

Overseas Development Administration

SECTOR APPRAISAL MANUAL

RURAL DEVELOPMENT

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SECTOR APPRAISAL MANUAL: RURAL DEVELOPMENT

A MANUAL CONTAINING AID GUIDANCE ON
APPRAISAL RELEVANT TO RURAL DEVELOPMENT
PROJECTS

JULY 1980

The Notes and Articles in this publication have in the main been produced by members of the Geographical Division of the Economic Planning Staff of the Ministry of Overseas Development and have in most cases been issued in the manual "Appraising Investment Proposals".

It was thought useful, however, to consolidate those relevant to Rural Development in one volume.

They do not prescribe policy solutions but are concerned with understanding policy options, appraising institutions and understanding specific investment proposals.

Where relevant they have been checked out with experts but it should be emphasised that the ideas expressed herein are those of the authors and in no way entail official ODM endorsement. Indeed, generalisations about the process of rural change need to be adapted to the social, physical, economic and political circumstances of each country and region.

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POLITICS AND RURAL CHANGE

THE URBAN AND RURAL CONFLICT

GUIDELINES FOR RURAL PROJECT IMPLEMENTATION.

G A Bridger
June 1980

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POLITICS AND RURAL CHANGE

THE URBAN AND RURAL CONFLICT

GUIDELINES FOR RURAL PROJECT IMPLEMENTATION

1. Much of the current thinking about policies for rural development and the organisation of rural development schemes appears to be taking place without a sufficiently clear understanding of the political factors which are fundamental to influencing economic and social change in the rural sector.
2. The international insistence on greater resource allocation to the rural sector often seems to be maintained oblivious of the fact that the vast majority of the governments who are supposed to implement such policies are dependent upon well organised urban pressure groups (radical or reactionary) who tend to be as interested in exploiting the rural sector as in developing it.
3. While the situation is less clear cut than the above statement makes out, it is a continual struggle between the short- and long-term interests of different power groups concerned with resource allocation within the economy. The mass of the rural population, while more numerous, does not possess the power, because of its dispersion, to organise and exert the leverage upon governments which urban groups can.
4. The situation is made more complex by the fact that since, in the poorer economies of the world, the only surpluses which can be obtained for investment in essential infrastructure facilities are those available from the rural sector, it is economically justifiable for surpluses to be creamed off from them. While there is genuine economic justification for the appropriation of rural sector surpluses, this can only be justified in economic terms when these surpluses are used for productive investment, which increases the demand for agricultural output and the supply of the inputs necessary to produce agricultural products.
5. "Surpluses" can be appropriated by statutory price controls which maintain food price levels below the market price or, alternatively, by foreign exchange policies and quota restrictions which restrict access to foreign markets, or make exports less profitable. The existence of an urban sector which is not always capable or interested in investing such surpluses productively is a widespread phenomenon.
6. The terms of trade, therefore, between urban and rural populations tend to shift in favour of the former. It is true that the process in the heavily industrialised parts of the world is in fact the reverse, but this is largely accounted for in the first instance by urban prosperity, which enables the rural sector to be subsidised, and secondly by systems of government which put a high electoral premium on a small but politically influential rural sector.
7. From time to time rural populations do succeed in throwing up representative political regimes. These regimes, however, tend to be politically repressive to the liberal mind as they are usually based on leadership which achieves its role through charisma and association with the "simple man" rather than upon policies which benefit the rural sector in a material sense and which are growth orientated.

LAND REFORM

8. The urban/rural struggle is one which precedes political ideology and one which political ideology has seldom overcome. Even though left-wing regimes which have come to power express a concern for the rural poor, this normally reveals itself in policies designed to redistribute the assets of their opponents - the landed aristocracy - rather than any policies which will transfer income from the urban to the rural areas. The cases of land reform coinciding with increasingly adverse terms of trade for the rural sector via price controls are a common feature in many countries. Clearly this does not invalidate the partial solution (of asset distribution) but it does put policies into a more realistic perspective if this is understood. Under the circumstances of urban domination, it is not too difficult to understand the bitter resentment of the peasant for the urban dweller and the savage vengeance meted out by the former when the limits of toleration have been reached.

ECONOMIC POLICIES

9. In order to meet urban demands, governments have used a variety of economic policies to secure a transfer of resources from the rural sector to them. Taxes on exports, undervalued foreign exchange rates, tariffs on imports, subsidised food imports, as well as fixed prices for agricultural produce, all figure in the armoury of resource transfer.

10. Agricultural price policies have perhaps been the most obvious means by which urban consumers have benefited at the expense of the rural sector. Since price incentives are a simple way of encouraging a positive response from farmers, the tendency of governments to be more concerned with the retail price index than with agricultural output is a disconcerting trend. While price incentives may be regarded as a clumsy way of offering incentives to farmers in countries where farm sizes vary widely in those countries, or continents (eg Africa) of small farms, the system has the virtue of simplicity.

11. However, under increasing pressure from well-intentioned aid donors and, indeed, to some extent from the recognition that they cannot totally ignore the rural population, an increasing number of governments are seeking ways and means of showing that they are prepared to assist the rural population. To a large extent this is achieved by embarking upon projects which are financed by donors' (supposedly) additional funds rather than by altering social and economic policies - though some donors, particularly the IBRD, have secured from time to time modest changes in government policies. While the impacts may well only be marginal, they should not be dismissed on these grounds. Foreign aid is itself only a marginal contribution to development.

DESIGNING RURAL DEVELOPMENT PROJECTS

12. The identification and preparation of rural projects should not normally present great difficulty. Most areas are capable of expansion and, provided no rigid concept is held of what constitutes a "project", there is usually scope for assistance. Whether this takes the form of technical assistance, of training, of credit, of feasibility studies, of capital investment, will depend upon circumstances.

13. Major capital projects are prepared by establishing the appropriate technical social and economic proposals for a model farm (or more) which can be satisfactorily managed and multiplying this to meet political and economic requirements.

14. It is in fact the management of rural development projects, more than any other factor, which determines their success or failure. Since they are of a complex nature, covering a wide range of activities and disciplines, the institutional structure is of critical importance.

INSTITUTIONAL STRUCTURE

15. There has been a great deal of thought given to the appropriate institutions required to promote rural development - and dissatisfaction with existing systems has led to institution building. The traditional institutions have been those built around a Ministry of Agriculture which is supported by functional Ministries such as Education, Transport, Health.

16. The existing functional structures have the great advantage of clear lines of political command and a system for providing professionals within them with a promotion ladder and daily contacts with colleagues in their own profession. These are powerful reasons for maintaining them.

17. Unfortunately Ministries of Agriculture have traditionally been politically weak - a reflection no doubt of the urban versus rural struggle and seldom have effective central direction. In this latter respect, the absence of any market discipline (ie of being responsible for the sale of crops) has almost always led to economically irrelevant research and extension work being carried out. For these reasons an increasing number of countries are seeking alternative public sector solutions.

AREA SOLUTIONS

18. One solution which has been proposed is the "area approach" - that is, of decentralising administration and of combining it with a multidisciplinary team. The theoretical advantages of this should be obvious - on the spot decisions, taken in collaboration with many disciplines. The approach, however, faces two major hurdles. The first relates to the willingness of those in power at the centre (be they politicians or bureaucrats) to release, or relax, control. While they may be prepared to do so for occasional projects, the widespread adoption of such schemes strikes at the heart of centralised political system must be acceptable and feasible.

19. A second difficulty is that the professional teams required for such activities are unlikely to be anxious to remain with organisations which cannot offer them a promotional ladder.

THE RURAL DEVELOPMENT SOLUTION

20. Some well-intentioned governments, anxious for some sign of progress and tired of conflicts between functional Ministries, have set up Ministries of Rural Development. Both the Fijian and Zambian Governments have adopted this approach.

21. However, the political implications of giving power to one Minister responsible for so important a geographical area (all the rural sector) have always meant that those Ministers responsible have, in fact, had little power and their functions have been only partly, if at all, executive, being mainly concerned with co-ordination. For this reason such Ministers still have to seek collaboration from the traditional functional Ministries. Unless the Minister of Rural Development has funds of his own, or can control funds of others, his power is severely circumscribed and often such a Ministry plays only a nominal role in shaping policies and projects in the rural sector. Mexico has a Rural Development Agency which has legal, economic and political power and operates effectively despite the existence of traditional Ministries and traditional rivalries. This, however, is an unusual situation, for the Minister responsible is also the Minister of Finance and the Minister of Finance is the President of the Republic. Under these somewhat unusual circumstances a Rural Development Agency can work reasonably effectively.

COMMODITY AGENCIES

22. An alternative solution has been to set up, beneath the aegis of traditional Ministries (usually the Ministry of Agriculture) special Commodity Agencies or Boards. The internal management of these is usually good. This is because there is a vertical link from marketing to extension and to research which ensures effective discipline in advice to farmers, and allows management (which is responsible for only one crop) to really understand marketing, technical and economic problems.

23. Provided that management is allowed to deal with the day-to-day affairs of the Agency, to appoint personnel and determine salaries, these agencies have been very successful. The Kenya Tea Development Authority, the Colombian Coffee Federation, the Fijian Sugar Board, as well as most of the CDC schemes, have operated very successfully along these lines. In fact, in Colombia, the Ministry of Agriculture has been shorn of virtually all its executive responsibilities in favour of Commodity Agencies and operates mainly as a policy-making body.

24. Since these Boards fall under the political control of the traditional centralised power structures, they do not cause conflicts of a political nature. Their weakness is that they tend to see the farmer as a source of only one form of output, thus, perhaps, ignoring technical aspects related to the ecology of the farm. While this, if it occurs, is undesirable, it should be recognised that the alternative - that of an Extension worker who can advise on all aspects of farm development - is unlikely ever to be found.

CREDIT INSTITUTIONS

25. Special Credit Institutions for agriculture exist in most countries - operated by private enterprise, the State or Co-operatives. While they can be effective methods of injecting funds into agriculture, they are in fact similar in principle to any international financing agency and they, too, have to consider appropriate forms of institutions with which they must work.

INTEGRATED RURAL DEVELOPMENT

26. None of the above institutional arrangements preclude an integrated approach to rural development. Clearly the area approach, with all disciplines falling under one management team, is theoretically the best but, as pointed out, likely to be the most difficult to arrange unless a decentralised political system is the norm. Ministries of Rural Development have not proved a success and the most effective institutional arrangements seem to be those which are commodity-orientated.

27. This does not preclude combining a commodity-orientated approach with an area approach - or indeed with an integrated approach to rural development. Additional facilities can be and are provided to coffee growers in Colombia (eg schools, family planning, roads), but it must be recognised that the greater the degree of integration, the more complex the system becomes and the more political and economic power the institution requires to carry through such schemes. While the objective of integration is desirable and, indeed, basic, the real problem is how best this can be organised.

28. A fully integrated social, economic and technical project is hardly likely to be a practicable political possibility, while the administrative difficulties of planning and managing such a team pose formidable problems. While every effort should be made to continue the efforts of the numerous power structures in society to maximise efficiency, the best is usually the enemy of the good and can inhibit rather than promote rural change.

CONCLUSIONS

29. While it can be argued that political pressure groups in most countries in the developing world regard the rural sector as a source of surpluses to maintain and expand living standards in urban centres, donors could have some influence, albeit a palliative one, in providing assistance to the rural poor. The best prospects - if one has to generalise at all - are, however, likely to be through the establishment of commodity boards, as these are likely to be more acceptable and will certainly be managerially more competent than any other alternative. There is no reason why a measure of integration of social facilities should not be achieved by this approach, but the more integrated the proposals become, the less likely the prospect of achieving practical results.

SUGGESTIONS FOR SUCCESSFUL RURAL PROJECT PREPARATION

- 1) Farm output must be marketable at prices which provide farmers with satisfactory rates of return.

An assessment therefore of the effective demand and price for increased farm output is essential.

Marketing facilities to buy the produce and handle it efficiently without excessive margins for the private middleman or public sector are vital to success.

- 2) The level of economic security of farmers will determine the degree of innovation he will accept.

The need to avoid risk which all innovation entails will be greater the closer a farmer is to the margin of survival. To embark on proposals which entail many innovations will thus have a high probability of failure, if only because it will ipso facto be complicated. Farmers are likely to accept only one or two innovations - related to their whole cycle up to selling - at a time. More than this will court rejection and failure.

- 3) A farm is a home as well as a place of work.

Family influences, traditions, and the need for security, are more deeply engrained in traditional farming systems than in industry and need to be fully understood, and catered for. Social considerations - the economic role of women and children - are of great importance in traditional farming and must be clearly understood before change is introduced.

- 4) Peasants are no more inherently conservative in their attitude towards technology than other social groups.

But it is not technology that interests them, it is a less precarious living and a higher income. When prices have been high for sufficiently long periods peasants have adapted their methods of production.

- 5) To differentiate between food crops and cash crops is to misunderstand the problem of rural change.

All food crops must in some sense be cash crops if farmers are to be persuaded to grow more - the difference between the two is not meaningful. Farmers should grow the crops they are best suited to produce and purchase other crops (or food) when this is possible.

- 6) Projects which envisage large sums of capital investment in transforming traditional farming are almost certain to fail.

This is because they imply a radical social economic and technological change which few farmers are likely to be willing to accept, or indeed cope with. The ability of people to cope with sums of money way beyond their current understanding is limited - and a recipe for failure. Intensive irrigation schemes with high levels of investment per farmer have been successful where management has been good and where there has been experience in irrigation cultures. Without this tradition success is rare and will take years to accomplish (eg Gezira).

While it is possible to bolster investment on this kind of scale with imported technical assistance, at very best even if successful, the project, or process, becomes so costly that it cannot be replicated unless the same additional "inputs" are provided. In most cases it is likely to fail leaving behind a farmer and society which will have been damaged and be even more reluctant to accept change in future.

- 7) When it is possible for experienced innovators to exercise a measure of control over certain types of farm inputs the chances of success are greater.

Control of water in irrigation schemes and outputs and over crop processing in factories permit new technologies to be introduced with greater prospect of success with credit being repaid.

- 8) As a general rule public sector, or semi public sector rural development schemes have been more successful when they are based on a single crop with a marketable output.

Tea, sugar, cotton, rubber schemes have been relatively successful schemes in public sector. This is because their management is simpler (in comparison with multi crop schemes), there is control over quality and delivery in the processing system and markets exist for the output. Food crop schemes often fail as farmers have many outlets for their produce and do not repay assistance. Irrigation schemes, limited to a few marketable crops, also tend to have a higher success rate (eg cotton, rice, sugar) for the same reason.

A wide variety of crops, especially perishable fruit and vegetables, encounter marketing and management problems. However where water is scarce throughout the year irrigation schemes through the provision and control of water have better chances of success.

- 9) "Outgrower" Schemes for small farms based on a centralized processing unit can combine efficiency with equity.

Extension services are most effective in an area when they concentrate on one or two crops and when they are geared to commercial reality. However in carefully managed extension services with responsive farmers extension schemes can operate effectively with several crops. They require, however, careful planning, annual reviews and careful monitoring.

- 10) Farmers adapt best to technical changes when they see the commercial success of their colleagues.

Government Demonstration Farms have generally been unsuccessful as they seldom reflect the technical economic and managerial realities of farmers. The best system of introducing change is by using responsive farmers to carry out demonstrations on their land and getting them to encourage good farming practices.

- 11) In traditional communities the technologies which should be given the highest priorities are those related to development of new varieties of crop or livestock, and of crop and animal husbandry.

Use of purchased inputs should be a later process in most traditional communities. The technologies of highly developed communities will not be a success since all the technological, sociological and economic factors will be different, and within L.d.c.'s themselves the availability of land, water, labour, will vary so that solutions will differ.

In many traditional communities livestock especially cattle are used as a form of saving rather than a source of income and until alternative forms of savings are made available attitudes towards increasing their productivity will not be easily changed. In these circumstances they also acquire a considerable social role which makes change even more difficult.

- 12) The existing agricultural institutions are unlikely to look favourably on proposals which reduce their power.

This could occur if new regional (or area) proposals are put forward, or if cooperation which entails, or could entail, less independence for existing systems are being considered. It is essential to minimize institutional change unless the political will for change exists, or the proposals are so significant that other compensating factors come into action (eg large amounts of A.D.).

- 13) Ignoring political factors in rural change is likely to cause problems.

An understanding of the politics of regimes, and institutions, is essential to effective project implementation.

- 14) Proposals for increasing incomes should combine incentives to adapt to change while spreading these benefits as widely as possible.

While all proposals should allow for significant income increases these should not be so large as to limit unnecessarily the number of beneficiaries. It is desirable for social and political reasons to limit farm sizes to provide an adequate balance between efficiency and equity.

- 15) The scope for investing large amounts of capital in livestock projects should be limited.

Increasing productivity in larger livestock (cattle particularly) is constrained by biological factors - i.e. reproduction rates. The growth of herds cannot be rapidly increased (other than by purchases - which does not entail an increase in the national herd). Large investments in fixed assets (eg abattoirs, fencing, water, points, roads) will not be economically justified until the number of livestock is increased. It is therefore necessary to relate the rate of fixed investment to the speed at which herds can be built up.

- 16) Settlement schemes are most likely to succeed when farmers are from distant areas and when they (not 'planners') are allowed to determine how best to organise their activities.

By settlement is meant the transfer of peoples into new areas. The distance from which the settler comes will determine the effort put into success - for the cost of failure will be greater the more distant he is from his origin. The technical, social and economic considerations in new settlement schemes are so complex that attempts at integrated planning from above have seldom been successful. Greater success has occurred when the basic infrastructure has been provided thus allowing farmers to make the micro decisions.

IDENTIFICATION AND PREPARATION OF RURAL PROJECTS AND PROGRAMMES

1. The main problems in identifying and preparing projects and programmes in this sector are not of a technical or economic nature, but are fundamentally political and administrative. The administrative or management difficulties can be overcome if there is sufficient political will on the part of the governments of the recipients and donors to do so, and if the incentives to overcome these constraints are sufficiently attractive. The latter can be achieved by offering to provide additional amounts of aid; improving the quality of aid; providing expertise and perhaps actually carrying out the work.
2. There is always scope for the provision of further expertise and capital aid for agriculture. The provision of CA does pose more serious problems, for the diverse and fragmented nature of the rural sector does not facilitate the easy disbursement of funds by the public sector without the provision of a very considerable management infrastructure. This can pose very serious constraints but even these can be resolved over time by the building up of this infrastructure. There is a danger, however, that the bureaucracy engendered by this infrastructure can in the end create more problems than solutions.
3. The definition of projects and programmes in the rural sector should be regarded as a flexible one. In some cases and indeed in perhaps most, it could entail the provision of restricted amounts of TA. In others it could mean the provision of TA and small amounts of CA and in other instances it could be some form of more comprehensive development which embraces expertise and expenditure outside of that which is normally associated with agricultural development.
4. The purpose of this note is to serve as a guide to those who are interested in seeking to promote our rural development programme and to identify how donors can assist.

STEP I

5. By identification of significant current agricultural outputs, examination of statistics, development plans, agricultural reports and IBRD/IMF studies, the pattern of crop production in the country is established. This establishes the range of crop (or livestock opportunities). Also to be considered is the pattern of agricultural imports which will assist one to establish what are the prospects of import substitution. While it is possible to initiate identification studies by determining major constraints, the commodity approach still has to be gone through and by embarking upon it first, it is possible to identify constraints subsequently in a more orderly fashion.
6. For all crops that one is likely to consider, some form of additional technical expertise will be justifiable. It is however important to assess in the first instance what the marketing prospects are likely to be for any increased or improved crop output and, of course, whether or not there is a reasonable prospect of additional output being profitably sold. The latter point brings one directly up against the problem of forecasting effective demand for crops. This is notoriously difficult. The practical approach to pursue is to assess whether or not the crops can be produced competitively with alternative sources of supply. If this is so, there is a reasonable case for going ahead with further development even if current crop price forecasts are pessimistic.

7. Clearly there must be a reasonable prospect of the commodity not only being able to repay resources put into it, and thus allow for recycling of resources, but it should aim to obtain the highest possible rate of economic return - thus maximising the use of funds and generating maximum growth and welfare. Naturally we would be considering economic, rather than financial rates of return.

STEP II

8. Identification of the social and political problems associated with promoting certain types of crop development:

a. While certain crops seem to have reasonable technical and economic prospects, they need to be considered in the light of the regions and social groups who will benefit most from their expansion or improvement and whether or not this is likely to be politically acceptable. As stated above, if the purpose is to assist peasant farmers, there are certain types of crops which are more suitable for peasant farming than others. The principal beneficiaries need to be identified. It should be borne in mind however, that increased agricultural output, if it does not benefit as many producers directly as is thought to be socially and politically desirable, may at least benefit consumers.

b. Promotion of temperate type of crops (eg wheat) may have social implications for technically and economically these are frequently best produced on large farms in order to obtain economies of scale in the use of purchased inputs and of management. Beef production is also frequently technically and economically best produced on a large scale as it requires capital assets and managerial skills which are not always particularly well suited to small scale production.

c. All investment should generate sufficient surplus to the economy to justify its expenditure and to ensure that self-generating growth is being promoted (investment which goes directly into consumption will not develop an area - and thus needs to be avoided). The amount of surplus which should be aimed at will depend upon a view of the beneficiaries of this investment (direct or indirect) and the time horizon established for translating the surplus created from additional investment into additional consumption. These issues will depend upon the socioeconomic structure of the country and the political objectives of those in power. The policies pursued for each country or area will need to be adjusted accordingly. (See Annex A).

