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# A Review of Agricultural Land Suitability Classification of Malda District in West Bengal

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**ABSTRACT**

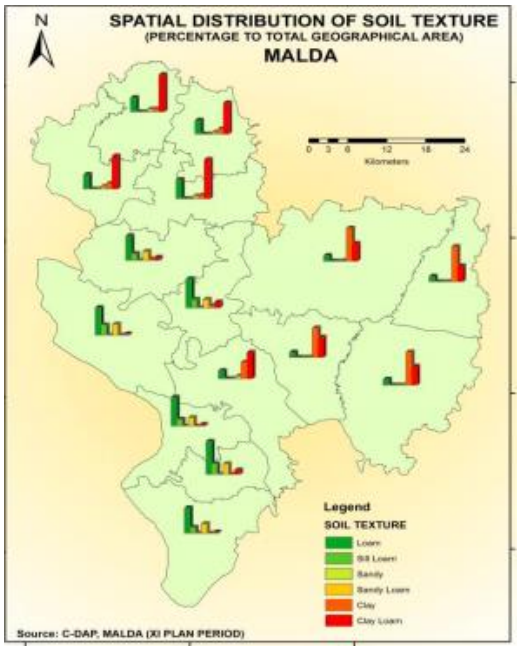
Green Revolution technologies have allowed the food supply of Asia to satisfy the demand of its rapidly growing population in the past decades; however, the pressure on soil and other resources has intensified. The cultivated area is continuously decreasing because of soil pollution, land abandonment, urbanization, and other reasons. Meanwhile, the population and the demand for food continue to increase. Under such a situation, increasing cropping intensity from monoculture to double or triple cropping in a year is an efficient way to guarantee food security on the amount of agricultural land now available. Paddy-upland rotation is the most important cropping system in southern and eastern Asian countries such as Bangladesh, China, India, Nepal, and Pakistan. This type of rotation has many different sequences, where numerous grain and industrial crops could be rotated with paddy rice. The rotation between rice and dry season crops has a long history; rice-wheat rotation, which is one of the largest and most important agricultural production systems in the world.

## 1. Introduction

Soil productivity encompasses soil fertility plus the inherent and management-related factors affecting plant growth and development. It is generally measured in terms of inputs versus outputs, which for agronomic situations generally refers to water and/or nutrient input versus crop yield. The critical soil functions influencing productivity within any soil are those that provide physical support, a rooting medium with plant-available water, air for respiration, and essential nutrients. Humankind can also have a tremendous impact on soil productivity through its effects on the dynamic soil properties. Agricultural management decisions regarding tillage, fertilization, crop rotation, irrigation, and drainage are among the practices that can significantly affect soil productivity. Soil productivity encompasses soil fertility plus the inherent and management-related factors affecting plant growth and development. It is generally measured in terms of inputs versus outputs, which for agronomic situations generally refers to water and/or nutrient input versus crop yield. The critical soil functions influencing productivity within any soil are those that provide physical support, a rooting medium with plant-available water, air for respiration, and essential nutrients. Humankind can also have a tremendous impact on soil productivity through its effects on the dynamic soil properties. Agricultural management decisions regarding tillage, fertilization, crop rotation, irrigation, and drainage are among the practices that can significantly affect soil productivity.

