

FORMATION OF LOCAL DESERTS IN PUNJAB AND THEIR CONTROL

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SUMMARY

Problem of formation of local deserts and sand drift in the Punjab has been discussed. Main causes have been enumerated and the treatment has been suggested.

The advance of Rajasthan desert into the fertile Indo-Gangetic plains has drawn lot of attention in the recent past. Another interesting and important phenomenon which deserves equal attention, as it is a prelude to the extension of the desert, is the formation of local deserts in the desert fringe areas. The attention of the Punjab Government has been drawn and a report to the Government for treating such areas in Ludhiana district has since been given by the author. The aim of the paper is to bring out the salient features of the problem and their cure.

THE PROBLEM

(a) *Extent*—Almost all the districts of Punjab except hilly tracts, are subject to this type of wind erosion, of course, to varying degrees. It is less perceptible in the northern parts of the state, but is prominent in central and southern districts. All stages of land on its way to desert formation are visible and the trouble becomes more acute as we go to the south. Stretches of land extending from less than an acre to over a square mile are covered with sand dunes ranging generally from almost a few inches to 30 feet in height. Occasionally even 50 feet high sand dunes are also found, they are non-shifting type. These local deserts are surrounded by fertile valuable cultivated lands which are generally irrigated by wells or canals. The extent of the 'local deserts' is estimated to be about 25% of the total area in central and southern districts.

(b) *Process*—During summer months high velocity winds are quite common and there are occasional storms of severe velocity too. Even with ordinary velocity of the daily mid-day hot winds, locally called 'loo', the dry and friable sand is drifted in easterly and north-easterly direction engulfing more area with the advance of time. Small sand dunes are blown over their crests and thus they creep forward. The biggest sand dunes usually remain intact and form part of the topography. These are liable to be disturbed by very severe storms only.

Sand from all these sources is blown over into the adjoining cultivations and gets mixed up there, changing the texture of the fields progressively. The soil surface of the cultivations thus tends to be more dry and friable when not irrigated and more liable to be effected by winds. The finer and more fertile particles are lifted away leaving more sand to drift, form small dunes against obstructions and thus to continue the advance of the local deserts. Fertile arable lands are impoverished and with their configuration spoilt they become unfit for irrigation even though the facilities exist. With the possibility of using irrigation being precluded, the process of deterioration becomes much faster not only due to drier conditions but also because the drifting sand is caught up in increasing quantities in the uneven ground. Thus a vicious circle is set up.

(c) *Main causes*—Both the climatic and biotic factors are at play in extending the existing desert or in creating new ones. Chief characteristics of climatic factors are extremes

of temperature, scanty rainfall, low water-table and fierce and dry winds in summer. The annual average rainfall is about 25" in the north-eastern portions and 15" in South-Western portions, i.e., there is a gradual decrease as we go from north to south. The distribution of this meagre rainfall over the whole year is very erratic, its greater part falls during July, August and September. March, April, May, October, November and December are very dry months. May and June are the hottest months and temperature under shade frequently rises above 115°F. Except the *bet* area (local name for the low lying alluvial tract along the river) the water table is deeper than 15'. Its depth increases from north to south. In southern most parts the depth of water-table is more than 120'.

Man has accelerated the damage from these natural causes by disturbing the ecological balance between soil and vegetation and by defective cultivation practices. Actually the present 'local deserts' occupy the areas which originally were coarse-textured, but were covered with some permanent vegetation even though sparse. He destroyed the balancing power of tree and bush growth in his endeavour to reclaim *jungle* land for his cultivation and other domestic and agricultural needs. The trees have so scrupulously been destroyed by him that for miles together one sees little of them over the cultivated areas and the dry high winds sweep over them unobstructed. His cattle help him in this process by overgrazing the already denuded areas.

