6.1 Introduction:

As has been noted, the soil deterioration due to erosion, ultimately changing them to waste lands is one of the most pressing problems of the nation. Already it has ruined a good acreage of cultivable land and if unchecked will continue to affect the remaining land also. In short, unless we adequately safeguard our area of good land we may eventually face a serious shortage. Hence, the concept of conservation to protect the existing cultivable land and the reclamation of already depleted waste lands list in priority of the planning by the Government bodies.

The reclamation measures which have been adopted in different areas of the Sultanpur district have been practiced since ages, not on the scientific basis but for only a few waste land types viz., usar, water logged and ravine land. Some of the methods were successful and later on proved to be technically sound, whereas few methods turned out to be unsuccessful after sometime because the land got converted back to its original condition due to mismanaged and unscientifically adopted reclamation measures and lastly a few other measures failed to show
any response from the land so treated. Thus the methods which are adopted for the reclamation measures should take into account the causes which led to the development of waste lands or deteriorating soil conditions of the land in association with morphometric, climatic, hydrologic parameters, including suitability and quality of the soil for producing a particular crop. This should not be taken to mean that such ameliorative methods are not work any trial. In fact they have shown remarkable progress under certain conditions as recorded from different types of waste lands during the reclamation period. But the input-output will have to be balanced with benefits accrued from the land over a number of years. Thus in any scheme of reclamation, the time and involved expenditure for the reclamation are the additional factors to be considered. It has been recorded that the cheaper amendments are slower in reaction and produce uneconomic returns at the beginning. Again certain ameliorating factors may be available as surplus farm commodity or industrial waste in an area but may prove prohibitive or may be available with difficulty at another place. These factors have to be fully considered before appreciating any technique or methods of reclamation of any waste land types. Thus in practice the reclamation measures for such deteriorated land has to be properly judged in the light of the above
basic conditions with a special attention paid to environmental factors in association with anthropogenic factors which are responsible for the development of different waste land types.

The remedies for the reclamation of different waste land types in totality cannot be measured because for different waste land types, different reclamation methods are required. In this chapter, the measures to be adopted to bring back the eight categories of waste lands are discussed. For the purpose eight villages have been selected (of each waste land type) on the basis of the highest percentage of waste lands among all the villages of the district from which the affected one acre land has been taken for the adoption of reclamation measures to see practically how these methods yield good results from the reclaimed land. The study has been carried over for both the cropping seasons mainly kharif and rabi, over one acre of land of the selected village. The various remedies for the reclamation measures which are adopted at the time of reclamation for different waste land types is elaborated below.

6.2 Remedies for the Reclamation of WaterLogged Land

The remedies for the reclamation of water logged land have been experimented on one acre land, in village-
VILLAGE-MALAPUR JAGDISHPUR

EXTENT OF WASTE LANDS

1981-82

WASTE LAND TYPES

- WATER LOGGED
- BANJAR
- FALLOW
- OLD FALLOW

MAP-16
Malapur Jagdishpur of the block and tahsil-Kadipur, having the highest percentage of water logged land to the total area of the village, which is shown in the map-16. The essential components of the water logged land reclamation which have been adopted step by step at the time of reclamation are as follows:

(1) The village-Malapur Jagdishpur is surrounded on two sides by the road and one side by the canal. Due to the low lyingness, excessive irrigated and rain water from all the sides gets accumulated as there is no out-let for the excessive water to drain out. The government had constructed a drain for the outflow of the accumulated water but as it was not properly planned, the problem remained the same. The new measure which is adopted in the village is to re-dig the same drain by widening and deepening and to join it with other Nala away from the village through which excessive accumulated water can easily flow out.

(2) The levelling of the land is done, providing strong bunds along the field and the farmer is trained for the proper implementation of the correct doses of fertilizer, irrigation and other technological inputs. At 15 cms. below from the level of the field, in accordance with the slope, small drains are made nearer to the field for the outflow of the excessive water.
(3) After testing of the soil and according to the requirement of the soil to produce paddy crop and keshari crop, nitrogen, phosphate and potash fertilizers are applied.

