

to others at fancy prices. A full grown bull fetches generally three hundred rupees, while calves do at least sell at a hundred per head. In view of the racy market for it by the richer section of the ryots of the District, the poor live-stock-owner cannot afford to own them long. Hence there is a danger of their extinction altogether, as a breed.

The case for revival of the breed The plea for reviving and increasing the number of the pure blood through Government patronage, gains support from the admissions of the Veterinary and the Agricultural Departments, as to their hardihood and endurance in facing and shouldering tough agricultural duties all the year round, their medium size and wiry frames suited for ploughing operations of clay soil and above all their comparatively low cost of maintenance—all qualities in a bull to be plumped for by the poor live-stock owner *ryot*. It is further significant to be told that because of the lack of patronage from Government quarters, in the way of grant of premium benefits to breeders, the breed has fast been disappearing.

Suggested reforms (1) Reinclusion of the breed in the schedule entitled to premium benefit, by the Veterinary Department. (2) Opening a model farm at Omblachery village, with a view to increasing the pure breed. (3) The immediate purchase of the surviving calves for purposes of the proposed farm. (4) Launching a co-operative enterprise with the subscribed capital of the Mirasdars of the district with objects, such as, (a) the immediate purchase, upkeep and maintenance of all available cows of half and three-fourths blood, (b) the purchase and maintenance of sufficient land for pasture and for growing cattle fodder, (c) assumption of rights and powers of exclusive marketing by or through their agency, (d) the imposition of a ban on the sale of heifer calves for a period of ten years from date of commencement of the said farm, and further ban on all sales of them to butchers. Other measures, incidental to and in furtherance of the objects may also be adopted. But it is urgently in the interests of the live-stock improvement of the District that early steps are taken by the authorities for reviving the reputed "Omblachery breed."

SELECTED ARTICLES

Notes on Erosion

By SIR A. TOTTENHAM, C. I. E.,

Administrator, Pudukottai

Erosion is a world-wide problem. Europe is the continent least affected, though even in parts of Europe, for example the Russian steppes, erosion is a serious problem. In America, Asia and Africa its importance cannot be exaggerated. In regard to Africa, General Smuts has said 'Erosion is the biggest problem confronting this country; bigger than any politics'. The Darbar consider Relief or Education. But, until the public have been further educated in the importance of this work, it would be hopeless to give it the priority to which it is entitled in our Budgets.

Erosion is of two main kinds, erosion due to wind, and erosion due to water. Erosion due to wind is of little or no importance in our State, though there is reason to believe that in Coimbatore, and perhaps other Districts of the Madras Presidency, it is of much greater importance. How important it is in the U.S.A. may be learnt from the story told by Stuart Chase in that terribly interesting book *Rich Land, Poor Land* that an old Nebraska farmer was sitting on his porch during a dust storm. Asked what he was watching so intently, he replied 'I'm counting the Kansas farms, as they go by'! In Pudukkottai we have to deal with erosion due to water.

This begins as 'sheet erosion', which most people would not notice at all. Layer after layer of the soil is peeled off, and finally, after less than a foot, it may be, is gone, what the Americans call 'hard-pan' is reached, which is infertile, at all events unless it has been ploughed up, and exposed to the action of the atmosphere for some time. For the time being, at all events, the soil is devoid of plant-food. Then come gullies, small at first, increasing rapidly, and finally forming gorges, perhaps 20 feet deep. There are such gorges in our State, for example at Ariyur *vari*, and Tudayamparai. As the process goes on large areas of rock are laid bare, as can be seen at the places already mentioned, and at many others in the State, among which may be mentioned Manaturai *vari* (which feeds Valnad *Periyakulam*) and Ponnehchikulam, both in Alangudi taluk.

