identified as one of biggest hotspots of freshwater diversity by the World Conservation Monitoring Centre (WCMC,1998). The hills and the undulating valleys create opportunities for the formation of large number of torrential hill streams which on its way join big rivers, and finally merge with Ganga-Brahmaputra-Barak-Chindwin-Kolodyne-Gomati-Meghna systems (Kar, 2006).

The knowledge of conservation of environment, natural resources and biological diversity became a part and parcel of tradition and culture of the tribal community of Meghalaya. Interesting to note that, from time immemorable, the native tribes were not only well equipped with the knowledge of the importance natural resource and its conservation procedure. The tribal peoples of Meghalaya were quite appraised, from time immememorial of protecting the biological resources an is reflected in their efforts towards preservation of the sacred groves,. Which was not only being practiced from ancient times but now become a tradition for the entire community of Meghalaya.

The Chocolate Mahseer (*Neolissocheilus hexagonolepis*) is one of the important indigenous fishes of Meghalaya region and is to be considered as single candidate species for culture in major water bodies due to easy availability. Now it is a realised fact that the number of this species is being declined by days due to several several factors including overharvest (Sarma and Bhuyan, 2007). Realising the need to implemented immediate conservation policy it is realised again that *in-situ* conservation following the indigenous procedure may help increasing population of the fish instead of putting it into endangered list.

MATERIALS AND METHODS:

The selected area of the investigation is an approximately 700 m stretchs along the Amlayee stream in Nongbareh village located in the district of Jaintia Hills under Maghalaya State and it lies between the 25^0 $10^/$ to 26^0 $50^/$ North latitude and $89^0 45^/$ to $92^0 47^/$ East longitude. It is a freshwater stream initially originating from a spring flows gently downward crossing through the Nongbareh village, and ultimately falls into a deep gorges. Then following southwest directions joins a major river, Umngot that finally flows towards Bangladesh. The areas of study are indicated in Fig.1 below :

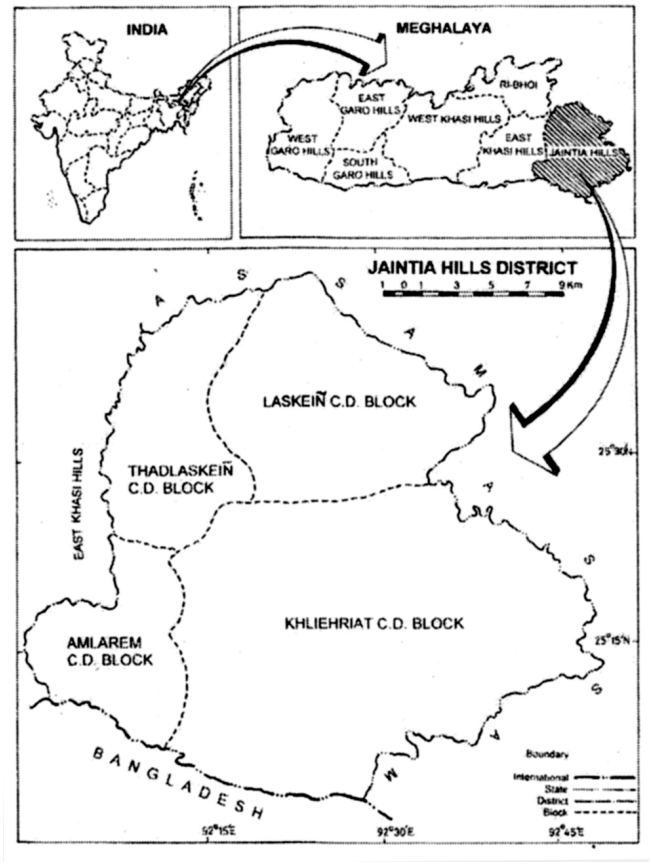

Fig. 1. Location of the study area and the path of river

The present investigation is a qualitative study conducted for four months, i.e March, 2010 to June, 2010. The fish samples were collected by using hooks and observations were made on fish species, size and length. The information related to fish population and degradation of habitat due to human intervention were collected by interviewing local inhabitants and site study with a view to device measures and procedures for conservation and sustainability involving local people.

Brief history of fish species

Mahseer is one of the most important game fishes in India. Various opinions have been expressed about the etymology of the term Mahseer and it is generally found in its large size. Mahseer juveniles are found in clear gravely hill streams,bottoms covered with gravel. In India, the species is said to be having a restricted distribution in the water bodies of North-Eastern States, namely Assam, Arunachal Pradesh, Meghalaya, Sikkim, and North Bengal,while Chacko et al,(1954) and Alikunhi (1957) reported the occurrence of the species in the river Cauvery of Tamil Nadu.