STEP III

9. Identification of the major constraints in promoting particular crop development. The examination can be carried out with the following check lists in mind:

- i. Technical considerations - research, extension, control of disease/pests, use of machinery, fertilisers, application of water.
- ii. Institutional - Marketing Organisations, Co-operatives, Public Sector Organisations and Boards - social structures and attitudes - land tenure, labour.

iii. Policies - price and marketing policies, legislation, grading, taxation, economic and labour.

iv. Funds - provision of loans/grants through existing institutions for the provision of investment (for the purchase of physical inputs, seeds, fertiliser, machinery, pesticides, vaccines, buildings, fencing, storage, irrigation equipment).

v. Management - type of expertise, professional or managerial, required to implement the projects and programmes. Training required in the UK or on site.

vi. There are a multiplicity of policies, inputs and institutions which continue, in varying relationships, which determine an effective rural programme. Annex I sets these out in graphic form.

STEP IV

10. Identification of relationship with other sectors and programmes with other sectors:

a. The examination should be carried out to assess whether there are critical constraints which have to be solved by assistance from other sectors. In particular, transport may be a problem. The provision of domestic water supplies, power, education and health should also be considered, bearing in mind that the traditionally responsible government departments may have other priorities, and vested interests may make it difficult to ensure co-operation with such programmes.

STEP V

11. Identification of the most effective way that donors can assist to promote such projects and programmes.

a. This could be done by the provision of TA, by training or by the despatch of missions to formulate and prepare projects and programmes. This work could either be carried out by ODM or by Consultants, or it could be carried out in conjunction with International Organisations.

STEP VI

12. Identification of relevant expertise required to formulate and prepare projects and programmes. It is almost certain that in every case the key disciplines are agriculture and agricultural economics. Additional professional assistance would depend upon greater knowledge of the type of projects and programmes which are being proposed.

ANNEX A.

NOTES ON COMMODITIES

The following issues need to be borne in mind when considering the development of commodities.

1. HORTICULTURAL CROPS

This is a field in which the public sector is unlikely to be able to make a particularly effective contribution (even in the USSR most of horticultural production is left to private activities as prices fluctuate wildly due to the inelastic nature of demand and the elastic supply of products. Furthermore, the problems (particularly perishability) encountered require an intimate knowledge of techniques and markets (which are usually small specialised and widely scattered) and need quick decisions - which the public sector can seldom cope with efficiently. It does not mean that no public action is possible - only that one needs to proceed with caution and give priority to the infrastructure and policies which facilitate the efficient operation of activities in this field.

2. FOOD CROPS

It is important to ensure that if food crops are encouraged the "need" for food is not confused with the effective demand (or purchasing power) for it. Too often well-intentioned efforts to meet needs have caused serious problems for food producers (large and small) as there is not a sufficient market to absorb surpluses at economic prices.

Public sector credit for food production frequently runs into problems of repayment as producers have unnumberable outlets for their increased output - and can avoid repayment.

Effective public sector involvement will vary dependent on the type of scheme and crop proposed.

3. LIVESTOCK

Three problems need to be guarded against. The fact is that as far as beef production is concerned, the time lags due to biological constraints, entail such a long waiting period that investors seek to speed up the process by bringing in breeding stock to take advantage of intensive investment in pasture, fencing and water. However, inasmuch as breeding cattle are purchased from other farms, the national income is not increased. Donors, with large amounts of money to disburse, are prone to encourage the purchase of cattle. Since the loans made to farmers are usually at concessionary terms, in an inflationary situation farmers have made large capital profits from such loans. Furthermore in almost all cattle societies, cattle ownership is very unequal and most of outside assistance goes to the few large cattle owners. Finally, in nomadic communities the balance between the political, social, economic and ecological structure is so fine that any rapid change can lead to rapid destruction of the society.

The other main problem to be borne in mind, for smaller livestock is that if purchased feed is required in large quantities (eg for pigs and poultry) the economic returns may be low - requiring good management, good livestock and an indigenous supply of cheap foods.

4. CASH CROPS

Crops which require processing, and particularly those which need to be processed in large central units, have a good development record as they are easier to manage, supervise, provide credit for, and carry out economical meaningful research and extension. The fact that they are cash crops rather than food crops does not mean that farmers will not produce their own subsistence food requirements or alternatively purchase them from other farmers.

GUIDELINES FOR EFFECTIVE PROJECT IDENTIFICATION MISSIONS

1. Although such a Mission can never make commitments it should be led by someone who has sufficient authority and knowledge of the donors' policies and procedures to ensure that encouragement given to recipients is not likely to be rejected or frustrated at Donors' Headquarters.
2. It should include someone with knowledge of the administrative and political problems of donors and recipients.
3. The Mission must be professionally multi-disciplinary. It would normally contain an engineer, if it is hoped to disburse capital aid, an agriculturalist, if it is hoped to assist agriculture, and an economist, if it is desired that the proposals are to be effective, economically viable and saleable to finance economic departments in donor countries. It is vital to ensure that these disciplines work together on such a Mission - omission of one or the other will seriously diminish the value of the Mission.
4. It should give consideration to the longer-term programme - four to five years is a reasonable target for identification, though if studies are required the disbursement target will be far longer.
5. If the recipient government is to be expected to respond the amount of funds available for commitment would have to be of a size to interest them and adjustments for inflation be allowed for.
6. The Mission must stay long enough to receive and identify proposals, to examine them in the field, and to clarify administrative procedures. A three-week Mission is probably about right if one is considering a new long-term programme, but if detailed project planning is to be included some staff may need to stay longer.
7. The Mission must always maintain liaison between the Finance/Planning Department and the Spending Departments to avoid pursuing proposals which will not be supported by the Central Authorities.
8. The Mission should always seek to take back requests in writing, or at least to leave in writing (agreed with spending and approving departments) the type of request the donor requires in order to be able to approve it.
9. It is highly desirable for the Mission to provide incentives and a target date for the clearing of requests through the administrative machine of the recipient government by offering the date for the arrival of experts, of consultants, of feasibility studies or for the approval of capital aid projects. (Naturally no commitment can be made but it is possible to indicate probabilities of approval if action is taken.)
10. The final report should be ready for reproduction on the Mission's return to HQ.

Co-operatives: conditions conducive to their success or failure,
and aid implications

Introduction

This paper discusses, for non-professionals in the field, some of the conditions under which co-operatives are likely to succeed or fail. It is not an exhaustive treatise but rather tries to identify under a number of headings the kind of factors to look out for. In order to prevent it becoming inordinately long, the usual defining, descriptive and historical preamble has been omitted. It has been written up many times elsewhere.

2. One thing which needs to be brought out more clearly for the present purpose is that, although the basic unit, the primary co-operative is in form and structure much the same everywhere, the context in which it operates and the concept of what it is supposed to achieve varies greatly from country to country, depending upon such factors as the social system, the prevailing political ideology, the level of economic and social development, the presence or absence of alternative forms of organization and so on. The Co-operative Movement simply is not one undifferentiated substance, subject to the same laws everywhere. There are in fact several different concepts on what co-operatives are supposed to do, varying from simple village community development at one extreme, to ushering in the millennium at the other. Furthermore, co-operatives do not necessarily stand alone. Some do, but others are part of or annexed to something larger: anything from a local integrated project to a full-blooded socialist state. Finally, the relationship between a co-operative and its members varies enormously. In some cases the co-operative is no more than a place to do occasional business; in others such as a co-operative farm or factory, the members are involved with it all the time. It follows that no set of generalizations can have universal validity. There are three basic sets of factors whose reaction upon each other will determine the end product: (1) the underlying social and economic conditions; (2) the type and concept of co-operatives being attempted; (3) the type and volume of inputs. In what follows an attempt is made to review some of these factors to see to what extent, and under what assumptions, co-operatives are likely to succeed or fail.

The Role of Government

3. By far the most important factor determining the existence and the success or failure of co-operatives is the Government. The notion that co-operatives must arise spontaneously from "the people" belongs to the nineteenth century, to the epoch of "laissez-faire" with which doctrine it has demonstrable common intellectual ancestors. Some co-operative movements in Britain and our European neighbours originated in the hey day of laissez-faire, and were fairly spontaneous, although even they had the crucial benefit of support and guidance from wealthy and illustrious patrons. Elsewhere, for example in the USA, Canada, Italy, Finland and Japan, the Government played an important role from the beginning, providing finance, education, supervision, guidance and tax privileges. Even in Britain, agricultural co-operatives receive

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substantial support from the Central Council for Agricultural and Horticultural Co-operation* and, in England at any rate, made very little progress until they did. In the LDCs, co-operatives owe their origins exclusively to Government initiatives. While other people may have advocated co-operatives, the real starting point was always the introduction of a co-operative law and the appointment of a Registrar of Co-operative Societies. In any case, the conditions of laissez-faire are totally absent: Government is involved in virtually everything. It is absurd to expect co-operatives alone to behave as if they were in nineteenth century Britain.

4. The role of the Government is crucial but there is not a simple equation which shows co-operative success in direct proportion to Government input. In fact, too much can be as bad as too little. Moreover, the type of input is crucial. The following pointers should be looked for to show whether Government's role is conducive to co-operative development:

- (1) A declared policy of support for co-operative development, published in a White Paper (or equivalent) and specifically included in the Development Plan;
- (2) An adequately staffed and trained Department of Co-operatives preferably within the Ministry of Agriculture;
- (3) Adequate provision and machinery for providing finance, short, medium and long-term, to co-operatives, either through a Co-operative Bank or a para-statal Development Bank, or, by guarantee or other arrangements, by commercial banks;
- (4) Machinery for co-ordination with other departments, para-statals and the like;
- (5) Adequate provisions for education and publicity, including television and radio time;
- (6) The political will to stand by its policies and the sound economic, financial and commercial practices needed for success.

While Government support is a necessary precondition, it is by no means always sufficient. Of course, where a government has, and exercises, authoritarian powers, or where a powerful ideological climate can be created, co-operatives can be made to work come what may. Short of these extremes, however, government has to take account of the other factors too.

Type of Crop

5. Where the prime function of a co-operative is the marketing of produce, or where such marketing is an essential component of a wider service such as the provision of credit, experience everywhere has shown that success depends upon the type of crop. It is not quite accurate to distinguish between "cash" crops and subsistence crops, although, as a rough guide, that distinction is helpful. The real

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* A body appointed by the Minister of Agriculture, Fisheries and Food.

distinction, however, is between those crops which, to be of any value, must go to manufacturing processes and on to the national or international market and those crops which can be consumed locally, either "green" or after simple processing which can be done at village level. A good example of the former is cotton. To be of value to the farmer it has to be sold and then ginned, carded, spun and woven. It, therefore, lends itself to a straightforward marketing structure in which the cotton flows from the farmer to a primary co-operative for bulking, then to a district union for ginning and then to a marketing board to be sold for further stages of manufacture. A good example of the latter is, in many African countries, maize. While maize might be sold on the national market, or even exported, it does not necessarily need to be. The farmer can consume it himself, or give it to his relations, or sell it to his neighbours or to the local schoolmaster or to the trader for re-sale in the locality. As a consequence, almost any institutional marketing system, co-operative or otherwise, is likely to spring serious leaks. A few years ago it was said that only 30% of the estimated maize crop in Tanzania was reaching the Marketing Board even though it was supposed to be compulsory for the farmer to sell to the co-operative and for the co-operative to sell to the marketing board. The remainder disappeared into the grey market which sprang up between the price fixed for the producer and the price ultimately charged to the consumer.

6. The a priori reasoning above is borne out by experience everywhere. Co-operative marketing does best in a limited range of manufacturing crops: eg cotton, coffee, cocoa, copra, tobacco, groundnuts and pyrethrum. This is not to say that co-operatives cannot work at all with other crops. There are many examples where they do. For example, there is a very good potato marketing co-operative in Jamaica, and fish-marketing works in a number of countries. It does, however, demand a high level of sophistication in management, and an awareness on the part of the people that evading the co-operative for short-term gain, when the outside market is higher, is not in their long-term interests. In very sophisticated communities, such as in Denmark, contractual obligations are enforced but this is not usually practicable in developing countries. Without such an awareness, or such contracts, the members tend to sell on the free market when it is to their advantage and to dump the residue on the co-operative. The outside markets might well be higher at times because the private merchant can pick and choose what he buys, in what quantities, and when he buys it.

Security

7. A fundamental question determining the performance of co-operatives, which are in any sense involved in credit, is security. Failure to collect loans or to secure payments for credit sale is, by far, the most common cause of failure. It should be noted that unless the losses are underwritten by government, the loan-recovery performance needs to be close to perfection. Looked at from one point of view, the performance of the Gambia Co-operatives in recovering more than 90% of loans to thousands of small producers, is a remarkable achievement. Looked at from another point of view, the 10% not recovered accumulates in a few years into a formidable liquidity problem. There are a number of devices for improving security including:-

- (i) Land. The Indian co-operative credit societies, nowadays, lend only to persons who have title to their land, or can get a

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guarantee from someone, usually their own landlord, who has. This has the immediate effect of restricting the benefits to the not-so-badly off and partly explains the allegation that co-operative benefit only the rich. As a matter of fact, they are rich only in a very relative sense. In the Nilgiri Hills the co-operatives were lending to members with as little as 3 acres and, with a subsidy from the Small Farmers Development Authority, to farmers with only 2 acres. It is much debated whether land is really much good as security. If there is widespread default, eg as the consequence of a crop failure, the co-operative would end up as the owner of a large number of small parcels of land for which there was no market. Land, as security, is probably useful mainly as a threat.

- (ii) Moveable property. A pledge of moveable property, including livestock, is sometimes used. It has, however, much the same objections as land, plus the additional one that the articles pledged are liable to disappear. Chattel mortgages are extensively used by urban credit societies in India, which are really co-operative pawnshops with vaults full of bangles, watches and rings, but are of little use in a rural area.
- (iii) Unlimited and joint liability. The original credit co-operatives introduced into India by the British were registered with unlimited liability. This meant, in effect, that everyone was ultimately responsible for everyone else's debts. In practice it proves pretty useless because by the time the co-operative defaulted the members had few assets to realise. The process of chasing debtors costs more than the amount recovered.
- (iv) Guarantors. A system of guarantors is widely used, especially by the Credit Unions. In poor rural areas, however, the trouble is that there are not enough guarantors to go round. The system really works only when the guarantors have deposits with the co-operative covering the extent of their liability. It is more useful in an urban setting than a rural.
- (v) Crop Liens. The co-operative law in virtually every country gives a co-operative first charge over crops and other assets, where these are raised, in whole or in part, as the outcome of a loan. The lien is exercised by a simple loan agreement which the member is required to sign at the time the loan is issued. He is required to deliver his crop to the co-operative and to authorise the co-operative to deduct the loan from the proceeds. This system is the basis of most of the more successful agricultural credit schemes such as the Co-operative Production Credit Scheme in Kenya. It works, however, only in circumstances in which the crop is bound to come back to the co-operative. In other words it is linked to the kind of crops discussed in the preceding section. Even then, it is not completely foolproof since the member can evade his obligation by such devices as selling the crop in somebody else's name or selling them to another co-operative. Nevertheless, it is about the best system of agricultural credit that anyone has so far devised. It is,

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incidentally, essential that the lending and marketing should be done by the same co-operative. This is the fundamental argument for multi-purpose* co-operatives. If the marketing agency is different, there are almost insuperable accounting problems.

Closely linked to the question of security for loans, is the question of the rate of interest. The true commercial rate of interest on loans to small farmers ought to be very much higher than it usually is, if the risk is to be covered. The old moneylender has been much maligned. The trouble is that the public has a concept of what is a "decent" rate and there is heavy political pressure to keep the rate down. Ideally, the best way to run a co-operative credit society would be on the old Rochdale principle of charging the same rate as the market, and making a refund at the end of the financial year, if a profit has been made. Unfortunately, this is frequently politically impossible, especially when the prevailing nominal rate is high (even though, with inflation, the "real" rate is negative), and the rate charged is often below cost. Incidentally, the same sort of ethical consideration explains why it is usually idle to talk of commercial banks lending to small farmers. To do so profitably, they would need to charge interest at a rate far higher than they charge to their other customers, and would end up in the pillory.

Agricultural Extension

8. Closely related to the question of security and, indeed, to the more general effectiveness of the credit system, is the availability of technical services to the farmer. This is widely accepted in principle, but is by no means always carried out in practice. Sometimes it is the farmers' own fault: they want a loan but they do not want the advice that goes with it, but more often the trouble is that there are not enough agricultural extensionists to go round, or there is no liaison between them and the cooperative. The farmer must have the technical knowledge to ensure that the increased value of crop produced exceeds the amount of the loan. It is, also, important that the agricultural extensionist has the trust of the farmer. If a package is made up for him, which he does not himself have faith in, no matter how correct it is technically, the farmer will tend to repudiate responsibility when the time comes to repay. Finally, it is a mistake to use a co-operative for purely technical experimental purposes unless it is very clearly explained to the farmer that that is what is being done. There are cases in which the experiments failed and the increased value of the crop produced was less than the amount of the loan. When this happens, confidence is completely destroyed.

Competition - Private Sector

9. The success or failure of a co-operative will, among other things, obviously depend upon the kind of competition it faces. This is not to say that co-operatives cannot stand up to any competition: on the contrary, competition is frequently good for them and for the public. There are, however, many situations in which the competition is so entrenched that short of authoritarian government action to put it out of business, the co-operative has little chance of succeeding. The idea of transplanting the

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* "Multi-purpose" here means that the Co-operative has more than one type of transaction with its members: it is not to be confused with multi-commodity.

familiar British consumers' co-operatives to the less developed countries has had much appeal, but has rarely succeeded. They were simply unable to stand up to the competition all the way down from sophisticated department stores to street traders. Nor, since the trade is competitive, was there much economic case for trying to start them. In Ghana, there is one trader for every twenty-two head of population. Small traders handle the bulk of perishable foodstuffs, making it virtually impossible to start co-operative marketing. On the other hand, the somewhat larger traders which act as Licensed Buying Agents for the Marketing Boards in many West African countries are not really in a competitive situation, and a case could be made for putting them out of business. The co-operatives have made some headway against them, but their presence makes it difficult to run a satisfactory credit system.

Competition - Public Sector

10. If anything, competition from the public sector is more inhibiting on the development of co-operatives than that from the private. This is, in fact, where the real battle is taking place at present. The real alternative to co-operatives in many countries, is not private enterprise, nor such things as informal groups, but the para-statal. The competition is, of course, political and administrative rather than commercial with the dice loaded in favour of the para-statal. Many failures of co-operatives can be accounted for by the fact that their field of activity has been pre-empted by a para-statal. Where they do the job better than co-operatives, it would be foolish and doctrinaire to object, but it is open to question, in the long run, and taking into account the wider political and social questions, whether they always really do.

Management

11. A very common cause of failure is inadequate management. To some extent this is a question of training, but there may be a deeper reason as well. It is a common experience that co-operatives are established with great enthusiasm, work successfully for a year or two and then collapse. The probable explanation is that their initial success carries the seeds of its own destruction. As the co-operative expands, its business becomes more sophisticated, and beyond the ability of the members to manage. The ensuing muddle brings rapid disillusion and the co-operative collapses. The solution to this problem is to hire a professional manager and, frequently, this works. It can, however, bring problems of its own. A gulf may develop between the manager and the committee who lack the knowledge to talk to him as equals and to keep a check on what he is doing. This gulf can itself lead to a collapse. Alternatively, the manager might, in effect, get complete control of the business, run it successfully according to his own rights, but, in the process, convert it into something different from the original concept.

Federation

12. The federalist idea is deeply ingrained in the co-operative movement. Starting from the basic premise that it is beneficial for individuals to band together to form a society, it is deduced that it is beneficial for the societies to band together to form a district union, for the district unions to form a provincial union, for the provincial union to form a national union and the national union to form a world union. In practice,
/benefits

benefits of this kind of federalism are frequently few and the problems many. The problems of growth mentioned in the previous paragraph, the inability of the members to understand and control, are compounded once a federation is established. The gulf between management and membership is greatly widened. In many countries the real troubles with the co-operative movement can be dated from the establishment of local or national federations. Primary societies which had worked reasonably well within their own limits have been beguiled by the temptation to get even greater benefits by banding together only to create a Frankenstein monster which has destroyed them. There is a difference in kind between large-scale business and small. It calls for much more sophisticated methods in financing, management, stock control and accounting. This is not, of course to argue that federations should never be set up. There have been many successful ones. It is important, however, that they should be functional and be cost-saving and not cost-creating. Furthermore, they should not be set up too soon before the primaries are capable of managing them. It is the primaries that matter - federations are justified only if they help to make the primaries stronger. If the primaries are not capable of managing them, it is better to provide services through other means such as private enterprise or para-statal.

Supervision and Guidance

13. Although in principle the members, through their elected committee, are supposed to control the co-operative themselves, it is unlikely for a very long time that they will be able to do so unaided. The kind of supervision and guidance which it is the duty of the Co-operative Department to provide is, in some ways, analogous to the extension service of the agricultural department. It is not the function of the supervisor to run the co-operative himself. Rather, his job is to assist the committees and managers to do so. One competent supervisor ought to be able to look after several primary co-operatives, depending upon their size and geographical scatter. Another important service is audit. The law usually requires the Registrar to have the books of every registered society audited at least once a year. In practice, this is rarely carried out. There are countries where the audits are four years out of date. In these circumstances it is impossible to detect and correct weaknesses and impossible to make sensible decisions.

14. It would be wearisome to rehearse all the evidence, but it overwhelmingly shows that there is a direct casual relationship between the quality of the Co-operative Department and the success of the co-operative movement it supervises. It does not need to be a very big department, and must avoid turning itself into a meddlesome bureaucracy. It needs highly competent and well-motivated people who understand that there job is to educate and guide, and not to try to run things themselves.

Conclusions - Aid Implications

15. It would be foolish to pretend that the co-operative movement is an easy thing to establish and run properly. In the past too much has been expected of it and too quickly. There have been a very large number of complete failures and many cases when results have fallen far below expectations. Nevertheless, there is sufficient evidence to show that given the right circumstances, the co-operative movement can be made to succeed and can make a contribution to rural development. If it fails, there may be no other alternative except a totalitarian one.