It must always be borne in mind that—apart from the serious silting up of the tanks caused by erosion—it is not a mere question of transporting soil from one place to another, where it may be equally useful. Whatever may be the nature of the silt carried by the Nile in Egypt, and some of the large rivers in China, the silt formed by erosion in our State is *infertile*, owing to the changes in the physical and chemical structure and composition of the soil that it undergoes, when carried to any distance by water. In their book *The Rape of the Earth*, Jacks and Whyte say 'The water breaks down the transported soil-crumbs into their constituent particles of sand, silt, and clay, thereby destroying most of the characteristic soil properties and fertility, so that even when the eroded particles are redeposited on cultivable land, they have lost much of their productive capacity'. (p 33).

It is not too much to say that, unless effective measures are taken to check erosion in our State, within a measurable time—it may be a century, it may be more, or less a very large part of the high grounds, such as are common in the Alangudi and Tirumayyam taluks (there is much less erosion in Kulattur taluk, probably owing to the fact that there is less laterite in the subsoil there and more gneiss) will have been reduced to a desert of bare and eroded rock, scarred by horrifying ravines, incapable of supporting any form of life,—human, animal or vegetable; while all the tanks will have been silted up, and most of the cultivable lands destroyed by the deposit of infertile silt.

All books on this subject lay stress on the fact that this artificial or man-caused erosion, as opposed to natural erosion, which is on the whole a beneficial process, is of *recent origin*. Such appears to be the case in our State. In fact, if erosion had been proceeding for any considerable period at the same pace as at present, the condition of the State would already be such as has been foretold above. The *Vattam Karnam* (village accountant) assured the writer that where the appalling Ariyur ravine now is, forty years ago there was no ravine at all. That this is literally true the writer cannot guarantee, but it seems not unlikely.

What started it? The clue may possibly be found in the following quotation from the State history. "It may be mentioned that the Resident made arrangements for clearing the forests and increasing the cultivable area of the State. In 1826 in reply to a question of the Governor to the Raja whether the country

was covered as much with woods as before, the Raja informed him that 'agreeably to his father the Colonel's' (i. e., Col. Blackburne's) 'order, the woods had been almost cut down, and that cultivation was going on, some thin wood remaining still in some places'. The fact remains, however, that in some of the areas where erosion is worst there is still a good deal of scrub jungle, and of course there was never high forest in Pudukkottai.

Cart-tracks are a fruitful cause of gullying. This is mentioned by Lord Hailey in his work on Africa. In any area where erosion is in progress the process can be seen by which at first small gullies are formed by the wheel tracks, then these are deepened, till the cart-track has to be abandoned, and another route is taken by its side, while the original track cuts deeper and deeper till a formidable gully is formed, to grow in due course into a ravine.

Nothing had been done to check erosion till some six years ago. Attention had been concentrated entirely on the silting-up of tanks, which it was sought to check by building expensive masonry grade-walls at the *bottom* of the *war*, leading into the tanks. Owing to their cost, these could only be few, whereas hundreds—nay thousands—are required. They were not particularly effective, even in stopping silt reaching the tanks. An idea was entertained that the silt deposited behind them might be removed in lorries, but of course this was never done. The cost would have been prohibitive, and it would have been difficult to find a place to dump the silt, whence it would not at once have washed down into another tank, or some cultivable fields. The problem of the rapid denudation of the *uplands* was of course not touched at all. It was like putting a basin on the floor to stop a leak in the roof!

What we now aim at is *preventing denudation and consequent formation of silt* not merely the disposal of silt after it has formed, and after valuable soil has been carried away from the uplands and defertilized. The cardinal principle that has now been adopted is that anti-erosion work must begin at the *top* of the eroded area, and work down to the bottom. Rubble dams have been built in very large numbers, and earthen bunds formed to check surface-wash. Dams formed of the trunks of palmyras (*Borassus flabellifer*) were tried at first, and would have been very cheap, but were not a success, owing probably to seasoned timber not having been used.