Outside India, the species was reported from Bangladesh, Bhutan, China, Indonesia, Malay-

sia, Myanmar, Pakistan, Thailand and Vietnam (Jayaram, 1981). *Neolisocheilus hexagonolepis* is abundant in most of the big rivers, lakes and reservoirs of Nepal from 250m to 1500m altitudes, having a preference for a water temperature range of 10°C to 30°C (Rai and Swar, 1989). *Neolissocheilus hexagonolepis* can be categorised as a coldwater rheophilic fish. Habitat ranges from bottom to column,though occasionally rises to the surface for nibbling the flowing food items. The fish naturally favours to inhabit fast flowing waters. The chocolate Mahseer is a voracious omnivorous (Talwar and Jhingran,1991) subsisting on gastropod shells, filamentous and planktonic algae, vegetables debris, sand and mud are also encountered in the stomach. The fish has bottom-feeding habit browsing the marginal shallows. In the early fingerlings stages this species feeds mainly on insect larvae, aquatic beetles and flies. Aquatic vegetation and marginal grass constitute the main food found in the gut of advance fingerlings and adults. In relation to the angling of chocolate Mahseer as a part of sport fisheries, artificial baits are of no utility. It usually prefers flour dough with aroma. Sweet balls (bundia) as baits are found to be very effective. It also prefers dead fish fingerlings, earthworms and shrimps as evidenced by easy catch by hooks. The breeding seasons as reported ranged from May-June to August –September (Ahmed,1948 and Sarma, 2009). Prolonged spawning season extends from May to September. The male fish attains maturity within two years while female mature in three years. Females are usually larger than males. A mature male weighs 300 to 400gm. While female weighs 600-800gm at first maturity. Gonads starts developing in March and the reproductive phase lasts from April to October. This is in conformity with the reproductive cycle of the other cyprinids.

RESULTS:

After interviewing local inhabitants of Nongbareh village it is found that the fish population,prior to the conservation, in the Amlayee stream diminished markedly mainly due to excess water loss during the dry season, leaving only small patches of pools which could support only very small no of fishes. As a conservation measures when the local inhabitants started embanking the stream using boulders and rocks they found that the fish population increased steadily. Along with this local people impose prohibitions of fishing except the sick one . This they did out of the understanding that by eating stream fish all types of disease will be cured, which indicates the therapeutic and nutritive vale of the fish. With these understanding the local inhabitant along with the soil & water conservation deptt. Of Meghalayay Govt,.in the year 2000, Started embanking the river upto the lower reaches which in a very short time create a conducive ecological environment with increased population size. Due to the positive impact that was observed, the local inhabitants went on to develop their technique which is ecologically beneficial for the growth of the fish population. In the year 2000, the Govt. of Meghalaya under the department of soil and water conservation has allocated funds for the constructions of permanent embankment downstream which has not hamper the ecology of the stream and also help in increasing the volume of water present at any given time of the year . This has provided good shelter for the fishes among which the chocolate Mahseer population has grown tremendously. It is seen that the fish have developed a tolerance to human which is attributed to their learning behaviour.

During sampling (April, 2010) capture of sexually mature broods is indicative of natural breeding of the fish in the stream. Eggs are

yellowish in colour and spherical in shape. Males attains maturity faster female and on slightest pressure on abdomen milt oozes out when the females of the same size group does not indicate any maturity sign.

Some of the threat that interferes with conservation efforts are mentioned below

Habitat Destruction

Any form of sustained unscientific and profit making approaches in human activity leads to the modification of natural environment., which successively affect the relative abundance of species and if this continues that will lead to extinction of specific species and loos in biodiversity. It is evident now that extinction of most of the fauna and flora, during 1000 AD to 2000AD, from particular region is mainly due to unscientific approaches of human being towards nature . The forest from which mankind had derived all his basic requirements is now being cleared to make way for human settlement and or fuel in the form of firewood. This random felling of trees has resulted in deforestation which severely disrupted the ecosystem. It is intrinsically linked to the loss of biodiversity as original forests host numerous species of precious fauna and flora. Forest also offer climatic and water resource conservation benefits that offers direct impact on biodiversity sustenance and ecological stability. It is now widely recognized that global warming over the past 50years is largely due to human activities and increased release of green house gasses such as carbon dioxide, methane, nitrous oxides, etc into the atmosphere Climate change tends to alter local weather pattern and thus disturbs life supporting natural systems and process that might affect agricultural productivity. Scientists predict that high temperature, drought and evaporation could have several implications to water availability, food security and loss of biodiversity (UNE 1999).

