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June 11, 1979

Mr. John R. Eriksson  
Assistant Director  
Agency for International Development  
Colombo, Sri Lanka (ID)  
Department of State  
Washington, D.C. 20520

Dear John:

Here is a copy of my Mahaweli Report which I have written with both AID and MDA-MDB readers in mind.

In terms of AID involvement, there are two general issues which I would like to mention in this letter. The first relates to "off-farm rural enterprise" and the second to AID's providing developmental assistance to an entire system. Under the first issue, the above quote comes from the CDSS where an argument is developed for increased AID assistance for off-farm rural enterprise. Certainly there is a major need to plan for and facilitate the emergence of a wide range of off-farm employment activities if the potential of the Mahaweli Development Project for regional development and job generation is to be realized. My comments on this issue are largely on pages 12-16; however, there I am discussing a broader range of both rural and urban activities within the Mahaweli Basin. While the need is there I do not know whether or not it is appropriate for AID to provide such assistance.

Under the second issue, you and I discussed from time to time the pros and cons of AID becoming the major donor in reference to a specific system. System B was mentioned as one possibility and System C if ODM does not take it over. I think a strong argument can be made for AID becoming a major donor in regard to a geographical area (which may or may not be a system) as soon as possible, provided there is room for flexibility and experimentation -- especially for experimentation with a mix of strategies for farm development which can be carried out on farmer holdings. There is a lot of discussion in reports about plans to set up research and development stations which incorporate farm families and which experiment with different sized holdings (both for farming and homesite plots), with different crops, with the integration of livestock, and with buffalo traction but I am uncertain if such stations have in fact been established. If not, then I think there is a major opportunity here for AID. And should AID decide to go ahead with assistance to nonfarm family development, then of course the possibility for a more integrated regional approach to development becomes possible if the MDA is interested.

June 11, 1979

I am moving forward in planning my DS-RAD funded evaluation of new lands settlement in the tropics. As you know, one country which has been included for site visits is Sri Lanka. In particular, I would like to spend a number of weeks at Minneriya interviewing settlers who have been there for over twenty years and looking into a range of issues which are introduced in my report. I pick Minneriya because I think (at this point in time, at least) it is a success story and I would like to learn more about how that success has come about, about its implications for land redistribution within the project, and about its implications for the emergence among settlers and others of off-farm economic activities which have contributed to the prosperity in the area. My approach would be to spend two to three weeks there with an appropriate research assistant, probably in September. I would also be available to follow up on other issues should AID or the MDA so desire. Does that appear feasible? Then I would hope to move on to Nepal in early October.

With best wishes,

Sincerely,

Thayer Scudder  
Professor of Anthropology

jh

Enclosure

cc: Robert Berg, AAA/PPC/E  
✓ John M. Miller, Sri Lanka Desk  
Alice L. Morton, DS/RAD

EVALUATORY REPORT ON MISSION TO SRI LANKAN SETTLEMENT PROJECTS:  
A DISCUSSION OF SOME BASIC ISSUES

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California Institute of Technology  
May 1979

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## I. INTRODUCTION

Although no recommendations are included in this report, it is intentionally provocative in hopes of stimulating discussion. Its purpose is to discuss briefly a number of issues pertaining to the Accelerated Mahaweli Development Project which came up during my January 25 through February 8, 1979 mission to Sri Lanka. During this mission, approximately half of my time was spent visiting a number of settlements, including some in System H, Minneriya, Gal Oya, and Uda Walawe. I am especially grateful to Jeff Evans, John R. Eriksson, M. J. Perera, and Kapila Wimaladharma who took time to accompany me into the field and share with me their knowledge and insights. I am also grateful to Nanda Abeywickrema (Secretary, Ministry of Lands and Land Development) and T. Sivagnanum (Secretary, Ministry of Mahaweli Development) for their support of my mission, and for the opportunity to meet and discuss settlement issues with a large number of Sri Lankan officials, academics and research personnel, and settlers themselves.

It is important to emphasize at the beginning that I am not an expert on settlement projects in Sri Lanka. The expertise that I brought with me pertains to over twenty years experience with river basin development and population redistribution in other tropical countries, with special emphasis on Africa and the Middle East.

Throughout the world, settlement schemes have to come to grips with certain basic issues if they are to become productive and if they are to evolve into the type of community in which settlers and the children of settlers wish to live. During my visit to Sri Lanka my main approach was to attempt to assess the significance of these issues in the context of the Accelerated Mahaweli Development Project. The purpose of this report is to introduce a number of these issues and to briefly discuss some of them. Since my return to the United States I have read more deeply in the literature on settlement in Sri Lanka. Principal source materials are mentioned in the bibliography.

At the end of my visit I made no recommendations, my brief familiarity with Sri Lankan conditions and my broad survey of the settlement situation in different areas making specific recommendations inappropriate. I did, however, suggest in a February 8 memo that a high-level Sri Lankan workshop on Mahaweli development policy in relationship to a small number of carefully selected settlement issues be held in the future, possibly followed by other workshops dealing with other issues. Contrary to the situation in many countries, there is a wealth of experience among Sri Lankan officials, scholars, and retired civil servants relevant to river basin development and, more specifically, to settlement projects. Sri Lankans, for example, have written at least 8 Ph.D. theses on settlement policy and on specific settlements while at least two other Sri Lankans are currently involved in dissertation work. The knowledge of these people is a tremendous resource. While some expatriate assistance might be useful in preparing position papers for the suggested workshop, I continue to believe that

participation should be restricted to Sri Lankans, with the total number attending the workshop not to exceed approximately twenty people.

## II. BASIC ASSUMPTIONS

*• Thesis*

The discussion in this report has been influenced by two basic assumptions resulting from my own research on new lands settlement projects. The first assumption is that settlement projects are dynamic entities which must pass through at least four major phases if they are to survive as viable communities. The second assumption is that even spontaneous migration from a home village to a new settlement area involves stress which has major implications for settler behavior and community formation. These assumptions are outlined below. If they are as valid as I believe them to be, they have important implications for the design and implementation of policies for expediting the settlement of relatively unoccupied areas and for optimizing the advantages of this settlement for both the nation and the settlement area.

### A. NEW LANDS SETTLEMENT AS A DYNAMIC PROCESS

Government sponsored settlements throughout the world tend to be viewed as production schemes, often specializing in the cultivation of a single major crop. Where irrigation is involved, the responsible agency is usually the Ministry of Irrigation or an agency, like the Mahaweli Development Board, which comes out of, and draws its senior personnel from, the Ministry (or Department) of Irrigation. While this

linkage has various advantages, a major disadvantage is an overemphasis on the provision and management of water for crop production and an underemphasis on the integrated regional development of human, land, and water resources. Especially neglected is the type of careful social planning needed to select farm and nonfarm families which will not only efficiently produce, market, and process crop surpluses but which will also form in time an interconnected network of viable communities with associated centers and industrial townships.

In the case of new lands settlements, the establishment of economically and socially viable communities should be viewed as a dynamic process involving the following four phases:

(1) A design and early implementation phase during which basic infrastructure is provided and settlers recruited.

(2) A transition phase which starts with the arrival of the first settlers and which is characterized by multidimensional stress for the majority of settlers, stress which can be expected to last for a minimum of two years.

(3) Following the end of the transition period for the majority, a post-transition phase during which major increases in economic growth and rapid social change are possible, but only under the right circumstances.

(4) A stabilization phase which includes the successful transfer of responsibility and leadership to the second generation of settlers and the perpetuation of economically and socially viable communities.