16. From what has been said earlier in this paper, it is obvious that aid must be selective. It should concentrate on those countries in which a reasonable number of factors are favourable (it would be asking too much to expect them all to be). To a great extent selection is automatic. We are unlikely to be asked for aid to co-operatives in countries where the government does not support them. It is fairly easy to determine to what extent the other relevant factors are favourable and, in many cases, the information is already available on the files. In selecting the types of co-operative to support, we should give the highest priority to those involved in credit, marketing and supply for agriculture, live-stock and fisheries. There are two obvious reasons for this (i) they are directly related to increases in agricultural productions and (ii) there is enough experience to show that, in the right circumstances and given the right inputs, they can be made to work. Other types of co-operatives would normally have a lower priority, but particular cases need to be looked at on their merits.

17. The UK is well equipped to provide technical co-operation in this field. The kind of expertise most needed is management and accountancy, either in a quasi-executive capacity or advisory or in training. There are plenty of suitable people in the co-operative movement here, as well as those who could be recruited from commerce and the educational sphere. Contrary to what is frequently said, there is no underlying great difficulty in transplanting persons from this country to the LDCs. (After all, we all have to start somewhere.) They are unlikely to be needed at the village level, or in politically-sensitive positions. Management and accounting are much the same everywhere and we have a lot of experience to show that adaptation is easy. There is a problem in that the LDCs tend to ask us for people with previous overseas experience, but this is probably no more than a habit which they should be persuaded to drop. The Scandinavian countries have manned their large Kenya project for nearly ten years with people recruited from their domestic co-operative movements and commerce generally.

18. The provision of education and training has been an important contribution made by this country for a good number of years, both in the International Co-operative Training Centre at Loughborough and through the Plunkett Foundation which has mounted short courses overseas. There is a very strong need for more, especially of the courses run actually in the LDCs themselves. We could also make a further contribution by providing more third-country training. There are good co-operative training institutions in a number of countries, including some which we have already supported by capital or technical aid.

19. Summed up the ODM could:-

- (i) select countries where the conditions are reasonably favourable for co-operative development;
- (ii) shift some capital aid into the institutions which finance agricultural co-operatives (this may necessitate employing ad hoc organizations or persons for project identification and appraisal);

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- (iii) ensure that the co-operative aspects (if any) of integrated development projects are properly taken into account in project appraisal;
- (iv) expand the programme of technical co-operation, especially management and accountancy;
- (v) be prepared to offer short-term consultancy services;
- (vi) finance more third-country training in this field (eg Swazis in Kenya, Solomon Islanders in Fiji, almost anyone to India or Malaysia);
- (vii) expand our own education and training programme, especially the "in and out" short courses in the LDCs themselves.

In this field, as in most others, there is a "chicken and egg" situation. We cannot offer more aid unless we are asked for it. But frequently aid is not asked for because it is not thought to be available. While maintaining all that has been said about limitations and the need for selectivity, could we not at least let it be known that we would be sympathetic to realistic projects?

APPRAISAL OF CREDIT INSTITUTIONS

To an increasing extent the ODM is making available funds for on-lending purposes to credit institutions. Since the purpose of such decisions is to delegate authority, it is not possible for ODM to appraise project proposals directly. What is required, however, is a careful assessment of the credit institution itself. The following notes are therefore intended to help to this end. It should be stressed that these questions should be regarded primarily as a check list - not a straitjacket. Proposals for improvement are always welcome.

OBJECTIVES

1. Does the institution have a clearly defined role in the development of the country as a whole and/or within particular sections or development areas?
2. Are the objectives spelled out in the credit institution's constitution, or is it clear enough from its composition what they are?
3. Is the institution involved in lending for "production" or "consumption", or both?
4. Are the objectives being hindered by requirements in the constitution (eg minimum financial rates of return) or by other directives from government?
5. What other institutions are there in the same field? Are they complementary or competitive?

LENDING POLICY

1. What projects is the institution involved in or likely to be involved in? Is it restricted to a particular sector or income group?
2. What type of borrowers are involved? What is the average size of loan and how does this compare with their incomes, or assets? If agriculturalists, what are the loans per hectare? What is the proportion of the annual repayments to borrower's annual income?
3. Will loans be long, medium or short-term or all of these? What proportion of each?
4. To what extent will credit be linked to other development efforts (eg technical assistance, investments in infrastructure)?
5. What security is obtained for loans? (eg mortgage, hypothecation of land or other assets, crop liens, guarantors, etc)?

PROCEDURES

1. Will the institution lend direct to individual borrowers or via intermediary institutions, or both?
2. If intermediary institutions are used, what sort? How are they constituted and supervised?

3. What size are these institutions and how many are there?
4. What procedures are there for verification of on-lending?
5. Is credit linked to other economic or commercial activities and will loans be recovered from these activities? What is the machinery for achieving this (eg proceeds of sale of produce, deductions from salaries)?
6. What criteria are used for project appraisal (eg financial analysis, economic analysis)?
7. How do requests reach the institution? Does it have staff to go out and propose ideas, or does it await requests?

MANAGEMENT

1. How many years has the institution existed?
2. How is the board of Directors appointed? How many directors are there? How long does each one serve?
3. How is the General Manager appointed? How long has the present General Manager served with the institution? What are his qualifications and previous experience? How many General Managers have there been in the last five years?
4. How is the Chief Accountant appointed? How long has he served with the institution? What are his qualifications and previous experience?
5. What other senior management personnel are there, and what are their qualifications and experience?
6. What other professional staff (eg accountant, economist, technical personnel) does the institution have, and what are their qualifications and experience?
7. What is the structure of the institutions? Does it have departments? Are there regional or district branches?
8. How is cash actually transferred to and from the borrowers? Does the institution use its own branches or does it make use of other institutions, such as the commercial banks?
9. Who audits the annual accounts?
10. What management charges, if any, does the institution make for handling credit.
11. How are the credits supervised? Is there the staff to do this? What qualifications do the staff have?

/PERFORMANCE

PERFORMANCE

1. How much has the institution committed to lending over the past few years? How does this compare with disbursements?
2. What terms does it pay for credit and on what terms does it on-lend?
3. What has been the rate of recovery (ie the loan repayment actually made as a proportion of those due at the end of the last financial year)?
4. What is the average size of loan? Are there any unusual large loans?

FINANCIAL POSITION

1. What is the share capital of the institution?
2. What are the institution's reserve funds?
3. Who are the principal lenders to the institutions, and on what terms?
4. In the past three years, has the institution made a profit or a loss?

(a copy of the most recent profit and loss account and balance sheet could be annexed)

ECONOMICS OF CROP STORAGE

1. The purpose of crop storage is to relate the uneven supply of crops to a normally regular demand for them.
2. The essence of project appraisal in crop storage thus relates to assessing the relationship between supply and effective demand. Appraisal raises no new theoretical issues but requires a formidable knowledge of past relationships and an estimate of future ones.
3. Storage may be required for two main purposes:
 - a. to even out the flow of grain or other food products to consumers during a season;
 - b. to guard against severe harvest fluctuations between one harvest and the next.

With a. the problems relate largely to finding the most efficient system of distribution and marketing, but with b. the problem is largely one of projecting future supply/demand fluctuations and assessing the degree of risk.

4. Too many investments in storage are made on the basis of inadequate knowledge and an excess of storage facilities can occur all too easily.
5. Physical investment in storage (as opposed to holding stocks) is designed to reduce crop losses. This will increase national income.
6. Much of the investment in storage is, however, designed to transfer income from one group to another. From consumers to producers - from producers to middlemen - from middlemen to producers. This investment does not increase national income.

INCOME TRANSFER

7. Investment in new storage facilities entails income transfer:
 - a. when storage is transferred from those who traditionally store produce (frequently entrepreneurs) to producers;
 - b. across frontiers - when a country builds up its own storage frontiers.
8. In the first instance, there is unlikely to be any increase in GNP arising from such measures. Indirectly, however, it could be that the greater income (to farmers), which such a step could lead to, encourages farmers to increase output.
9. Investment by the State in its own storage facilities will not necessarily benefit producers as the State represents both producers and consumers. The way in which additional benefits will be distributed will depend upon the political power of those influencing Government decisions.
10. The provision of sufficient storage to reduce producer price fluctuations may be an important factor in encouraging investment by farmers. This will apply to those crops which require considerable investment and

which are subject to risk (via price fluctuations). It will not be of such importance to certain crops (eg coconuts) whose investment requirements are minimal. In this case price fluctuations may even encourage a higher level of output than would otherwise be the case by stimulating planting at periods of high prices.

CROP LOSSES

11. Measurement of crop losses poses serious practical problems. It is extraordinarily difficult to measure the losses of crops which could be eliminated economically by further investments. What commonsense suggests is that the high percentage losses suggested by some (of over 20%) is unlikely to be the average crop loss over extended periods of time. Otherwise it is difficult to believe that those who consistently lose such a high proportion of their output would not take steps to remedy this.

MEASURING COSTS AND BENEFITS

COSTS

12. The calculation of financial costs of additional storage presents no fundamental technical problems. The principal costs would be:

- i. Capital costs
- ii. Recurrent costs - labour, fuel, pesticides, bags
- iii. Cost of produce storage (ie interest on capital thereby invested).

A serious problem frequently arises in obtaining the financial resources to purchase and store crops.

13. Adjustments to the financial costs in order to calculate the economic costs of storage will probably be necessary. Storage to even out seasonal flows will tend to be justified on the basis of financial cost benefit analysis while longer term storage will be more likely to be justified on economic cost benefit analysis. This is not to suggest that the two are incompatible.

BENEFITS

14. These are very difficult to assess. Conceptually, the direct gross benefit of an investment is the difference between the estimated value of a crop stored, and what it would be without storage. Initially, this will usually involve a consideration of what physical loss will be averted (its total elimination can seldom be economically justified). It is extremely difficult to make any kind of accurate measure of the loss averted by any particular investment: such loss can only be measured over a considerable period of time. Many estimates of loss have been made and, although the definition of loss has varied, it has often been put, in physical terms, around 10-15%.

15. There is not yet an agreed way of measuring physical losses. One of the main problems of measurement is that of sampling - the size of the sample, its source (within the store), its timing and frequency. The economist is not primarily concerned with such difficulties, but when presented with an assessment of loss, he should also obtain its method of

estimation. A common error, which would affect appraisal, is the application of an assessment made at one point in time to the whole crop in store - ignoring the fact that since a store is being emptied gradually a heavy percentage loss may be borne by only a small proportion of the crop. Another error is the application of an assessment made on a small scale to a much larger area over which it may have little validity. Having estimated the "extra" produce that is potentially available, its value should be assessed. This will necessitate a detailed study of the economic environment.

16. The maintenance of the quality of a stored crop may be as significant as a reduction in weight loss. This can be assessed by means of a suitable grading system. It is, of course, important to remember that this is an economic benefit only if it is reflected in a price premium.

17. The economic assessment of the income transfer effect of investment in storage also presents formidable problems. Not only does it require an assessment of the probable purchases and sales which are made over an extended time period but also an assessment of price fluctuation over this period, "with and without" the storage. The cost of holding crops, and the losses, can be heavy charges on the investor and it would be unwise to assume that an investor such as a Co-operative or Government will always provide a better service than a knowledgeable self-interested entrepreneur. The critical deciding factor in an efficient storage system is an intimate knowledge of the market and the ability to make rapid decisions.

CONCLUSIONS

18. Measurement of costs and benefits therefore depends heavily upon an intimate knowledge of local markets. Over-investment in storage at the national and regional level - not at the farm level - is a common error made by those unfamiliar with the local circumstances. The most sensible and cost effective approach is to build up storage facilities gradually thus avoiding misinvestment and allowing those responsible to build up a knowledge of local conditions.

DAIRY PROJECTS AND ARTIFICIAL INSEMINATION

Naturally wherever possible economic appraisal of projects such as these should be conducted by an agricultural economist. The following notes are meant to give some guidance to generalists who nevertheless find themselves compelled to step into a breach. However the notes are no substitute for talking with agricultural economists and livestock advisers. This is particularly true of all the parameter values mentioned below, which are based on a particular Indian project and included only to give a very approximate feel for the numbers. The need for real data, or at least an expert's judgment on the particular case in question, cannot be over-emphasised.

The Existing Situation

The key descriptors of the existing situation in an area are: number of breedable cows, milk produced per year, the milk sold per year (the residue being consumed by the farmers themselves). These imply a figure for average yield per day per breedable cow which varies from $\frac{3}{4}$ litre for half starved Indian Non-Descripts to (in UK conditions) 10 litres per day for a Jersey and 15 litres per day for a Friesian. However wherever possible obtain data for both lactation yields (ie total milk output between consecutive calves) (bad: 500 litres, good: 5000 litres) and intercalving interval, (bad: 2-3 years; good: 1 year). Between them these figures imply an average yield per day. But beware: cows lactate for a year or less, so the average yield per day while the cow is in milk, which is the figure most farmers will know about and quote, may be three times higher than the average yield per day if the intercalving interval is 3 years. Note also that the inverse of the intercalving interval (measured in years) is the average number of calves born per breedable cow per year, ie the birth rate.

What do do?

Normally the ultimate objective is to increase milk sales, and hence the income of producers. For this a prerequisite is marketing organisation. One can safely say that absence of marketing outlets is the major constraint on smallholder dairying and therefore the first thing on which any appraiser should satisfy himself. In some countries there may be enough local effective demand for milk to justify a project: the farmer sells direct to his neighbours or to cafes. But in India, at least, milk is a luxury good: the main market for it is amongst higher income groups, ie mostly in urban areas. Marketing the milk any distance from the point of production means chilling, transport, pasteurisation, packaging, and a hard selling campaign, such as underlies the Milk Marketing Board's success in UK. (Pasteurisation is a form of heat treatment: typically the milk is held at 72°C for 16 seconds. the objective is to kill bacteria. Thus treated, milk cannot transmit Tuberculosis or Brucellosis, and keeps longer. Whether these benefits outweigh the costs will vary from situation to situation.) It also means having processing facilities so that seasonal excesses of liquid milk supply can be converted into eg butter, cheese, milk powder. Furthermore the quality of the milk supplied will only be acceptable to consumers if the marketing agency has a sensible procurement pricing system. The point here is that milk consists of fat, solids not fat (SNF) and water. So purchase on the basis of volume gives the farmer

every incentive to dilute his milk. It is therefore important that milk should be purchased on the basis of its solid content. Ideally one would establish a price for fat, based on the market price for butter oil, and a separate price for SNF based on the market price for dried skimmed milk, since the farmer can vary the composition of the milk by varying the feed. In practice testing is time consuming and expensive, and reasonable results have been obtained in India by testing fat content alone for individual producers, though dairies also test the SNF content of the pooled production of each village.

Given adequate marketing, ie the physical plant and an institution to run it which is sufficiently efficient to charge a low enough margin over farm gate prices to be able to sell to the better off urban consumers, there are three broad options for expansion:

- i. More cows
- ii. Better management
- iii. Better cows.

In some environments more cows may be an entirely plausible option: if cows haven't in the past been kept, for cultural or disease reasons, but now (say) cows have caught on or tsetse fly been eradicated. Analytically the requirement for simple expansion of this sort to be viable is that the supply curve of cattle feed and fodder should be fairly elastic (ie no shortage of grazing land) and similarly the demand curve for milk (no problem about marketing extra output). In such environments, cows can be viewed as a new technique, to be replicated as fast as natural reproduction and or imports will allow.

An Aside on Projection

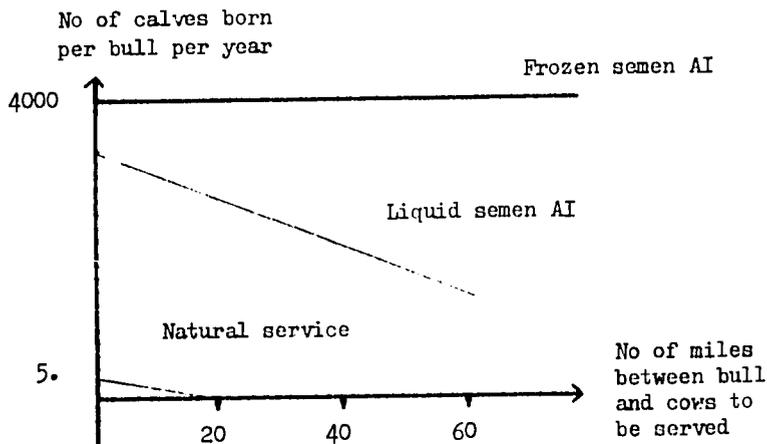
As regards projecting a growth rate from natural reproduction the laborious way is to use exactly the techniques of manpower planning, demography etc: starting from a given age and sex distribution in year 0, one assumes age specific mortality rates and fertility rates, and applies these to produce a breakdown by age and sex for year one, and so on for year 2 etc. There is however a short cut. Suppose you have data for a typical female, eg one female calf produces 0.3 female calves in year 4 (allowing for some mortality and 50/50 chance of sex being female), 0.27 female calves in year 6, 0.24 in year 8, 0.21 in year 10, then the rate of growth of that herd will be equal to the internal rate of return if these numbers represent not calves but cash flow, ie the IRR of $(-1, 0, 0, 0, 0.3, 0, 0.27, 0, 0.24, 0, 0.21)$.

In India and probably many other places the environmental assumptions above are quite wrong: in particular there is little surplus land either for pasture or fodder crops. Existing cattle do it is true subsist largely off roadside forage and agricultural by-products, but it is arguable that at the margin extra cattle feed requires land to be switched from some other crop. The cow is in no sense a recent innovation, and the fact that the cattle population is roughly in equilibrium suggests that, given farmers' religious reasons for keeping cattle, the economic returns to dairying are negative at the margin, ie India is overpopulated with cattle. The solution cannot therefore be more of the same.

What then of option ii, Better Management? High rates of calf mortality and disease incidence both point to poor management (as may low yields - but see below). The main solution is more, and better quality, feed (eg adequate amounts of green fodder; cacti, as fed to some buffaloes in India, are not ideal). Additional desiderata are disease protection, early weaning, frequent breeding, and the use of good bulls (discussed below). The intercalving interval is determined entirely by management rather than genetic make-up of the cow, and of course has a big effect on average yield per day and thence, the overall economics, given the lactation yield. But the achievement of improvements in these matters is difficult and slow, as with all other types of agricultural extension service. It is not sufficient that the government makes a budgetary allocation for veterinary services, fodder seed distribution, distribution of feed concentrate etc: it is also necessary that these services are really responsive to farmers' needs, that the vet can be obtained when he is urgently needed. In short, the improvement of cattle management is a challenging area, but one in which it will normally be difficult for donors to identify off-shore cost assistance.

There remains option iii, Better Animals. This is a relatively easy area for donors to become involved in, but in terms of the project as a whole, complementary progress with animal management is crucial to success. Cows with high yielding potential but still underfed and exposed to disease may be an economic disaster.

Sometimes the solution is simply a matter of better selection within an existing breed. But there may also be a proposal to introduce a new breed into the local environment. How exactly should one compare the performance of a new breed with that of an existing local breed? First, the new breed's performance must be measured in the local environment, which includes local standards of cattle management (ie including any improvements in management that can realistically be expected in the course of the project). It is no use advocating a pedigree Friesian on the basis of its UK performance if it is to be placed in an environment where it will suffer from heat stress, have no resistance to local diseases, and be half starved into the bargain. In India it has been found that crossbreeds (ie part local blood, part exotic blood) combine the high yielding qualities of the pedigree milk breeds with the robust survival quality of local breeds. Secondly, performance should be measured not in terms of net output per animal. Suppose for instance a crossbred cow is three times as large, in every economic sense (yield, feed cost, net output etc) as a local cow. Then in an environment where feed availability is a real constraint, it is neither better nor worse than the local cow because the efficiency with which it converts feed to milk is identical. More precisely conversion efficiency should be measured as the net output per unit of feed of a whole herd (rather than just of cows in milk): exotic breeds reach sexual maturity earlier so exotic herds have higher ratios of females in milk to total stock (of concept of dependency ratio in human populations). Finally, net output consists not merely of milk: cows have economically important by-products, notably dung, farm power (ie bullocks), meat and leather. On simple a priori grounds one would expect breeds which give more milk per unit of feed also to give less dung per unit of feed. This seems to be the case in practice and should therefore be allowed for in appraisal. Unfortunately it is difficult to measure the performance of a draft animal, but this does not mean that the farmer is wrong when he says some breeds are better than others for draft purposes. Such factors should, and do, determine the acceptability of a new milk breed.



By way of explanation: walking the cow to the bull takes time and on arrival, the cow may no longer be on heat. Walking to and from in any case reduces the probability of conception. And if the cows stay put in their various villages, it is impossible for the bull to be always in the right place at the right time. Thus the number of conceptions per bull per year declines rapidly with distance.

Artificial insemination (AI) methods, whether using liquid or frozen semen, allow the bull's semen to be diluted to produce many doses per collection. They also obviate the locational difficulty that a bull cannot be in two places at the same time. In the case of liquid semen, however, there remains a relationship between success rate and distance, for a different reason: liquid semen deteriorates quickly if transported for long distances over bumpy roads with inadequate cooling. A further disadvantage of liquid semen is that however carefully it is kept, it is useless after about two days. This means that any random or reasonable fluctuations in the match between semen supply and semen requirements result either in wasted semen or unsatisfied requirements (and hence prolonged intercalving intervals).

Frozen semen technology enables semen to be stored indefinitely and transported without any loss of quality, which greatly simplifies the logistical problems of distribution. Any village however remote can have its own semen storage flask, which need only have its supply of semen straws and liquid Nitrogen (the usual coolant), replenished once every two months. Fluctuations in daily semen requirements present no problems.

