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*Reclamation  
of land*

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THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE

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SOME LAND RECLAMATION COSTS

by

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### Some Land Reclamation Costs

The margin of cultivation is not a fixed boundary, a kind of ring fence, beyond which no land is ever cultivated. Its position will vary from time to time, depending on economic circumstances. Greater production may be achieved by more intensive use of existing arable acres, but there comes a point at which marginal inputs are no longer balanced by marginal outputs. Then it is that, if still further production is to take place, the margin of cultivation may be extended.

Every year rural development - new roads, new air fields, new factories, new houses - takes its toll of agricultural land. Inevitably some of it must be good land so that there may be quite an appreciable loss of total production, which must be made good if the agriculture of this country is to maintain or increase its contribution to the nation's food. Sub-marginal land cannot replace, acre for acre, better land lost to industrial development; but there can be little doubt that many acres are sub-marginal, not because of inherently low fertility, but on account of some obstacle such as tree roots, or water logging, technically surmountable perhaps but an economic barrier. Modern techniques, better and more powerful equipment, and direct state aid have induced a number of farmers to extend the limits of cultivation of their farms by reclaiming such sub-marginal land as was available adjacent to their holdings.

Sixteen farms from various parts of this College area have provided cost data covering a total of 188 acres, many of which in their natural state, looked far from promising. In almost all cases some clearing of the ground was necessary, from the removal of stones to the digging up of tree roots. Some idea of the variation in the nature of the land can be gathered from the expense of clearing, given in the cost table which follows.

Most of these farmers expect to bring the reclaimed land within their normal cropping rotation at some date and, as a first step, eleven of them established grass, either by direct reseeding or sowing out the grass seed under a nurse crop. Of the remaining five, two sowed pilot crops and three simply brought the land directly into the crop rotation by sowing oats.

These projects were carried out a different times from early 1952 to 1954, but for the sake of uniformity the same labour rates have been charged throughout. Some operations were done on contract but where a regular farm labour and power was employed the hourly rates applied were:-

Man Labour 2/9 : Horse Labour 1/6 : Tractor and Equipment 9/- .

A higher than normal rate for tractor work was charged to cover wear and tear, as well as repairs, of the implements used.

The cost table which follows is arranged in three sections:-

- A. The labour cost of cultivations
- B. The cost of seeds and manures
- C. Any clearing, fencing and draining costs

The sum of the three sections gives the gross cost of each scheme. In section B manure costs are given net but, apart from this, no other subsidy has been deducted, although, as far as is known, all received ploughing subsidy - mostly at the £10 per acre rate - and M.A.P. reclamation grant. In addition there were fencing and draining grants applicable to a number of schemes. Because the amount of state aid has not been divulged in every case, net costs are not given.

As each scheme is unique, to some extent, no grouping with a view to computing average costs is possible; hence the costs of all schemes are given side by side in the following groups:-

- I Nine cases where the land was directly reseeded.
- II Two cases where a nurse crop was used along with a long term seeds mixture.
- III Two cases where pilot crops were sown.
- IV Three cases where an oat crop was sown.

TABLE I  
Reclamation Costs - £ per Acre

Group	I									II		III		IV		
	R1	R3	R4	R19	R20	R28	R32	R36	R37	R10	R22	R6	R16	R12	R13	R24
Ploughing	4	4	6	5	2	5	4	4	4	3	8	4	5	3	2	5
Cultivating	3	2	10	3	1	4	4	3	4	3	1	2	-	3	1	1
Sowing	3	1	1	2	2	3	3	2	6	1	1	1	1	1	1	1
Sub-Total A	10	7	17	10	5	12	11	9	14	7	10	7	6	7	4	7
Seeds	6	4	5	5	5	4	4	4	5	9	6	1	1	3	3	3
Manures	7	9	17	12	10	10	9	12	10	11	5	13	12	6	3	5
Sub-Total B	13	13	22	17	15	14	13	16	15	20	11	14	13	9	6	8
Clearing	3	-	4	16	3	7	1	1	-	4	1	3	65 <sup>#</sup>	7	1	6
Fencing	10	-	16	-	5	10	3	9	-	-	2	2	4	-	-	-
Draining	42	4	25	-	-	-	-	-	-	-	-	22	-	-	3	-
Sub-Total C	55	4	45	16	8	17	4	10	-	4	3	27	69	7	4	6
Gross Cost A+B+C	78	24	84	43	28	43	28	35	29	31	24	48	88	23	14	21

<sup>#</sup> This includes some cultivations.