During the first two phases, settlements are unstable;

1.1  
 ORGANIZATION  
 MIGRATION

indeed, if the transition phase is not successfully brought to an end, the settlement will fail. Even where the transition phase does end, with the settlers finally adapting to their new habitat, the settlement will not necessarily be characterized by a phase of rapid growth. Indeed, in the large majority of cases rapid growth does not occur, with the settlement characterized by an extensive system of production of relatively low productivity. In this case, the third and fourth phases are indistinguishable. As for the fourth phase, obviously the settlement will also fail if the children of first generation settlers are unwilling to take over from their parents or if replacement settlers cannot be recruited.

Since settler aspirations and expectations and labor resources change through time, settlement planners need to be aware of such changes. The size of land holdings, for example, which appeared to be attractive to settlers at the time of their recruitment may cease to satisfy their aspirations and those of their children as the years go by. Two basic issues are involved here. The first relates to changes in aspirations between the generations, with those of settler children being higher than their parents. The second pertains to the normal "development cycle" of each settler family during the first generation. Generally speaking, newly recruited settlers tend to be a married couple in their thirties or forties with a number of young children. During the years of phases one and two these families usually suffer from an inadequacy of labor, especially where children are still young. On the other hand, as the children grow up, and especially as they marry and have children of their own, the labor supply expands beyond

the needs of the family holding. Discussions about the "best size" for land holdings usually fail to adequately consider such changes within the labor pool of settler families -- and changing aspirations.

#### B. THE STRESS OF SETTLEMENT

Research throughout the tropics suggests that movement from one habitat to another subjects the settler and the settler family to stress until the transition phase comes to an end. The more dissimilar the new habitat is from the old one in terms of natural environment (including terrain, climate, and vegetation) and in terms of economy, social organization, and culture the greater the stress. Multidimensional, stress has physiological, psychological, and sociocultural components which are intricately interrelated. Physiological stress is characterized by increased incidence of disease -- and in some instances death, especially among children. Psychological stress has two components: homesickness for the old habitat and anxiety about the future. Sociocultural stress arises from difficulties in transferring old production techniques, behavioral patterns and institutions (including local leadership), and values to the new habitat. Generally speaking, the more heterogenous the settlers the longer it takes to create integrated communities which are both economically viable and socially satisfying to live in.

Because of the stress of settlement, the general tendency of new lands settlers is to transfer to the new habitat their old production system and their old culture. Indeed, because of labor constraints at the time of settlement, they may practice more extensive forms of

agriculture than they did in the past. In attempting to adapt to their new surroundings, they cling to the familiar. As a result, a significant number of settlers can be expected to reject during the first two phases most major innovations simply because they are not able to handle the increased anxiety and uncertainty associated with further risk taking at this time. Rather, they cautiously try to adapt to their new habitat through incremental changes in existing production techniques, behavioral patterns, institutions, and values -- changing these no more than is necessary to reestablish old lifestyles under new conditions. This is a logical coping response which can be interpreted as an adaptive mechanism to control what already is a critical stress load through the rejection of further changes prior to the end of the transition phase. For this reason, it is important for the settlement authority to do everything possible to help the settlers gain confidence and get back on their feet. Only then will the transition period end for the majority, initiating the possibility of rapid growth during the next phase.

Not only is it unrealistic to expect high output from the settlers during the first two phases, but there is also a major danger at this time that government policy will create a more dependent population which is even less likely to innovate in the future than would otherwise be the case. Dependency is increased, for example, when government provides the settlers not only with practically all inputs but also with ready-made housing, institutions, and community facilities. While some government assistance is obviously necessary at this difficult time, it should be carefully thought through in terms of assistance

which will increase rather than decrease settler responsibility and independence both for their own lives and for the settlement of which they are part.

Separation of the initial settlement phases from the third phase of potentially rapid growth does not mean that the interests of development need be initially ignored. It does mean, however, that settlement authorities should concentrate initially on laying a firm basis for the future by initiating pilot and demonstration projects and by building up the necessary extension staff at the village level.

#### C. THE EXPERIENCE WITH NEW LANDS SETTLEMENT IN SRI LANKA

Sri Lanka has had over forty years of experience with major settlement projects. Some of these, like Minneriya, have successfully passed through all four phases, although like any community in a rapidly changing world they are continually threatened by both old and new problems alike. Summarized in Ellman, Ratnaweera, Silva, and Wickremasinghe's 1976 Land Settlement in Sri Lanka: 1840-1975, there is also a rich literature evaluating this experience. Obviously many people, both government officials and scholars alike, have thought deeply about new lands settlement and have translated their thoughts into a wide range of experiments. While this experience is an invaluable source of information, it is no substitute for ongoing evaluation and monitoring simply because new lands settlements are dynamic entities in which the experience, education, expectations, and aspirations of the members of both farm and nonfarm families alike are rapidly changing. For this reason alone, approaches to colonization

,which proved unsatisfactory in the past might work today, while approaches which worked in the past may be unacceptable today. This is why it is absolutely essential for there to be in Sri Lanka (both within and without the Mahaweli Development Authority) an ongoing monitoring and evaluatory program with the capacity to identify problems as they arise and before they take on crisis proportions.

III. BASIC ISSUES

The list of issues is taken from my February 8, 1979 memo on "A Suggested Sri Lankan Workshop on Mahaweli Development Policy for Settlement," although their order has been changed. This list is highly selective -- with other equally important basic issues not included.

A. FURTHER CONSIDERATION OF, AND POLICY TOWARD, MAHAWELI DEVELOPMENT AS A MEANS FOR THE INTEGRATED RURAL AND URBAN INDUSTRIAL DEVELOPMENT OF THE DRY ZONE

- 1. A regional perspective that takes into consideration current urban centers, marketing networks, and purana villages.
- 2. Occupational diversification within settler communities in terms of agriculture, cottage industries, and other local businesses (including boutiques), service facilities, and agro-industrial complexes.
- 3. Integration of crop agriculture with livestock management, fisheries, and forestry.
- 4. Crop diversification.

General statements outlining the major purposes of the Accelerated Mahaweli Development Project emphasise two goals. The first is to meet national food deficits, with major stress on rice -- although sugar, cotton, and a few other crops also receive emphasis. The second is to provide employment for a significant number of an estimated one million adults without work in 1978 and for some 150,000 young people (many of whom have completed secondary school) who are joining the labor force annually. These goals are not necessarily compatible; indeed, too much emphasis on the first can interfere with the realization of the second.

1. Settlement Projects in New Lands Are Rarely Planned Within an Overall Regional Context

Partly this is because they are seen as discrete production schemes in which one crop tends to dominate and in which the emphasis is on the farmer rather than on optimizing the opportunity presented by colonization for increased employment through occupational diversification. Fortunately, this overemphasis on monocropping at the expense of agricultural diversification (including crop production, livestock, fisheries, and forestry) and on agricultural production at the expense of occupational diversification is gradually changing. Currently the World Bank is playing a role in terms of experimentation with new approaches. While the FELDA schemes in Malaysia are often mentioned as the most successful settlement schemes in terms of agricultural productivity and of adequate returns on economic investment, the Malaysian government and the Bank now realize that settlement

schemes are not realizing their full potential in terms of national development and the well-being of farm and nonfarm families. As a result, increasing emphasis since 1974 is being placed on articulating settler communities with an urban center that will be created as part of the project. Planned in connection with the Johore Land Settlement Project, one of the functions of such an urban center would be to provide a much greater variety of employment opportunities, including opportunities for the children of settlers as they grow up and marry. The implications of such an approach for job creation and diversification will be discussed in more detail under section B.