(4) Unlined canal banks are not cemented on all sides but in few areas culabas and gul of the canal drains are properly made pacca near the affected area to check the seepage of the water.

(5) Regular meetings are held from time to time between the personnel of canal irrigation department and the farmers for the use of canal water in irrigation in a proper quantum according to the requirement of the field.

(6) Paddy is grown as a first crop during the kharif season selecting high yielding tolerant variety and timely plantation of relatively older seedlings.

(7) In the second rabi season keshari is preferred mainly because in this field, paddy takes more time and more moisture of the soil, while keshari crop does not need much water and is found to be ready within the limited time. This crop rotation is to be followed for at least three years and the farmers are suggested not to leave the land fallow for a long period.
VILLAGE - GHAZIPUR
EXTENT OF WASTE LANDS
1981-82

WASTE LAND TYPES
- USAR
- FALLOW
- OTHER TYPES

MAP - 17
6.3 **Remedies for the Reclamation of Usar Land**

Various reclamation measures of the usar land are practiced, in the village-Ghazipur, block-Bhadar, tahsil-Amethi, having the highest percentage (depicted in map-17) of the usar land to the total area of the village.

At Central Soil Salinity Research Institute (CSSRI) Karnal in 1969, scientists have developed a package of technology for the reclamation of saline soils. Measures for reclaiming usar land in India have been several including -

1. **Mechanical**
2. **Leaching**
3. **Application of chemical amendments**
4. **Growing of salt tolerant crops.**

Adoption of suitable methods have to be encouraged, taking into consideration such factors as total cost, availability of good quality of water, type of soil, nature of terrain, local cropping practices etc. The earlier workers like Leecher (1903, 1914) and Voslicker (1893) and others as mentioned in the literature survey of the First chapter, had tried preparation of drainage, leaching, application of heavy doses of organic matter which have also been found feasible in Uttar Pradesh and
Punjab by many workers. However reclamation measures through application of organic matter alone is considered feasible only when the deterioration in the soil is found and beneficial effects appear to be of short duration.

Reclamation measures of the usar land are adopted practically in the village-Ghazipur, adopting all the practices of technology rather than to use the pick and choose approach. Availability of good quality of water for irrigation is an essential pre-requisite. The essential components of usar land reclamation which are adopted at the time of reclamation are as follows -

(1) Proper levelling, providing bunds along the field is done to obtain a uniform spread of water. The field is divided into convenient size plots with small earthen embankments in accordance with slope. Small suitable drains are made for the removal of excess rain and irrigation water. Leaching with rain water during the rainy season is carried over.

(2) Testing of the soil is done to know the nature of the soil and fertilizer requirement to produce crop. In the first season 40 quintals of gypsum is applied and along with this 50 kg. urea, 25 kg. Shakti Khad and 25 kg. M. Polash and also the compost Khad is used. Lastly top dressing of fertilizer is done applying 25 kg. of urea.
In rabi season for producing wheat crop total 75 kg. of urea, 50 kg. M. Potash and 50 kg. Phosphate fertilizer are applied. Easily decomposable organic matter (Dhaincha) is also applied before rain. Gypsum in a powdered form is mixed with in upper 10 cms. soil. After application of the gypsum, water is needed to stand for 10-15 days before paddy plantation. Even Pyrite can also be applied.

(3) In the first kharif season paddy is grown and the transplanting and growing of paddy crop for a few years is done until a good crop is obtained. 25% more nitrogen than the normal recommended dose is added without zinc application. The green manuring is followed by rabi crop.

(4) In the rabi season - wheat crop is grown applying 25% more nitrogen. High yielding tolerant variety of wheat crop is sown.