The variation in gross costs is enormous - the highest cost is more than six times the lowest. At the lower end of the scale R13, costing £14 per acre, concerned a flat piece of land which had been subject to periodic flooding, with the results that rushes had taken possession and the area had become almost valueless. Silting

at a bend of the river, where the bank was low, had been the cause of the floods. By excavating the river bed and raising and extending the bank, the cause of the flooding was removed. This work was certainly part of the reclamation cost but it was carried out by the landlord and no costs were available, so that to this extent the cost of R13 is understated. With the removal of the cause of deterioration, restoration was a comparatively simple task; rushes were cut, the land was drained and thereafter normal cultivations for an oat crop were completed.

At the other extreme there is R16. Forty to fifty years ago this land was growing timber. During the 1914-18 war the trees were felled and the area passed into agricultural use, but only as poor quality summer grazing. With the passage of time, grasses gave way to heather and the value of the land as an agricultural subject deteriorated. Before there could be any thought of establishing good grass, the heather had to be burned, the tree roots removed and the land levelled. The technique adopted for removing the roots was to bulldoze around them and then simply push them out. Large quantities of earth which adhered to the roots were removed with hand-picks. The cavities were filled and the land was levelled by bulldozer. These excavations and subsequent cultivations brought large quantities of stones to the surface and the gathering and carting of these went on throughout operations. Direct reseedling with a long term grass seeds mixture was considered inadvisable and instead a pilot crop of Rape and Italian rye grass was planned. Owing to an error in delivery of the rape seed, only the Italian rye grass was sown. It is to this point that the scheme was costed but subsequent procedure was to disc the land several times after the pilot crop had been eaten off, manure it and sow out the grass seeds.

Although sections A and B both vary quite a bit between schemes the extreme variability of the gross cost is largely attributable to section C. To pinpoint some of the reasons for variation, it is necessary to examine the components of each section separately.

#### Section A

This section is one of labour cost, and variations are attributable to the times spent on each operation. The table which follows gives the hours spent by regular farm labour on operations; where an operation was undertaken by a contractor the hours were not disclosed so the letter C is used to denote "contract work", in the table.

TABLE II

Man Hours per acre on Field Operation

Code Number	R1	R3	R4	R19	R20	R28	R32	R36	R37	R20	R22	R6	R16	R12	R13	R24	
Floughing	6	7	18	C	6	C	C	C	6	C	12	8	C	5	4	C	
Discing	2½	3	18	C	1	C	C	C	22	C	1	C		C	1	C	
Harrowing and Rolling	5	½	6	2	1½	3	3	1		1	1	1		1	1	1	1
Sowing	5	2	3	C	5	9	7	4		4	1	½		1	1/3	C	C

The extremely high labour input of R4 is immediately obvious. There is an element of clearing included in the ploughing and discing figures but throughout these operations two men were employed and the work was done most painstakingly. Repeated discings were necessary in order to produce the desired tilth. A very high standard of workmanship was aimed at and achieved, hence the high cost of this scheme. R22 also shows an unusually high ploughing time; steepness of the land necessitated one way ploughing with a single furrow plough. In the cases R37 and R16, data were incomplete and it was found impossible to separate one operation from another with any degree of accuracy.

Harrowing and rolling time was high where these operations had to be repeated several times to produce a fine seed bed.

Sowing time covers both seed and manure sowing, and again the repetition of the operation gives a high labour input in some cases.

Section B

Seeds: In group I (Table I) where there was direct reseeding, the variation in seeds cost is not very significant. As each mixture was prepared to suit each separate set of circumstances, the varying proportion of the different grasses and clovers account for cost differences. Only in one or two cases was the seeds mixture disclosed and, for these, the rate of sowing lay somewhere between 30 and 40 lbs. per acre.

The nurse crops used in R10 and R22 were Rye (6 bushels) and oats (6 bushels) respectively, and the grass seed in each case cost between £4 and £5 per acre. The pilot crop used in R16, which was to be Rape and Italian rye grass, turned out to be 18 lbs. ryegrass only. On R6 the very successful pilot crop comprised:- 12 lbs. ryegrass, 2 lbs. Rape, 2 lbs. white globe turnips and 2 lbs. thousand headed kale.

The group IV schemes, all sowed 6 bushels of oats per acre.