Similar experimentation is going on within the dry zone of Sri Lanka, with the Mahaweli Development Board (MDB) aggregating settlers into village clusters which are related to larger service centers. The 1979 formation of the Mahaweli Development Authority (MDA) should make it still easier to carry out planning within a broader regional context. In Malaysia, FELDA schemes tend to be established in unoccupied areas of primary rain forests. While the Mahaweli basin is not densely occupied in comparison with the wet zone, there are numerous purana villages and some prominent townships in the area, with the local population swelling rapidly as migrants move in seeking new lands (as encroachers and prospective settlers) and jobs in the context of the Accelerated Mahaweli Development Project. Except where purana villages are incorporated within newly irrigated blocks as in the H area, I did not get the impression that settlement planning is paying sufficient attention to the articulation of settlement areas to purana villages outside the area under command, and especially to establish urban and

commercial centers. Unless this is done, it will not be possible to capitalize fully on the development potential of the Mahaweli Basin, both in terms of increased productivity and in terms of increased employment. The major failing of river basin development projects around the world is not that they are an economic failure (indeed, the rate of return may be quite good) but that they underutilize the human, land, and water resources of the basin. The Mahaweli Basin is not only the largest river basin in Sri Lanka, but it also includes much of the underdeveloped land within the nation. Because of overcrowding in the wet zone and national agro-industrial needs, Sri Lanka cannot afford to not optimize the development potential of the Mahaweli Basin and adjacent areas through the Accelerated Mahaweli Development Project. Integrated regional planning is essential.

## 2. Occupational Diversification Within Settler Communities and Associated Townships

There does not appear to be much occupational diversification in purana villages in the dry zone. Many of these are small, with less than 100 families -- the large majority of whom are primarily employed in agriculture as small scale owner-operators and/or sharecroppers or as agricultural laborers. Because most villages appear to be dominated by or restricted to a single caste, usually the dominant cultivator caste of Sri Lanka (Goyigama) or even specific lineages, there is little of the occupational specialization associated with multicaste communities in India. At the same time, standards of living are sufficiently low<sup>3</sup> that wealth alone is not able to support artisans

or other specialists in significant numbers. In one purana community in the North Central Province described in an ARTI publication (Lebbe et al., 1977), 83 percent of the villagers made their living directly from agriculture. Of the remainder, half were in government service and the others employed as traders and craftsmen. This breakdown does not appear to be exceptional, although the number of government workers presumably is higher than in more remote communities (the study community was twenty miles from Anuradhapur and four miles off the main route to Trincomalee).

Perhaps partially because of such studies, and because of an overpreoccupation with agricultural (and especially paddy rice) production, I believe insufficient attention has been given to the potential of the Accelerated Mahaweli Development Project for increasing off-farm employment both within settlements and in adjacent purana villages and townships. With careful planning it should be possible to create employment within the region for up to one nonfarm family for each farm family. In the Malaysian Johore Land Settlement Project, to which mention has already been made, the expectation is that the project will provide employment for somewhat over 10,000 people. Slightly less than half of these would be farmers employed on the oil palm schemes. The remainder would find development-related and other jobs in project villages and nearby urban centers. Here the expectation is that the project will support slightly more than one nonfarm family per farm family.

Such an expectation does not seem unrealistic for Sri Lanka. I was immensely impressed by the wealth and occupational diversification

associated with Hingurakgoda, the township serving the Minneriya Settlement Project. With settlers being the main clients, the substantial shops were said to be better stocked than equivalent areas in Kandy in regard to electrical appliances, plastic wear, canned goods (imported from countries throughout the world), children's toys, and a wide range of other consumer items. The private sector was also active in the provision of agricultural requisites, with one private merchant proudly stating that 90 percent of agricultural inputs in the area were now provided by local businesses as opposed to less efficient multipurpose cooperatives.

Clearly, agriculture in Minneriya is now supporting a strong and growing business community. In addition to shops providing agricultural requisites, there are privately owned mills, as well as private establishments concerned with all aspects of agricultural mechanization. Government services are also rich in the area, ranging from the grain stores of the Paddy Marketing Board and the tractor unit of the Department of Agriculture to hospitals, schools, local government, and other services. The whole community has an aura of successful development which includes the local market and surrounding small scale businesses. The latter are especially important since they suggest the type of goods and services desired by settlers throughout the Mahaweli Basin and adjacent areas. In addition to traders and hawkers specializing in grains, fresh vegetables, fruits and fruit drinks, pulses, dried and fresh fish, and meat, they include basket and rope makers, potters, furniture makers, blacksmiths, radio repairmen, and newsdealers. There are a whole range of activities involving the private sector which the

Mahaweli Development Authority could facilitate through careful planning that runs the gamut from the small scale type of operation already mentioned to larger scale industrial operations based on the design, manufacture, and repair of appropriate agricultural equipment and on the processing and distribution of agricultural produce.

The history of settlement schemes around the world provides example after example where major opportunities to increase employment through the encouragement of both private and public investment in nonfarm work were neglected. Such a trend unfortunately continues today in many countries. In Jordan, for example, the major agricultural area within the country is the Jordan Valley which is being developed through irrigation by the Jordan Valley Authority (JVA). In planning for the area, the JVA is assuming less than one nonfarm family for every two farm families. Not only is such an estimate far too low in terms of what is both desirable and feasible, but to an extent poor planning takes on the characteristics of a self-fulfilling prophecy -- since a project designed without the interests and needs of nonfarm families in mind will reduce the number of such families which might otherwise have contributed to the development of the area. While Sri Lanka is much more aware of the nonfarm family component, which approaches the settler component numerically, in some studies planning still appears to be restricted primarily to the provision in newly created central places of service and shop facilities rather than to the facilitation of local commercial enterprise and other activities throughout the region, including existing townships.

The timing of government action could also be improved so that

service and shop facilities are more available to settlers during the first few years of settlement. Produce marketing also needs careful consideration, especially if more attention is to be paid to crop diversification and the integration of crop production, livestock, fisheries, and forestry. Finally, there is a need for much more research on the possibilities of occupational diversification in the northeast. A starting point here would be to make an occupational survey of the Minneriya Project both to ascertain what has happened there and to gain further knowledge as to what is possible in the future for increasing the labor absorptive ability of the Accelerated Mahaweli Development Project.

### 3. Integration of Crop Agriculture with Livestock Management, Fisheries, and Forestry

Generally speaking, such integration can be carried further than is usually the case. Some of the largest irrigation projects in the tropics are in the Sudan, the Gezira scheme (including the Managil Extension), the Khashm el Girba scheme, and the Rahad scheme being the three largest -- with Gezira coming first in time and Rahad last. Although livestock were excluded from the Gezira scheme and initially from the Khashm el Girba scheme, more attention today is being paid to the incorporation of livestock management within scheme boundaries. Hence at Rahad, experimentation is just starting this year, with some sixty tenants each utilizing ten acres in fodder for twelve dairy cattle. Although incorporation of livestock into the Accelerated Mahaweli Development Project requires careful thought

since the majority of settlers are Buddhists, most studies of purana villages mention the keeping of poultry and production of small quantities of milk. Furthermore, they indicate that villagers sell cattle to passing merchants when in need of cash. Certainly there is a place for the use of water buffalo in land preparation and threshing, a topic which will be discussed separately under section F.

Both fisheries and forestry have received more attention in planning, although again my impression was that the fish potential of tanks and of reservoirs behind the new dams is being underestimated while too little attention is being paid to the efficient utilization of wood that is cut down during the process of forest clearance. Old and new tanks would appear to have considerable potential for fishing -- and indeed for fish farming -- especially if the drawdown area within the tank is used for grazing water buffalo and the tanks are used for wallowing so that buffalo manure fertilizes the water (in Africa, dung from hippopotami, for example, is an important source of nutrients for swamp and lucustrine fisheries). Certainly serious attention should be paid to utilizing and restoring old village tanks rather than destroying them during the Accelerated Mahaweli Development Project, although each case need be considered separately. Possible costs to be considered would be loss of land for rice production and increased risks from malaria, while benefits would include increased fish production, grazing and wallowing areas for water buffalo, and a raised water table creating gangoda-like conditions for a greater number of homesite plots. Certainly where new tanks are constructed, the vegetation within the tank bed should be cleared in such a way as

to increase the availability of firewood and the efficiency of fishing with bottom, middle, and top set gill nets once the tank is filled.