(5) Light but frequent irrigations are managed in rabi season, according to the requirement of the crop. It is much useful to grow dhaincha as a green manure crop when sufficient irrigation water is available. This crop rotation is to be followed for at least 3 years continuously and farmers are suggested not to leave the land
VILLAGE-PIPARPUR
EXTENT OF WASTE LANDS
1981-82

WASTE LAND TYPES
- BANJAR
- FALLOW
- OLD FALLOW

MAP-18
H.R. YADAV
The above discussed techniques could be suitably modified to meet the requirements of the soil. But before any reclamation project is taken into hand, there should be adequate levelling of the fields, improvement of the drainage and supply of the ample irrigation water of the good quality. A project on the reclamation of such type of uncultivated land, big or small can be an economic proposition if planned on scientific methods. In many cases deterioration caused to the soil by salt is more easily repairable than caused due to erosion. This is due to the fact that the land prices have gone up and there is scarcity of land, so the reclamation projects should be carried out to meet the requirement of the farmers.

6.4 Remedies for the Reclamation of Banjar Land:

For the successful cultivation of the banjar land through chemical and technological amendments, an understanding of the behaviour of water table and knowledge of the quality of the soil are necessary. Various reclamation measures which are applied to reclaim one acre banjar land, in the village-Piparpur, block-Bhadar, tahsil-Amethi (depicted in the map-18) are as follows -

(1) The field is equally levelled for ensuring uniform application of irrigation water and fertilizer, uniform crop growth and better reclaiming action of the amendment.
The field is divided into different size plots for judging proper levelling of the land, with proper bunds. The bunds are made because it is required essentially to prevent the entry of run-off water from outside area and also to check the outflow of the water from the field.

(2) The surface drainage is necessary and it is made along the outside of the bunds, for providing proper outflow of the water. The good quality of water is necessary for irrigation and water is being tested before its use in irrigation.

(3) Soil testing is done and according to the nature and requirement of the soil to produce crop urea, shakti khad and m. Potash is applied in both kharif and rabi seasons. The gypsum/pyrite is used and it is mixed up in the upper 10 cms., with light ploughing fifteen to twenty days before sowing of the paddy crop. After the use of amendments excessive irrigation is done till 5-7 cms. level is obtained. Green manuring is done after cultivation.

(4) In the first kharif season, paddy crop is sown and in the second rabi season wheat crop is sown of the high yielding tolerant variety. After reclamation, farmers are suggested to follow this crop rotation and not to leave the land fallow for a long period.
VILLAGE - RAIBIGO
EXTENT OF WASTE LANDS
1981-82

WASTE LAND TYPES
OLD FALLOW
BANJAR
FALLOW
RAVINE
OTHER TYPES
KANKRILI

MAP-19
6.5 Remedies for the Reclamation of Old Fallow Land:

Various measures have been adopted for reclaiming one acre of old fallow land in village-Raibigo of the block and tahsil-Kadipur (map-19).

(1) Levelling and strong bunding is done in the field with suitable drainage for removal of excess water.

(2) Testing of the soil is carried out to know the nature and extent of the problem of the soil and to determine the required quantity of the amendments. According to the requirement of the soil, urea, compost and shakti khad are applied in both kharif and rabi season. Fertilizer application is done for few days in case of paddy crop. More quantity of the nitrogen is used than the normal recommended dose.

(3) In the first kharif season paddy crop and in the second rabi season - wheat crop is sown. The seeds in both cases are of the high yielding varieties. According to the requirement of the crops irrigation facilities to the crops are provided, while green manuring is not done due to the scarcity of the water. Lastly farmers are suggested to follow this crop rotation and not to leave the land fallow for a long period.
VILLAGE - BHADAINYA

EXTENT OF WASTE LANDS

1981-82

WASTE LAND TYPES

- FALLOW
- RAVINE
- OTHER TYPES

MAP 20
6.6 Remedies for the Reclamation of Fallow Land:

The various reclamation measures have been adopted to reclaim one acre fallow land in village-Bhadainya of the block-Bhadainya, tahsil-Sadar Sultanpur, having the highest percentage of fallow land (map-20) to the total area of the village. For achieving best results, all practices of the technology are adopted rather than to use the pick and choose approach. Adopted essential components of the fallow land reclamation are as follows:

1. The proper levelling of the land is done in order to obtain a uniform spread of water and fertilizer. The field is divided into different size plots with small earthen embankments and providing suitable drainage for the removal of excess water.