Steep banks have been terraced, and on the bunds and terraces various kinds of grass have been sown. Two African species have been tried, Kikuyu grass (*Pennisetum clandestinum*) which had already been cultivated at Kodaikanal, and Giant Star grass (*Cynodon plectestachyum*) which was specially obtained from Kenya and Pretoria. Various indigenous grasses have also been tried. The Kikuyu grass has not proved successful, but the Giant Star has done well in some places. Much more remains to be done in this direction.

A considerable area adjoining Manaturaivari has been ploughed with the State motor tractor, *along the slope*, and *Cholam* (*Sorghum vulgare*) sown. The ploughing is of course very beneficial, but the *Cholam* was sown at the wrong time and failed. Aloes (*Agave*), Cashew (*Anacardium occidentale*) and *Virali* (*Dodonaea viscosa*) are other species planted or sown. Owing to the comparatively cheap nature of these expedients, a good deal of work has been done in half a dozen places, and a steadily increasing allotment is being made for these works in the Budget.

The *ryots* were at first by no means convinced that these works were to their advantage. They said that they were cutting off the supply to their tanks; which in any case were doomed to destruction sooner or later, if nothing was done—a fact that they did not grasp—though actually the ultimate effect of the works must be to improve the water supply, by raising the general water-level in the

upland sub-soil, while checking the velocity and reducing the violence of floods. Now, it is believed that many, even of the *ryots*, are beginning to see how beneficial these works are.

What the Darbar are doing at present is but little, it is true, having regard to the magnitude of the problem. Lakhs, perhaps crores, might be spent on it. That is not possible, but the Darbar consider that it is better to go on methodically, year after year doing what little they can, rather than to do nothing. They do not subscribe to the principle 'Posterity has done nothing for me, so there is no reason why I should do anything for posterity'.

Addendum to Notes on Erosion The Darbar must not omit to mention the valuable advice that they received from Rao Sahib E. V. Padmanabha Pillai who was lent for a short time by the Madras Government to study the problems of erosion in the State, and advise as to the methods to be taken to deal with them. He visited the State from 28th August to 7th September, 1938 and again from 21st January to 1st February 1939, and wrote a useful note on the subject, which the Darbar had printed.

An appeal to Tanjore ryots *

By M. S. SIVARAMAN, I. C. S.,

Collector and President, District Agricultural Association, Tanjore.

There is an impression among many that paddy cultivation which has been in vogue from time immemorial in Tanjore District has reached a high level of perfection. But the truth is that no proper attention is paid to cultivation in this district. The average outturn realised is 25 *kalamis* per acre which is about one-third of the yield per acre in the Aduturai Farm and one-fourth of the yield per acre in Spain and Japan.

The reason for this low outturn is the deficiency of the bulk of the soil of the delta in the two vital elements, nitrogen and phosphoric acid, which are essential for the successful raising of paddy. The existing manurial supplies are totally insufficient to replace the elements taken off the lands by the crops raised and there has been a gradual deterioration of the soil which has gone on for centuries. It is necessary that more attention should be paid to the proper manuring of the lands if the average outturn of the district is to be anything like what it ought to be.

Can the *ryot* repair the damage done in the course of centuries and secure a better outturn in the immediate future without much extra expense? He can, if he follows the advice of the Tanjore District Agricultural Association. He can increase the average yield of the district by over a hundred per cent even in the course of two years.

The deficiency of nitrogen can be made good by green manuring. The Association has distributed seeds of several kinds of green manure plants like *daincha*, *pilliposara*, sunhemp, *katumpayar*, *kolinja* and *Sesbania speciosa* with instructions to *ryots* to raise their own seed requirements on bunds of fields and on waste lands. The intention of the Association is to make every *ryot* self-sufficient in respect of the supply of green manure seeds. There are 1.2 millions of acres of wet land in this district and these will require at least 20 million lb. of green manure seed or roughly 1¼ lakhs of bags of seed. Each seed produces not less than 2000 seeds in the course of a season and in two seasons, it is theoretically possible to get 40 lakhs of seed. Five lb. of seed can be theoretically multiplied in the course of two seasons to satisfy all the requirements of the

* An appeal issued on 15th February 1943.