



IDENTIFICATION OF SUITABLE SOIL PARAMETERS FOR THE GROWTH OF BRACKISHWATER AQUACULTURE IN THIRUVALLUR DISTRICT USING REMOTE SENSING AND GIS

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Abstract:

This paper is study on a identification of suitable soil parameters for the growth of brackish water aquaculture in Thiruvallur district using remote sensing and GIS. The present study area is located in the North Eastern part of Tamil Nadu between 12°15' and 13°15' North and 79°15' and 80°20' East. The base map was created from Survey of India top sheet 1972. The soil map was generated from IRS P6, LISS IV 2011satellite image (scale 1:50000) thematic map and the soil details is obtained from geological survey of India. Using visual interpretation keys, the various types of soil features were identified like as Entisols, Inceptisols, Alfisols, settlement, vertisols, Pondicherry, Reserve forest miscellaneous, etc. The best suitable soil was analysed to give the weight age parameters based on the overlay analysis.

1. Introduction:

The rapidly rising world population is creating a great pressure on land and water space and there is a continuing need to increase food output. The extension and monitoring the suitable sites for food production in general and aquaculture in particular is the need of the day. The coastal zone is a delicate environment both ecologically and economically and significant in making more aquaculture activities. India is the second most populous country in the world. Agriculture and fishing play a major role in the Indian economy, with fisheries as a well-established sector. As far as marine fishery is concerned, sea food production has almost reached saturation due to over fishing and increase in the operational cost due to non-availability of fish. On the other hand, consumption of sea food has been increasing rapidly with the exponential growth of world population. This leaves a large gap between production and demand which suggest exploring alternate sources of fish production. Aquaculture has emerged as one of the alternate sources to augment fish/prawn production in the world. Aquaculture contributes almost 50% of the world's sea food. Brackish water aquaculture contributes immensely to food and nutritional security, substantial income and employment generation, productive utilization of coastal waste lands and significant seafood export earnings. Thiruvallur district is the leading this state in brackish water aquaculture in Tamilnadu. Agriculture and aquaculture equally contributes the economy of this district. Pulicatlake is the second largest brackish water lake or lagoon in India, after Chilika Lake. The use of remote sensing techniques has become increasingly important in describing a variety of satellite-derived data sets and their application to understand changes in the landscapes. Remote sensing has long been recommended for its potential to detect, map and monitor degradation problems and effects with time. Use of remotely sensed imagery evolved on the basis that traditional survey become expensive and time-consuming. GIS are best described as software and techniques for displaying and analyzing information about the earth in a digital form.

2. Objective:

To identify the suitable soil parameters for the growth of brackish water aquaculture in Thiruvallur district using RS and GIS.

3. Study Area:

Thiruvallur district, a newly formed district bifurcated from the erstwhile Chengalpattu district (on 1st January 1997). The district is surrounded by Kancheepuram district in the South, Vellore district in the West, Bay of Bengal in the East and Andhra Pradesh State in the North. The district spreads over an area of about 3422 Sq.km. The months between April and June are generally very hot with temperature going up to an average of 37.9°C. During the winter (December-January) the average temperature is 18.5°C. The coastal areas receive more rains than the interior ones. The average normal rainfall of the districts 1104mm. Out of the total 52% of the rain fall occurs during the northeast monsoon period and 41% during south west monsoon period.

The types of soil predominantly found are rednon calcareous and coastal alluvial. The soil found in the coastal region is of the erinaceous type (sandy), suitable for casuarinas plants. The predominant soil types are sandyloam which is found in all taluks with redloam in part of Tiruthani Taluk. Saline and alkali soils also noticed in some patches of Ambathur, Ponneri and Tiruvallur Division.

The main occupation of the district is agriculture and allied activities. Nearly 47% of the total work force is engaged in the agricultural sector. Around 86% of the total populations in rural areas engaged in Agriculture and Allied activities. The major crops grown in the district are rice, cumburagi, greengram, black gram, sugarcane and groundnut. Apart from this, certain horticultural crops like mango, guava and vegetables have also been cultivated successfully.

The total coastal area of the district is about 49803 hand has a coast line of 80 km former in fisheries. Prawn/shrimp culture is famous along the coast line of Gummidipundi and Minjur. The total marine fish production is to the tune of 7937 tonnes and inland fish production 14816 tonnes during 2009-10.

