CHAPTER X

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The characteristics of the land surface and its suitability for agricultural practices may vary in infinite number of ways. Planning involves preparation for the future upon the basis of existing knowledge. To use this knowledge and apply it, there must be a standard of classification or categorisation. Since there are many kinds of lands used by many kinds of people in many different ways, the problem of understanding and classifying our experience and result of research are varied and complicated. But we are concerned here mainly with classifying agricultural lands. Yet there are varieties of approaches and it must be noted that in any such approach observable or recordable features should be taken into consideration. Thus initial classification of the available land in terms of physical factors should be the basis of economic planning and then further categorisation of the land should be made according to the inherent qualities in terms of chemical nutrients and other physical attributes.

However, any standard method may not be suitable for all the purposes. So modification should be made as and where necessary to suit individual requirements. Classification of lands having high and moderate relief is comparatively easier than plain lands, because groups or classes in the plains require intensive scrutiny for micro-level studies. The characteristics of soils both physical and chemical, profile characteristics, drainage, vegetation and climatic aspects will certainly be of great help in
classifying land. Considering the land as a valuable resource of man
its best use in terms of its nutrient quality can be well established by the
application of method and techniques used in the present treatise.

G. Azmi's principle of classification of land on the basis of
chemical status gives a definite clue for evaluation of land in terms of
its inherent quality. But he has not given due consideration to the external
factors which definitely have some control, at least partially, on productiv­
ity. So with a view to examining the combined interaction of physico-chemical
factors for assessing land value Storie's method has also been employed in the
present study. But his empirical formula has some drawback for any one of
the factors having a low value may necessarily give a low rating signifying
poor in quality. So an alternative proposition has been suggested in the
present treatise which gives a well balanced rating value for lands for
assessing potentiality.

While approaching these methods and techniques all physico-chemical
properties of soils and other physical attributes influencing production have
been studied and high positive correlation between the factors and production
have been obtained suggesting strong influence of the physico-chemical factors.

Mapping has been employed to show the distributional pattern of
different nutritive elements in the field. The observed frequency distribution
and scatter diagram correlating production with each of the individual nutritive
elements are also shown in the map. On the basis of Storie's indices and
modified indices, two maps are drawn (Map No. 13 and 14) which show the
boundaries of different categories of land according to their inherent qualities.
Both the maps show four land types whose boundaries are delineated on the basis of physico-chemical quantum.

Residual mapping has also been made from the data obtained from Storie's and modified index values of the author and correlating them with production. From the residual map, it has been possible to distinguish the study area into positive and negative regions. Positive regions are areas where production is more than that which could be expected from their inherent quality and negative areas are those producing less than expected of them. Thus from the study of map, it may be forthwith suggested that the negative areas can considerably be improved by amelioration.

As our country now faces an acute food crisis the best land should be utilised for raising as many crops as possible. This involves certain factors for consideration, firstly the maintenance of soil fertility and the yield, and secondly the maintenance of irrigation water in times of need. If the user of the land continually uses it without addition of fertiliser the land must be impoverished the result of which will be reflected on the rapid fall in yield. So for ensuring optimal utilization of the land resources all possible conditions have to be attained inclusive of arranging water for irrigation during the period draught either on co-operative basis or with government help.

It should be remembered that one of the functions of the farmer is to produce crops. The farmer, therefore, must carry out a plan with the object of improving and maintaining the fertility status of the land on which he depends for his outturn. To maintain soil fertility, organic matter is
extremely important. It supplies the plants with necessary nutrients. Excessive oxidation by cultivation, exposure to strong light, wind and heavy rain accelerate organic decomposition, and leads to deterioration of physical properties of soil. This may lead to decimation of soil fertility.