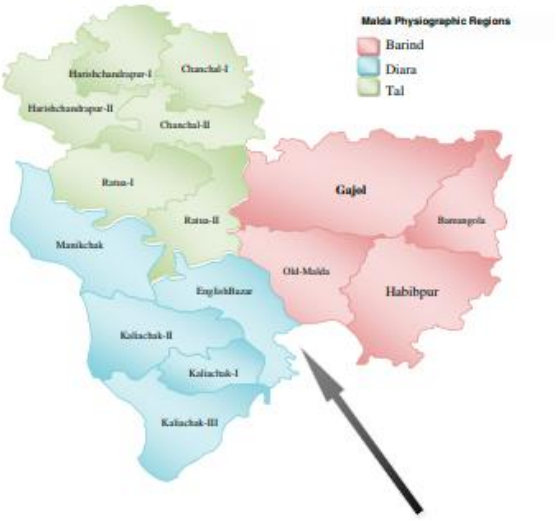
## 2. Soil

The pedological characteristics of the district do not have a very strong explanatory characteristic so far as the thematic spreads of the present research work. However, the beels or water body areas partly act as depositional areas as follow up of surface runoff and resultant structural change over of soil horizon. Broadly speaking except that of Barind region the entire district possesses a strong active alluvial characteristic and the beels areas are no exception. But since the beels' areas contain some kind of static hydrological condition the scope of depositional activities leading to creation of specific soil characteristic that take place. The overlying introduction of newer soil ingredients as product of the surface runoff is expected to create apedological composition that becomes a part of the abiotic components in the beel ecosystem. The district having different physical and physiographical characteristics is covered byalluvium of two different ages. Older alluvium dominates the Barind region while newer alluvial dominate both



**3. Tal and Diara regions.**

So, the soils of the district are locally classified as below; The Soils of Barind Area Barind Soils are usually made up of massive argillaceous beds of pale reddish brown colour. It is composed of stiff clay, containing iron and lime and become extremely hard in the cold weather.




**4. The Soils of Tal Area**

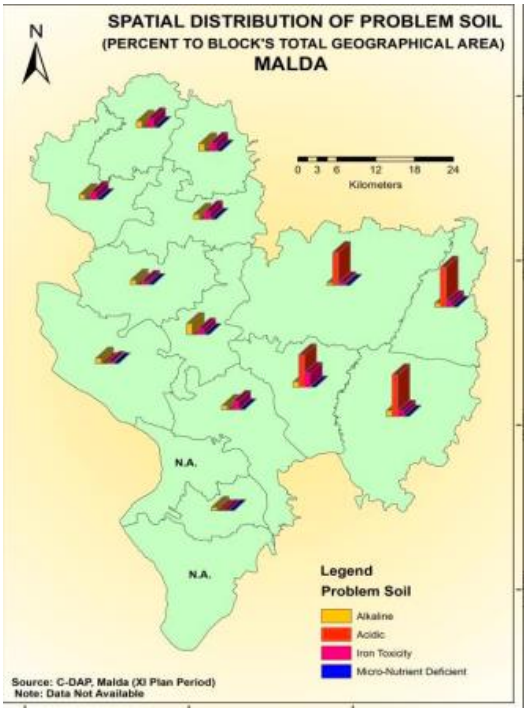
The Soils of Tal region are clay loam to sandy loam in texture. These soils are light loam called 'Do-ash'. It is a later alluvial formation and consists of an admixture of clay and sand.

**5. Agricultural Land Suitability Classification of Malda District**

Land suitability classification (LSC) is an approach of land evaluation, which measures the degree of appropriateness of land for a specific land use. LSC is governed by a myriad of factors at the local and regional level including physiographic, pedologic and a host of socioeconomic and infrastructural determinants. This has called for the application of different multi-criteria decision-making (MCDM) techniques in agricultural LSC. The present study has attempted and compared various MCDM-based agricultural LSCs for Malda District in Eastern India. The study is based on multiple parameters governing agriculture, considering not only the physiographic and pedological attributes (e.g., relief, slope, soil fertility, soil organic carbon, etc.) but also the socioeconomic ones (e.g., the percentage of people engaged in agriculture, cultivator–labor ratio, degree of electrification, etc.). Four major MCDM algorithms have been applied, i.e., composite ranks, composite Z-scores, analytical hierarchy process (AHP) and weighted principal component analysis (WPCA). The results were also compared with the crop productivity-based agricultural efficiency. It was observed that about 15.44% of the area of Malda District is highly suitable for agriculture, whereas limited suitability is displayed by about 12.68% of area. The remaining part falls under moderate and marginal suitability classes. Furthermore, WPCA and AHP are superior to the nonparametric techniques of MCDM, namely composite ranks and composite Z-score. Moreover, the results of WPCA are superior to those of AHP. Due to the inherent limitations of the AHP approach, this study proposes the use of WPCA in the domain of agricultural LSC.Agriculture is a prime source of food and also the sources of raw materials for various agro-based industries. Agriculture is the backbone of the Indian economy and main source of livelihood in rural people of West Bengal. In the process of Agriculture development, Agriculture is a prime source of food and also the sources of raw materials for various agro-based industries. Agriculture is the backbone of the Indian economy and main source of livelihood in rural people of West Bengal. In the process of Agriculture development

