

The study reveals the aquatic health and wealth of this region and its natural resources. By overlaying all the data on GIS platform and their spatial distribution, a clear status of the fish diversity in this region have been gained and now a better decisions can be made regarding management, conservation, site selection and species information.

Field based estimation of impounded water body is very difficult in nature but geospatial technology makes it easier. In this study, over a period of time quantitatively managed and analyzed the standard classes of impounded water body, Growth rate (GR), water body density and distribution pattern etc. The time series Growth rate and Kernel density (KD) models were adapted to analyse the rapid growing status of water body of the study area. Water conservation policy and increasing growth of aquaculture sites in this entire region resulted in the rising quantity of impounded water bodies in the past few years. Total overall water bodies are tremendously growing from the year 2010 to 2018. It has been observed from the study that impounded water bodies in 2010 was 22790.02 ha., increased to 27006.71 ha. in 2014 and reached a peak at 34202.88 ha. in 2018. Maximum growth rate has been observed at Moyna, Tamluk, Contai-II, Contai-III, Bhagwanpur- II, Nandakumar, Panskura- I, Panskura- II and Sahid Matangini blocks as these blocks are having vast amount of impounded water bodies. The Kernel density (KD) models reveals that high densities areas has been observed in four blocks i.e. Moyna, Bhagwanpur-II, Contai-II and Ramnagar-II blocks within the entire district. Analytical method of impounded water body combined with temporal series entropy model is put forward to estimate the distribution pattern. The calculated absolute Shannon's entropy indicates more compact distribution patterns found in the Moyna zone in comparison to other zones. On the other hand, the dispersed distribution pattern has been observed in Bhagwanpur-II and Contai-II block region. Therefore the status of extensive spatial distribution of impounded water bodies measured in order to get better management of the aquaculture pond and improve the protein requirement of the people in this region. Relationship between geomorphology and concentration of water bodies in this region has also been analyzed and the study reveals that most of the surface water bodies are situated around the basins or in the topographic depressions.

The study also reveals the diversity status, abundance of collected fish species and their distribution pattern throughout the region. Taxonomically classified and available surveyed fish species are identified and a total number of forty six (46) native fish species of eighteen (18) families of seven (7) orders has been recorded. The surveyed information shows that highest numbers of fish species are belonging under Order Cypriniformes (39.13%), Perciformes (28.26%), Siluriformes (19.57%) and others are Osteoglossiformes (4.35%), Synbranchiformes (6.52%) and Mugiliformes (2.17%). Among the eighteen (18) families of total surveyed fish species Cyprinidae family shares the highest numbers of species (39.13%) and others are Channidae (8.70%) and Bagridae (6.52%).

Based on detail market survey throughout the district, among the total fish fauna, nine (9) species (*Notopterus chitala* , *Notopterus notopterus*, *Labeocephalichthys guntia*, *Colisa fasciatus*, *Amblypharyngodon mola*, *Ompok bimaculatus*, *Puntius gonionotus*, *Mystus vittatus*, *Polynemus indicus*) were recognized as a locally threatened category. The preliminary survey shows that there was a low abundance of those species in last few years. Over fishing, pesticides in agricultural field, unscientific fish harvesting and pollutions and many anthropogenic activities (indiscriminate use of pesticides) are the main cause for diversity loss. The proper management and conservation action like restriction of harvesting of fish population size, development of new breeding techniques may protect those species from extinction.

The GIS based multi-criteria evaluation technique (GIS-MCET) is trouble-free and flexible that can be used for suitability analysis. It provides comprehensive and satisfactory database of availability of suitable land for developmental work is in turn will help in solving any specific problem. Priority studies in this area have not yet been considered as socioeconomic factors such as rail-road transport, fishery families, industrial influences, etc.

To increase the fish production rate as well as to identify the fish survival environment in this region the selections of site is an important issue. The distribution of potential and most suitable site for fish farming were analyzed and measured by the Site Suitability for Fish Farming (SSFF) and Site Suitability for Commercial Fish Farming (SSCFF) model using water availability (waterbody density, proximity to river,

precipitations), water quality (pH, DO, Temperature and TDS), slope-soil (slope of the land, soil pH and soil texture), land use types, proximity to industries, density distribution (population, road and railway), proximity to road, market and sub division head quarter, population of fish farmer and outcome of SSFF parameters respectively. The distribution of suitable site has been identified by using multi-criteria geospatial technology and its applications. It is proven that GIS has a capable tool to evaluate and mapping the spatial distribution of suitable site. This study would be enormously useful for evaluating the physico-chemical conditions and fish survival circumstances of the available water bodies. The model based estimated results shows that 77123.40 ha. (19.91 %) area is in suitable, 262351.39 ha. (67.71%) area is in moderately suitable and 47959.93 ha. (12.38 %) comes under unsuitable category in this entire region. The most of the suitable zone has been observed in Moyna and Bhagawanpur-I blocks while Nandigram-I, Haldia, Sutahata, Panskura and some parts of Nandakumar, Nandigram-III and Sahid Matangini etc, blocks has been observed as unsuitable zone for fish farming practices. On the other hand, the 47110.05 ha.(12.16 %) and 83950.54 ha.(21.67 %) area has been found as suitable and unsuitable class for small-scale economic fish farms. Most of the areas of Panskura and several portion of Moyna, Sahid Matangini, Tamluk, Nandakumar-III and Bhagawanpur-I block has been considered as suitable areas for development of commercially fitted fish farm, while Khejuri-II, Nandakumar-I, Nandakumar-II and Egra-I block etc, has been found unsuitable for development of commercial fish farms. The overall result reveals that the existing situation in this region supports promising opportunity to create and run a successful aquatic farm. Sufficient availability of water and environmental qualities for fish growth can be a good influence on small-scale fish farms in this region. But commercial fish farming in this area is also limited by lack of proper transportation facility, which is the substitute of major market and nearest city. The lack of scientific fish farming is the main obstacle for the advancement of the potential aquaculture. The supply and production of fishes are limited, while the demand for nearest cities, emerging markets of urban and town centers are high. Therefore, it is necessary to develop the faster and reliable transportation facilities, and to adopt a useful guideline through scientific training for up gradation of small-scale aquacultures.

Limitation of Research:

1. Unavailability of up to date Government Statistical data on fisheries sector.
2. The insufficient previous environmental data as well as physicochemical data of aquatic bodies' of the region.

Future Scopes of Research:

1. Changing scenario and conversion of crop land into aquaculture land.
2. Socio-economic status analysis of fishing folk community throughout the region.
3. Developing paddy cum fish culture sector in this district.
4. Based on the experience gained during this study, it is suggested that Block level study could be of immense help in characterization and quality improvement of fish diversity.