One of the most successful aspects of river basin development in tropical Africa has been increased fish production in large reservoirs backed up behind new dams. Throughout my visit I was particularly interested to see fishermen working the tanks, the Gal Oya Reservoir, and the main channel of the Mahaweli Ganga itself. At Namal Oya, a village in the Gal Oya Project area, several of the wealthier settlers were also fishermen. Obviously the fishermen and fish traders, often Muslims, are there, so the development of fisheries within the context of Mahaweli development offers one more possibility for increased food production and occupational specialization. Fisheries development in large scale man-made lakes, however, is characterized by special problems which need be anticipated ahead of time. These include appropriate forms of bush clearance from the basin of the future reservoir and a strategy which anticipates the boom in productivity that immediately follows reservoir formation, and the subsequent reduction of that productivity. Because of systematic research on a number of large scale man-made lakes, the Department of Fisheries of FAO has the greatest experience with inland fisheries of this sort.

During the early years of settlement, there is obviously a surplus of timber from cleared forest for construction, firewood, and other purposes. It is amazing, however, how rapidly abundance turns into scarcity, with settlers suffering from an inadequacy of fuel and lumber. This problem can be especially severe in such large scale settlement programs as the Mahaweli one since extensive areas are

involved. With forestland being cleared from different directions, all of a sudden one finds that one has run out of wood within the immediate vicinity. In this regard, better use should be made of wood removed from existing forest while the future needs of settlers and nonfarm families for firewood, lumber, and so on should be carefully assessed. Because the number of people attracted to settlement schemes is almost always underestimated, especially in regard to nonfarm families and seasonal laborers, the fuel and lumber needs of the population also is underestimated so that insufficient areas are set aside for forest reserves, plantations, and shelter and windbreaks. The high temperatures and strong winds in the dry zone during the summer months make shelter and windbreaks especially important both as a source of shade and as a mechanism to reduce wind erosion and evaporation from water surfaces.

4. Crop Diversification

I have no useful information to add to the discussion currently going on as to appropriate crops for maha and yala cultivation under irrigation and highland conditions in the Mahaweli Project area other than to note that increasing attention is being paid to the benefits of diversification in a number of major irrigation projects, including the Rahad Project in the Sudan. Diversification also makes sense granted different soil conditions within the northeast, both in terms of soil catenas and in terms of local variation. One impressive feature of Sri Lanka is the range of agro-ecological zones within the country. Overemphasis on one crop (no matter how important that crop is) in terms of acreage, marketing facilities, and price policy

reduces the nation's ability to capitalize on the productive capacity of these zones.

B. MECHANISMS FOR ACHIEVING MORE EFFICIENT WATER MANAGEMENT  
AND IRRIGATION SYSTEM MAINTENANCE

The Mahaweli Development Board, the international donor agencies, and various consultants (including NEDECO) are paying special attention to this issue, about which I have very little expertise. I will be referring to it only indirectly under other issues such as forestry (using well-placed windscreens to cut down evaporation rates, especially during the windy months of the dry season); use of water buffalo (provision for watering points and wallowing places so that buffalo do not break down canal walls); and local participation (whereby settlers associated with each turn-out play a more active role in water management).

C. APPROPRIATE MECHANISMS WITHIN THE MAHAWELI DEVELOPMENT AUTHORITY  
FOR RESPONDING TO SUCH POTENTIALLY ADVERSE ENVIRONMENTAL IMPACTS  
AS EROSION, WATERLOGGING, AND AQUATIC WEED INFESTATION BEFORE  
THEY ASSUME SERIOUS PROPORTIONS

Recent reports make it clear that the magnitude of environmental problems has been underestimated especially in regard to erosion in upper catchments because of the removal of vegetation in connection with chena cultivation and other human activities. While the problems are serious, an awareness of them is increasing to the extent that the government is planning to establish an Environmental Authority, while an Environmental Panel has been established within the Mahaweli Development Board to

coordinate responses to perceived environmental problems. It is especially important that the U.S. AID-financed environmental impact assessment in the Mahaweli Basin be carried out in such a way that it not only clarifies the nature of the entire range of environmental problems but also that it increases the capability of the Mahaweli Development Authority to perceive, research, and respond to environmental problems before they reach crisis proportions. Even a very brief visit was sufficient to illustrate for me a number of problems, namely waterlogging as seen in the lower portion of the Gal Oya Project; aquatic weed infestation (Salvinia and Eichhornia in the Gal Oya area, and Typhus and Imperata in canals and fields, respectively, in part of the H System); upper catchment clearance and erosion in a number of areas; and removal of forest in many areas without sufficient attention being paid to soil impacts and future shelter belts and sources of fuel and lumber.

#### D. THE SIZE OF THE PADDY ACREAGE

This is a very complicated issue which has been hotly debated within Sri Lanka over the years. I believe the debate should continue. Though few argue for smaller holdings, there are good arguments justifying the current 2.5 acre holdings and equally good arguments in favor of larger holdings. The basic issue is not so much one figure versus another as with a fixed acreage throughout which does not pay more attention to soil conditions and differences in agro-ecological zonation, family size, rising living standards and expectations, differential ability among farmers, and the second

generation of settlers. The current figure of 2.5 acres does appear to be rather arbitrarily selected. A 3 acre paddy holding (down from 5 acres) was first introduced at Gal Oya in 1953. Subsequently, the World Bank advocated 2.5 acres in 1976 and 1977 reports. However, there appear to be few longitudinal studies justifying this acreage in terms of agricultural intensification and labor utilization.

At least three arguments have been advanced in favor of a 2.5 acre paddy holding. These are the following:

(1) Granted the government goal of reducing unemployment and landlessness, a 2.5 acre holding makes more sense, at least during the first generation of settlers, than the larger holdings allocated in the past.

(2) In terms of social equity, the 2.5 acre holding will support the large majority of settlers at a higher standard of living than in the past without creating too wide an economic differential between settlers, other farmers, and nonfarm families.

(3) Past experience has shown larger holdings to be too much for the labor resources of most families. As a result, extensive rather than intensive agriculture is practiced at the expense of higher yields per acre.

While the first two arguments are hard to rebut, the third is questionable in regard to insufficiency of family labor for full and intensive cultivation. Though yield figures which are not actually measured are always suspect, the few studies available to me that contain information on yields in relationship to size of holdings suggest that intensification is not more apt to be practiced on 2.5

to 3 acres holdings than on larger acreages. In a study of rural indebtedness, Ganewatte (1974b) notes that yields from 2.5 acre plots in the Kagama Kattiyawewa Special Project in North Central Province average out at only 18.1 bushels per acre for yala and 20.5 bushels for maha. These yields are very low even for settlement projects. Though settlers blamed them on poor soils and low use of fertilizers, Ganewatte wrote that "it is a fact that most farmers still use 'traditional' methods of agriculture" (page 8). In his economic survey of six major projects, Jogaratnam (1974) was even more explicit, finding no evidence that smaller farms were cultivated more intensely.