2. According to the results of the tested soil and knowing nature of the soil, urea, shakti khad, potash and compost amendments are applied in kharif and rabi seasons.

3. As the first crop—paddy is sown during the kharif season, using more nitrogen, while the farmer is suggested to sow paddy crop for few years until a good crop is obtained. In the rabi season, high yielding variety of wheat crop is sown followed by green manuring. Light but frequent irrigation is provided to the wheat crop according to its requirements.
VILLAGE- SEUR CHAMURKHA
EXTENT OF WASTE LANDS
1981-82

WASTE LAND TYPES
- KANKHIL
- OTHER TYPES
- FALLOW
- BANJAR

MAP-21
(4) Again after the rabi season Dhaincha as a green manure crop is grown and testing of the soil is done to know the nature of the soil. Lastly the farmers are suggested to follow this crop rotation at least for three years and not to leave the land fallow for a long period.

6.7 Remedies for the Reclamation of Kankrili Land: —

Kankrili land reclamation is practiced in one acre land, in village-Seurchamurkha (map-21), block-Kurebhar, tahsil-Sadar Sultanpur. The measures which are adopted at the time of reclamation are as follows —

(1) The compact clay or kankar pan in soil is processed by deep ploughing to break the pan and after it kankars are thrown out of the field. Proper levelling of the land is done for the equal distribution of fertilizer and irrigation water. According to the slope, land is divided into convenient size plots, with earthen embankments. Proper strong bunds are also provided along the field. Suitable drains are made for the removal of excess water. Testing of the soil is carried over to know the nature and extent of the problem of the soil. According to the requirement of the soil urea and compost khad are applied for producing chari crop in kharif season and barley crop in rabi season. Early decomposable organic matter before the outset of rain is applied. Farmers are suggested to grow fodder crop for a few years until a good crop is obtained.
because there is an uncertainty of the good output from paddy and other crops, seeing the nature of the land.

(2) Thus in the first kharif-season fodder crop—chari is sown and in the second rabi season—barley crop is sown. Light but frequent water is provided to the barley crop according to its requirement.

(3) The farmers are suggested to follow this crop rotation at least for three years and not to leave the land uncultivated for a long period.

6.8 Remedies for the Reclamation of Ravine Land:

It is important to know the extent of the land under ravines and a survey should be conducted to assess whether ravine in question is suitable for agricultural purposes after reclamation or is to be devoted for forests or grass lands. During the survey, information about depth and width of the ravines and the type of soil should be obtained. It would be desirable that an aerial survey of the contiguous ravines be conducted and topographical sheets be prepared to know the nature of gullies and ravines. However with proper reclamation measures which may be expensive such land may become suitable for agricultural purposes. Any how for the practical exercise various measures of the reclamation are carried over with the help
VILLAGE - RATANPUR
EXTENT OF WASTE LANDS
1981-82

WASTE LAND TYPES
- RAVINE
- OLD FALLOW
- OTHER TYPES
- FALLOW

MAP - 22

HR. YADAV
of Kamla Nehru Farm Science Centre, Sultanpur, in village-Ratanpur, block-Kurebhar, tahsil-Sadar Sultanpur in one acre ravine land (map-22) because this village has the highest percentage of ravine land to the total area of the village. The following reclamation measures are adopted to reclaim one acre of ravine land -

(1) Mechanical (tractor) reclamation is used for levelling the ravine land and bullock power is also used for terracing and levelling of the land. According to the slope and terraces, the field is divided into different size plots and strong bunds are constructed around the field to check the erosion and water flow. Suitable drains are made for removing excess water. Land preparation and ploughing is done according to the nature of slope. Diversion channels are constructed to reduce the erosion through gullies. A dam was constructed earlier to check the erosion and flooding.

