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Soil Conservation with Special Reference to the Nilgiris

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It may be said without fear of contradiction that the problem of soil erosion started when the first man turned the sod in the garden of Eden and began upsetting the equilibrium established by Nature. We are all aware that the native grass that clothes the Earth's surface and the vegetation that springs up spontaneously are the anti-erosion controls of Nature. The cover or canopy effect of vegetation, the mechanical hindrance to the flow of water by stems and roots, the soil-binding property of the roots of plants and the biological effects brought about by the addition of dead and decaying organic matter year after year; all these contribute towards the control of soil erosion.

Soil erosion in the Nilgiris is most marked during the heavy pre-monsoon or post-monsoon showers of the South-West Monsoon and the heavy sporadic rains of the North-East Monsoon. It is least during the main period of the Sout-West Monsoon, when the sky is completely overcast and rains are received in continuous showers for days on end. There are two phases in soil erosion. The first is the breaking up of soil particles into fine silt. The actual loss takes place during the second phase when the fine particles are washed down by the surface flow. American workers have observed that these two phases are negatively correlated. For instance, sand is easily detached by the beat of heavy rain drops, but it is not easily transported, whereas stiff clay is not easily detached but is carried away quite easily by the run-off water. Unfortunately we in this country have no data at all on this subject. From a cursory observation of the colossal soil loss in the Nilgiris, as evidenced by the silt in the run-off water from newly broken land, it is clear that the laterite soils of the district are as easily detached as sand and transported as easily as clay particles.

Contributory Factors: From the point of erosion control, the cultivation of potatoes, which occupies a place of honour in the agronomy of the State, with 19,100 acres out of a total area of 19,500 acres in Madras State, is the bane of the Nilgiris district.

Prior to the First World War, the average area under potato was in the vicinity of 7,000 acres. With the end of the first World War the price of potato began to rise and with that started the race for extended cultivation. Steep hill-slopes that were previously left untouched or were planted with blue-gum trees were converted into potato fields without any regard for protection of the soil, either by terracing or levelling. During the Second World War from 1939, the area under potatoes increased once again, reaching the peak of over 20,000 acres in 1945. In this boom period not only were all possible lands brought under cultivation but also the bulk of Government *poramboke* lands not so far assigned to anyone were also leased out and cultivated. The

net result was that the evils of soil erosion, which were hitherto insignificant, began to be felt in a serious form. The *sholas* which sheltered the springs disappeared. thereby causing the streams to dry up. The soil particles were washed down to silt up the streams and were carried down even to the plains through the waters of the Moyar and Bhavani rivers. The rains began to fail year after year, the mild and equable climate changed into hot summers and all the greenness disappeared, giving place to bleak and desolate hillsides.

Secondly, to make matters worse, the trees existing in Government and private plantations were mercilessly felled, without any attempt at re-afforestation, in order to tide over the fuel shortage. Due to an unfortunate order of the Government that non-agricultural lands in municipal areas should be charged a prohibitive penal assessment, the entire tree growth within municipal areas, nearly a century old, were all ruthlessly eradicated and the lands opened up for potato cultivation.

Thirdly, the ryots who had made enormous profits by potato cultivation, when deprived of their lease lands, rushed for possession of the extensive Toda *patta* lands which for centuries were used as grazing grounds and broke up the area without any regard for anti-erosion methods.

A good bit of the Wenlock Downs, which was retained as a National Park was broken up when it was assigned to the Political Sufferers. Though the methods suggested for prevention of soil erosion were ignored by these assigneess when they occupied the land, it is gratifying to note that the bulk of the area has now been bench-terraced, thereby minimising soil losses.

Conclusion: The rape of the Queen of the Hill Stations, brought about by the mad rush for extended potato cultivation in unsuitable sites and the reckless devastation of the forest area for fuel and timber without adequate provision for re-afforestation, has not only resulted in eroding the already poor soil of the district and reduced its productive capacity, but it also threatens to silt up beneficial works such as the Lower Bhavani Reservoir, which is intended to give irrigation for two lakhs of acres of food crops. The only silver lining to this dark cloud is the attempt by a few well-to-do ryots, to adopt soil conservation methods such as terracing, levelling, gully-plugging, and contour planting of potato and the belated awakening of the Government and the people to the dangers of the situation. The position is no doubt bad, but is not hopeless yet, and can be retrieved by the strict enforcement of a ban on assigning lands in the Nilgiris, by encouraging large-scale tree-planting on steep slopes, by judicious granting of kist remissions and large-scale adoption of simple anti-erosion measures like bench-terracing, contour planting and better cultivation.