It might be thought that the spatial aspect brought out in the diagram is relatively trivial: could not bulls be scattered throughout the country so that, at least for liquid semen, the inefficiency due to distance was negligible? The answer is often that this would create new problems. Managing a stud of bulls, particularly exotic bulls in a hot climate, is a very skilled business. So is the organisation of semen collection, dilution, and distribution. There are therefore big efficiency gains from concentrating such activities in a few well run central farms, and it is only with frozen semen technology that these gains can be combined with full spatial coverage.

To be effective, an Artificial Insemination system requires not merely a supply of semen but also an efficient distribution system. The main choice here is between a small number of fully trained inseminators (ie vets) and a large number of only partially trained village inseminators. The second system leads to less skilful insemination, but it does mean that the inseminator can assist with heat detection, and is more likely to be in the right place at the right time.

Benefits

It will be evident from the above that there are two broad ways of presenting the benefits of AI vs Natural Service, or Frozen Semen AI vs Liquid Semen AI. One is to argue that the technique will enable better usage to be made of an existing bull stud. This could be justified if say a region wanted to crossbreed with Jerseys and the number of Jersey bulls available was for some reason fixed. It could also be justified if there was only one suitable location for the Jersey stud within the region, in which case one technique would have greater outreach than the other to surrounding villages. The other approach is to argue that one technique will enable the same number of cows to be served from a smaller number of bulls. This leads to two identifiable benefits. First a pro rata reduction in the cost of maintaining bulls. Secondly, and of great importance, an improvement in the quality of the bulls: the smaller number of bulls can be selected not at random but on the basis of expected genetic worth. Genetic worth can be estimated on the basis of pedigree and physical characteristics; but it can be established with more certainty by "progeny testing": examining the average milk yields of the daughters born to that bull so far. In either case the studs required for a given number of cows will be not merely smaller but also better.

Clearly the choice between the two broad ways described above of viewing the benefits will depend on the evaluator's assessment of the most likely "without project" situation.

An Aside on Data

Evidently a crucial component of the overall efficiency of bull utilisation is the number of calvings per insemination (a typical figure might be $\frac{1}{4}$ for liquid semen). There are a number of data problems in this area. First, check whether ratios quoted include all inseminations or only those on cows which have eventually born AI-conceived calves. Secondly, what system is there for recording that a particular birth has taken place, and that it is due to AI rather than Natural Service? Thirdly, data collection may not be organised in such a way that the inseminations in a particular block of time can be related to calvings in a block of time 9 months (ie the gestation period) further on. Quoted values of the ratio may then be seriously misleading if the insemination programme is growing fast.

Costs

Liquid Nitrogen plants are subject to important economies of scale. A 25 litre per hour plant costs about £100,000 and is manufactured in Holland rather than UK, so will not be eligible for UK tied aid. The main running cost is electricity, at about 50 kwh per hour. If at all possible, however, projects should obtain their Liquid Nitrogen as by-products of other industrial processes eg manufacture of fertilisers or oxygen.

Given an adequate supply of the coolant, the other main expense of frozen semen technology is the provision of storage flasks to each individual inseminator at very roughly £150 each. Additional relatively minor costs include laboratory equipment and skills for freezing semen, and flasks for storing it and transporting it to inseminators.

Inseminators need a few weeks training, preferably at a slaughterhouse so that they can learn from their trials (dye is used for insemination and it is therefore possible to check after slaughter precisely where the dye has been deposited).

Any cost benefit analysis of crossbreeding as such must endeavour to quantify the extra feed and vaccination costs of crossbreeds, and not to exaggerate the likely rate of uptake of AI. Crossbreeding can only be expected to catch on when villagers see for themselves the yields of crossbred cows reared by their neighbours. Thus there is a lag of at least 4 years between the adventurous pioneers and their later imitators.

What An Economist Wants to Know About Dams

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The job of the professional consulting economist is to improve decision making. Only too often the only decision posed to an economist is whether or not to build a dam that has already been sited and designed. In this situation, the economist is usually required to place some sort of value upon the proposed investment - a benefit-cost ratio or a present net worth estimate¹. If this value is high enough it is concluded that the dam should be built. This is a poor way of making decisions when the alternatives are many and complex and it involves a most inefficient - even dangerous - use of an economist.

What an economist wants to know about dams depends upon the nature of the decision and the way in which he is involved. Typically, with water basin development, there is a high degree of interdependence between all decisions. Here we shall take a broad view of the range of decisions with which an economist might be concerned. In practice, a sequence of decisions has to be made; a sequence unfolding through time starting, perhaps, with a decision to commission a consultant's preliminary report and continuing in perpetuity as successive steps in the development of the water basin. In considering what an economist needs to know about dams I shall argue that an economist needs to be party to the decision-making process from the start and I assume that he is not being simply called in - as he usually is - to provide an evaluation after a scheme has been outlined.

Unfortunately, in reality some of the most important decisions relating to the building of a dam are likely to be taken without effective participation by economists or indeed of others whose views are relevant. Let us consider simply the determination of the site for the building of a dam. Sometimes there may be available only one such site technically determined by the topography of the water basin and by its geology. But, desirable though it may be to build the dam on a firm bedrock, in a form economical of construction materials, at a point where storage capacity per unit cost is maximised, there may be other considerations relevant to the siting of the dam. Where a dam is built will affect its potential as between power generation, flood control and irrigation capacity. It will affect the land that will be irrigated and the land that has to be flooded. It will affect the people who will benefit and the people who will suffer. Insofar as it affects irrigation potential it may have long-term food supply and foreign exchange implications. It may also affect transport and communications - whether or not existing railways and roads become inundated; whether or not water-ways become usable as part of the transport system and at which point communications converge to cross the river. Thus the technically most efficient dam site, narrowly defined, may not be the one most socially desirable and alternative technologies of dam construction and water storage might need to be considered if alternative sites are to be exploited.

An economist who participates fully and from the start in decision making for water basin development needs to know the basic technical strategic alternatives and the range of possible means of water control and utilisation. Economists may become involved with hydrologists in building simulated models of river systems the results of which they may need in order to

determine alternative storage and release patterns and their implications for power generation, irrigation, flood control and navigation². Where groundwater is important the alternatives faced may be greatly extended - especially where groundwater in different places is at different depths and of different degrees of salinity and subject to different rates of recharge. In such a case, one might have to choose not only between one or many dams and alternative sites and patterns of operation but also between dams and tubewells, or different mixtures of the two, possibly using dams for power generation for driving tubewells. A further related aspect might be the costs of canal construction or widening and the possibilities afforded of carrying water from dam storage or tubewells to other areas. In all cases, too, the pattern of development through time offers wide ranges of choice. Usually, the choice of the time pattern of development depends not simply upon economic factors, such as the growth of demand for power, but also upon physical factors, such as the rate of silting of a dam or the incidence of water logging with a given rate of rise in the sub-surface water table. Thus an economist may want to know a good deal about the physical aspects of water basin hydrology and engineering.

But in order to identify key alternative development strategies an economist will wish to know a good deal more than what water there is and what can be done with it. His major concern is the prediction of the consequences of alternative patterns of water use. For the purpose of prediction he needs a good deal of data. How much data and what sort depends to some extent upon the objectives in the light of which decision is to be made.

Thus one of the first things that an economist will need to know about a dam is the range of considerations that are going to be operative in the process of decision making. In this respect, the total of additional income generated in the economy by the building of a dam is not necessarily the only relevant consideration. The distribution of this income may be particularly relevant and, related to this, so also might be the number of jobs created. Matters of secondary importance might be the effect of the dam upon food supply, foreign exchange and government tax revenue. Thus prediction may need to be undertaken in respect of all these items - and others too, perhaps.

In the process of eliminating alternatives it will also be necessary to know of policies that government may wish to pursue. The government may not for example be willing to pursue irrigation development on the basis of estates even though these may generate both the maximum increment of national income and the largest number of jobs. Others' objectives besides governments' may need to be taken account of also. If agricultural settlement is to take place on a family farming basis the pattern of farming predicted must be consistent with the objectives of the settlers. An understanding of their norms with respect to such matters as working effort, subsistence production, cash income, sexual division of labour and so on will need to be known.

I have noted earlier that the effects of dams are likely to open up opportunities with respect to irrigation, flood control, power and communications. It would be unnecessarily tedious to itemize the full list of relevant data needed by an economist under each of these headings.

But some detailed idea of the range of data requirements might be illustrated in relation to irrigation aspects. Where we are concerned with irrigation potential we will need to know what crops might be grown and the sorts of yields that might be achieved with different irrigation regimes. While this might be relatively simple in the case of a river basin where crops are already grown and where the effect of a dam might be simply to extend the growing season or augment the level of water delivery, it may not be nearly so simple in the case of a river valley where cultivation has not been developed or where it has been extensive dry land farming. With respect to yields, it may be necessary to know both the biological potential of the area and the likely means and deviations of yields which might be experienced by farmers over time. In practice, such knowledge may not exist and effective estimation of these values may require a systematic search for relevant data and its very careful analysis. The resulting 'data' may well be little more than heroic assumptions but even these may be better than unfounded notions. Where water is scarce it might be particularly important to have estimates of yields under sub-optimum watering techniques (ie of the extent to which yields fall when water is supplied in some pattern or amount other than that which would give maximum yields). Such estimates may be necessary, in any case, where capital or running costs can be saved by sub-optimal watering regimes.

In appraising major alternative river basin development strategies, one needs to consider for each the best possible pattern of exploitation. That is, if the choice were between one high dam and several small dams it would be necessary to decide what would be the best way to exploit the alternatives before choosing between them. With regard to irrigation developments, where it is decided that the best way to exploit irrigation development is to let farmers develop on the lines that they find most profitable, the economist's role is more that of a predictor than that of a planner. Even so, he may need to plan for the optimum provision of credit, research and extension and marketing services. In some cases, however, irrigation development is likely to be by regulated settlement schemes and here the economist will need to design optimum farming systems which are likely to be followed by settler farmers and to which irrigation design must be related. Provided the design of farming systems is intended to produce cropping and husbandry patterns which farmers will want to follow, there is little difference between planning and prediction. In both cases it will be necessary (i) to calculate the change in potential created by the new or improved irrigation (measured from the farmer's point of view); (ii) to calculate the rate at which farmers will exploit this new potential.

However, both the nature of the potential created and the rate at which farmers can exploit it will be governed by official policy. This might, for example, dictate that settlement will be on family small holdings with little or no hired labour than on estates or 150 acre mechanised holdings, or co-operative settlements. Choice of crops might be affected especially by government's willingness to provide processing or market outlets and even by such matters as its readiness to amend regulations governing dates of crop planting and uprooting. In various ways assumptions about government policies may bear critically upon the plans and predictions that the economist is trying to make. In this situation it is desirable - failing clear guidance and an unswerving government policy - to predict or design optimal farming patterns for each set of permuted assumptions about

government policy. In these days of electronic computers this is not so impossible as it may sound. The main point to note is that another set of data important to the economist is the set of constraints on government policy which define the context within which planning and prediction must take place.

The problems of defining optimal or expected farming systems may need to be tackled in relation to labour requirements of different crops at different times of the year. Again, where such data does not currently exist, heroic assumptions may be necessary based on the consideration of the most relevant existing data. To some extent it is possible to explore the significance of errors in these assumptions. At least it should be possible to determine which of the assumptions about labour requirements are most critical.

The economist will need to know a good deal about agronomy - about cropping sequences and pests and diseases, for example - and about irrigation technology. Alternative techniques of irrigation may need to be considered. There may be a choice of furrow irrigation and overhead sprinklers. This choice is not solely a technical matter, though very much technical data will be required relating especially to capital cost implications of alternative systems. (In the case of furrow irrigation the capital requirements of land planning and clearing and, in the case of overhead sprinklers, the capital costs of pumps, pipes and sprinklers and their relation to different forms of control, layout and farming systems). Physical properties of the soil will be important, especially as these relate to eg percolation (important with furrow irrigation) and panning. The choice of techniques will affect both capital and running costs in local currency and in foreign exchange. It will affect also the possibilities of obtaining overseas aid; the nature and size of communities that might have to be envisaged and provided for; the efficiency of water and land use; the nature of authority and control of irrigation development as well as those considerations which might ultimately be most important - the number of people settled and the extent of extra incomes created.

In designing - or predicting - alternative irrigation developments a vast amount of technical physical data will be required most of which the economist might ideally expect to have provided for him. There is, however, a good deal of data that he needs that he should properly expect to provide himself. In designing or predicting farming developments he will need to know the prices of factors and products. Where new developments create new demands and increase product supplies, allowance will need to be made for the impact of these changes on prices. In appraising alternatives, opportunity cost prices for factors might need to be calculated where there is reason to suppose that market prices do not reflect true costs.

So far then we have suggested that the economist starts by indicating the alternative strategies of development and their broad implications. Fairly early on a decision will be taken to consider only certain possible lines of development and the economist should play a role in the process of eliminating some alternatives from further consideration. Thereafter, more detailed design or prediction is carried out in respect of the short-listed strategies still under consideration and their implications for national income, employment and so on are assessed. At some stage decisions will have to be taken about dams - one or many; where located; storage capacity; operation in relation to power generation and irrigation; and the

timing of these developments especially in relation to power generation and irrigation; and the timing of these developments especially in relation to other complementary inputs. Such decisions may not be readily possible on the basis of initial surveys and reports. These might simply reveal the critical nature of some of the assumptions made and the desirability of further investigations even at the cost of delay in going ahead. More information might be required on the hydrology of the river basin, on soils, crop potentials, farming systems, silting rates and the like - even where this means delay in initiating the project. (Not that a decision to build needs to be a decision to build immediately. A dam which is expected to have a short life because of silting might especially be delayed until power demands, for example, have grown to the point where fullest use can be made of the new capacity).

Typically, a detailed survey will lead to some positive decisions - a choice of strategy; a call for design specification or tenders for dam construction; a bid for overseas loans. It will also lead to further investigation of some aspects of development where decisions can be postponed. As we stressed earlier, there is a continuous sequence of decisions to be made and action to be taken by a wide variety of people in government alone, and it is difficult to conceive of any of them where the economist cannot contribute to a clarification of the issues.

In trying to answer the question what an economist wants to know about dams, I have seen the economist's role as having two sides: one, clarification of choices to be made in respect of water development policy; two, the contribution to the design of development. In both these roles the economist will need to have available a vast mass of technological data covering a wide range of disciplines from hydrology to agronomy as well as more strictly economic information relating to such issues as market conditions, expenditure patterns and tax systems. It is clear, however, that decision making based solely on technical and economic considerations is wholly unsatisfactory and that the social and political implications of the choice of alternative strategies of development including alternative technologies of irrigation has profound social and political implications. In both the design and predictive aspects of the economist's work, he will need to take account of political and social aspects and, in the choice of strategies, the political and social implications of alternative lines of action will need to be clearly presented.

Thus, in all aspects of his work, the economist must clearly operate in the closest co-operation with technologists from many disciplines and with sociologists, political scientists and administrators. To be effective in his own work he needs to know a good deal about theirs.

¹See S A Marglin, Public Investment Criteria, London, 1967.

²See A Maass et al, Design of water resource systems, Harvard, 1963. and A S Manne, Product-mix alternatives: flood control, electric power and irrigation, Carter Foundation Paper No 175, Yale, 1962.

Note on Effective use of Agricultural Extension Staff

1. The purpose of Extension Staff is to assist farmers to alter their techniques.
2. A Farm is not however just a productive unit. It is normally also
 - a. a home
 - b. a long established way of life.
3. The issues relating to change are therefore extremely broad and deep.
4. They entail social, economic, psychological as well as technical change.
5. No Extension worker can possibly expect to cope or understand them all - especially not the poorly and technically trained field worker.
6. One should accept this and ensure that:
 - a. The Extension worker concentrates on one activity which he knows well from several angles.
 - b. The farmer is then the best judge of how this affects his life style.
7. To ensure effective Extension the system guiding the Extension worker should ensure that
 - a. Farmers are involved in choosing priority work.
 - b. Extension workers are guided by commercial consideration - prices, markets, profits.
 - c. That they should be restricted to certain crops or certain types of techniques in order to ensure they are really knowledgeable.
8. These conditions are not fulfilled in Ministries of Agriculture who invariably attempt to cover too many crops, too many techniques, and who seldom appreciate commercial considerations. Most Extension services operating under Ministries are a failure.
9. The best examples of an effective Extension service are to be found in Commodity Boards, Cooperative or State, or Commercial Organisations. Some examples include

Colombia Coffee Federation
 Kenya Tea Authority
 Fijian Sugar Authority
 Philippines Rubber Authority
 Farm Coops in Argentina
 Sugar Beet Authority - Chile.
10. While this sort of management structure has the disadvantage of covering only one aspect of farm activity it at least does this efficiently - as compared with a system which seeks to cover all aspects - and does it badly.

INTRODUCTION

A. Groundwater exists wherever

- i. water penetrates beneath the surface;
- ii. the material beneath the surface is permeable enough to store and transmit this water;
- iii. the rate of infiltration is sufficient so that the material is saturated to an appreciable thickness.

B. Groundwater is a usable resource

- i. when the material in the zone of saturation is permeable enough to yield supplies of water to wells, springs or streams;
- ii. when the annual recharge of the zone of saturation is sufficient to allow practical exploitation;
- iii. When the mineral substances dissolved by the water as it percolates through the soil and rocks do not reach such concentrations as to make the water unfit for the desired use.

C. Groundwater becomes an economically usable resource when the costs of exploratory drilling and exploitation are outweighed by the benefits arising from normally increased agricultural or livestock production.

COSTS OF GROUNDWATER DRILLING

1. The costs of drilling are divided between the cost of the drilling team and the equipment they require. Clearly the expenditure on the drilling team is a marginal cost, and there is also the marginal cost of material to be considered: ie the casing and screen which remain in the wells. The quantity required for each well depends on the nature of the material penetrated and the depth to the water table, apart from the obvious variable of the total depth of the well. The quantity required for an exploitation programme will depend on both the number of wells and the fraction of the casing and screen, if any, which can be practicably extracted and re-used. The cost will be determined by both the foregoing and the specifications of the casing and screen: diameter, wall thickness, nature of material used etc.

2. In general, exploration survey costs fluctuate very widely due to the influence of many different factors, whose significance can also vary in time and place. To that extent each programme has to be appraised on its merits.

3. STAFF COSTS are usually small where test drilling forms part of the exploration programme - increasing their numbers significantly would make little difference to total costs. Some of the factors affecting staff requirements are listed below:

- i. degree of existing development and extent of information available in advance of project manning;

- ii. need for geophysical techniques in the field programme;
- iii. significance of surface hydrological factors (rainfall-run-off-evapotranspiration effects);
- iv. degree of specialist input required;
- v. complexity of drilling programme and associated aquifer testing;
- vi. degree of supervision required of contractors' work.

It can be expected that staff costs will tend to vary directly with the factors listed above.

4. DRILLING COSTS also fluctuate widely - tender submissions for overseas projects frequently show a wide range amounting to several hundreds per cent. Factors influencing drilling costs are:

- i. the depth/diameter of the well.
There are certain limiting values of these parameters which relate to a particular rig. The use of a larger size rig can increase costs significantly and the situation can be affected by availability;
- ii. basic well completions ie gravel pack, special screens etc in order to ensure that the water running through the pump remains clean;
- iii. difficulties with the terrain, including the geology of the area and logistics relating to remote areas.

5. Cost details of individual drilling programmes in the YAR and Honduras are given as an annex to this appraisal note. Costs per metre of completed well are different and suggest a rather wide range (Honduras £49/64; YAR £105) although the Honduras estimate may, in fact, turn out to be higher.

BENEFITS OF GROUNDWATER DRILLING

6. It is all too commonly assumed that the scarcity of water justifies the expenditure on surveys to assess the extent of the underground supplies. However, like any other expenditure on data collection, the greater the effort and cost being proposed, the greater must be the effort in assessing whether or not benefits will result. The commonly used argument that until such data are collected the probabilities would be unknown, should not always be accepted for there is usually a good deal of information in existence about the area for it to be possible to make a judgement about the probable justification of expenditure on groundwater drilling.

7. The benefits are generally divided into those related to the provision of

- i. domestic water supplies, and
- ii. those related to improving crop or livestock production.

i. DOMESTIC WATER SUPPLIES

8. There is no satisfactory way of measuring the benefits of improved domestic water supplied. The following considerations should however be borne in mind when reaching a decision about whether or not to embark on a domestic water supply drilling programme:

- a. What is already known about the hydrogeology of the area?
- b. What is therefore the likely cost of a programme to evaluate groundwater resources?
- c. What would be the capital cost per household or per person served by the provision of groundwater? Is this reasonable in the context of the country/specific area?
- d. What benefits would result?
- e. What are the alternatives to such a course of action?

There may be some labour saving if inhabitants have to obtain water from a long distance but if this occurs is it likely that the labour thus saved will be put at least in the long run to other more productive activities? While it is often believed that health benefits result from the provision of better quality water, the research evidence does little to support this belief (eg see Evaluation of Lesotho water supplies - University of Birmingham). It seems reasonable to suppose, however, that better quality water is a necessary, but not sufficient condition for better health. Health education programmes may be an essential complementary input in this respect.

ii. AGRICULTURAL WATER SUPPLIES

9. Unless it is possible to carry out the intensive cropping of high value crops (ie feasible in terms of soil, climate, availability of agricultural skills etc) the provision of groundwater supplies is unlikely to be economic. Clearly the cost of water (and therefore the consequent benefits necessary to justify the investment) depends on the depth which has to be drilled, the type of pump used, the nature of the material to be drilled and the requirements of casing and screen. In Asia, it has generally been found that the total costs of groundwater development (exploration plus exploitation) are less than the benefits precisely because agriculture is carried out intensively. Since the water table is often close to the surface, costs of extraction per litre are not too high. Furthermore the large population of the area ensures that the market prospects for agricultural output are better than in sparsely populated areas. In desert areas the demand for agricultural products is likely to be restricted and only in oil-producing countries will the demand be for intensive high value crops. In the savannahs of Africa where traditional cereal crops are grown, higher returns are likely to be obtained from improved practices in dryland farming systems than through groundwater irrigation investment.