(2) Testing of the soil is done to know the requirement of the soil to produce particular crop and according to its requirement urea, shakti khad, potash and compost khad are applied in both kharif and rabi seasons.

(3) In the first kharif season - maize fodder crop is sown and in the second rabi season - barseem fodder crop is sown providing light but frequent irrigation according
VILLAGE - DADARA
EXTENT OF WASTE LANDS
1981-82

FURLONGS

WASTE LAND TYPES
- OTHER TYPES
- OLD FALLOW
- RAVINE
- BANJAR

MAP-23

H.R. YADAV
to the requirement of the crop because this soil does not have much moisture retaining capacity. In summer season, after rabi crop Dhaincha as a green manure crop is sown. The farmers are suggested to follow this crop rotation for at least three years and not to leave the land fallow for a long period.

(4) The other simple measure for the ravine land reclamation is to stop grazing and providing suitable outlets for excessive run-off. Controlling of soil erosion may itself be sufficient to reclaim such land and above discussed measures may be adopted for the reclamation of ravine land.

6.9 Remedies for the Reclamation of Other types of Waste Lands

The reclamation measures have been practiced in one acre of other types of waste land in village-Dudara of the block and tahsil-Musafirkhana (map-23) because this village has the highest percentage of other types of waste land to the total area of the village. Adopted reclamation measures for other types of waste land are as follows -

(1) Proper levelling of the land is done to insure equal distribution of water, organic/inorganic amendments and strong bunding is done along the field. The field is
divided into different size plots with earthen embankments and suitable drains are provided for the removal of excess water.

(2) Testing of the soil is done to know the nature of the soil and according to the requirement of the soil to produce particular crop, urea, shakti khad, potash and compost khad are applied in kharif and rabi seasons.

(3) In the first kharif season, jowar crop and in second rabi season barseen fodder crop are sown. According to the requirements of the crop light but frequent irrigation are provided.

(4) The farmers are suggested to follow this crop rotation for at least three years and not to leave the land fallow for a long period. If the erosion is more, it may be checked by constructing dam, growing of grasses, closure of grazing and providing outlets for the excessive run-off. Controlling of the soil erosion may itself be sufficient in reclamation of such types of waste land.

6.10 Conclusion :

The above discussed reclamation measures can be suitably modified to meet the requirement of the soil and waste land resources can be made available for the agricultural purposes. But before any reclamation plan, it should
be checked that there should be adequate levelling of the
field, improvement of the drainage and supply of ample
irrigation water of good quality. A project on reclamation
of any waste land types, big or small, can be an economic
proposition if planned on scientific lines. The fact that
land prices have gone up and there is scarcity of cultivated
land more such reclamation projects should be carried out
with the help of government officials. The reclamation of
any type of waste land is a physical problem. The general
procedure followed to reclaim these lands are very simple.
Thus, where the reclamation is not possible within the
means available, suitable management practices will have to
be developed, capable of co-existing with any type of
waste land problem for some sort of economically worth
while agriculture, through such methods as proper selec-
tion of crops, special planting and irrigational techniques.
A list of such practices are given below -

(a) Land preparation and tillage.
(b) Seed-bed preparation and planting.
(c) Irrigation, leaching and drainage.
(d) Crop rotation.
(e) Continuous cropping.
(f) Application of amendments.
(g) Afforestation and pasture development.
Apart from the reclamation methods, some certain preventive measures and management practices should also be adopted. There are other important methods as intensive pre-irrigation, soil surveys and mapping of sub-soil characteristics, in regard to permeability and to indicate areas where water table is expected to rise. The extent of rejuvenation for gully formation can be explored from topo-sheets and aerial photographs, so that these factors may be taken into account while designing the irrigation system, such as lining sections of the channels, where the soil is excessively porous and sub-soil is impermeable. Thus if all these measures are adopted, they could lead to the extension of the cultivated area of the Sultanpur district.

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