Emergency Food Production Camps

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Introduction: This paper proposes to stress the necessity for putting into operation a practical scheme towards increasing food production in as many places as possible in the State.

Concentration on stepping up production on the lands already under cultivation is more essential than attempting to extend cultivation over patches now remaining fallow. Because most of these new areas are agriculturally defective, any attempt towards their reclamation is a tedious process.

The areas proposed to be worked should literally be 'camps' as only then can an atmosphere of grave danger be realised.

It is accepted by all that there is shortage of food. Various schemes have been launched and a number of concessions have been granted by Government to agriculturists to cover the deficit. Half a dozen years hence, if we look back at the achievement it would be found that it had not been a success. There have been adverse seasonal conditions in many tracts, but even in places where an assured supply of water was available, the level of production of crops has not reached increased over the pre-shortage days.

This indicates that the danger has not been fully appreciated and that there is want of heart in the application of methods aimed at growing more food. What is now required is the continuance of concessions to agriculturists and widening of facilities to a greater extent on the part of the Government and in return the farmers should co-operate to a greater extent than at present, in the problems facing the country.

Under the efforts to be put forth by the Government, it is essential that suitable centres should be selected, taken on lease and practically worked to enhance the production under scientific guidance to convince the people that the yielding capacity of the land could be raised. Can any one deny that an ounce of practice is worth a ton of theory? This saying was proved beyond doubt during the war years in producing sufficient vegetables for the military. The Government took lands in suitable tracts, grew vegetables and met the shortage very successfully. If similar efforts are directed towards producing food, it is bound to bear successful results and be an eye-opener to the full productive potentialities of the land.

No obstacle should be considered unsurmountable in taking up beneficial schemes and these schemes have to be worked with a protective purpose rather than earning big returns on the sums invested.

Objects: The objects of the scheme described in this paper are:

1. To make the cultivation of crops which form the staple food of the locality more intensive than what is being done now by the farmers.
2. To increase production of crops by adopting better methods and relieve the acute shortage.
3. The improvements carried out on the lands would serve as permanent objects of demonstration and a lasting asset to the owners of the land.
4. Greater interest will be evinced by the farmers of the locality on the improvements carried out on the lands of some of their own men and they will adopt them with the result that production level will increase in the region as a whole.
5. Besides increased food for the man, fodder for the beasts of the farmer also is increased in quantity.
6. To stir those at present in complacency to a state of real activity.

It is suggested that the scheme be run for five years. The requisites for working the scheme, viz., land, technical staff, labour (including human, mechanical and cattle power), irrigation sources and manure requirements are discussed. Then the cropping scheme which will be most profitable to the tract, the increased out-turn and the extra human and animal units that can be supported are indicated.

Land: Each camp can have a minimum area of 200 acres in a block. If one block is not available smaller blocks of 50 acres in extent not far from each other can also be taken up.

Garden and wetlands with assured water supply alone need be taken on lease.

Farmers unable to do effective cultivation for want of sufficient funds, absentee landlords and some who may be attracted by the lease amount offered, may agree to lend their lands on lease. Besides these, lands belonging to temples and charitable institutions may also be available. The lease amount will be on a par with that prevailing in the locality with a small premium added to it. A five-year work on the lands by the technical department will be sufficient.

Labour: The following sources of labour can be usefully employed.

1. As much labour as is locally available.
2. Demobilised soldiers willing to take up farming.
3. Labour migrating from famine districts.
4. Able-bodied beggers who are at present idling.

The imported labourers should be provided with sheds as close to the workspot as possible.

Regarding wages, rates similar to local rates can be paid to adults and juvenile labour. A slight modification is suggested, viz., wages can be paid at intervals of a week. Instead of disbursing the whole amount, two-thirds can be paid and the balance credited to his account. This accumulated amount can be utilised at the end of each year to meet the

clothing requirements and the balance carried over to the end of the 5th year and disbursed in a lump sum. The underlying object is, that when the scheme is disbanded after 5 years the individual worker is left with a lumpsum which will help him to buy cattle and become a tenant cultivator or to build a house of his own or buy milch cattle and live on milk trade.

The wages vary according to seasons but taking the average to be Rs. 1—4—0 per day per man, 12 annas per woman and 8 annas per boy, the yearly accumulation after disbursement will be Rs. 144/- per man, Rs. 84/- per woman and Rs. 57/- per boy. Deducting Rs. 44/- from men, Rs. 34/- from women and Rs. 17/- from boys towards clothing for themselves and their children they are left with Rs. 100/-, Rs. 50/- and Rs. 40/- as net savings each year. At the close of the five-year period each man has to his credit Rs. 500/-, woman Rs. 250/- and boy Rs. 200/- disbursed in a lumpsum to be utilised in the best way possible. Regarding implements they can be loaned from the agricultural department and cattle pairs hired locally.