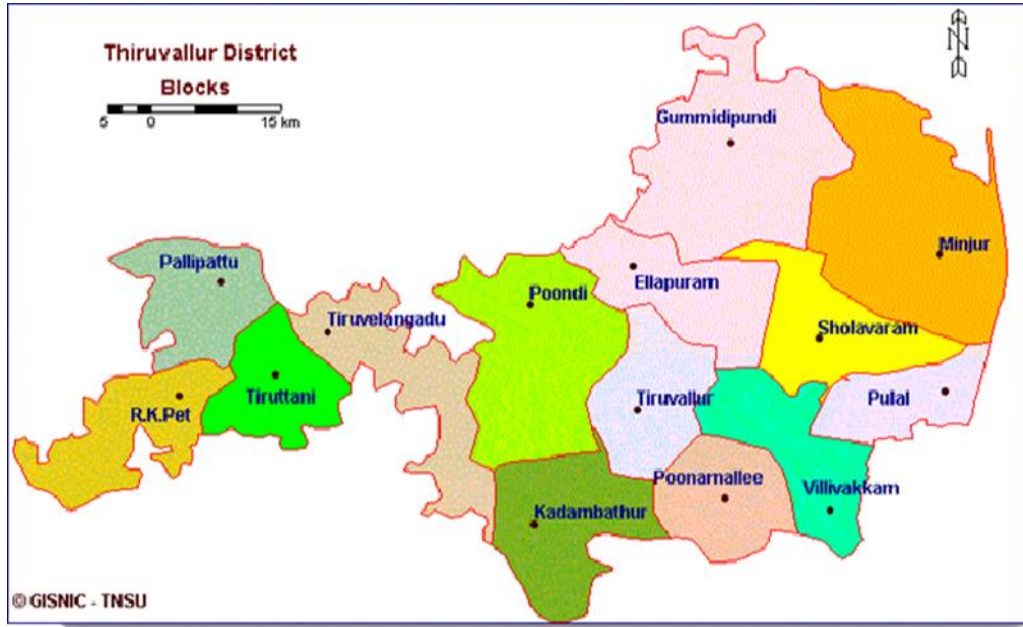
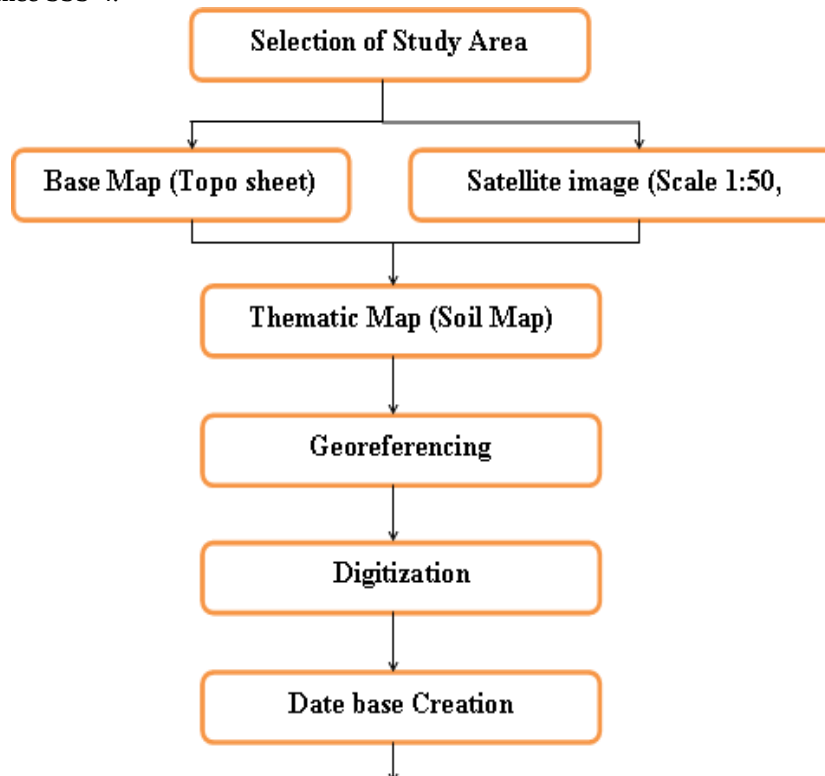


Figure 1: Study Area

4. Materials and Methodology”

The base map was generated from the Survey of India. The Soil map was created from the satellite image IRS P6 LISS IV, scale 1:50,000. The soil details were identified from the soils of Tamil Nadu booklet No.359, soil science SSS-4.