Under the humid climatic condition of the area, there is a continual washing out of all plant nutrients, specially nitrogen, calcium and potassium. To this must be added the unavoidable removal of plant nutrients in harvested crops. Such losses can be kept low but cannot be altogether avoided, by restoring to the soil as many plant-residues in the form of organic manure as possible. Organic manure can act as a steady supplier of $N$, $P_2O_5$, $K_2O$ and $CaO$. Hence lands rich in humus do not need any artificial fertilizer. Dhar, N. R. (1972) conducting experiments on occupiers farm has shown that straw plus basic slag, ploughed in, can supply available $N$, $P_2O_5$, $K_2O$ and trace elements as almost as readily as composts. Related publications of the Government of West Bengal (1962) provide the information that by adding farm-yard manure and 30 lbs. of nitrogen as ammonium sulphate, the production of paddy increases by 358 lbs. per acre.

Due to their pecuniary condition, the farmers often find it difficult to procure artificial fertilizers for use in their farms. So application of farm-yard manure, or composts or animal excreta may be recommended for the maintenance of fertility of soil especially for the study region. It may be noted that the soils of the eastern part are deficient in $N$ $P$ $K$ content. This may be for impeded drainage conditions and flooding. Singo Mitsui (1955) of Japan states that denitrification process under waterlogged condition is
responsible for low availability of nitrogen. Besides, loss is associated with washing of much of the fertilizers such as, CaO, P₂O₅, and K₂O. This area, therefore, needs good management for profitable agriculture.

Proper draining out of accumulated water through sluice gates is necessary for the lowlying tract of the east. Drainage of sub-soil water can be effected by providing subsurface channels (mole drain) at proper depth down which water can flow easily out. Such drains will remove all excess water beyond the field capacity from saturated soil. The immediate effect of the drainage is to let air into otherwise waterlogged soil, but it has other associated physical advantages amongst which is the improvement in the structure of the heavy clay soils as a result of partial drying out and floculation.

The region is also deficient in available phosphate. The maintenance of requisite phosphate is rather difficult. Added phosphates do not long remain in available form. Depending on the pH they are converted into either iron or aluminium compounds in acid soils and calcium compounds in neutral and alkaline soils. Thus much of the phosphate is fixed in the form of complex insoluble compounds which are of no use to plants. Problem soils which are acidic or alkaline require application of lime or gypsum as the case may be. So judicious liming in acid soils and providing gypsum in alkaline soils will maintain intermediate pH-values (6.5 - 7.0) which will minimise phosphate fixation.

For the maintenance of fertility of soil in the area suitable crop rotation may be recommended to the farmers. This will certainly improve fertility. Although such a practice has great disadvantage in the region where
grain needs are high, yet for part of the year crop rotation should be introduced in the farm for restoring soil fertility. According to the suitability of climate and soil, rice in the rainy season and rabi crops (pulses, potatoes, gram etc. or other leguminous crops) in winter may be cultivated in rotation. A two-year rotation of rice alternated with sugar cane and simultaneous cultivation of different crops may be suggested. As sugar cane is a whole year crop, it cannot be cultivated with rice during the year. While cultivating sugar cane simultaneous cropping of sesamum (til), 'mug' or 'arhar' (a kind of pulse) may be introduced between the rows. A good crop rotation, therefore, involves the inclusion of one or more crops which grow closely together, such as, wheat, gram and linseed, or berseem and clover.

Rotation also provides for crops of differing types of root systems and usually includes at least one which is comparatively deep rooted or of the leguminous type. The introduction of deep rooted crop will ensure some measure of rest for the top few inches of the soil since much of this plant's feeding will be from the deeper zone. Leguminous crops, such as, clover, grams, vetches, soyabeans etc., can take up nitrogen from the air. Most of this nitrogen is incorporated into the roots and the body of the plant. When the whole crop is ploughed into the soil, the soil nitrogen supply is enriched to the extent of the entire amount of nitrogen fixed by the plants.

However, suitable crop rotation coupled with the use of manures and fertilizers will bring about great improvement in soil fertility and raise the yield of crop or crops. A study of long continued field experiments in U.S.A.
and England has brought about some exceedingly important facts regarding benefits of good rotation. Such benefits may be extended to this area also if the methods suggested are taken into account and applied.