Staff: The minimum requirement will be one upper subordinate at a maximum salary of Rs. 220/- and dearness allowance of Rs. 45/-, one fieldman on Rs. 45/- plus 25, one store-keeper on Rs. 45/- plus 25. This comes to Rs. 4,860/- or Rs. 5,000/- for 200 acres per year i. e. Rs. 25/- per every acre to work the scheme at each centre of 200 acres.

This is only a fraction of the extra return realised from the land as explained more fully in the later portion of this paper namely Rs. 130/- per acre in wetlands and Rs. 180/- per acre in garden lands.

Irrigation Sources: If the block of land happens to be entirely garden land, and if the existing number of wells are insufficient; a few wells can be dug. If they are in disrepair or with poor springs the department can set them right. The owners of the lands can be charged 50% of the cost of excavation or deepening to be recovered from the lease amount in five annual instalments and the rest treated as subsidy.

In places where facilities exist for getting electric connections electric motors and pumps can be installed for the wells. Otherwise oil engines have to be provided. This will dispense with animal pairs and their high maintenance costs.

At the end of the scheme the engines can be offered to the owners of the wells at a concession rate. If necessary they can be given loans also, to make the purchase. In case there is no demand from the owners of lands who had given them on lease the engines can be auctioned.

Providing wells or deepening them, installing pumps by the Government, and offering them at concession rates is no small help to the farmer since many find these beyond their means.

If wetlands are chosen they should have guaranteed supply of water from an irrigation project. Even here wells have to be provided to raise timely nurseries and give a few irrigations to green manure crops.

Manures: If the 200 acres are entirely wetland, except for 20 acres required for nurseries, the rest can be put under a green manure

suited to the locality. Even here the dual-purpose green manure viz., pillipesara can be grown, seeds collected from the first flush, fed partly to cattle and the subsequent flush ploughed in.

Planting perennial green manure shrubs such as *Glyricidia* and *Adathoda* on alternate field bunds will provide sufficient leaf and supplement what is obtained by sowing green manure seeds in the fields.

In places where two crops of paddy are raised, the first crop is easily manured with green leaf, but the second crop does not get leaf as the short interval between the two crops does not permit raising a green manure crop on the field. Hence farmers who can afford it, buy artificial manures or oil cakes for the second crop. Other starve their second crop resulting in poor yields. To overcome this difficulty, in easy method of growing leaf is suggested as follows:

A nursery of *Sesbania* seedlings has to be grown at the time of sowing paddy nursery for the first crop. Immediately after transplanting the paddy crop, i. e. by the end of June or July, the *Sesbania* seedlings are pulled out from the nursery and planted in the field touching the bunds, one foot apart or even closer. These seedlings grow very well and commence to flower by September. The paddy crop is harvested by the end of September if it is a short duration variety. Immediately after harvest the land is prepared for the second crop; just at that time the *Sesbania* plants along the bunds are pulled out and pressed into the field. It will give at least 3,000 to 4,000 lbs. of leaf per acre. Where no leaf is available and also where the cost involved in buying oil-cakes is too high this method of supplying leaf comes in very handy.

Experiments have indicated that a complete manuring of paddy, namely leaf manure, phosphates and ammonium sulphate gives maximum yield. Based on this, adequate artificials have to be applied at an uniform rate of 100 lb. ammonium sulphate and 50 lb. of super phosphate per acre over a basal dressing of 5,000 lb. of leaf.

If garden lands are selected, composts and cattle manure are to be secured from the nearest available sources as maintaining cattle pairs is not contemplated but composts from available waste material can be prepared to a limited extent.

Top dressing with ammonium sulphate and oil cakes will help in obtaining substantial increases in yields.

Cropping Programme: Wetlands: Single crop and double crop.

The entire area of 200 acres can be cropped with paddy and then sown with green manures except over 20 acres which may be required for raising nurseries.

If it is a double crop area, the first crop is raised, then the second crop and finally a green manure crop which will be useful for the first crop of the succeeding year.

Garden lands: Out of 200 acres, crops can be grown as follows:

Cereals	120 acres	2 crops to be raised in a year.
Vegetables	50 acres	2 crops where vegetables of short duration are raised.
Root crops	20 acres	
Bananas	10 acres	

Vegetables and root crops will rotate with cereals over 70 acres every year and over the rest of the area every alternate year. In the cereal portion, where there is an interval of three months, fodder crops can be grown.