10. The number of wells required to achieve a given initial yield depends primarily on the:

- i. transmissivity of strata concerned;
- ii. height of lift from water to well-head.

The primary constraint on groundwater exploitation is, therefore, whether well yields are adequate and if the number of wells required and the pumping lifts involved to meet a given agricultural demand will make groundwater abstraction an economically viable proposition.

11. An approach to the economic analysis uses the approximate crop water requirements of the likely crops to establish an opportunity cost of a unit volume of water, again making due allowance for the other recurrent costs. This can then be compared with the probable costs of supplying water at the well-head. In all cases, operation and maintenance of the pump and well assembly form a significant part of the cost.

12. A further important refinement of the argument occurs in the case of supplementary irrigation. There are many areas of the developing world where an additional crop could be obtained if existing rainfall or surface supplies could be augmented sometimes for relatively short periods, at the beginning or end of the growing season. Although capital costs remain the same for such a system, operating costs will be reduced. The use of groundwater in this situation increases farmers' security i.e. the probability of a successful harvest. This obviously has a marked effect on peasant attitudes to investment in relatively experienced supporting inputs.

13. The existing cropping pattern will give a good clue as to whether or not expenditure on drilling and consequently on pumps is likely to pay off. In the majority of areas in which such investment is proposed and where the greatest doubts exist about its value, study or observation of the current systems of applying water and its costs will give a valuable indication of the probable value of capital investment of the type proposed. Where extensive systems of agriculture are carried out such as cereal production, cotton production and livestock production, the prices obtained for these commodities are not likely to be such as to justify expenditure on pumps and their maintenance. If it is argued that the current pattern of production can be radically altered in favour of more intensive forms of agricultural production, the problems of marketing, transport and management must be taken into account for these may be formidable and it is unlikely that it will be possible to embark on intensive production on any scale in an area which is traditionally run on a system of extensive farming (see Appraisal Note on Irrigation Feasibility Studies). However, this is generally a function of geography i.e. groundwater exploitation may be adversely affected by these factors in Africa, but much less so in Asia.

MAINTAINING PUMPS IN OPERATION

14. It has been found that in traditional communities the problems of maintaining pumps; of finding the funds for keeping them going; and supervising the application of water pose serious problems to the extent that pumps which have been installed frequently break down and are abandoned.

15. The following major problems may emerge:

i. MAINTENANCE

It is necessary to train somebody to maintain the pumps and to ensure that he is responsible for doing so. If it is possible to find somebody in the locality who can be trained and assume responsibility for such an activity, so much the better. But this is liable to pose problems for payment for this service. If it is proposed to appoint someone to be responsible for a large number of pumps, the problems of payment and transport as well as supervision, are considerable and could be costly. Clearly where the community possesses the skills and is prepared to assume responsibility for the maintenance of pumps, this problem is solved. In the Indian sub-Continent, maintenance is either carried out by the public sector, or where tubewells are owned privately, by the owners relying primarily on the private sector. Thus responsibility for maintenance falls squarely on the owner of the tubewell.

ii. RECURRENT COSTS

A system for ensuring that recurrent costs are met and that fuel is ordered and the pumps are properly supplied must be evolved.

iii. CONTROLLING THE USE OF WATER

An institutionalised system for controlling the amount of water is likely to be essential. This poses serious technical, sociological and economic problems. By whom and how is water used to be controlled? In cases of physical systems of control, eg padlocks or mechanical systems of water limitation, the pressures on those actually controlling the use of water in a small community can be very great and be open to abuse. On the other hand, financial charges for the use of water pose similar problems in small communities. If, however, funds are not raised by the users to pay for the servicing and maintenance of the pumps, who is going to finance them?

iv. OVERGRAZING

The problem of overgrazing resulting from increased water supplies is so well known as to scarcely deserve mention were it not still a problem. The private interests of stock owners often conflict with the society as a whole. Voluntary systems of group control seldom seem to work. However, groundwater development can be used to provide larger numbers of small watering-points which greatly assist in spreading the load on existing pasture.

16. Generally speaking there are therefore a considerable number of questions which have to be asked before embarking on groundwater drilling and it is unwise to assume that the provision of considerable expenditure to this end is justified solely on the grounds of absence of adequate water supplies or absence of data.

YEMEN ARAB REPUBLIC DRILLING CONTRACT FOR 35 BOREHOLES FOR EXPLORATION
PURPOSES 1974 - 1975

1. Areas drilled:

1. Montane Plains: alluvium occasionally interbedded with ashes, overlying Tertiary lavas, tuffs and other volcanics.
2. Wadi Rima: alluvial coastal plain of unconsolidated to semi-consolidated alluvium ranging from coarse wadi deposits (boulders) to fine sand, silts and silty clay. Hypabyssal porphyritic hinterland.

2. Contract details:

	Montane Plains			Wadi Rima		
	Contract	Actual	Meterage	Contract	Actual	Meterage
Exploration	10	14	2268	8	8	1251
Production	5	4	516	5	3	359
Observation	3	3	246	4	3	217
Total		21	3030		14	1827

a. Moving and mobilisation charges

Mobilisation	£138,500
Intermediate mobilisation charges	£12,500
Demobilisation	£53,000
Moving between holes	£33,600
Total	£237,600

Moving between boreholes was at a fixed price, £900 per move to an exploration or observation hole and £1,200 per move to a production hole.

b. Drilling charges

i. Exploration	0 - 150 m	£19/m
(200 mm hole, 150 mm casing)	150 - 250 m	£23/m
	250 - 300 m	£28/m
ii. Production	0 - 250 m	£23/m
(200 - 250 mm hole, 150 - 200 mm casing)		
iii. Exploration	0 - 150 m	£17/m
iv. Coring	0 - 150 m	£90 each
	150 - 300 m	£100 each

c. Well completion charges

Casing and cementing (installation)	£4 - 7 per metre
Cleaning and development	£19 per hour
Cost of casing	£10 - 31 per metre

d. Pump testing charges

Fixed price	£19 per hour
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3. Contract Breakdown

	Cost	% of total Contract Price
a. Mobilisation and moving	£237,600	47%
b. Drilling charges	£97,000	19%
c. Well completion and other charges	£156,248	30%
d. Pump testing	£19,152	4%
TOTAL	£510,000	-

Item (c) includes installation and purchase cost of casing. Average cost per metre is £105 (including completion, development, mobilisation, demobilisation, and test pumping). Average cost per metre is £45 - 67 depending on well diameter, but excluding mobilisation.

REPUBLIC OF HONDURAS PROPOSED DRILLING OF SIX BOREHOLES FOR EXPLORATION PURPOSES IN 1977

Total of 700 m drilling. 6 Holes to be drilled to 18 inches diameter, gravel packed and cased to 8 - 10 inches, developed and pump tested. Discussions have been held with a number of local Honduran and one Panama based company. The work is presently out to tender.

The two possible contractors are:

Perforadoro Hondurana S de RL	\$ US105 per metre inclusive
Agua Bueno SA (Panama)	\$ US80 - 95 per metre inclusive

The Anticipated contract price is £40,000. Breakdowns on these costs are not yet available (~~\$~~1.64 = £1 Stg).

MUNICIPAL MARKETING FACILITIES

1. Investments are being made in many less developed countries in municipal marketing facilities normally for agricultural products, without a sufficient understanding of the circumstances which make them economically justifiable.

2. By municipal marketing facilities one refers to large buildings which enable producers and consumers to deal directly with each other usually in the sale and purchase of perishable agricultural products. Often, however, there is a wide range of consumer products on sale.

3. These markets are found in the major urban centres of the world and it is often assumed that the advantages they bring in these circumstances also apply in less developed urban communities.

4. The advantages they confer in major urban communities include:

a. Base, speed and economy for consumers in purchasing these commodities.

b. Economies of scale in the provision of certain infrastructure facilities such as light, storage, water and car parks.

c. Ease in establishing quality standards for produce and legislation.

d. Reduction of trading margins by more direct consumer to producer sales.

e. Greater hygiene in provision of products.

5. These markets may, however, be costly and the annual capital costs and the costs of administration have to be paid for by someone. It seems fairest that they should be paid for by the prime beneficiaries - the producers and consumers. This is normally done by making a charge to producers by renting the facilities. The benefits will be measured by payments made for use of the premises.

6. These centralised facilities can be economically viable and financially remunerative provided there is an effective demand for quality produce as well as for a quick and easy shopping service. These conditions are likely to exist in high income areas in large cities, where quality is in demand and convenience is important.

7. In many towns, however, the prospects of establishing an economically successful municipal market are frustrated by alternative free or cheaper space available to traders and the administrative impossibility of restricting them to the market. The greater the financial charges made by the authorities for use of the facilities, the greater the incentive to avoid them. The success of such markets is therefore very much a function of space. While successful municipal markets are found in big cities where space is at a premium, the prospects of them being economically justifiable decline as the size of the towns diminishes.

8. The essence of an economically viable market is, therefore, a monopolistic control over space. This control can be expressed in physical terms (absence of alternatives) or with an effective system of control, in administrative terms. However, the monopoly of a market is unlikely to be contained in towns where space is not at a premium, where administrative control is weak and when financial charges are thought high.

9. For these reasons proposals for investment in municipal markets need to be considered carefully in the smaller urban centres of the world.

A Bridger
28 October 1975

A GUIDE TO THE APPRAISAL OF LARGE SCALE IRRIGATION PROJECTS

1. Immense numbers of irrigation feasibility studies have been carried out in less developed countries. That so few of them have ever been implemented can largely be explained by the fact that they should never have been initiated in the first instance. People are all too often mesmerised by the success of the TVA or the Gezira scheme regardless of the fact that the circumstances which justified them seldom apply in other areas.

2. Failure to implement feasibility studies is not normally due to the fact that the studies have recommended against development. Far from it - they invariably recommend that the project should be initiated. Perhaps the main reason for lack of implementation is the high capital cost associated with the development - or put in another way - the Government has more pressing requirements for its capital funds.

3. It is sometimes argued that at worst feasibility studies will always collect data which one day will be useful even if the scheme is not implemented immediately. Unfortunately, this is not true as most of the type of data collected in feasibility studies does not retain its validity for long and because those carrying out subsequent studies must necessarily assure themselves that the data is correct, so that they either have to check it all or decide to collect their own.

4. Since the cost of these feasibility studies has escalated very considerably over the last few years an appraisal of the proposals is becoming increasingly relevant. The conventional reaction to appraisal is that until the data is collected the answer cannot be given. Clearly without data one cannot come to a decision but data sufficient to enable one to come to a decision as to whether to embark on studies or not is usually easily available in libraries or files, provided the right questions are asked.

5. The following are some practical guidelines which can be used in deciding whether or not further effort and expense is necessary (possibly by means of pre-feasibility studies) to decide whether a feasibility study is justified.

6. It should be stressed, however, that one is concerned with large scale capital intensive irrigation schemes (several thousands of acres at several hundreds of £'s per acre) in less developed countries, not small scale low cost schemes built up gradually by farmers themselves (which are frequently very profitable).

7. A The only crops likely to justify a large scale irrigation scheme are sugar, rice and cotton.

When large scale schemes are being considered it is managerially impractical, and with respect to marketing unlikely, that an irrigation scheme will be viable on the basis of a large number of intensive minor crops (eg fruit and vegetables). It will almost certainly depend upon finding one major income earner and this is likely to be either sugar, rice, or cotton.

It is true that wheat and maize are often grown on large scale schemes but usually because imports are prohibited or have high tariffs. Mexico and India immediately spring to mind as examples of both these crops being grown under capital intensive irrigation schemes. It is possible that they might be justified in terms of the low opportunity cost of land or labour but the case needs to be examined carefully before one can be definite. It should be borne in mind that the annual capital costs per acre of large scale irrigation schemes are unlikely to be less than £20 (and usually they will be far more), so that one can seldom think in terms of crops yielding low returns per acre, which are normally grown on flat unirrigated plains with immense economies of scale resulting from some mechanical investment. India or Mexico, for example, could just not compete economically with Canada, USSR, USA or Argentina as far as wheat and maize are concerned in export markets. (This should not be taken as implying that more modest irrigation schemes are not economically viable for foodgrains for local consumption in countries such as India).

It is true that fruit and vegetables are crops whose gross return per acre could cover the capital costs of intensive irrigation schemes. The marketing problems are, however, serious obstacles. The market for fresh fruit and vegetables is likely to be local and restricted, and since the demand for these products tends to be inelastic supply miscalculation can be disastrous for producers. The markets for tomatoes, onions, etc can easily be saturated by a few extra acres being brought into production. When one seeks to compete in international markets the competition is fierce and efficient.

Milk production is likely to be economic but the market will be restricted. Livestock fattening is almost certain to be uneconomic as the internal market is restricted, the local animals of too poor a quality to benefit from costly inputs, and price premiums for quality beef unlikely to exist. Exports cannot be contemplated on grounds of costs.

While it would be unwise to rule out completely the prospects of anything but cotton, sugar and rice under large scale and intensive systems of irrigation, it is extremely doubtful whether anything else could be economically and managerially justified.

- B The economic justification for irrigation development increases as the average amount of rainfall declines.

There is an obvious relationship between the economic justification for irrigation projects and average rainfall. It is surprising, however, how often this relationship is ignored. This is because it is argued that it is not the average rainfall, but the seasonal rainfall which is relevant.

This argument, at first sight, seems plausible, but it ignores the comparative costs of alternative means of crop production. It is more than probable that if a region has adequate average rainfall to grow particular crops the comparative advantage of irrigation development disappears. Under these circumstances

the rate of return of investment in dryland farming is almost certain to be higher. West Pakistan, Sudan and the coast of Peru are all obvious starters for irrigation studies. On the other hand Panama, Uganda and Malaysia are not.

It is often argued that intensive production methods will increase yields to such an extent that it will more than compensate for the additional costs. This may be theoretically the case but the practical evidence to justify such a belief is not available. Not only would it require intensive and costly supervision and management, but it would require totally new work habits, new social responsibilities, new social structures and high standards of education. Those social changes do, of course, occur but they are likely to take years, if not decades.

- C The economic justification for intensive irrigation development increases as the proportion of cultivable land decreases (rainfall assumptions being constant).

This merely reflects the pressure of population on land and the need to increase output per acre.

- D The fact that crops are already produced under irrigation does not validate the assumption that further irrigation development is justified, if the capital costs per acre are likely to be higher.

While there is a great deal of irrigation development throughout the world costs of development have normally been low as it has been based on simple, labour intensive, techniques. A great deal of this development has taken place over decades or centuries and proceeded very slowly using labour whose opportunity cost has been very low or zero. The latter is especially true on individual holdings.

- E Since market projections for most agricultural output are invariably pessimistic (and on this basis little investment in agriculture would ever have taken place) commodity projections should not necessarily be the critical deciding factor.

Most countries have no alternative but to ignore commodity forecasts - and they have almost always been justified. Knowing that other countries are expanding output it is in practice impossible to refuse to assist increased output of a commodity by a competitor.

A justified ground for refusal could, however, be based on probable comparative costs - will the country be able to compete with other world producers - either internationally or domestically?

- F The greater the capital cost of the project the greater the likelihood of funds not being found to implement it.

This merely reflects the problem of allocating scarce government resources to large schemes.

8. Whether or not to embark on feasibility studies or irrigation studies thus requires some analysis (as well as data) of the prospects of success. The amount of work put into this assessment naturally relates to the cost of the feasibility study and the prospects of benefits resulting.
9. It should be perfectly possible to limit any studies in the first instance to a general agro-economic and social review of the problems of the area to ensure that the best technical solution is being contemplated. In order to achieve this it is therefore important that the composition of the survey team should be such as to preclude professional prejudice or commercial vested interests.
10. Once a feasibility study has been agreed to, its end product should be a cost benefit study to a 10/15% margin of error. This will enable firmer decisions to be taken about availability of capital and political and social acceptability.
11. At the above stage it is quite unnecessary to carry out soil surveys, photography, water studies, which will determine farm level usages. All one requires in the way of technical studies are those which will allow one to reach reasonable conclusions of the average level of inputs (eg water, fertiliser, labour) for the scheme as a whole and average level of outputs (yields) over the whole project. Detailed studies which do more than this (eg water requirements for each acre of land) are required at the design stage, not the feasibility study stage.
12. The social and political problems of irrigation development are, of course, of paramount importance. Irrigation development requires new social structures and attitudes and while these do change the change is not an easy one to bring about. The higher the financial rewards, however, the more rapid the change. Clearly irrigation development in areas which are new to it, will take years before they become economically viable and an allowance should be made for this.
13. The problems of actual implementation of irrigation schemes are numerous and well known. They are set out by Professor Harrison Church in the Agricultural Economics Bulletin for Africa No 4 (11/1963) - and deserve to be studied.

APPRAISAL OF SURVEYS AND RESEARCH

Introduction

1. Expenditure by the OIM on surveys and research, while impossible to calculate with any accuracy, probably runs into several millions of pounds sterling per annum. Not only are there special OIM institutions dedicated to surveys on a full time basis, such as the Directorate of Overseas Surveys (£1.5m per annum), the Land Resources Division (£400,000), but many of the other OIM institutions, such as the TPI, devote a considerable proportion of their time to surveys and research. Further to these institutions a good part of the £1m spent on consultancies must be devoted to surveys and data collection while the same could be said of a considerable proportion of personnel sent out under technical assistance schemes. Finally, there are the many United Nations bodies which are financed by the UK, especially the UNSP who are active in this field.

2. Total expenditure on these activities could well exceed \$5m per annum - though whatever the figure is it is obviously one which merits some thought and effort so as to ensure that best use is made of these resources.

The Need for Evaluation

3. The collection of information (or research) is frequently thought to be indisputably desirable in itself, and consequently too little thought has been given to whether or not the information collected is likely to be useful. The argument is usually that until one has obtained the information one cannot tell whether it is going to be of value.

4. This argument ignores two basic issues:-

a. Resources, human or economic, devoted to data collection and research could perhaps better be employed elsewhere.

b. While information will probably always be of some use (although in fact it can become obsolete - or even get lost) data which is likely to be of use next year is economically and socially more valuable than identical data used in say 10 years time.

5. While both the above issues are usually recognised by those involved in approving investments in such activities it is too often accepted that it is not possible to assess the probability of such an investment being of developmental value. In practice, however, every decision does involve a decision of this sort though it may be intuitive or subjective.

6. When the investment is large, however, it is essential to establish a logic for decisions of this sort and to ensure that some quantity is attached to the probability of it being of developmental value - in the shortest possible time.

Probability Analysis

7. The above is a somewhat grandiose term for a step by step approach to an investment decision for which the outcome is uncertain but to which maximum and minimum probabilities are attached to the likelihood of success being achieved. It has been developed particularly by Petroleum

Companies before embarking upon exploration. The technique is to ensure firstly that there is likely to be a market for the product and then to get down with scientists to quantify the probability of every step taken leading to a successful outcome. When choosing areas for exploration those areas with least transport (or transfer) costs are chosen first.

8. The problems faced by the sort of work financed by the OIM are usually far simpler than problems faced by petroleum companies because almost invariably a good deal is known about the areas or problem before work is initiated so that the probability of it being useful is thus much easier to assess.

9. The basic weakness so far has been that of adapting a production oriented approach and believing that before knowing what production potential there is it is not possible to estimate a piece of work's developmental potential. This random approach to research (or data collection) and surveys has largely been discredited as a luxury which can no longer be justified.

10. This paper is only attempting to cover one form of resource use - that whose end product can be measured in physical, and/or, monetary terms. We have ignored work such as that related to social surveys as these are seldom financed by OIM.

11. While all surveys and research collection should be examined against the probability of some increase in physical output resulting probability has been attached to the social benefits of this output exceeding the social costs.

12. Since, in practice, OIM resource use in this field can be divided into two sorts, one concerned with surveys and data collection of specified areas, and the second with surveys and data collection into products and commodities, it is proposed to examine them separately. While it is obvious that the latter must be related to production in specific areas and the former to outputs of certain products the sequence of thought is clearly different although the basic justification is exactly the same. It is hoped that this way the process of evaluation will be more convenient and clearer.

Area Surveys

13. Before embarking on data collection, or surveys of an area, it is vital to establish what the probabilities are of the area being able to market its output at an economic price.

14. It is not too difficult, especially if one is dealing with agricultural outputs* to establish a range of products which will be marketable and which are likely to be able to bear the transfer costs (transport and marketing costs) to markets. There are virtually no areas in the world

*Mineral surveys are excluded as OIM does not normally finance these activities. The general principles still apply to them however.

where something is not already known about its production potential and the prospects of totally new crops being discovered, which can bear transfer costs and for which capital or managerial skill can be obtained should be viewed with scepticism.

15. The further the area is away from its main markets the greater will be the need to develop products whose transfer costs are less per unit than those near main markets. Wheat, cotton, beef, wool are capital of development, distant from markets while most horticultural* and most dairy products have to be developed in the vicinity of markets.

16. While it is true that many areas can produce and sell small quantities of produce locally the type of surveys the OIM is engaged upon are usually activities which envisage a fairly large output and, since domestic markets are usually limited, an export market is usually essential if a viable project is to be developed.

17. While it could be argued that on a large project a multiplicity of crops for local markets might be economically feasible, the managerial constraints then become serious.

18. It is argued, on occasion, that even if there is no market internally, or externally for crop output that the need for additional food is such that development should proceed. This is to ignore the unfortunate fact that production for subsistence consumption is not likely to be an economic proposition.

19. What is required therefore is:-

- a. A list of probable crops for which there is likely to be a market.
- b. An assessment of those best able to bear transfer costs without being priced out of the market.