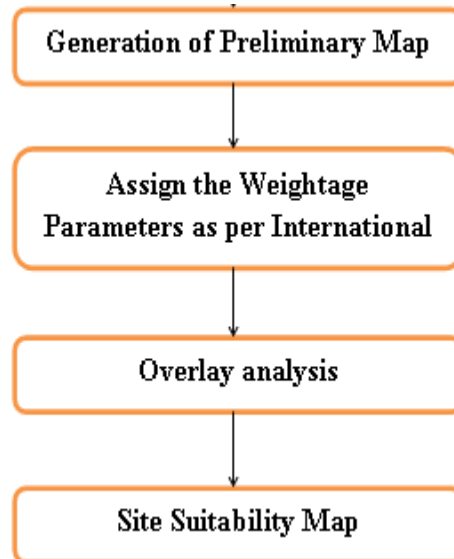


Figure 2: Flow chart showing the methodology adopted in the study

5. Result and Discussion:

The coastal districts of the study area are covered with various soil types. The classification of soil is derived from the soils of Tamilnadu, Booklet No. 359 published in 1982 by Soil Science society of India. The soils of Tamilnadu have been classified into 5 soilorders such as Entisols, Inceptisols, alfisols, ultisols & vertisols. Previously the soils were studied under the category of black, red, laterite & alluvialsoils. The black soils are now classified under vertisols & Inceptisols, red soils under alfisols andultisols, lateritesoils intoalfisols and ultisols & alluvial soils into inceptisols & entisols. The types of soils are important parameters for growth of aquaculture.