On the area where root crops have been grown (i. e. 20 acres) and where cerals are not alternated with vegetables, the next year, a short-term green manure crop like Sunnhemp can be grown to recuperate the soil.

The above crops provide a variety of food. They give scope to engage the labour throughout the year, and they satisfy the nutritive considerations also by supplying varying amounts of proteins, carbohydrates and minerals, besides vitamins. Vegetables, root crops and bananas yield 6 to 8 times more energy than cereal crops from the same unit area.

A statement is furnished to show the increased out-turn that will result by working a scheme of this nature and how it justifies employment of special staff.

In respect of wetlands a moderate acre yield of 1 ½ tons of paddy and 1½ tons of straw is anticipated instead of the ⅞ ton grain and 1 ton of straw now obtained on an average.

In garden lands the cereal acre yield is expected at ¾ ton in the place of the present average of ½ ton.

Regarding root crops, vegetables, bananas and fodder crops, an increase of 1 ton per acre alone is aimed at over the 5-ton yield that is being realised now.

The value of the increased yields anticipated as a result of improved methods is computed at very reasonable rates, indicated in the statement.

Every acre of wet land can bring a net increased return to the value of Rs. 130/- over what is normally obtained and in garden land up to Rs. 180/- per acre, as a result of operating a scheme of this nature.

Conclusion: A brief account of the methods of increasing food production by starting emergency camps or production centres is discussed. These centres will serve as models for wider application of improved methods. They do not in any way displace those already engaged in the agricultural profession; in fact, other kinds of labour are invited in addition to the locally available ones and their efforts properly diverted towards more production.

Attention devoted towards maximising production in manageable units by technical staff will prove to be effective in solving food shortage in the zones attempted, besides benefiting the State as a whole.

ACRE YIELDS AND PRICES (ASSUMED)

Crops	Present producton in tons (per acre)		Expected production in tons (per acre)		Increased production in tons (per acre)		Prices assumed.
	Grain	Straw	Grain	Straw	Grain	Straw	
Cereals	⅓	⅔	⅔	1	⅓	⅓	Rs. 224/- per ton or 0-1-7 per lb.
Root crops	5 (tubers)		6 (tubers)		1	...	Rs. 210/- per ton or 0-1-6 per lb.
Vegetables	5	...	6	...	1	...	Rs. 210/- per ton or 0-1-6 per lb.
Bananas	5	...	6	...	1	...	Rs. 280/- per ton or 0-2-0 per lb.
Fodders	...	4	...	5	...	1	Rs. 45/- per ton or 0-0-4 per lb.
Green manures	...	...	...	2	...	2	Rs. 3/- por ton.

CROPPING ON GARDEN LANDS.

Nature of crop	Area in acres	Present production (estimated) in tons		Expected production (estimated) in tons		Increased production (estimated) in tons		Value of increased produce		
		Grain	Straw	Grain	Straw	Grain	Straw	Grain Rs.	Straw Rs.	Total Rs.
Paddy first crop.	120	40	80	60	120	20	40	5600	1800	7400
,, second crop.	120	40	80	60	120	20	40	5600	1800	7400
Root crops	20	(100 tubers)	...	20 (tubers)	...	20	...	4200	...	4200
Bananas	10	50	...	60	...	10	...	2800	...	2800
Vegetables	50	250	...	300	...	50	...	10500	...	10500
Fodders	75	...	300 (green)	...	375 (green)	...	75 (green)	...	3375	3375
Green manure	70	...	...	...	140 (leaf)	...	140 (leaf)	420	...	420
										36,095 or

36000 Rs. or Rs. 180/- per acre.

Nature of the crop.	Area	Present Production		Expected Production		Increase		Value of increased produce.		
		Grain	Straw	Grain	Straw	Grain	Straw			
Paddy	200 acres.	175 tons.	200 tons.	276 tons.	300 tons.	92 tons.	100 tons.	Grain Straw	20,608/- 500/-	Rs. 25,108/-
Green manures	180 acres.	...	...	Leaf	360 tons	...	...	...	...	1080/-

Remarks	Present production		Expected production		Increase		Total.	26,188
	Grain	Straw	Grain	Straw	Grain	Straw	or	26,000/-
								i.e., Rs. 130/- acre.
Acre yield assumed	7/8 ton. (1680 lb)	1 ton.	300 lb. (1-1/3 tons)	1½ ton	½ ton	½ ton.		
Green leaf.			2 tons per acre.					

Prices: (assumed)

Paddy grain.	Rs. 224—0—0 per ton
Straw	Rs. 45—0—0 per ton.
Green manures.	Rs. 3—0—0 per ton.