20. A rough method of assessing the probability of certain types of production being economically viable, assuming that transfer costs are not high, is to compare the circumstances under which the output will have to be produced with other competing sources of production.

21. Surveys of existing areas, already in production and surveys of areas which could be settled from adjoining overpopulated areas may require a different type of survey. The intention in the former case is to intensify existing production patterns. In this case there is usually a market available and a mechanism for marketing output exists. Under these circumstances it is important to ensure that the type of work or techniques to be carried out are in sequence which ensures least cost methods are applied first. It is pointless for example to carry out fertiliser response surveys if nutrients are not a constraint and if simple husbandry methods could be improved, or irrigation surveys if water storage is not the main problem and soil surveys if crops which can be grown are known and the use of inputs needed to improve soils likely to be uneconomic. In new relatively underpopulated areas the surveys will be of a more elementary nature.

*Some products, with the advent of cheap air transport are being developed in areas far distant from markets but this is to satisfy out of season requirements.

Research

22. Under this heading one can include most types of research financed by ODM. In the first instance it is essential to establish what products, or what range of products, research is likely to affect. Clearly some forms of resource use will affect a multiplicity of products, such as anti-locust research but it is still vital to establish those products most likely to benefit from investment in research.

23. The next fundamental step is to assess what the practicability is of the product finding a market. This should differentiate between "demand", and "effective demand", the latter being what people can and are prepared to buy, the former what they cannot afford. It is obvious that research should be concentrated on those products for which there is likely to be an effective demand in the foreseeable future.

24. Research can be of cost reducing or quality improving sort. In the first instance this could lead to increased profits to producers or increased profit to consumers - or both. It is important, however, to assess who is likely to benefit most. Research devoted to solving the problems of expatriate producers who are unlikely to pass on benefits to consumers is likely to be less socially defensible than research which will benefit larger numbers of peasant agricultural producers. In the same way it is important to assess who will benefit from research into improved quality products. It should be emphasised that this does not rule out assistance to minorities for the longer term benefits may well benefit a broader strata of society but it does mean that some thought should be given to the main beneficiaries of any research.

25. The probability of the research being technologically applicable (within the foreseeable future) must also be of constant concern. Lack of trained personnel to operate and supervise research recommendations, difficulty of obtaining spares and special inputs required for operating equipment must also be borne in mind.

26. The capital and operating costs of probable new proposals are clearly of major importance and the probability of them being available for the implementation of research proposals needs to be considered.

27. The prospects of the product being an economic possibility should be assessed at every stage of research and especially when new techniques are being considered. The economics of product change are obviously related to the area where they are produced, or where they can be produced and this is very much a function of transfer costs to markets. The problems of assessing area development prospects are set out in the earlier section.

28. Since the problems of poverty in the developing world are such it is important to ensure that research which has little prospect of showing any return, or for which no returns can be foreseen should not be attempted. This form of random research is better left to wealthy countries whose problems are less pressing. There is plenty of research work to be done which has good prospects of showing returns in the developing world and priority should be given to quick maturing projects.

Evaluation of Proposals

29. Attached will be found two Appendices which set out the type of questions to which answers should be sought before embarking on expenditure or commitments or surveys or data collection. It is not pretended that they should be exclusively answered - most of the questions will need little effort to answer on the part of knowledgeable personnel - they are meant to serve as a checklist rather than a procedure.

EVALUATION OF REQUESTS FOR AREA SURVEYS

1. General information about the area to be surveyed.
 - a. Physical information - square miles
Climate - Topography - Vegetation.
 - b. Population.
 - c. Production - crops produced for local consumption and for export.
Imports of agricultural commodities.
 - d. Transport and markets - Accessibility of area and type of
transport. Distance to main markets.
2. Prospects for Development
 - a. Are there reasonably good prospects of selling additional output
from the area?
 - b. Where will the additional putput be sold?
 - c. Is the commodity likely to be able to bear transport and other
marketing costs?
 - d. What other sources of competition exist in proposed markets?
 - e. Is the capital cost of development of the area likely to be
considerable? Where is capital likely to come from? Can the area
be developed on a gradual basis?
 - f. Will managerial expertise be available to develop the area?
 - g. How many people are likely to benefit directly by the development
of the area - and when?
3. Costs and Details of Survey
 - a. What is the probable total cost of the survey likely to be?
 - b. In what way is the expertise provided likely to increase output?
Are the results of the experts recommendations likely to be applicable
economically or socially? Does the skill exist to apply probable
recommendations?
4. Recommendations.

APPENDIX II

EVALUATION OF REQUESTS FOR RESEARCH

1. Product for which information is being sought.
 2. Existing Situation:-
 - a. Market for product.
 - b. Area, country and number of people involved in production.
 3. Effect of Data Collection on Product:-
 - a. Effect on quality or quantity of product.
 - b. Market for product and marketing channels.
 - c. Transfer costs from source to market.
 - d. Area, country and number of people involved in production.
 4. Costs:-
 - a. Probable order of cost of obtaining the data and time taken.
 - b. Probable order of costs to carry through to implementation.
 - c. Effect on existing production costs.
 5. Technical and Managerial:-
 - a. Requirement of technical and managerial skill to implement recommendation.
 - b. Likely availability of these skills.
 6. Probable time taken before results/information is obtained and recommendations actually implemented.
 7. Countries and/or numbers of people likely to benefit.
 8. Extent or type of benefits.
- Recommendation.

AN EXTRACT FROM "A STUDY OF THE CAPACITY OF THE
UNITED NATIONS DEVELOPMENT SYSTEM" - VOLUME II

Surveys

1. A distinction needs to be made between surveys intended to establish the feasibility of early investment, on the one hand, and, on the other, those intended to provide a basis for long-term planning (eg river-basin studies, some national or regional power studies, the collection of hydrological data), or to lead to the setting up of permanent survey services. These latter types of survey can be said to be successful if they achieve their stated objectives, even if these do not lead to early investment.
2. At the same time, there is a real danger of resource surveys becoming too exhaustive and long-range. Many countries can be expected to develop only a small part of their natural resources in a given period. The scope of a resource survey should accordingly be based on the country's capacity to develop its resources and on a judgment as to where it should begin. The evidence available to the Capacity Study suggests that a good number of the surveys assisted by UNDP have been planned without taking these important factors sufficiently into consideration and that, consequently, their findings have either gone largely unutilized or are likely to be out of date by the time the country concerned is in a position to take advantage of them. Moreover, as mentioned in the previous section, many UNDP-assisted survey projects have tended to place too much emphasis on technical considerations at the expense of economic analysis. There is an understandable tendency on the part of experts to put forward a technically attractive project despite misgivings about its economic feasibility. One financing institution informed the Study that, when discussing forty-two on-going projects in the agricultural sector, it found that, of the thirty-four classified as pre-investment studies, eleven projects at the most had been really pre-investment oriented at the outset. Most of the projects were likely to provide adequate technical and engineering data, but without modification they would lack the necessary financial and economic data, while institutional aspects were rarely covered.

SOIL SURVEYS AND LAND CAPABILITY ASSESSMENTS FOR DEVELOPING COUNTRIES

I The Problem

Soil is one attribute in a landscape being assessed for development. While soil surveys should, and must form an integral part of any development study, they are but one element in a number providing information for the decision maker. Soil surveys, as part of development studies, have been very much in vogue since World War II, but recently they have come under growing criticism. This has been emphasized because there are examples of effective development having taken place without recourse to expensive soil surveys. Reasons for criticism are several but perhaps the two important ones are:

(1) Soil surveys are often not cost-effective in terms of total project costs. It has been suggested (Bie and Beckett, 1970) that the ratio of soil survey costs to development costs is about 500. However, many decision-makers would argue that this ratio is considerably exceeded and the total costs of soil surveys do not provide value for money in terms of information that can be used by the decision-maker.

(2) Information provided by soil surveys is often not in a form that can be readily used by the decision-maker. Furthermore, it may not be suitable for the needs of the subsequent user. This is the 'comprehensive gap' about which Stobbs (1970) writes, "(it) expresses the failure of soil surveys in one of their most important functions, namely to act as the vehicle for the transference of knowledge." Absence of information may also lead to management problems after project effectuation.

The object of this paper, which solely represents the author's views, is to examine how these criticisms can be overcome and, in so doing, to evaluate the role of ODA (Land Resources Division) in soil surveys and land capability assessments for development purposes. It is necessary, though, to briefly comment on the objectives of soil surveys.

II The Objectives of Soil Surveys

There are two broad categories of soil surveys - those that are designed to gather information for a national resource inventory and those whose ultimate aim is a development project. Included in this latter category are those reconnaissance surveys which, at the outset, have no particular project in view, but, as the survey proceeds, crystallise on a particular form of development.

1. Soil surveys for national resource inventories. These are mainly found in the 'developed countries' of the world and, as type examples, one might cite the Soil Surveys of Scotland and of England and Wales. Their main concern is the systematic study and mapping of soils in the United Kingdom and it has only been in the last 5-7 years that there has been any emphasis on land capability classification as an interpretation of the soil survey. An even more recent phenomenon, on any appreciable scale, has been the direct approach by users of soil maps for specific information relating to a variety of land uses eg location of oil storage tanks, urban planning, alignment of motorways etc.

Such surveys are expensive to operate and there is an appreciable time lag between collection of information and dissemination of information to potential users in the form of memoirs etc. Furthermore, informing users of the role and values of soil surveys of this type is an extremely lengthy business - the soil surveys in the United Kingdom have been operating on a major scale since World War II, yet it is only now that users are approaching the surveys with requests for specific information. Clearly, such surveys are not feasible in the "developing country" situation on account of cost, excessive time and also the type of data they provide.

2. Soil Surveys for development projects. The hierarchy of soil surveys for development work is now well established (Stobbs, 1970, Young, 1973) and is summarised:-

Type of Survey	Purpose	Scale	Technique
Reconnaissance	Resource Inventory Development Potential	1:500,000- 1:100,000	Land Systems(CSIRO approach)
Semi-detailed	As above but with more detail, Project location	1:100,000 1:25,000	Land Systems and facets
Detailed	Project execution Feasibility studies	1:25,000- 1:10,000	Various
Intensive	Management problems	Larger than 1:10,000	Various

CSIRO developed the Land Systems approach in the early 1950's to provide basic environmental data for large tracts of land and it uses air photograph interpretation as a primary technique. Used in this way, the integrated Land Systems approach only provides a limited amount of information on individual attributes of the landscape but "it enables detailed investigations...to proceed from a common base" (Young, 1968). In this respect, then, it is a resource inventory but only at a reconnaissance level. From such surveys, specific project proposals may be formulated, each type of project possibly requiring slightly different criteria in the soil surveys and land capability assessments.

III Land Resources Division and Soil Surveys.

The prime role of ODM (Land Resources Division) is to assess land resources with a view to agricultural and forestry development. To the author, though, this has the implication that consideration MUST be given to any infrastructural requirements eg communications, new settlements etc and thus additional data is required from the soil surveys. This will be alluded to later.

1. Reconnaissance Level. Land Resources Division basically use the Land Systems approach but this, it would seem, has not diminished the 'comprehensive gap'. This approach is good at the reconnaissance level in providing limited basic data from a variety of disciplines and can be easily comprehended by the planner or decision-maker with limited time, particularly if an indication of land potential is given.

However, it would seem to the author, that Land Resources Division have used this approach to provide a rather more detailed resource inventory. This may be required by some clients but to others there is a superfluous detail all too often accompanied by a tendency to over-emphasize the soil survey. Costs rise with increasing detail and it is this exaggeration of soil surveys at the reconnaissance level which diminishes the cost-effectiveness of the soil survey in the eyes of the economist or planner. Furthermore, excessive detail is often provided about areas of strictly limited potential-areas which have no potential and can be omitted from the survey.

Data provided by the Reconnaissance level surveys should be characterised by their simplicity. Only sufficient information should be provided to allow the decision-maker to decide on general policy eg resources appear to be favourable for irrigated agricultural development in such and such an area, not irrigated cotton schemes will be established. This policy decision must be made against the broader economic policy of the region or country as a whole.

2. Semi-detailed, Detailed and Intensive Surveys. At the more intensive levels of study soil surveys have a major role to play, but again the full benefits are not always obtained by the planner. This can result from a number of factors.

(i) There may be no clear end-point to the survey. After the reconnaissance appraisal, the soil surveys (and others) should have a particular project clearly defined as this influences the type of data collected.

(ii) The soil classification employed. As Gibbons (1961) emphasises, the values of soil surveys depend upon the classification of the soils in the areas under study. In many soil surveys, the classification is only readily understood by the soil surveyor himself and is insufficiently practical or is not readily explained in the soil survey report in suitable form for the planner/decision-maker.

(iii) The criteria described by the survey is often insufficient. This may stem from (1) above or is the result of trying to combine a natural resource inventory with a development proposal. The information collected may be insufficient for the needs of some of the disciplines involved in

detailed planning or to predict future problems. One of the commonest omissions is sufficient detail concerning physical properties of soils, yet these are of considerable importance in planning infrastructural requirements as well as predicting how soils will react to different cropping practices.

(iv) The 'comprehension gap', "The amount of thought, effort, time and money which is employed in preparing and publishing soil survey reports is rarely commensurate with that lavished on the survey itself" (Smyth, 1970). Soil surveys tend to be projects in themselves rather than part of a comprehensive development plan.

IV Land Capability Assessments.

Soil surveys provide the fundamental data for interpretative soil groupings, one of the most widely used being land capability classification. There are a number of land capability classification schemes which can be modified for a particular situation but all are heavily dependant upon criteria observable in the soil, in either the field or laboratory, at a particular point in time and at a given level of technology. This point is often not appreciated by the planner for it is not emphasised sufficiently in the report - once man begins to influence the soil through agriculture, changes can be rapid and profound.

One of the weaknesses of development studies is that insufficient time, effort and expense are given over to monitoring changes in the soil after development has taken place. It could be argued that this should be undertaken by the operator; yet if this is the case there may well be insufficient feedback to the soil surveyor/land classifier and lack of data of this type can make prediction in the planning phase of future projects less tenable than it might otherwise have been.

V Conclusions

In this paper, there has been an attempt to summarise the types of soil surveys and their objectives in development studies. With regard to the activities of Land Resources Division, these will tend to vary from project to project but, to the author's knowledge, the Division is rarely, if ever, involved in soil surveys and land capability assessments from the reconnaissance stage right through to project implementation. In this situation then it would seem that:

(i) Current soil surveys/land capability assessments fall between the two categories of survey discussed earlier. Information tends to be too detailed for a reconnaissance survey and at the same time is inadequate for detailed planning.

(ii) There should be clearer identification of the objectives of both Reconnaissance and Semi-detailed surveys. The former should present basic data relating to the widest range of attributes - soils, hydrology, topography, vegetation etc - and should provide the starting point for further investigational work. At the reconnaissance stage soil surveys should not exert the dominant role that they now appear to do, at, perhaps, excessive cost. The Reconnaissance stage must be clearly separated from the Semi-detailed stage by a policy appraisal and full communication must be established between all parties.

(iii) Greater consideration should be given towards the type of data collected, in particular more information relating to physical aspects of the soil, at the Semi-detailed level.

(iv) Interpretation of data collected by the soil surveyor must be presented in simpler and more effective form.

(v) It might prove advantageous to monitor projects, after implementation, to improve the level of prediction.

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APPRAISAL NOTE - TRACTORS

1. It is unwise to generalise about the use of tractors in developing countries. Their spread has been caused by the financial benefits accruing to users, which have sometimes been enhanced by subsidisation in government settlement or service schemes. These financial benefits may militate against employment and thus be economically harmful. The social structure and culture, not to mention the politics, of the country or area are critical to the use or misuse of tractors.

2. However it is essential to be aware of the indirect and dynamic aspects of tractor usage and not see the problem solely in a direct or static fashion. Increased tractor usage has increased food output (and thus benefited consumers and, by generating higher farm incomes, eventually benefited other income groups).

3. It is also important to regard the different forms of draft power not necessarily as alternatives but as possibly complementary in the farming system.

4. The potential benefits arising out of the use of tractors can be examined under the following headings:

a. EXTENSION OF AREA UNDER CULTIVATION

This may result either from bringing more land into cultivation or by increasing the percentage of the cultivated area which is double or triple cropped.

b. TIMELINESS

Greater speed of operation may produce benefits not only in extending the area cultivated but also in increased yields per unit area through more optimal planting dates.

c. POWER

There may be soils which can only be cultivated or subsoil "pans" broken up by these more powerful mechanical means, or areas where draft animals are in short supply, eg in tsetse areas, or in weak condition, eg after a long dry season.

d. IMPROVED QUALITY OF OPERATIONS

This aspect of tractor work - ie increased yields through better ploughing and cultivating - is not clearly established and if it occurs it is likely to be of lesser benefit as compared with the tractor's capacity to extend the cultivated area.

e. COST REDUCTIONS

The use of tractors can reduce substantially labour input per unit area and drudgery, and the use of oxen in cultivation. In the latter case, land for feeding oxen can be devoted to other uses. The assumption is that displaced labour can find alternative work and oxen can be disposed of, or that displacement of labour is avoided by an increase in cropped area.

f. TRANSPORT

While the marginal cost of tractors used for transport is far higher than more traditional forms of moving people and goods, there may be cases when speedier transport is justifiable, eg to reduce post-harvest losses. The marginal cost of tractors for transport may be less than that of other motorized transport, or tractors may be usable in more inclement road conditions.

5. Conditions most likely to justify tractor use are:

- a. Areas where there is ample land whose use is constrained by lack of power.
- b. Areas where yield is highly responsive to date of planting.
- c. Farms (or farmers) enabling tractors to work between 800/2000 hours per year. (This, of course, depends on the economic relationship between inputs and outputs).
- d. A social structure which encourages farmers to extend tractor usage through contracting to others.

6. Conditions least appropriate for tractor usage include:

- a. Areas which are densely populated and intensively cultivated in small fields, especially if individual land ownership is fragmented.
- b. Availability of other sources of power - eg oxen.
- c. Climatic conditions which do not put a premium on speed of operations.
- d. Social and economic structures which do not facilitate transfer of labour displaced by tractors to other activities.

7. Few conclusions can be drawn under any one heading without consideration of the others and without a study of the physical, economic and sociological conditions of the areas for which they are being considered. No one consideration on its own is likely to justify or condemn the use of tractors.

SOCIAL STRUCTURES

8. Unless the labour displaced by tractors is used for other purposes, the benefits of tractors will be reduced or nullified - at least until those social structures change. This could occur if, as is frequently the case, the tractors displace male labour whose responsibility is for land preparation and this labour is not then used for assisting with weeding or harvesting, a female responsibility.

9. Similarly, if unemployment is created, family ties may make it unacceptable for this labour to move. It should be borne in mind, however, that the introduction of animals will also alter social structures.

ANIMAL DRAFT POWER

10. Where animals are being used, the costs and benefits of using them need to be carefully assessed. Their costs include:

- a. Slowness.
- b. Inadequacy of power if used at the end of a long dry season (unless good management can rectify this).
- c. Feed - land producing forage may have a high opportunity cost.

The benefits are:

- a. Lower capital cost both of the power source and the associated implements.
- b. Smaller units.
- c. Fewer maintenance problems.
- d. Reproduceability.
- e. Eventual food and hide value.
- f. Sometimes milk production.
- g. Manure for crops (thus retaining fertility, saving on purchased fertiliser) and fuel.

ORGANISATIONAL STRUCTURE

11. The ability to maintain tractors will vary from one society to another. Societies with little contact with mechanical methods have seldom made economic use of tractors.

12. Critical is the need to have an organisational structure which will provide spares and repairs. If these are not provided rapidly, the potential gains from improved timeliness of operation are likely to be forfeited.

13. Individual usage of tractors has proved generally in practice to be far more economically efficient than cooperative use. This is because in order to obtain efficient tractor use, rapid decisions relating to its optimum technical and economic use have to be made. Furthermore, care in the use of tractors is critical and this is best ensured under systems of individual ownership.

14. State schemes for tractors have usually failed or been uneconomic. The difficulties of determining optimum usage and of ensuring adequate care have usually proved insuperable. Such schemes do have slightly better chances of improved economic performance on very large and crop uniform farms with high levels of management.

15. However co-operatives with a few members may be more successful as they are likely to be more able to agree on usage and would have a greater individual interest in maintenance.

16. Political factors behind the use of tractors are also important. These may be ideological in nature and relate to a particular vision of the desirable social structure of society, or may be more basic in origin - the desire to benefit particular areas, classes or individuals. In all events they should be examined and at least understood.

CONCLUSIONS

17. Conditions which are likely to justify tractor usage are:

- i. Areas where power for timely land preparation is insufficient.
- ii. Areas with large farms.
- iii. Societies having some contact with machinery and a concomitant will to provide servicing and repairing capability.
- iv. When these are individually owned.

PLANNING LAND SETTLEMENT SCHEMES
(With special reference to East Africa)

by

G A BRIDGER

Land Settlement Schemes are becoming increasingly popular in Africa as more countries become independent. There is obviously a certain attraction in initiating completely new settlement schemes of this nature, for they represent a clean break with the past and symbolize unconsciously, if not consciously, the start of a new approach to problems and a genuine attempt to come to grips with the traditional poverty of most agricultural areas in Africa.

Yet there are dangers in breaking too clearly with the past for, although the technical and economic knowledge may be readily available, it also requires a complete break in the social structure to achieve these desirable but usually novel ends. The agricultural community is conservative and suspicious of change and all too often they have been proved right. Africa is littered with well-intentioned mistakes to improve the lot of the agriculturalist. This only seems to prove to the supposed beneficiary that his suspicions and his stubbornness have been justified.

Land Settlement Schemes have been tried and are being tried in all parts of Africa and they too have had their quota of failures. All too often those that have succeeded have done so at a cost which could have been better incurred elsewhere.