PLANNING AND TREATMENT

Necessity of concerted effort—The 'local deserts' have to be immediately tackled to confine them if the process of extension of Rajasthan desert into the plains of the Punjab is to be halted. Efforts in the main desert region alone are not enough and the remedies are needed in the desert fringe tract with 'local deserts', as well. It is also clear that any solitary or sporadic effort to fight the sand menace is no answer to the problem. All areas whether cultivated (both irrigated and un-irrigated) or un-cultivated demand attention and an all out concerted effort is required. The proper answer, therefore, is the preparation of Regional Working Plans prescribing proper land utilization and treatment for all types of area with a view to :—

- (i) Mitigate the evil of wind erosion, check sand drift stabilize local sand dunes and isolate the valuable land from sources of sand by the formation of vegetative cover and obstructions against the the wind.
- (ii) Conserve soil and moisture in all areas. Depriving the hot winds of its powers of desiccation and detaching, by providing shelter belts and wind breaks, will help in spreading irrigation over larger areas than at present and as a consequence the production will increase.
- (iii) Satisfy local requirements of fuelwood and timber and save the cattle dung for application as farm-yard manure in fields.
- (iv) Raise standard of living including health ; and
- (v) To link forestry more closely with the agriculture.

For the sake of prescribing treatment for all types of lands, it will be convenient if they are divided into different working circles. Formation of following working circles has been suggested in the Regional Working Plan for Ludhiana district. This almost holds good for other districts too, but adjustment for variations can be made depending upon the local conditions.

(I) *Cultivation Working Circle*—This will consist of all areas under cultivation and comprises 80 to 90% of the total area. It can be further divided into two working series namely :—

1. *Level area cultivation working series*—The level areas under cultivation free of sand will come under this working series.
2. *Undulating sandy area working series*—This will comprise of all undulating sandy areas fit for some cultivation.

(a) *Method of treatment of level area cultivation working series*—These areas are under cultivation the standard of which is quite good. They are generally irrigated by canal, persian wheel and by tubewells. Near the 'local deserts', the following treatment need be taken up on a large scale :—

- (i) To plant live hedges of suitable species, e.g., *Tamarix* species, *Acacia modesta*, *Ipomea*, *Saccharum munja*, etc., isolating the cultivations from the sand focii.
- (ii) Leguminous cover crops to be grown in summer months, for which experimentation is needed to recommend suitable species. This would be easily possible with increased irrigation facilities.
- (iii) Construction of earthen bunds (wats) about two feet high will help in obstructing sand drift and conserving moisture.
- (iv) Ploughing to be done at right angles to the constant direction of wind in May and June, i.e., south-east to north-west and the final furrows to be left a little wide and rough to obstruct the wind.
- (v) Occasional tree species, e.g., mango, *sissoo*, mulberry, etc., may be grown at all available corners, paths, irrigation channels, etc. After the consolidation of holdings rows of trees need be grown along the main paths and around the rectangles.
- (vi) The organic matter contents to be built up by including green manuring as part of crop rotation.

(b) *Method of treatment of undulating sandy area working series*—These areas should be levelled to make them fit for irrigation, especially for canal irrigation which is being extended to these areas. Two special advantages which accrue from canal irrigation are :—

- (i) The moisture contents of the soil are raised thereby reducing the desiccating effects of hot winds.
- (ii) The fertility of soil is increased due to the introduction of rich silt brought by canal water.

Necessary prescriptions and programme should therefore be made for levelling such areas.

All other recommendations and suggestions given in para (a) above are applicable here as well.

(II) *Strip Working Circle*—It will include the following 4 working series :—

1. Railway strips working series.
2. Canal strips working series.
3. P.W.D. road strips working series.
4. District Board roads strips working series.

These areas are at many places level with good soil but at other places they are sandy. Sand dunes are frequently found at various places. They are also subject to very heavy grazing at present, but it can be eliminated as they are the property of the Government and the District Board, and the people have no right of grazing in them. Working schemes for the areas, the management of which is with the Forest Department, have already been prepared and they will be worked according to the programme and prescriptions laid therein. The programme and prescriptions for the rest of the areas should be worked out and the respective Departments will carry out these prescriptions and programmes. It is, however, recommended that the strips where more than 2 lines of trees can be grown on either side may be got transferred to Forest Department and provisions of Indian Forest Act applied to them to ensure better protection and little cost on fencing them.

The sand dunes found in these areas will be planted with *kana* (*Saccharum munja*), *Leptidenia spartium* and *Calligonum polygonoides* to start with. When these species get established, *mallah* (*Zizyphus numelaria*) will be introduced. Later on when the soil conditions improve, *chamror* (*Ehretia laevis*), *kikar* and *Prosopis juliflora* can be introduced. Grazing and browsing will have to be totally eliminated from such areas.