The adequacy of family labor resources tend to be evaluated at the time of settlement, or within a few years following the settler's arrival. In other words, such evaluations are carried out during the initial two phases of settlement which are most characterized by instability and stress. In trying to cope with drastic change in his life, the settler and his family can be expected to cling to the familiar, which means not only maintaining close contact with the home village but also trying to reestablish in the settlement former cultivation patterns. Under these conditions, it is unlikely that a majority of settlers will initiate improved techniques during the initial phases of the settlement project.

It is also unlikely that the settler family will initiate labor intensive techniques during these two phases not just because of the transitional stress associated with new lands settlement but also because during this time period the settler family will have other demands on its labor, including house construction and the

reestablishment of a home in a new and still strange habitat. At the same time, the early years of settlement also tend to be the least healthy. In addition, simply because services, including boutiques, tend to follow settlement by one or more years, the settler family is apt to spend more time initially obtaining food, clothing, and other basic needs.

Another major factor relates to criteria used for settler selection. Obviously where younger settlers are chosen, their children tend to be young -- with a high proportion of dependents to producers, which again slows down the process of bringing paddy land into full production. For all these reasons, it is unrealistic to expect settlers to rapidly bring all their land under cultivation and to rapidly intensify that cultivation. If acreages are to be based at least partially on the amount of land that can be efficiently utilized by family labor, then studies of optimum plot size should be delayed until after the transition phase comes to an end. By that time the settler will have brought his family, the family will have settled in, and mechanisms will have been established for recruiting local labor or kin from the home village for periods of peak labor demand.

There is some evidence that after the initial years are over, settlers with 2.5 acre paddy holdings have surplus labor between sowing and harvesting their paddy. In the above mentioned study by Ganewatte, 50 percent of the ninety colonists interviewed found some employment as part-time farm laborers in the neighboring villages, where they received wages of Rs5 per day. Sixty-three percent also cultivated, on the average, 1.5 acres of chena. Though no cross tabulations were

done on whether or not chena cultivators were less apt to hire out their labor, Ganewatte's data suggests that a significant number of these colonists had surplus labor some twenty years after the project began. For reasons which are not clear, they preferred to utilize this labor for off-project activities rather than for intensifying production on their own allotments.

Where off-scheme activities have been carefully documented in the Sudan in connection with the Khashm el Girba scheme, it is clear that off-scheme activities are more lucrative to the farmer than additional on-scheme labor. While this may or may not be the case at Kagama Kattiyawewa, Ganewatte does note that during the 1971/72 season colonists with chena obtained an average annual income of Rs.524 from this garden type, largely because of a bumper harvest of chillies which provided good profits. As for wage labor, that may be important because it meets colonists' needs for immediate cash income. Although the situation here is complex, more research is needed on the trade-offs between an almost exclusive dependency on paddy cultivation (toward which the Mahaweli Development Project is biased) versus crop diversification and other labor opportunities. Looking to the future, if the trade-offs favor the latter it makes more sense to build them into the scheme.

While the acreage that most settler families can be expected to efficiently utilize after the termination of the transition period can be expected to exceed that cultivated during the first two phases of settlement, generally speaking it will still be less than what the family will need and can cultivate in future years. As dependent

children mature, obviously the available labor supply will increase. And as those children marry and have their own children, obviously the demand for land by the new extended family will exceed availability. Under the Land Development Ordinance of 1935, as amended by Acts No. 60 of 1961 and No. 16 of 1969, settler holdings cannot be subdivided among the settler's heirs contrary to the norms of customary land tenure practices. In this sense, settlement projects which are supposed to decrease landlessness during the first generation actually increase it during the second generation, although in fact the amount of illegal subdivision that occurs is probably considerable.

Yet another problem relates to rising expectations among settler families, especially following the end of the transition phase. The experience in Malaysia in connection with FELDA schemes is that the size of holdings allocated for tree crops during the 1950s were too small in terms of what was an economic holding, in terms of full utilization of family labor, and in terms of rising expectations. Here it is important to emphasize that project success correlates with rising expectations; hence twenty years later, good settlers may consider their farms to be too small while their children, for the same reason, may be unwilling to remain on the project. The response of the Malaysian government over the years has been to gradually increase the size of settler allotments rather than decrease them, as has been the general trend in Sri Lanka.

In summary, I suspect that 2.5 acres is too small to meet settler needs once the transition period has come to an end, although such an acreage may still make sense when political and social equity

considerations are taken under consideration. In that case, however, far more attention need be paid to absorbing the children and other dependents of settlers -- the second generation -- into nonfarm occupations which are built into the Accelerated Mahaweli Development Project. Either way, more survey research at old projects like Minneriya is needed in order to learn more about how larger holdings are in fact utilized some thirty years after scheme initiation and what opportunities exist for surplus second generation labor. And more experimentation is needed in terms of variations in plot size according to differences in slope, soil conditions, and agro-ecological zonation. While the social prestige of paddy is such that all settlers want paddy land for rice cultivation, the fact of the matter is that the number of applicants for settlement land far exceeds the supply. Hence it should be possible to allocate smaller holdings of paddy land on the more fertile soils and larger holdings on the less fertile soil. Similarly, it should be possible to vary plot size according to different maha-yala crop combinations, the emphasis being not so much on a rigidly standardized holding but rather on production potential of crops grown on varying soil types, with the goal being not only to increase production but to try to provide each settler family with a roughly equivalent income if that family cultivates the land in the recommended crops and according to recommended techniques.

One approach to the need for experimentation here might be to devote a specific area in each system or in different agro-ecological zones to the necessary research and demonstration, with different approaches executed on the holdings of farmers who are carefully

selected for settlement within research and demonstration areas.

#### E. THE SIZE OF THE HIGHLAND HOMESITE PLOT

While there are good arguments for 2.5 acre paddy holdings, I have heard no convincing social or economic arguments that justify the present size of 0.5 acre for homesite plots. In terms of the passage of new lands settlements through a series of development phases, of the integration of livestock with agriculture (including the stall feeding of buffalo), of crop diversification to enhance settler household self-reliance, and of increases in family size, a one acre holding makes more sense. On older projects, most retiring settlers appear to want their heirs to settle on their homesite plot. On new allotments in the H System, wives in particular complained about the lack of privacy on a 0.5 acre plot. Clearly there was insufficient land for vegetable and tree crops, for poultry and a few cows, for water buffalo, and for a well and additional domestic structures. The only apparent disadvantage to a one acre site is the added land needed for village clusters. Still, it should be possible to design a community layout that maintains the advantages of community living and access to community services without precluding the activities and structures mentioned above.

#### F. THE PROPER BALANCE BETWEEN BUFFALO TRACTION AND TRACTOR MECHANIZATION

Very little attention appears to have been paid to the incorporation of livestock, and especially water buffalo, within

'colonization projects. As for research, apparently virtually none has been carried out. In the context of Mahaweli development, there is an unmistakable trend toward tractor mechanization; indeed, settlement design and layout "has loaded the dice" against the incorporation of buffalo. This is because, on the one hand, house lots of 0.5 acre are too small for keeping buffalo and, on the other, there is no provision within most settlements for pasture for buffalo, and for watering and wallowing. What buffalo do exist are viewed as undesirable by irrigation engineers since, in the absence of special watering points, they damage canals wherever they move in and out of the water. Under these circumstances, it is not surprising that the number of buffalo in settlements has decreased to the point where there are insufficient trained beasts to meet current demand.