There are, however, few records of the experiences of these schemes by which planners in other countries could benefit from the failures, or successes of their colleagues elsewhere, and it is the object of this paper to review some of the settlement schemes in East Africa in the belief that their experience can be used by others. The principles of land settlement policy are the same in all countries - it is only the components which change. It is maintained, therefore, that the experiences of Kenya, Tanganyika and Uganda will provide a useful guide for action in other African countries.

2. EAST AFRICAN SCHEMES

Kenya, Uganda and Tanganyika have all initiated settlement schemes over the last 10 years. It has not been possible to obtain all the information about them which it would be desirable to do, for as in other countries, the information is scattered between Ministries or Departments, often it never gets beyond officers in the field and very frequently it has never been obtained. It is no reflection on those responsible for these schemes that the information is frequently not available for the time available to them for applied research of this nature is very limited.

/It

By settlement schemes in this paper is meant the transfer of population from one area to another on a planned basis, the object being to raise living standards.

It has not been possible to delve deeply into the records kept by governments to ascertain details and the reasons for policies, but it is nevertheless felt that a survey of the information readily available is better than no survey at all, for there are sufficient characteristics, problems, and solutions, in this information to suggest future policies for planning settlement schemes.

The study is only concerned with dryland farming schemes. Irrigation schemes are far more complex and require separate examination. Information about settlement schemes in the "European farming areas" was not available at the time the report was produced and they have consequently been omitted.

A. Tanganyika

While there are only three land settlement schemes of any significance in Tanganyika they are better recorded than the settlement schemes in Kenya or Uganda. All three schemes are offshoots, to a greater or lesser extent of the Overseas Food Corporation's ill-fated attempts to grow groundnuts in Tanganyika. They have benefited to the extent that land was often cleared and ready for planting, roads available and housing built. There was also a certain amount of evidence of what crops could or could not be grown. It was therefore, clearly a wise step to utilize these ready-made facilities for other projects.

The object of these three land settlement schemes which are regarded as experimental schemes and which are now the responsibility of the Tanganyika Agricultural Corporation, a statutory body, was to "establish a healthy prosperous yeoman class - appreciative of its fruits, jealous of its wealth and dedicated to maintaining the family unit on it".^{1/}

The policy which was to be followed to achieve the above ends was summarized as follows: "The main limiting factor to the ambitious African farmer is the hoe. It limits physically the amount of land that can be prepared, quality of work, and psychologically weakens the endeavour of all the strong in character to persevere. There are indications - that the work output of an average African family, assisted by a tractor at critical periods in the agricultural year is many times greater than the output of a family dependent wholly on the hoe."^{1/}

In order to break this bottleneck to increased productivity the settler was to be provided with a series of facilities, although these were to be kept to a minimum in order to keep production costs low. In general the land was cleared for the settler and he was to be provided with seed, fertilizer and/or insecticide, basic tractor services, water, rations until his crops were available as well as marketing facilities. Tenants or settlers, who were to be chosen on the basis of recommendations from Chiefs and District Commissioners were provided with seasonal loans to cover these advances. With few exceptions settlers were obtained from neighbouring areas as tribal loyalties made recruitment of outsiders difficult, if not impossible. The schemes were situated in under-populated areas where the pressure of population of land was not serious.

Certain farming standards had to be maintained and once the schemes had been operating for a few years settlers could take out licences which gave them the right to farm indefinitely, provided they maintained minimum standards of good husbandry.

/Nevertheless

Nevertheless even in Tanganyika the financial details of these schemes are not always clear for, while in various reports^{2/} it is stated that tenants have been or will be charged for all the facilities provided, in 1957/58 when the schemes had been operating for several years it has also been stated that "none of the experimental farming schemes are as yet financially self-supporting".^{3/} Inasmuch as not "financially self-supporting" means that direct revenue was less than direct expenditure, it is nevertheless probable that the indirect revenue in the form of customs and excise duties as well as indirect taxation, has made considerable inroads into any subsidy. While details of the settlement schemes are thus not complete there are valuable lessons which can be learned from the experiences of Tanganyika.

The settlement schemes were fairly costly in comparison with those in Uganda and Kenya and an estimate of costs per settler today would be around £300/£350 of capital per tenant plus seasonal advances. This includes clearing, house for settlement officer, plant and machinery, tractors, motor transport and water supply. Each settler had varying amounts of land but an average of arable land was 20 acres, $\frac{1}{3}$ of which was usually fallow, and it eventually became the policy to give settlers permanent land rights if they followed sound land husbandry policies.

The Nachingwea settlement scheme in southern Tanganyika was initiated in 1952/53 with some 30 tenants from adjoining areas. They were provided with houses (in order that there should not be legal difficulties if tenants had to be evicted), the farms were laid out and cleared for tenants, they were provided with rations till their own crops were available, water services were put in and advances granted for the use of seed, machinery services, etc. The debts were to be repaid out of the sale of crops. The major crops grown were maize, groundnuts, sorghums and soyabbeans which were marketed on behalf of tenants.

The scheme expanded quickly to 122 settlers in 1956 but then fell to 79 in 1959. While the drop in numbers of tenants can partly be ascribed to lower profits in 1957, 1958 and 1959 the turnover of tenants even in good years was usually over 50%. The following figures are of interest:^{4/}

	<u>Tenants</u>	<u>Turnover</u>	^b <u>Estimated</u> <u>Net profit</u> <u>per tenant</u> *
1952/53	28	16	60
1953/54	54	14	50
1954/55	102	49	35
1955/56	121	60	55
1956/57	99	46	26
1957/58	88	44	5
1958/59	79	56	- 25

*This excludes illegal off-farm sales

/Except

^{2/} Overseas Food Corporation - Report & Accounts 1949-1955
Tanganyika Agricultural Corporation - Report & Accounts 1955-1959

^{3/} T.A.C. Report - 1957/58

^{4/} Tanganyika Agricultural Corporation - Annual Report 1958/59

Except for the last 2 years when seasonal conditions were very unfavourable the profits must be regarded as reasonably attractive in comparison with the usual gross incomes of "subsistence" farmers, which probably vary between £10 and £20 per family.

Nevertheless, from an economic point of view a serious weakness was the cash advances which this method of production required. These advances varied from about £100 to £125 per tenant and, apart from making heavy inroads on gross profits, were a psychological burden which the tenant, whose costs previously probably never exceeded £1-5, must have found hard to bear. The new methods of production which were required could not have been followed easily, at least in the first season, and failure would put an impossible burden on the settler. Experience has shown in other parts of Africa that excessive advances encourage irresponsibility rather than the opposite if the quantity is far beyond the experience of the borrower. In these circumstances the penalty of failure on the borrowers would be nil as they had no assets with which to repay except their crops and, therefore, there would be a great temptation to bypass the marketing channels provided by the scheme which were used to recover advances. This in fact did occur with those crops which were negotiable in the area, but to an extent which is unknown, and the T.A.C. had to bear the considerable burden of these losses.

The yields of crops were generally low, with groundnuts seldom averaging in excess of 600 lbs per acre and soybeans not much more than 700 to 800 lbs. They were in fact only a little higher than those obtained by subsistence farmers. This was presumably what was anticipated for the whole object of the project was to compensate for low yields by increasing the acreage. Inasmuch as the estimated net incomes were in fact considerably higher than those of subsistence farmers, it can be argued with some conviction that when seasons were suitable this object was achieved.

On the other hand it is obvious that the high turnover of tenants on the scheme militated very heavily against its success, and in fact did not lead to the establishment of the yeoman farmer whose emergence it was the object of the scheme to attain.

It, therefore, can be argued that while the scheme was reasonably successful economically in the early years, it did not achieve its end. If the reason for this cannot be found in the economics of the project it is likely that more satisfying answers can be found in social and human factors.

One of the most serious obstacles to the establishment of a yeoman farmer must have been the fact that the tenants were chosen from neighbouring areas and were thus too close to their own society for them to break away from it. The incentives or pressures upon a man to break his tribal ties must be very great and, as is shown later, this can best be done if his new mode of life is geographically remote from his traditional environment. A prosperous farmer who has social obligations in his immediate vicinity will soon find his financial outgoings to his family and tribe taking a substantial portion of his net profit. In addition a tenant whose home is in the immediate vicinity will undoubtedly spend a great deal of time away from his new farm and administrators on the scheme did in fact complain of this as a factor leading to poorer crops than necessary.

It has been argued^{5/} that "In the first year it was considered that by attracting farmers who lived at a considerable distance from Nachingwea there would be less

risk of them leaving their holding at crucial times of the year to work on their own shambas on the villages. Later it was found to be of less importance than was at first anticipated and in fact farmers from nearby villages were often able to call on the help of relatives at busy times."

Even though the importance of alternative occupation of tenants in the immediate vicinity of such a scheme can be exaggerated from a strictly economic point of view, it could hardly be denied that closeness to tribal ties makes the emergence of an independent farmer extraordinarily difficult.

The earlier extract also brings out a further difficulty of the scheme and that is the amount of work entailed. This obviously exceeded the work effort of the family. As the above article states: "This is in part due (lack of use of a welfare centre for the heterogeneous collection of tribes on the scheme) to the long hours worked by farmers for much of the year" - very few of the farmers are able to get through the year without hiring labour to help them at busy periods and although sometimes this may reflect a certain innate laziness there is ample justification for even the most industrious farmer hiring labour if by doing so he is able to cultivate a larger holding and increase his final profit.

The extra work load which this new type of farming entailed must also have been a considerable deterrent and could only be nullified if the net profits were sufficiently large. It would also tend to encourage settlers to go back to nearby villages.

Another problem of some importance which arose is the fact in many tribes, especially in this area, the work function of the man is to clear and to carry out heavy cultivation whilst the woman is primarily responsible for the planting and weeding of the crop. "Whilst mechanical cultivation takes over the direct responsibility of the man it adds considerably to the burden of the woman and although there is no longer such a distinct division of labour, in certain instances it has led to a domestic upheaval and caused otherwise successful farmers to leave the scheme." 5/

If in fact the man does not engage in the same amount of productive work as a result of mechanical cultivation it must be clear that the whole object of the scheme - to extend the output of work of the family - was sabotaged. The extent to which this occurred is unknown but it also must have contributed to the problems of the scheme. It also must have given rise to serious personal problems within the family group.

The Nachingwea Experimental Settlement Scheme brings out the importance of social problems in the planning of agricultural development and shows how difficult it is likely to be to bring about social changes within a traditional society unless the incentives offered are sufficiently great.

The Urambo Experimental Settlement Scheme, started on the same basis as the Nachingwea, with 11 tenants in 1952/53 and gradually expanded to 38 tenants in 1954/55. There was a shift, however, away from general crop production as it was discovered that tobacco grew well in the area. As the growing of tobacco required considerable skill, it was decided to pass tenants through various training stages. A system was evolved whereby tenants first of all attended a school for 1 or 2 years in which the Corporation provided seedlings, advice, carried out the curing, made appropriate charges and used a system of payment by which successful learners could accumulate profits.

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The second stage was a graduation to small farms which required a tenant to possess £50 of working capital and permitted him to grow 3 to 5 acres of tobacco instead of the previous 1 to 2 acres. The tenant erected his own house and tobacco barns and cured his own leaf, while credit for stores was made available to him.

The third stage was graduation to medium sized farms of 200 to 300 acres which required working capital of £150. Buildings, barns, stores, labour quarters are provided by the TAC on rental and stores on credit.

There were in 1961 some 200 farmers on the scheme but only about 6 were at the third stage.

The scheme has worked well despite initial teething troubles because a sufficiently attractive economic incentive has been found. The average profits are stated to be £60 as learners, £80 on small farms and £488 on the medium farms. It should be clear that with the possibility of these sorts of profits before them, profits which had actually been achieved by their own people, that there should be considerable enthusiasm on the part of farmers in the area and a willingness to break traditional kinship ties.

On the other hand the capital required for such a project is considerable. Costs of production are estimated to be some £60 per acre for tobacco while the actual capital investment required would be heavy. Nevertheless the project with its policy of training farmers for a period for specialized crops has much to commend it and is a policy which could well be followed elsewhere.

At Kongwa, inland from Dar-es-Salaam, where an ill-fated venture of the Overseas Food Corporation was started, another Experimental Settlement Scheme was started in 1954/55 with some 20 tenants growing groundnuts, maize and sorghum. Cattle were also provided in small numbers at a yearly rental of 40/-.

The majority of tenants seem to have made profits and the scheme has expanded successfully to 100. The basis of the Kongwa scheme was the same as Nachingwea with tenants growing a variety of crops with groundnuts and castor beans as the main cash crop, and mechanical assistance being provided at cost.

The area is, like that of Nachingwea and Urambo, under-populated, and the tenants have been recruited locally but, unlike the Nachingwea scheme, the turnover has seldom exceeded 10%.

The reason for this lower turnover seems to be due to the fact that cattle have been given greater emphasis on the project and settlers can build up their own cattle herds. The area is predominantly cattle country and therefore cattle are important socially as well as economically. Since many of those living in the area do not own cattle, the scheme offers them a wonderful opportunity to do so.

The means by which a cattle herd can be built up by settlers was originally by paying 40/- per year for improved stock obtained from a ranch operated by the TAC in the vicinity, and tenants were permitted to keep up to a minimum of 5 cattle per head excluding calves - the remainder being sold back to the ranch. The care taken of cattle has been very considerable and calving percentages have been over 90%. Permitted stockholdings increased to 10 in 1960. Detailed changes have since been made in the system but the principle is unaltered.

While there can be some legitimate economic doubts expressed about the worthwhileness of transferring cattle from a ranch onto a settlement scheme the concept seems to be a brilliant one from the point of view of providing an incentive in an area

where there is little population pressure on the land and where something had to be found to encourage settlers to come and stay on the scheme. Thus crops whose production is a risky proposition due to erratic seasonal factors are being gradually abandoned in favour of cattle.

It appears that with this somewhat novel introduction of cattle as an incentive that the settlement scheme should be able to establish itself on a sound basis. Like Nachingwea the surrounding area does not put great pressure onto the population to move into settlement schemes where higher incomes do not compensate for the discipline, extra work and the new mode of life which is required.

The experiences of Tanganyika, a relatively under-populated country, suggest that where the pressure of population is slight the incentives which people have to be offered to move on to settlement schemes must be considerable. Two of the settlement schemes have, after some struggle, found these incentives, one a socio-economic incentive, the other a really attractive economic proposition.

These schemes have, however, been costly, for the many failures of tenants have had to be borne by the TAC. It would appear, that under current conditions in Tanganyika, the extension of farmer's labour by the introduction of machinery, rather than its intensification, is at least temporarily, a cul-de-sac. The extra income earned does not appear to be sufficiently attractive for farmers to break away from their traditional ways of life. On the other hand, the introduction of really profitable crops, farmed on an intensive basis, as tobacco at Urambo, and the use of socio-economic incentives, cattle at Kongwa, have enabled the Tanganyika Agricultural Corporation to make a break through into what it is hoped will be sustained productivity.

The experimental farming settlement schemes in Tanganyika have provided valuable information on ways of promoting increased agricultural production and this experience should not be lost to other countries where similar conditions are to be found.

B. Uganda

In Uganda there are some 9 main dryland settlement schemes, with two more planned for 1961/62. Information is not easily obtainable on the majority of them as they are small and the administration of them has been decentralized.^{6/}

With minor exceptions the prime objects of settlement schemes in Uganda have been to push back the tsetse fly barrier as well as to increase production. The need to eradicate tsetse fly has meant that settlement has to be fairly closely concentrated, in order that bush is cleared, and has had to follow an organised pattern.

In general it has been the policy in Uganda to keep capital outlays on settlement schemes to a minimum and settlers have been required to clear their own land and build their own houses. The facilities usually provided have been demarcated holdings, roads, free transport to settlement, water points, free seed, 6 months' rations and advisory services. In certain cases settlers have been granted 2 years tax free exemption, limited acreage of cleared land, free spraying of cotton, free ploughing for one year, and some material assistance in housing. No special arrangements have been made to change the system of land tenure but as in most traditional agricultural economies the tenure is secure as long as the area is being cultivated. The arable acreages vary, depending on the quality of the soil from 10 to 22 acres.

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^{6/} Most of this information was provided personally by officers of the Department of Agriculture.

There are three major settlement schemes in Uganda, the largest being in South Busoga, north east of Lake Victoria where a determined drive has been made to open up land which was subject to sleeping sickness in order to relieve over-population to the north of it. Parallel roads were driven through the area 1 mile apart and tracks cut through them at intervals to join the roads. Water points were made available. Each plot was approximately 10 acres in extent and settlers were supposed to clear this themselves.

Great interest was shown in the scheme and in 1960, 1,635 plots were taken. The chiefs who possessed the right over the land have been able to obtain rent from settlers which has varied from £5 to as much as £25 per year. Cotton, maize, millet, cassava and potatoes have enabled settlers to pay these unusually high rents.

During 1961 sleeping sickness started to creep back into the area as the areas allocated to each settler were not properly cleared. Steps have been taken to counter the menace.

No costs of the scheme are available but it is clear that they must have been minimal as facilities provided were few. Despite what will be presumably only a temporary set back, the scheme has worked well though there have been many complaints of excessively high rents demanded by chiefs.

At Kigumba, in the Bunyoro District, a settlement scheme was started in 1957 (although an earlier start had been made in a minor way to take over an unsuccessful "partnership" project) the prime purpose being to consolidate the tsetse fly barrier. ^{1/} In addition to the usual free transport, free rations for 6 months and advisory services, the novel idea of 2 years tax remission was granted and initially corrugated iron sheets were provided for housing and 2 acres of land were cleared. Transient settlement camps were also provided.

It was thought that the local Bunyoro people would be willing to come onto the scheme and grow cotton, maize, potatoes, millet and groundnuts, for the Bunyoro Native Government had been consulted at all times and fully supported the scheme. As it was, no local interest was shown, presumably as the population was not forced onto the scheme by shortage of land or attracted to it by the hope of great profits.

When it became clear that the local people were not interested, the Bunyoro Native Government reluctantly gave assent to anyone to move onto the scheme. The Settlement Officer got in touch with some 20 Sudanese who were living in the Northern Province and they became the first settlers. There was a long pause before any others could be found and then by chance contact was established with Nyanza Province of Kenya where the population was so dense that each farmer only had about 2 acres of land. Great interest was shown and free transport to the area, free rations for six months and remission of 2 years' tax attracted settlers so that by 1959, all but 5 of the 395 plots were taken up.

The average return per cotton grower in 1957/58 and 1958/59 was stated to be £42 and £41, not a great sum, but attractive enough by the standards to which most of the settlers were accustomed. ^{2/}

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^{1/} For a useful account see "Symposium on Mechanical Cultivation in Uganda" - edited by J L Joy on behalf of the Department of Agriculture.

^{2/} Unpublished article by the Provincial Officer, Western Province, and others, dated January 1960.

The group of settlers came from very different areas and in December 1958 the structure was as follows:

Kenya origin	217
Sudan origin	25
Bunyoro origin	27
Rest of Uganda	29
	298

It is not coincidence that the success of the scheme has been dependent upon outsiders, as other settlement schemes show. There has been a turnover of tenants however, of about 10% a year, presumably because social and personal ties attract them back to their own societies. The establishment of schools should however in the course of time establish a cohesive society in Bunyoro. The general simplicity of the scheme, combined with the introduction of outsiders, has undoubtedly been the cause for its success.

Another large settlement scheme was started in 1956 in Birvera, north Ankole, based on coffee, cotton and food crops, with the object once more of consolidating the tsetse fly barrier. The settlers come from over-populated areas further south and besides the usual inducements of free transport and free food for 6 months, water points were provided, free seed issued and free spraying of cotton carried out. The settlement attracted 669 settlers and the objects of the scheme have been achieved.

In addition to these three main settlement schemes, there are several other smaller schemes with small numbers of settlers. The principles of settlement have however been the same and where care has been taken to ensure that there is a social need for them, they generally seem to have been successful.

The danger in Uganda could be that anxiety to push back the tsetse fly would lead to inadequate settlement or schemes for which local people felt little need to join while preventing land-hungry settlers coming in from other areas.

It would appear, however, that this danger has been kept in check and the policy of keeping capital investment to a minimum and depending on the energy of land-hungry settlers is undoubtedly a wise one for Uganda.

C. KENYA

Unlike the other two East African territories settlement schemes in Kenya have largely been the result of population pressure in certain parts of the country. The Mau Mau Emergency lent extra emphasis to this need for population transfer and prisoners provided a cheap source of labour for digging canals, clearing bush and preparing the land.

Settlement schemes in African areas of Kenya have been the responsibility of the Board of Agriculture (Non-Scheduled Areas) ^{2/} which has grown out of the African Land Development Board (ALDEV) and so far some 13 schemes have been initiated. Of these, five have been completed, two have been shelved and the remainder are in various stages of development. ^{10/}

In 1958/59 it was estimated that since 1946 the Land Development Board (ALDEV) had settled 17,000 families (probably between 60,000 and 85,000 people) on their various settlement projects.

/Although

^{2/} A separate Board (the Land Development & Settlement Board) has been recently set up to take over European owned land for African settlement. Details of the schemes are not yet available.

^{10/} Two of these are irrigation schemes. Report of the African Land Development Board (NON-Scheduled Areas) 1958/59.

Although in its earlier years ALDEV tended to provide a number of services free of charge with the object of encouraging increased production, the experience was not happy, with the result that there has been a gradual changeover to a policy of reducing to a minimum the services rendered and raising to as economic a figure as possible, charges for facilities provided. The latest schemes are therefore intended to be fully self-supporting.

The system of choosing the settlers is the same throughout the schemes. They are obliged to complete a questionnaire aimed at ascertaining their degree of need and are interviewed at the beginning of each month. Absentees from the interview help to weed out those who are not genuinely interested.