(III) *Unculturable lands Working Circle*—It will comprise of areas in and around the village habitations, schools, hospitals, religious places and public buildings, etc.

These areas are generally level with good soil free of sand and are very much suited for growing trees. Only few trees are found sprinkled all over and there is no shrub and bush growth in them. They are subject to very heavy grazing and their afforestation will be really a big problem. However, it is hoped that the 'Panchayats' of villages will be able to execute the works with very little trouble and the necessary protection to trees by means of tree guards or brushwood fencing will be secured at no or little cost with the co-operation of the villagers. It must be remembered that no attempt is to be made to grow thick forests in these areas as the object is not to raise regular forests here. The main object is to beautify the places and to provide shade. Wherever, village *shamlats* for herding the cattle are available tree-cum-grasslands are to be aimed at and not more than 10 to 15 trees per acre should be prescribed. Where inferior grasses infest the area prescription for good fodder grasses should be made and a convenient programme for rotational closures should be laid down.

(IV) *Sand dunes Working Circle*—It will comprise of all the sand dunes other than the sand dunes included in Strips Working Circle. Great efforts will be required to combat this menace of creeping sand dunes. It is very essential that they should be established *in situ* so that they do not creep into and spread over valuable lands. The best and most effective method to start with is to plant them with *kana*, *Ipomea* and *mallah*. The treatment of such areas will be the same as provided for sand dunes in strips working circle and programme for afforesting them will be laid down.

(V) *Plantation Working Circle*—It will include all areas under existing compact plantations and each plantation will form a different working series. In Ludhiana district, there are two such plantations namely:—

1. Ludhiana Reserve Forest.
2. Mattewara Fuel Plantation.

Separate Working Schemes exist for these areas and when their period is over they will be revised separately. Similar Working Schemes can be prepared for such areas in other district too.

(VI) *Waste land Working Circle*—It will include all waste lands which are culturable. In Ludhiana district they are mostly found in the *bet*. These are the areas where Forester should have more free hand to enrich the tree population of the district, although here too the

main aim is to have tree-cum-grasslands. These areas can be gone over under rotational closure schemes and a programme should be laid down accordingly. It is better if the provisions of Indian Forest Act are applied to these areas as well. The number of trees per acre can be more than that in the unculturable lands working circle and it can be raised to 30 to 40 trees per acre.

Wherever sand dunes occur in these areas, treatment suggested in para 2 of Strips Working Circle can be prescribed.

Certain requisites for achievement of success—For successful implementation of the recommendations and suggestions given above the fulfilment of the following essentials is necessary :—

- (i) *Consolidation*—The first requisite in this direction is to complete the consolidation of holdings in the minimum possible time, so that every owner of land has a definite and separate unit of land and he can be persuaded to take interest in its improvement and also in the planting of trees. At present the local people are not sure which land each one of them will get after consolidation and naturally they lack all enthusiasm. These operations are already in progress but their speed is required to be accelerated.
 - (ii) *Application of Land Preservation Act*—Strong propaganda and efforts are required to bring it home to the people and to make them realise that their valuable lands are threatened by the demon of erosion and that they should rise to the occasion to lay it low by their concentrated efforts in fighting against it. They are required to be persuaded and convinced that their salvation lies only in planting as large a number of trees as is possible. However, the unfortunate position in this regard that the people generally are conservative and nothing progressive becomes convincing to them till brought under the law, cannot be entirely disregarded and application of Land Preservation and Indian Forest Acts becomes essential to make it possible to remove practical difficulties and secure participation of villagers in achieving success. The matter has already been initiated and it is hoped that it will come through successfully.
 - (iii) Transfer of remaining canal, road and railway strips where 2 or more rows of plants on either side can be planted. The Chief Minister has already publically expressed his intention to transfer such management to the Forest Department.
 - (iv) Co-ordination between Forest, Agriculture, Irrigation and other departments and also public and private institutions to achieve desired results under various working circles.
 - (v) Allotment of adequate funds for execution of various works.
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