This bias against water buffalo appears to have no scientific justification; indeed, in the long run it may well prove to be a major mistake to rely almost solely on tractor mechanization through the use of both two- and four-wheel tractors. Whereas farming communities using buffalo are relatively self-sufficient in terms of land preparation, those using tractors are dependent on fuel supplies and equipment that come from outside Sri Lanka, and on parts and maintenance from outside the farm community. In the event of a major petroleum crisis, they would be very hard hit, having lost their previous resiliency. Such a possibility can hardly be ignored. After leaving Sri Lanka, I traveled in April to the Sudan, where I visited the 300,000 acre Rahad scheme. The third largest irrigation project in the Sudan, the policy at Rahad, as on the Gezira scheme, was to move increasingly toward

mechanization of practically all operations. At the time of my visit, however, the management was having second thoughts because of the continuation of a very serious shortage of fuel in the country. My return to California coincided also with a fuel shortage there, along with statement of concern that future supplies of diesel fuel might be insufficient in the Midwest and elsewhere in the United States for mechanized farm operations.

What needs to be carefully assessed, in the Mahaweli development context, is the proper balance between mechanization and buffalo traction. During our visit to System H, Minneriya, Gal Oya, and Uda Walawe we made frequent inquiries to both government officials and farmers about the comparative advantages of the two types of traction. Though opinions varied, there was a general concensus that there was a place for buffalo on the project, although this would have to be carefully thought out in terms of a number of factors such as:

#### 1. Grazing

On the older projects, some farmers have managed to retain sufficient buffalo to meet their needs by utilizing a variety of food sources. After the maha harvest they graze their buffalo on their paddies and also feed them straw. As the dry season progresses, they cut grass along the canals or stake out their beasts there or along the roadways. Still later, the buffalo are moved into the beds of the larger tanks where they graze the grass cover both above and within the reservoir drawdown area. At both Gal Oya and Minneriya some farmers hire herders to care for their buffalo in this way. One farmer at

Minneriya, for example, pays a herder Rs100 per month plus food to keep his ten buffalo close to the upper margin of the reservoir during the last four months of the dry season. The reservoir at Gal Oya is used in the same way, with one farmer stating that 400 to 500 buffalo and cattle might be grazing there during the latter part of the dry season.

The above type of adptation are less likely in System H and in future projects in the basin for several reasons, including:

(1) Smaller household (highland) plots for settlers, a 0.5 acre plot being too small for integrating buffalo with other uses.

(2) Reduced grazing access to roadways, canals, and tanks because of management opposition to buffalo.

(3) Increased theft of buffalo and cattle which are not kept under close scrutiny -- meaning either close herding or confinement on household plots.

## 2. Availability.

As the number of buffalo decreases, supply is insufficient to meet demand. To reverse this situation, provision will have to be made in the future for on-scheme grazing, watering, wallowing, and corralling facilities. A breeding program may also be desirable. In assessing the proper balance between water buffalo and tractors, the rapidly increasing price of the latter must be carefully considered. In one area, we were told that the price of two wheeled tractors had increased five-fold during the 1970s. When we checked actual prices, there appears to have been nearly a three-fold price increase over the past three years.

### 3. Disadvantages and Advantages of Buffalo Land Preparation

On heavier soils which have not been moistened either by rainfall or irrigation, buffalos have difficulty carrying out the first plowing of paddy fields. In such cases tractors are more effective. Buffalo land preparation also takes longer, putting the farmer who does not own his own buffalo at a disadvantage. Some younger people, especially those with an education, were said to dislike using buffalo as opposed to tractors, although such attitudes are not immutable. As for the advantages, buffalo can operate in wet clay soils in which tractors bog down, they may be more effective in dealing with Imperata and other weed infestation, and they do not have the adverse impacts on certain soil types that have been blamed on tractors.

As the above comments suggest, there are important trade offs between buffalo and tractors which need to be carefully assessed in terms of project planning and design to come up with an appropriate balance. Currently, on some blocks of System H we were told that approximately one-third of land preparation was with hand (hoe) cultivation, one-third with buffalo, and one-third with two- and four-wheel tractors. According to one senior agricultural officer, whose experience had been more with tractors than buffalo, a proper future balance might be 50 percent buffalo preparation and 50 percent tractor preparation, with hand cultivation being entirely replaced. According to him, two trained buffalo can handle five acres, so that one buffalo per farmer would be sufficient. Farmer, to whom we talked, however, doubled this estimate, emphasizing that the two plowings and one harrowing during maha made four trained buffalo more satisfactory. If so, most settlers using buffalo on 2.5 acre holdings presumably would like to have two buffalo of their own.

G. THE PROPER BALANCE BETWEEN PURANA AND OTHER DRY ZONE RESIDENTS AND WET ZONE RESIDENTS; AND OTHER CRITERIA FOR SETTLER SELECTION

Over the years the proportion of dry zone residents who are settled on projects has gradually increased. Although there has been some criticism of this trend, especially in terms of government goals relating to the decrease of land pressure in the wet zone, I believe the advantages definitely exceed the disadvantages. The main advantage is that dry zone residents, including migrants aside from those who have arrived only recently, have already adapted to dry zone conditions and are part of social networks and existing communities. Not only is the stress of settlement on them less than is the case with wet zone immigrants, but an argument can be made that generally speaking they become more productive and socially integrated settlers than is the case with wet zone settlers who are selected from a number of different locales.

In the literature, the main concern about the increasing predominance of dry zone settlers was expressed by Farmer in his Pioneer Peasant Colonization in Ceylon (1957), where he concluded that "it would appear that too many places have gone to peasants hailing from villages in the vicinity of colonies." In making this point, Farmer was concerned not so much with efficiency of cultivation but with the relief of agrarian pressures throughout Sri Lanka, including both the wet zone and the areas in the vicinity of and immediately south of Jaffna. For a variety of reasons, he pointed out that certain districts with increasing population pressures had been relatively neglected in comparison with other districts.

Today land pressure can be demonstrated throughout most of Sri Lanka, including around many purana villages in the dry zone. This is quite clear from two recent studies of purana villages in North Central Province (Ganewatte, 1974a and Lebbe et al., 1975). In the first case, dealing with fragmentation of paddy land in five villages, the author concluded that "fragmentation of paddy lands is a major problem throughout the country and particularly acute in the purana villages, where cultivation of paddy is dependent on irrigation water" (p. 22). All five villages are of the Goyigama caste, with their members closely related through affinal and consanguineal ties of kinship. Not surprisingly the land situation is worse in the oldest village, where fragmentation through inheritance was the most extreme, with approximately 58 percent of the parcels there being below 1/8th of an acre.

While the Ganewatte study does not contain information on size holdings of specific households (households usually controlling more than one parcel, the range being from one to ten), this information is contained in the second study which deals with a single village of sixty interrelated households (all of which belong to the same varige) totaling 325 individuals. There the authors have divided the population into three groups, labeled poor, intermediate, and landed. Defined primarily in terms of land ownership, the poor comprised 33 percent of the households. In contrast to the landed (who comprised 18 percent of the households but owned 54 percent of the paddy land), these poor households owned only 5 percent of the paddy land. As for the intermediate group, they comprised 48 percent of the households and owned 40 percent of the paddy land.

While land holdings in this village were relatively large,

the average parcel being approximately .5 acre in size and the average holding being 7.45 acres (including both irrigated and chena land), the most prized land in the "old field" beneath the tank is highly fragmented, with fragments averaging .22 acre in size while the average holding is 2.97 acres. The poor, however, even though related to the landed, have scant access to this land, with two-thirds of them (22 percent of the village population) owning no paddy land at all. Relying mainly on chena cultivation and agricultural labor, these people are very poor by any standard. Living in wattle and daub single room houses, 85 percent of them own no moveable property (including household furnishings), while 84 percent have no cattle. Furthermore, through time, the gap between rich and poor in the village is widening as the former extend their holdings through expansion outside the village area and through land purchases from the poor.<sup>1</sup> Not only have none of the landed group ever had to sell land, but "all but one of them had bought or asweddumised some land, while 65 percent of the present household heads had increased their acreage of paddy land by more than ten acres" (p. 17). They also tended to cultivate large chenas, "mostly by using hired labor."