The holdings naturally vary in size but are usually in the vicinity of 20 acres each, some 12 acres of this being arable. Land is held on a rental basis but each tenant can name his successor to the tenancy on his death. Settlers are provided with rations until their own crops are available, advisory and administrative facilities and land is sometimes cleared for them though a charge is now usually made for this service. Roads and water have usually been provided free. The settlers are required to build their own houses and within recent years are obliged to pay an entrance fee, together with a yearly rent for the facilities provided, as well as an annual grazing fee for cattle.

By this means costs have been kept to a minimum. Unfortunately no details of total costs of these settlement schemes are available and those that are available exclude administrative costs. Administrative costs are however, eliminated by the withdrawal of the settlement officers once the scheme is completed.

Nevertheless it is clear that costs of settlement are low. The following figures from the ALDEV Report 1946/55 give the average costs of settlement for various schemes as follows:^{11/}

Makueni	1209	Families at ₦212 per family			
Lambwe	635	"	"	₦ 53	"
Kimulot	234	"	"	₦ 76	"
Sarora	61	"	"	₦ 41	"
Gedi	504	"	"	₦ 78	"

With the increasing emphasis put on charges since 1955 for facilities provided to settlers, it would be a safe guess to assume that even with administrative charges the cost of settling a family does not exceed ₦100 and is probably nearer ₦50. With the exception of one scheme where tea is being grown, the crops are ones which are generally familiar to settlers though cash crops such as tea, coffee, cashew nuts, pyrethrum are being encouraged.

One of the largest and oldest settlement schemes in Kenya started by ALDEV was the Makueni Settlement Scheme and its high costs are a reflection of the experience gained.

The Makueni Scheme was started in 1945/47. Farms were rectangular in shape with a system of individual holdings (group farming had been tried but was unpopular and abandoned), with rights of inheritance and with a prohibition on fragmentation. Settlers were required to bring cattle, if tsetse fly permitted it, and build their own houses. They were obliged to clear 2 acres of land for paddocks and 5 acres, marked out in the preliminary survey, for arable land. The first five acres were broken by tractors free of charge. The crops grown included maize, millet and some vegetables. Roads and water supplies were provided for. A hospital and dispensary was built in 1951.

/No

^{11/} Excluding costs of administration.

No money was recovered from settlers until 1956/57^{12/} when the African District Council imposed fees for settlement and ploughing. The settlement fee was £15 and ploughing £10. The cost of settling a family was thus reduced to about £50. Applicants were still numerous despite these charges and in 1960 there were 2187 settlers on the scheme and the total expenditure since 1946 totalled £307,355 or some £140 per settler.

The Shimba Hills settlement scheme was started in 1949 with the object of settling farmers from the Taita District which was heavily over-populated. The idea was to move 10 "pilot" settlers into the area which due to poor soil, lack of water and tsetse fly, was unoccupied. However, for unexplained reasons the Wataita did not wish to come onto the scheme and it made little progress.

In 1954, Wakamba from another over-populated area showed interest in the scheme and prisoners were put onto clearing the land. Rations were supplied to new settlers, who totalled 94 in 1955, 3 European type houses were built as well as a church, school, dispensary and a co-operative and butchery established. Free transport was provided for settlers while settlement and ploughing fees were introduced in 1956/57.

The number of settlers increased to 135 in 1958/59 and although Wakamba were showing less interest, others (the Nandi) were likely to move onto it.

It is obvious that the provision of housing, a school, church and dispensary must have incurred heavy capital expenditure (calculated at £600 per settler in 1955), which could have been spread over a large number of settlers than those presently in the scheme, but would certainly seem excessive in relation to the numbers on it during the period. In 1960 however, it was reported that good progress had been made and "morale among the settlers has greatly improved due to the reduction in the incidence of malaria".^{13/} Some 213 settlers were on the scheme by 1960 and the capital costs had been reduced to just under £500 per settler but a considerable increase in numbers would seem to be necessary before the scheme could be economically justifiable.

The Gede Settlement Scheme on the coast, north of Mombasa, was started as far back as 1928, but since there was little pressure of population of land, and since there was little staff continuity, little occurred till ALDEV took over in 1946. The area was then expanded and under these circumstances the threat of eviction for failure to follow good farming practices could more easily be applied as there was less land to move away to and some progress was achieved. Cotton was grown and a levy made the scheme largely self financing, so that by 1958/59 some 520 settlers were on the scheme.

The Lambwe Scheme was also started in an unoccupied area where lack of water and communications had made settlement impossible. Roads, water and first ploughing were to be carried out for settlers but they had to clear the land. Once cattle could be admitted, when tsetse fly had been eliminated, some 635 families settled in by 1955. A school was built by voluntary effort. Costs were gradually decreased to £53 per acre and charges for ploughing were introduced. The ALDEV report (1946-55) complained however, that "the system of farming had not radically changed".

In 1956/57 the number of settlers on the Lambwe scheme fell to 510 and the ALDEV report stated "Despite propaganda, neither south Nyanza nor central Nyanza have shown much interest in applying for land, and it is now clear that there is little

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^{12/} Except for recurrent costs of borehold maintenance.

^{13/} ALDEV Report for 1960.

if any prospect of the Luo wanting to settle there in the next few years - one of the problems is that with stricter controls and rules, the less likelihood there is of attracting settlers." In 1957/58 the number of settlers fell to 451 "due to disinclination to accept control when there is much uninhabited land in the area". As a result of this the scheme has been put onto a "care and maintenance basis".

While the desire to increase the efficiency of agriculture on the Lambwe Valley scheme was a laudable one, it is apparent that the settlers were reluctant to accept the discipline necessary and moved to other areas. It can be argued however, as is done later, that it was not really necessary to insist on increased productivity from settlers, for, if they have moved out of an over-populated area, this means that the production per head in that over-populated area would increase. The mere movement of people would lead to an increase in the Gross National Product and therefore the fact that the settlers had not "radically changed" their system of farming need not be of great concern if attempts to force them to do so could not be successful.

The Kerio Valley Scheme, which was abandoned before it was started, adds force to the general argument that settlement schemes are a natural evolution from over-populated areas for the ALDEV (1946-1955) report states that "The scheme has been shelved until such time as pressure of the land enforces development." The possibilities of ensuring that proper agricultural practices are carried out by a reluctant population where there is plenty of land available are obviously small.

The first schemes on which settlers were expected to pay for all the services provided to them were those of Sarora and Kaimosi. Settlers had to pay 46 as an annual fee and it was intended that they should eventually pay 12/- for each head of cattle per annum. The schemes have been successful and capital outlay has been kept to a minimum.

Other schemes at Kimulot, Itembe, Chepalungu, Olunguruone, Giaki, Narri, have followed the same pattern as Sarora and Kaimosi and have all been successful in establishing settlers at a minimum of cost.

The policy presently being followed in Kenya of reducing capital outlay to a minimum and insisting that the settlers carry out as much work as possible themselves is undoubtedly the correct policy not only for Kenya but for most African countries. The policy has not been arrived at without a certain amount of trial and error, but nevertheless, the experience has not been ignored. The only danger which might be overlooked, is that unless there is real pressure of people on land the effort entailed and the discipline required to initiate new settlement schemes is likely to be unacceptable to the people and can only succeed with heavy capital expenditure.

D. Summary

While the objects of settlement policy have been the same in all three territories, ie to increase production, the motives which have given rise to them, as well as the policies pursued, have differed. In Tanganyika it was the desire to use facilities made available by the Overseas Food Corporation and clearly the methods were strongly influenced by the policies of large scale mechanization which the Overseas Food Corporation had abandoned. In Uganda it was the desire to eliminate tsetse fly from certain vulnerable areas but the methods used were not radically different from those that farmers were used to. In Kenya, population and political pressure led to new settlement schemes which, after an initial period, did not attempt to make any revolutionary break with traditional farming practices.

The use of machinery in Tanganyika suggests that attempts to extend cultivation also require extra capital, extra labour and better management if it is to be successful and that in order to create a yeoman farmer, a complete break with traditional ties is essential. Experience in Tanganyika illustrates the danger of burdening settlers with heavy loans and expecting settlers in underpopulated areas to adapt themselves to new methods of farming unless attractive incentives are offered. In this last respect the introduction of a really profitable crop such as tobacco and the provision of a socio-economic incentive, cattle, seems to have successfully broken through traditional objections.

In Uganda, the desire to check the spread of tsetse fly has led to the use of organised schemes with, generally speaking, a minimum of capital outlay, and at least on some of their schemes they have shown that outsiders make better settlers than do local people. The use of such an incentive as tax remission is worth noting.

In Kenya, after some initial setbacks, the provision of minimum services combined with a maximum of payment required by the settlers seems to be the best policy to be followed by countries that cannot afford to subsidize settlers.

The impact of these settlement schemes on the economy is difficult to assess although it is likely that they have generally been profitable. If one takes for example, the Kimulot settlement scheme on which £20,305 has been spent and on which 245 settlers were to be found, and assume that the net increase in income of settlers as say as little of £30 per annum, the investment would have been covered within 3 years. Admittedly this does not mean that there are no other projects for which these resources could not have been used more profitably, in fact it is more than likely that in many cases there were, but it does suggest that in general their impact upon the economy has been beneficial.

There are important lessons to be learned from the experiences of these three East African territories and although it is realized that conditions vary from one territory to another, the following section puts forward some suggestions for future development in other areas of Africa south of the Sahara. They are intended to suggest rather than to recommend, for each territory must decide for itself what its requirements are and what resources it has to satisfy them.

3. PLANNING NEW SCHEMES

Land settlement schemes can play an important part in improving the agricultural economy but it is vital that they should be integrated into the economic programme of the territory. All too often they are the haphazard product of a specialist who fails not only to integrate it with the economic plan for the country but ignores the very many facets of the project.

Since African countries are generally short of capital and trained personnel it is important to use these as carefully as possible if optimum growth rates are to be achieved. Maximum use must be made of land and labour which is generally in plentiful supply throughout the continent.^{14/}

The movement of people from one area to another, which is what settlement entails, is a relatively costly enterprise and should only take place when the pressure of population is great enough to justify it. Where there is over-population, (this is defined as an area in which the addition of one extra person leads to a decrease in average productivity) the movement of people to another area is not only justified but essential.

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^{14/} In some countries bordering on the Sahara, labour is also a scarce resource though still not as scarce as trained personnel and capital, (eg The Sudan).

The concept of over-population is however, a static one and it is important to bear in mind that the introduction of new techniques eg better seeds, fertilizer, management, can turn what was once an over-populated area into an underpopulated area, or alternatively the introduction of machinery could turn an underpopulated area into an over-populated area. Where it is judged possible to introduce new techniques without much difficulty into the area, the transfer of the population is unlikely to be justified for the cost of introducing these new techniques is likely to be less than that of resettlement. The consequent increase in output will probably be much larger.

In Nyasaland and Southern Rhodesia, for example, where extension policies concentrate on selected and receptive individuals within a community, it has been found that output can be trebled in three or four years for a relatively small outlay on personnel.

Great care must be exercised therefore to ensure that settlement is not premature, for this can only lead to a misuse of resources.

Assuming that it is not possible to reduce over-population by the introduction of new techniques, it will then be possible to initiate settlement schemes at a minimum of cost, as the pressure on people to move will be such that they are likely to be prepared to move and carry out most of the work such as land clearing and preparation, themselves. This is clearly what has occurred in Kenya and it enables settlement to occur with relatively little outlay.

On the other hand where the pressure of population on land is not severe, very considerable incentives will have to be offered to persuade people to move and this is likely to entail fairly heavy expenditure. Land may have to be cleared and ploughed, houses built and a variety of services or incentives offered. Since most territories are capital hungry, this will lead to misuse of scarce capital resources.

In many parts of East Africa, however, the pockets of over-population which exist are very often in highland areas and the problem of getting people to move down into lowland areas, into a very different natural environment, is therefore accentuated. The problem is, however, one of degree for eventually pressure in highland areas will oblige people to move down. The problem of a different environment is one which should not be overlooked in the preparation of new schemes and it should be borne in mind that to get people to adapt themselves to a completely different environment, the pressures or incentives will have to be greater than if they were moving into similar environments.

It has been argued that there is little benefit to the economy in getting people to move if they are merely going to continue with their primitive form of agriculture. This is not correct. If there has been a sound policy and settlers come from over-populated areas the very fact that they have been moved away must mean that the average production (not the total) will rise in the over-populated areas and since there is additional, and presumably similar productivity in new areas, there will be an increase in output in the economy. It is true that the output might be greater if a variety of services were provided, but only at a cost to other enterprises in the economy.

The problem can be reduced to a question of pressures and incentives. Where pressures are few, incentives must be great. Where pressures are heavy, incentives can be few. Since incentives are almost certain to involve heavy capital outlay, the best policy to pursue in African countries is to initiate settlement schemes only when population pressures are great.

A. Social aspects

The importance of social problems in agricultural communities cannot be underestimated. Apart from the fact that social values have been built around systems of farming which have been practised for decades, if not for centuries, the place of work is also a home. The successful introduction of new techniques, or the movement of peoples must therefore have profound effects upon the attitudes and relationships within the society.

More often than not when new methods are carelessly or weakly introduced, they will be brushed aside. A very careful study has to be made of the allocation of work, of income and of social responsibility before new methods are introduced and they must clearly seek to combine the best features of these relationships with the needs of society.

If there is no wish or need, on the part of the settler to change his mode of life, schemes will be almost impossibly handicapped unless force is used. Inasmuch as settlement schemes are likely to mean more work and more discipline, they will obviously be a disincentive especially if the settler has heavy commitments to others who are making no effort. This is likely to be the case where the scheme is in the vicinity of his tribe, as has been noted at Nachingwea, so if the economic structure of the project differs substantially from the traditional form of agriculture, it will be necessary to ensure that the social changes which must inevitably follow are not handicapped by proximity to the traditional society. There should in effect be a reasonable distance between the settler and his previous society if he is to be able to adapt himself to change.

On the other hand, if the incentives offered are very substantial, as for instance are the tobacco incomes of medium farmers at Urambo, it is possible that this change will take place even though there is proximity between the new attitudes and the traditional social structure. These incentives however, are likely to require heavy capital outlay and substantial farming skill and it may not be possible for countries to afford them.

Distance supported by pressure of population is likely to provide the best type of settler. Cut off from his traditional environment with distance making it difficult to return, or at least to neglect his farm, this settler is likely to be forced to succeed. This is borne out very well from the experience of Kigumba where it is Sudanese and Kenya settlers who have made the scheme a success. The same can be said of several schemes within Kenya.

It is singularly unfortunate that tribalism has in many cases prevented the immigration of outsiders into new settlement schemes. Settlement schemes are started in under-populated areas and the local people usually have already a modest cash income and are seldom prepared to accept the discipline and extra effort which these schemes entail, yet they object strongly to the introduction of outsiders. All too often Governments give way to these parochial and reactionary pressures with the result that the nation suffers. It is vital that settlers should be drawn from as far away from the settlement as possible if success is desired.

While local people may be reluctant to take part in a new project, outsiders can be used to show them what can be achieved if they are prepared to adopt new methods. Teaching by example can, under these circumstances, change attitudes and lead to full participation of local people in the scheme. ^{15/}

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^{15/} People in the Gezira only accepted the scheme when others from outside the area showed them it could work. See A Gaitskell "Gezira".

B. Community effort

The heterogeneous social nature of a new scheme must be overcome and people welded into a unit as soon as possible. Perhaps the best way to achieve this is by means of Community Development projects - by the building of schools, roads, wells, clinics, welfare centres etc. It is important however to ensure that if Government is to contribute to these activities, it should be in a once for all fashion and that the people should bear recurrent expenses. The people themselves must however be fully involved in the project and made to feel that it is their project - not one which has been imposed upon them. If for example, a school is desired, it is better that Government should help with the actual building and the people should pay the teacher, for in this way the need to find annual funds to pay the teacher's salary will commit them to continual effort and make them much more receptive to advice in order to increase productivity and incomes.

C. Services

"Assistance (to settlers) should not be so plentiful that it would lead to over-dependence of the settler on the settlement authority, at the same time it should be sufficient to cover the most urgent needs of the settler and give him an incentive to devote his full energies to making a success of farming." ^{16/}

Although the above was stated in a very different part of the world it applies to Africa equally well. Excessive assistance demoralizes rather than assists and it is vital to ensure that assistance is related to something within the imagination of the settler.

It not only encourages irresponsibility but it also means a much higher loss to the sponsoring body if the settler is not successful. Although collection of debts will also be rendered more difficult and attempts to avoid collection, as at Nachingwea, are likely to be attempted.

The basic services rendered to a settler should include a survey of the area, demarcation of land, a farm management study, rations for a limited period and transportation to the area. Useful and relatively minor incentives in the form of exemption from taxes for 2 to 3 years, roads and water might also be given importance and are likely to have to be provided free of charge. On the other hand if settlers can pay a settlement fee, this should be sought, for there are few countries in Africa who can afford to subsidize particular sections of the community.

As far as activities like clearing, building, ploughing and cultivating are concerned, if these are felt to be necessary, there is no reason why the settler should not carry these out himself, there seems to be little excuse for the settler receiving them free of charge.

Inasmuch as disease is likely to have been a major reason for lack of earlier settlement, it should be an essential government service to ensure tsetse fly, malaria, or whatever it may be, is no longer a danger to health.

Extension services are naturally desirable in all areas and are not special features of settlement schemes, though inasmuch as many of the settlers, if properly chosen, are likely to be receptive to new ideas, it may be worthwhile to ensure that extension services are provided on the same conditions as elsewhere.

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^{16/} Report on the centre on Principles and Policies of Land Settlement for Asia and the Far East - FAO Rome 1959.

It is also possible that credit facilities will be better used in these areas than in others, for the reason given above, but it is important to ensure that advances are limited to a few essential items (eg seeds, fertilizer, plough etc) and not, for reasons given earlier, be too heavy. A maximum of around £50 would perhaps be reasonable for a man who has previously only engaged in semi-subsistence agriculture.

The provision of veterinary services are also likely to be required but wherever possible these should be charged to the beneficiary as benefits from the services should enable owners to pay for them. In Kenya where land is short, grazing fees have been charged on annual basis. This is undoubtedly wise as it obliges cattle owners to treat their animals more productively.

D. Co-operation

Co-operation is an important issue in the successful development of settlement schemes, although co-operation from the production side has not always been successful for very long under voluntary conditions. Group farming, in which farms were so laid out that various production factors could be used efficiently, was tried out fairly extensively in Kenya^{17/} but without success. There is however, considerable need for the development of co-operatives for external purposes (eg credit, marketing, processing) and these should be developed if personnel are available.

E. Choosing settlers

The choice of settlers has been on a somewhat haphazard basis in East Africa, in some cases settlers have been chosen by chiefs as they have defaulted on their taxes, or incurred his wrath,^{18/} and there is a need to establish some form of selection board. It is true that this may not be possible due to lack of personnel or because distance prevents travel, but a panel consisting of persons responsible for the scheme, one with local knowledge of the area from which settlers are being chosen, and a social worker is perhaps the ideal which should be aimed at.

The qualities of the prospective settler should naturally include the physical ability to carry out the work, and for this reason an age limit might be necessary. Important too is the ability to adapt to a new environment and for this quality one should not only seek out the younger applicants but those who have left their traditional environments on previous occasions. This latter factor not only tends to indicate an element of enterprise but should bring with it an ability to react effectively to new situations.

Inasmuch as the work entailed is likely to be considerable, settlers with large families should also be given priority and they should be obliged to bring them with them. This not only reduces the work load, but it also reduces the temptation to leave the scheme.

It would also be desirable if future settlers were given a training course not only to enable them to cope more easily with problems of a technical value but also to weld them into a group before going on to a scheme. This is, however, not always possible as personnel, time, and capital are not always available.

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^{17/} ALDEV Report 1946/55

^{18/} This has occurred in other parts of Africa. See "The Niger Agricultural Project" by K D S Baldwin.

At least in the initial stages the majority of settlers are likely to be younger, more adaptable people, but this can give rise to a population imbalance if there are no older people on the scheme which may lead to social instability. The need for this balance will vary from area to area, but it is certainly not an aspect of settlement schemes which should be ignored.

F. Economics

The fact that a settlement does not cover its expenditure by means of charges against the settlers, does not mean that a project of this sort is not economically justified, for the government should receive a considerable amount of revenue in an indirect form, by means of customs and excise, and by taxation.

It is not easy to calculate, however, what these revenues will amount to due to the lack of information and more research is therefore required. Information is required as to the pattern of expenditure of settlers, the multiplier effect of settlers expenditure and the levels of indirect taxation. Once these are available, it should be possible to calculate approximately what revenue Government is likely to receive.

The indirect cost factor should also be assessed if the economic viability of the project is to be calculated. This would include interest on capital (which could be used on other projects), as well as the cost of factors which could be employed profitably elsewhere.

G. Administration

Where there are a sufficient number of schemes or a large number of settlers, it would appear best to put them under a special Department or Board in order to ensure the proper co-ordination of activities and a continuity of staff and policy. Both the Kenya and Tanganyika Governments have in fact done this and the Uganda Government intends to do likewise.

It would also seem best to grant this body an autonomous status in order to ensure that it is free from day to day interference from politics, as well as to ensure that an experienced body of men can be educated in settlement problems and that they will remain responsible for them for reasonable lengths of time.

4. CONCLUSION

The experiences in settlement schemes of the three east African territories throws valuable light on the problems which are likely to face planners in this field and the ideas put forward in the earlier section will no doubt have to be modified within each territory to satisfy particular requirements. Nevertheless, there is a clear need to examine each territories' need in the light of the factors of production which are available. In general, however, it would seem wise to initiate settlement schemes, only when there is serious over-population which cannot be reduced by the introduction of improved techniques, better seeds and fertilizer or better crops.