Pollution

Water pollution has been widely cited as a caused of habitat deterioration which have resulted from discharge of waste from human population centre, industrial activities or unscientific mining. A good example of it is the river Lukha in jaintia hills which is now called the "dead water". it is uncertain as to caused the disappearance of fish from these rivers, but one can clearly state that it is either the result of waste discharge from the cement plants or from the leaching of toxic compounds from the mineral resources. In view to Amlayee stream the only source of pollution is through soaps or detergent where the people used the stream for bathing and washing clothes. Because of the embankments the spill of water from this shelter area fluctuates with different seasons. In the pre-monsoon season it is low and so the self-purification of water is reduced to a minimal and as such the water turn milky-white in colour whereas in the in the monsoon it is not encountered. Even though with in such condition the fish population thrive, but the extent of the risk of detergent and soaps is not evaluated.

Over exploitation

The small stretch of the stream where conservational practices is carried out has helped the population of fish to survive, but fishing is thus allowed downstream. In these stretches fishes are not in abundance but somehow are available and seem to take shelter under the crevices of rocks and so catching a fish is time consuming and sometime impossible, and so people have resorted to destructive fishing using toxicants like bleaching powder, copper sulphate, and dynamite. Intensification of fishing when the water level is low also adds to the problem of declining

fish stocks and distribution of fish along the stream is also hampered. Even the remote terrains which are not easily accessible have also suffered severely.

Denial migration

Migration is an important aspect in the life-history of chocolate Mahseer. They migrate to upland stream in search of congenial breeding grounds. This migration is greatly influenced by the intensity of flow of water which usually occurs during the monsoon season when heavy precipitation help in raising the water level and rainfall acts as a great stimulus to the preparation of breeding. But in recent times there has been less rainfall and coupled with abstraction of water the connectivity of the migratory route to the upstream breeding ground is greatly reduced due to the minimal flow of water. Thus the migration of fish is interrupted which hamper the breeding activity. This further alleviates the problem of the declining population of Mahseer.

Poaching

Even though fishing is prohibited in the stream particularly in the shelter areas but there are instances of secret fishing taking place, which further add pressure to the existing population. Therefore concerted efforts are needed to sensitize the local masse about the importance of these vital resources which are considered to be endangered.

DISCUSSION:

Meghalaya is one of the few places which has not been properly investigated in terms of it faunal diversity, but it is seen that it has the required environment for sustenance of different types of animals and in particular fishes. In and around the Amlayee stream, the entire region provides a conducive habitat for the natural propagation and growth of the chocolate Mahseer, which in perspective has seen a slow but continuous growth in number partly due to the efforts of the local inhabitants and also due to favourable ecological condition. It was observed that the breeding season of the fish, according to Sarma (2008) the fish breeds from the month of May to June and August to September. During this time fish always remain in constant motion either towards downstream or upstream. During the breeding seasons this fish starts it upstream migration and spawning takes place on stones and gravels at water temperature of 18°C-23°C (Rai and Swar, 1989). But the biggest threat for the sustenance and survival of Mahseer is the geometric increase in population in one side and at the other side increased encroachment of habitat of the fish, that led to the destruction through changing patterns of land usage and pollutants derived from human activities. Recently it has been observed that Luka river,which is one major river of the district Jaintia Hills has been deteriorated to such an extent that the water is no longer fit for any fish to thrive.

During the course of investigation, it was found that the attempt to conserve aquatic organism has been carried out long time ago when the fish were still in abundance and the natural habitat being untouched by human activities. It shows that our ancestors had far sighted vision that the generation ahead of them would not have enough stock of fish to replenish the stream and also no fish to consume, which is evident with the fact that there is surely a decline in fish population now. The villager participated in every possible effort to conserve the fish for they saw its importance and the success of which we are seeing now. Thus our ancestors showed a perfect example of dedication, intelligence, unity and obedience to nature.

Conservation techniques are by far the most complicated human endeavour put forth for preservation of any organism. Conservation as seen in Amlayee stream has been done without any core scientific knowledge. But due to the sheer perseverance of the locals armed with indigenous knowledge and have at least been able to protect the declining population of Mahseer by providing safe sanctuaries for their natural propagation by implementing rules and regulations which prohibits fishing at the embankment site. The technique could be adopted in various streams and rivers of the region for the survival of the fish population, hence the onus of protection of animals in the region would not be the sole responsibility of the fishery department, non-governmental organisation or the conservation community alone but that joint effort represents the way forward.

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