**6. Crop Diversification in West Bengal Malda District**

Sustainable growth of the agricultural sector depends considerably on the process of agricultural transformation, which in turn is well connected with shifts in production patterns i.e. on the extent of crop diversification. A greater degree of diversification from the traditional wheat-paddy system helps in overcoming various ecological problems including decline in soil fertility. The importance of crop diversification becomes more pertinent particularly as a strategy to reduce variability in agriculture production and yield. A diversified cropping pattern can be seen as a strategy to cope with production risks and uncertainties associated with climatic and biological vagaries and a correct crop mix can help the farmers to cope with the risks of crop loss due to climatic variations. Farmers living in fragile ecosystem such as semi-arid and arid regions and those who are in subsistence economy more often than not adopt diversified cropping strategy because of the fear of crop failures due to pest attack or lack of sufficient water, etc. In essence, crop diversification helps the farmers in reducing variability in income, sustaining a reasonable income level and mitigating drought and enhancing water use efficiency. Contrary to this, in recent years, the growing demands for agricultural production has forced the farmers to adopt intensification of agriculture practices along with the increasing use of high yielding crop varieties for maintaining higher levels of production. This has restricted the scope for crop diversification and hence efficient water use in agriculture.



**7. Major weaknesses of the District**

1. Perceivable shrinkage in cultivable land due to growing population pressure
2. Increasing problem of Arsenic contamination in the gravity flown water
3. Sluggish rate of diversification
4. Deteriorating soil health
5. Dereliction of productive area for fish production system
6. Poor overall system performance of the livestock based small production system
7. Growing unemployment
8. Extremely poor rate of women literacy etc.

**8. Thrust areas identified**

1. Introduction of High yielding varieties of crops along-with improved management practices.
2. Soil health management.
3. Planning and management of existing orchards.
4. Introduction of new cultivars of remunerative crops.
5. Integrated pest & disease management of major crops in the district.
6. Intensive Livestock management of cattle with special reference to feed and disease management.
7. Scientific management of poultry birds for increasing productivity with improved exotic birds like RIR.
8. Scientific method of composite fish culture with special reference to feed management, stocking density, finger ling and fry production.
9. Supply of quality inputs.
10. Socio economic empowerment of rural masses through various income generation programmes and formation of Self Help Groups (SHGs).

**9. Conclusion**

the levels of agricultural development are not offer in all blocks of the Malda district. The Composite Score show a wide range of variation among variables in the district. There are 6 blocks that fall under high level of agricultural development, 4 blocks under medium and remaining 5 blocks under low level of agricultural development. The block-wise composite score depicts that, the blocks which have high level of agricultural development area enjoy good infrastructural and technological factors such as large net sown area, high proportion of agriculture labor, better and assured irrigation facilities, high application of Impact of Technology on the Development of Agriculture in Malda district of West Bengal (India): All rights reserved by www.ijsrd.com 416 chemical fertilizers, pesticides, insecticides, High Yielding Variety of Seeds, high application of farm mechanization, high cropping intensity, large size of operational landholding. Whereas low level of agricultural development areashave low irrigation andcropping intensity, small share of net sown area, low proportion of agriculture labour, small size of operational landholdings etc.

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