Granted the fact that the demand for dry zone land is far greater than the supply, and that there is serious land pressure in the dry zone as well as within the wet zone, it makes sense to select the large majority of settlers from the dry zone for two reasons. The first is that they already live in the area, and as residents should have first claim to land that is developed close to their homes, especially where project development requires the purchase of their

existing lands and, in some cases, the destruction of their villages. The second reason, on which greater emphasis will be placed in this report, is that generally speaking existing residents can be expected to be better farmers. Though this point has yet to be adequately documented, there is one Sri Lankan study which appears to support it as well as a number of reasons based on theoretical considerations which have been shown to apply in other contexts.

The one case study relates to the Gal Oya project where, according to the Report of the Gal Oya Project Evaluation Committee, the only component of this major multipurpose project with a positive benefit/cost ratio greater than unity using a rate of discount of 10 percent is the purana lands of Pattipola Aar, from which the authors (including B. H. Farmer, who was chairman of the evaluation committee) concluded that in the future it might be best to concentrate on the consolidation and development of existing projects, on the intensification of agriculture in purana villages through the provision of flood protection and through improvement of the existing irrigation system (p. 57). However, this evaluation does not go so far as to suggest that adjacent purana villagers make better farmers on settlement projects than do selectors selected from the wet zone and more distant dry zone locales, a point which I would like to consider on more theoretical grounds.

It has been hypothesized that the shorter the distance that settlers must move and the smaller the differential between their old habitat and their new surroundings, the less the associated stress. If so, and there is considerable empirical evidence supporting this point,

then one would expect the transition period among settlers from adjacent areas to be of shorter duration than in the case of settlers brought in from a distance (obviously the sooner the phase of rapid growth begins, the better for the project and the settlers in terms of increased productivity and rising standards of living). Where existing purana villages are incorporated in their entirety within a project, one would also expect more viable communities than is the case with a more heterogeneous group of settlers who are brought together in a new settlement from different villages in different districts and who may also be members of different castes or variges. To support this point, report after report emphasizes the failure of Sri Lankan settlement projects to facilitate the emergency of new integrated communities with an active and respected community leadership which can represent the settlers in dialogue with government officials. Even in Minneriya, which is one of the older and more successful projects from an economic point of view, community cooperation and local leadership are said to be weak (see Farmer, 1957, p. 296, although the situation may have improved in recent years).

Not only are existing purana villages relatively well integrated, with an established village leadership, but it is quite possible that the provision of lands to the poorer villagers will open up avenues to leadership to a greater extent than is currently the case in established villages. As already mentioned, the gap between rich and poor in existing villages appears to be widening, with financial emergencies often forcing the poor to sell what land they have to money lenders who more often than not are landed villagers and merchants. Here it is

difficult to overemphasize the social equity arguments for providing settlers with similar income earning opportunities, hence giving all households within an incorporated purana village the opportunity to raise their living standards and, if they are diligent and talented, to eventually provide village leadership. The word "eventually" deserves further emphasis. Within purana villages most leadership positions are dominated by the equivalent of the landed group. Though educated children from the intermediate group may also be able to exert leadership (see Lebbe et al., 1977, pp. 29-30), it is virtually impossible for the poor to do so. Their incorporation on settlement schemes at least lifts the effects of grinding poverty off their backs, and makes their future more dependent on their own skills and personalities. Granted the homogeneous nature of purana village society in terms of caste and kinship interrelatedness, the social constraints to upward mobility presumably are far less than the economic and educational ones.

ROACHER

There has also been considerable discussion in Sri Lanka about the place of "encroachers" in the context of Mahaweli development. Though the term "encroacher" is a pejorative one, evidence from the Philippines and Indonesia, from Africa, and from Latin America documents time and again that spontaneous migrants by and large form more cohesive communities and are better farmers than is the case with government-selected farmers on government-sponsored settlement schemes. While the question of spontaneous versus government-sponsored settlement is not that relevant in the Sri Lankan and other cases where a major government role is needed for opening up pioneer areas through the provision of

irrigation facilities and other major infrastructure, there is also considerable evidence that spontaneous migrants or encroachers make better settlers on adjacent settlement projects than do long-established villagers. The major reason for this would appear to be that "encroachers" are risk-taking pioneers. While settler selection in the wet zone under government auspices contains major risks (such as headmen trying to get rid of competitors or undesirable residents, and selection as a reward for political support), "encroachers" are a self-selected population of people whose original movement to the dry zone shows initiative and enterprise.

Against this background, present government policy to give priority to dry zone residents living within or adjacent to project boundaries makes sense. Increasingly this policy is interpreted to include encroachers who have been living in the area for at least five years. This trend also makes sense; indeed I believe it should be taken still further, with the required number of years of prior residence reduced where there is clear-cut evidence that the encroacher is not the agent for a land speculator, and where the encroacher has made commendable progress in opening up and cultivating garden land, and providing housing for his family. There are at least two reasons in the Sri Lankan case why a more liberal attitude toward encroachers makes sense. The first has already been mentioned -- the probability that on the average encroachers make better farmers. The second is that a significant number of encroachers are the children of settlers who have begun pioneering on their own because of the inability of their parents' allotment to support them after they have grown up and started families of their own.

In the Kagama Kattiyawewa Special Project area, Ganewatte notes that close to his study area of ninety colonists "there are over fifty encroachers, usually the grown up children or close relatives of colonists, occupying state forests and reservations" which are nearby (1974b, p. 2). Although he does not mention the origin of the relatives, a common practice during the early years of settlement is for settlers to recruit relatives as laborers from their home villages, some of whom eventually move permanently to adjacent lands. In System B an increasing number of encroachers have moved in, a significant number of whom are the children of Minneriya and other settlers in the Polonnaruwa area. Granted their previous experience with farming on settlement projects and their current initiative, it makes sense to recruit such pioneers into new settlement schemes. It also helps relieve the problem of unemployment among the children of settlers.

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Looking to the future, the spontaneous movement of migrants into the Mahaweli area can be expected to accelerate as more and more people move in seeking jobs and land. Virtually impossible to stop, such a migration carries with it both advantages and disadvantages.

The major disadvantages are ecological costs to the habitat caused by extensive clearance of forests, especially in water catchment areas, and spread of extensive forms of agriculture which meet the subsistence needs of the farm family but do not provide adequate surpluses for national consumption. Since it is virtually impossible to stop spontaneous migration, the best approach would be to attempt to channel it into certain carefully selected areas, perhaps in the lower Mahaweli Basin. At the same time important catchment areas in the upper basin,

and bio-reserves throughout the basin, could be set aside and protected from land settlement.

What I am suggesting for consideration here is a double-barrelled strategy. On the one hand, encroachers close to existing settlement areas would be included as settlers as new lands are brought under cultivation if they meet certain criteria relating to length of residence, self-sufficiency (that is, nondependence on land speculators), and experience. Here two types of experience should be rewarded. The first is agricultural expertise as shown by encroachers who are primarily farmers. The second is nonagricultural experience, including a wide range of skills and/or a reliable record of employment (over a minimum time period, the length of which requires careful thought) in such activities as forest clearance and construction. While some of the latter might well qualify as farm families, based on previous agricultural experience, or agricultural activities in addition to their employment, most might be best absorbed as nonfarm families. In such cases .5 acre plots might well be provided in village clusters and smaller plots in larger communities and townships. Granted the probability of building one nonfarm family per farm family into the Mahaweli Project, obviously careful planning of houseplots and services for laborers and service personnel is required.