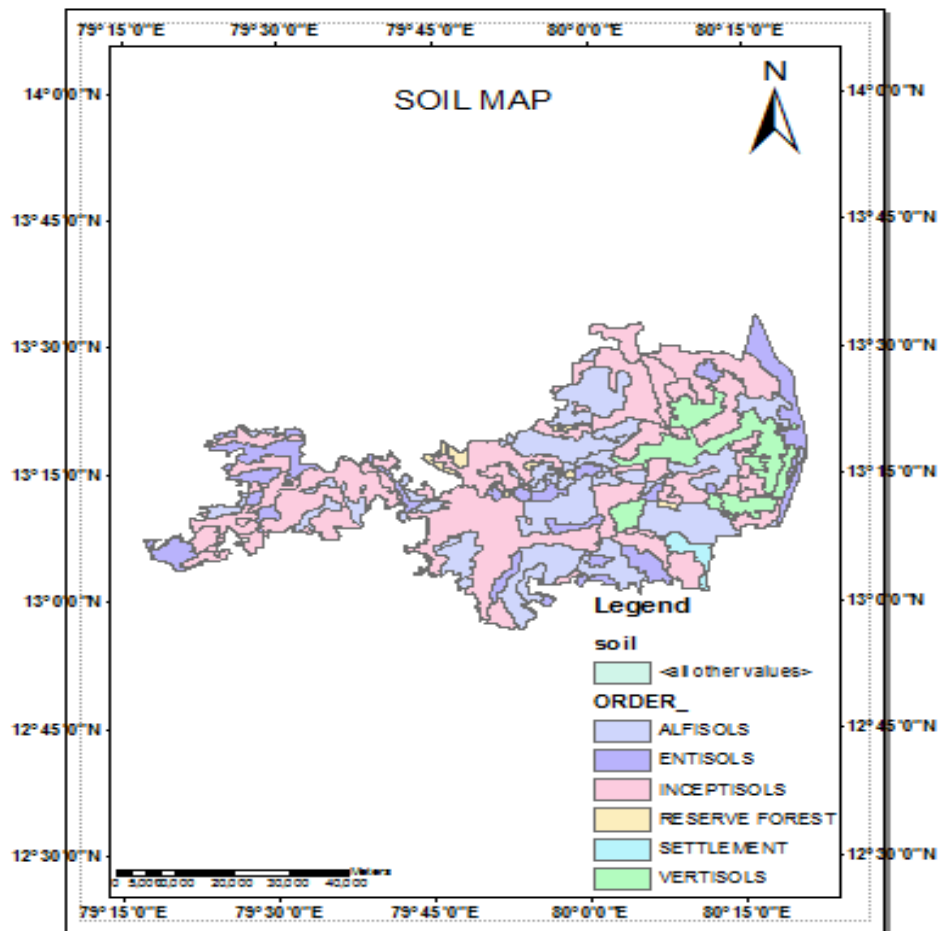


Figure 3: SOIL MAP

S.No	Soil Type	Rank for Saltpan
1	Alfisols	2
2	Entisols	3
3	Inceptisols	1
4	Reserve Forest	-
5	Settlement	5
6	Vertisols	4

Table 1: Weight age of Soils

Inceptisols: Inceptisols is an immature soil, before the soil stage. It is hard and compacted gravelly soil. It does not allow water to infiltrate. Hence, it is given the first preference.

Alfisols: Alfisols are composed of aluminum and iron minerals. It consists of pedogenic accumulation of clay. As permeability will be less, it is assigned second preference.

Entisols: Entisols is deposition by water, wind, and colluvium. It consists of alluvium particle. It is composed of sulfidic clay or kaolinite clay. In these soils groundwater table is high during rainy season and low during summer. Therefore, third rank is given to entisols.

Vertisols: Vertisols consist of expansive clay having high permeability. Water will not store easily. Therefore, fourth rank is given to vertisols.

Settlement: Settlement is a process by which consolidation of soil is carried out by which the volume of soil is decreased. This has to minimization of gaps in the particles which control water absorption to a great degree. This settlement of soil is found different for different surface according to its nature of the location. Some of districts are having fertilized (minerals) settlement. These minerals are restricted to growth of aquaculture. Hence it is assigned the fifth option.

6. Conclusion:

Thiruvallur district lies in the North-eastern coast of Tamilnadu. Fisheries and aquaculture is major role for the economic growth in this district. Suitable soil can be identified for aquaculture development. Using IRS P6, LISS IV satellite image, the soil thematic map is prepared and soil details are collected from soils of Tamilnadu Booklet No.359. The spatial data are analysed, finally the result was concluded that Inceptisols are more suitable for aquaculture growth. Alfisols and Entisols are moderately suitable, & vertisols are poorly suitable soils for aquaculture development.

7. References:

1. Abdus Salam. M, Lindsay G. Ross, C.M. Malcolm Beveridge (2003). A Comparison of Development Opportunities for Crab and Shrimp Aquaculture in Southwestern Bangladesh, Using GIS Modeling, Journal of Aquaculture Research Vol.2, No 20, 2003. ISSN: 477-494.
2. Abhijit Bernard Chaves and C. Lakshumanan, (2008). Remote sensing and GIS-based integrated study and analysis for mangrove wetland restoration in ennore creek, Chennai, South India. Proceedings of Taal 2007: The 12th world lake.
3. Chaudhari L. P. (2003). Sustainable use of natural resources for integrated aquaculture and agriculture: an Indian overview, Journal of Environment and Agriculture, Vol. 4, No. 57, 2003. ISSN: 1807-0957
4. Coastal Zones of India 2012 published by Space Applications Centre, ISRO, Ahmedabad.
5. Dao Huy Giap, Yang Yi, Amararatne Yakupitiyage (2005). GIS for Land Evaluation For Shrimp Farming In Haiphong Of Vietnam, Journal of Ocean & Coastal Management Vol. 48, No. 1, 2005. ISSN: 1016-003.
6. German Amali Jecinta .T, V.E. Nethaji Mariappan (2011). A study on Tamilnadu coastal deformation processes using SAR Interferometric data, International Journal of Geomatics and Geosciences Vol.1, No 4, 2011. ISSN: 0976 -4380.
7. Gupta, M. C., and Gopalakrishna Sreshty, I.V. (1993), Development of a model for brackish water aquaculture site selection in India, Journal of the Indian Society of Remote Sensing Vol. 29, No. 1, March 2001. ISSN: 0255-660X.
8. Hand book of fisheries and aquaculture, 2006 published by Indian Council of Agricultural Research, New Delhi.