Manures:- It would be surprising if manuring costs were uniform throughout, in view of the wide range of soil types and conditions covered. Although lime was not applied universally, in one form or another, it was used in 11 instances, amounts varying from

1 ton of ground limestone to 10 tons shellsand per acre. Quite a variety of artificial manures were applied and the types and quantities applied per acre are set out in Table III.

TABLE III

Manures applied - Types and Quantities (cwts.) per Acre

Code Number	R1	R3	R4	R19	R20	R28	R32	R36	R37	R10	R22	R6	R16	R12	R13	R24
Grain Manure					5		3				5			6	6	6
Potato Manure	4	5	5			4		4								
Sulphate of Ammonia										1						
Nitro Chalk										2		3				
Slag			16	10	9	15	13	18	11		6		12			
Superphosphate										5		5	3			
Mineral Phosphate	6	6		6												

Section C

Clearing: Mention has already been made of R16 and, although £65 is set against clearing, some of it rightly belongs to cultivations. The other very high clearing cost was incurred in R19 where the land was densely covered with broom which had to be cut, hauled out and destroyed. Other less costly clearing operations involved the removal of stones, cutting of rushes and pulling out occasional scrub.

Fencing: Some of the fencing was of a temporary nature as in R6 where two plain and one barbed wires were erected by a contractor at 2/- per linear yard, or £2 per acre reclaimed. At the other extreme there is R4 where a very elaborate fence cost £16, of which £11 was for material.

Draining: Only in three schemes was a major drainage project necessary, R1, R4 and R6, and in each case the work was done on contract. Although the least costly of the three, R6 was probably the most spectacular. The basis of the scheme was a ditch about 24 feet wide at the top and five to six feet deep, into which piped drains were led. This ditch conveyed the water to a canal, constructed as part of a very large draining contract covering a wide district.

The drains in R4 were hand cut at 32/6 per chain and the materials cost approximately £10 per acre.

In R1, maximum use was made of machinery for opening and closing the drains. Where a machine could be used the cost was 2/- and 2/3 for opening to a depth of 2 feet 6 inches and 3 feet respectively and 10/- per hour for a bulldozer to close them.



Summary.

These costs have been computed by using, in the main, the normal methods and rates for costing a farm enterprise. It may be argued that the reclamation costs are those incurred in excess of the cost of a one-year crop, and some costs may be incurred in subsequent years, such as removal of stones brought to the surface by cultivations, which ought to be charged to reclamation.

Just how much it would cost to reseed, directly, land which was in normal cultivation, is difficult to assess, but, from Enterprise Cost Studies<sup>≠</sup> it appears that, on average, the cost per acre might be computed as follows:-

Ploughing	£2: 3: -
Cultivating	-: 18: -
Sowing Seeds & Manures	1: 4: -
Grass Seed	4: 7: -
Manures (Estimate)	1: 8: -
	<u>£10: -: -</u>

As far as group I projects (Table I) are concerned, deducting this sum from the gross cost would then give the reclamation cost to the end of the first year. In later years maintenance work will be necessary but, given this, the life of the reclamation is infinite.

An assessment of the worth of the projects may be made by considering the possible annual return from this capital investment. If it is assumed that any of the farms make a profit of £6 an acre, this sum can be considered as interest on the capital invested in reclamation. Consider, for example, R4: the gross cost of reclamation becomes £74 (£84 - £10) and a return of £6 on this is equivalent to 8% interest. On the other hand R3, on the same basis, would have a return of 40%.

An alternative method of assessment might be to consider how much would willingly be paid by the farmer for land reasonably comparable with his existing acres and adjacent to his farm and compare this with his cash outlay on reclamation. From the gross cost must be deducted the amount of state aid received. In R1, for instance, this cost would be £50, i.e. Gross Cost £78 less Crop Cost £10 less subsidies £18. To arrive at a farmer's extra cash outlay further items may need to be deducted, such as the cost of the regular farm labour which, as a rule will not be increased as a result of such a project. In this sense the extra cost to R1 would

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<sup>≠</sup> Enterprise Cost Series 1953. M.A. Haughs and A.D. Imper.

be about £45 per acre; and in some of the less expensive instances it would be of quite small proportions.

A final comment might be that reclamation may involve further capital expenditure on buildings or extra stock so that full advantage can be taken on this additional land. It may be, on the other hand, that land so added to a small farm makes it into an economic unit and all the acres will give a higher return.

The view was expressed by several of the farmers that, when reclamation work is being undertaken for the first time, it is wise policy to begin with a small acreage so that a proper technique may be evolved. If a large acreage is undertaken at once, an error of judgment will be an exceedingly costly business.