On the other hand, an attempt would be made to channel future encroachers into carefully selected lower basin and other areas through the provision of site and service facilities including at the commencement roads and domestic water supplies. Eventually such areas would become settlements in their own right as irrigation facilities were extended.

While current policy indicates that the large majority of future settlers will be residents of the dry zone at the time of their selection, there is still room for the selection of a minority of settlers from the wet zone. Because the number will be small, it makes sense to restrict selection to situations which are characterized by a predetermined set of criteria which are designed (A) to select for education and agricultural expertise as opposed to landlessness, and (B) to deal with special problem situations. Under (A) landless laborers, tenants, and small landowners would all qualify, but only if they had relevant agricultural experience.<sup>2</sup> Under (B) a wide range of situations might qualify, of which two examples will be given. The first relates to situations where entire villages must be relocated in connection with national development. A case in point is the Kotmale Dam, the construction of which will require the relocation of over 12,000 people. Here the opportunity exists to experiment with the relocation of whole communities which, if successful, could then be used as a strategy to deal with severe land pressures in nonreservoir areas. Although every attempt should be made to meet the preferences of the Kotmale people (for after all, their interests are being subordinated to national interests), according to the research carried out in the area by the Socio-Economic Unit of the MDB, approximately 80 percent of the future relocatees wish to move to System C or at least to newly irrigated lands within the context of the Mahaweli Project (oral communication from S. Bulankulame).

Obviously there is a tremendous potential here to experiment with the relocation of entire communities although it must be kept in

mind that reservoir relocation is especially stressful since the relocatees are moving not because they want to but because they must. As a result, the transition period can be expected to be longer than is the case with voluntary settlement, a fact which has important policy implications. Indeed, reservoir relocation is such a special case that the MDB would be well-advised to request special assistance through the World Bank or other international donors to deal with the types of special problems associated with reservoir relocation. Although I was not able to obtain precise figures, it is clear that future dam construction within the Mahaweli Basin will require the compulsory relocation of at least 40,000 people. Appended to this report are two articles by the author that deal specifically with this topic.

A second situation applicable to both wet and dry zone villages might relate to an area of extreme fragmentation where sufficient families, extended kin groups, and village segments were selected as settlers to reduce both the degree of unemployment in the area and the amount of land pressure. While landless agricultural laborers, tenants and small-scale land owners might all qualify for removal, special emphasis would be paid to small-scale land owners who would be required to sell their land as a condition of selection. Sales would be to neighbors and relatives, the idea being to use land sales as one mechanism for effecting land consolidation, here defined as both the enlargement of existing fragments through purchase of adjacent land, and the aggregation of a number of fragments into a small number of larger holdings through a program of land exchange. Though I am not aware of any experiments with land consolidation in Sri Lanka in

connection with settler selection, it deserves some consideration simply because of its relative success elsewhere, a major example being in Kenya. At least in the dry zone Sri Lankan farmers are aware of the problems associated with excessive fragmentation. Referring to five purana villages, Ganewatte (1974a) points out that fragmentation is greatest in the most valuable lands -- that is, paddy land immediately below the tanks. In discussing this situation with many farmers, all "indicated that consolidation of their holdings in one or two parcels would result in higher productivity" (p. 22).

In this second example, I am not recommending that settler selection from the wet zone be linked with a program of compulsory land sales and of land consolidation in villages with especially serious population problems. Rather I am giving consolidation as an example of the way in which settler selection, in both the wet and dry zones, could be used to deal, on a village by village basis, with land pressure. Though farmers realize that excessive fragmentation interferes with productivity, the parcelization of land through inheritance may still serve important social functions. Land owners, for example, seldom cultivate all their parcels, especially where they are scattered about in several villages. Rather they make sharecropping arrangements with other farmers, who are usually relatives. At the same time, they may become sharecroppers on fields which are closer to those parcels of their own which they choose to cultivate themselves. While this is one mechanism for reducing the disadvantages associated with excessive fragmentation, such sharecropping arrangements also link villagers together in a network which may perform valuable social functions. However this

may be, it would appear that fragmentation has reached a critical point in a sufficiently large number of villages that corrective mechanisms, which require some government initiative and assistance, are called for. Obviously the situation is complex and requires careful study. In many agricultural production systems, fragmentation is intentionally practiced by farmers as a risk aversion strategy, each farmer seeking access to a variety of soil types so as to spread the risks of crop failure associated with any one field or crop. Before attempting any experimental program with land consolidation in Sri Lanka, a careful study of both the disadvantages and advantages of fragmentation in wet and dry zone villages should be completed.

H. A CONSISTENT POLICY TOWARD SETTLER PARTICIPATION IN MAHAWELI DEVELOPMENT THROUGH LOCAL ORGANIZATIONS, WITH RESPECTED MALE AND FEMALE LEADERS WHO VOICE CONCERNS AND TIE-IN WITH THE GOVERNMENT-ORGANIZED EXTENSION SERVICE

The one topic on which all reports are unanimous is the lack of effective leadership and social integration in settlement projects. Clearly here is a major problem which requires the careful consideration of politicians, policymakers, project managers, and experts on Sri Lankan settlement projects. Provided a small number of background papers have been carefully prepared ahead of time, this topic appears to be a most appropriate one for discussion within the context of a high-level workshop on Mahaweli Development Policy for Settlement Projects. The timing certainly is appropriate since Agricultural Production Committees and Cultivation Committees have been abolished by the government, while

new policies for establishing government-sponsored local level organizations have yet to be executed.

In discussing this issue, it is important to stress that solutions must be worked out in the context of local level community structure and organization, and national policy and government organization. In other words, there must be a linkage between "development from above" institutions and "development from below" institutions and leaders. While both are necessary, to date in Sri Lanka, there has been an overabundance of government-sponsored (and essentially government-run) organizations, including APCs, CCs, Rural Development Committees and Multi-Purpose Cooperative Societies, none of which have been effective in mobilizing on an ongoing basis widespread settler participation. Though I do not know why they have been ineffective, on the basis of experience with settlement projects in other countries three possible reasons come immediately to mind. The first is that these organizations do not have a base in the settlement community; that is, they are not seen as representing the interests of the settlers to the extent that they become actively involved as members. In effect there is no linkage between them and local level organizations.

Though community organization is weak in settlement projects, we were told by settlers in Uda Walawe of an attempt to form a Farmers Front. Based on local initiative and local leadership, membership increased to about 150. Though the Front collapsed several years later for a number of reasons, one which was emphasized in our discussions was lack of government interest in the association. According to those with whom we talked, members became discouraged when their representations to

government were ignored. Far more common in settlements are Funeral Associations and Temple Committees, both of which foster local leadership. Obviously potential leaders are there, as well as organizational possibilities. A number of settlers to whom we talked felt that the best approach would be to reestablish such former leaders as the vel vidane, along with the necessary support systems, such as judicial mechanisms for punishing offenders. Though they may well be right, institutions which worked effectively in the past may or may not be applicable today.

A second reason behind the ineffectiveness of government-sponsored "grass roots" agencies is that there are just too many of these organizations. With different functions, and responsible to different ministries (and even departments within the same ministry), all too often such organizations compete with each other for the settlers' allegiance. They also too frequently serve political functions which are not related to agricultural production and which may in fact fractionate the settler community especially where leaders are, in effect, selected by members of parliament rather than by their peers in the community. Such organizations also tend to give the settler conflicting advice or so much advice on a wide range of topics that the settler has a difficult time assessing priorities. The situation must be particularly difficult for those who seek leadership in such organizations since the same individuals tend, time and again, to occupy the positions of president, treasurer, secretary, and so on.

Though the first two reasons for the ineffectiveness of government-sponsored local level organizations are characteristic of

many types of development, the third reason is more characteristic of settlement projects. This reason relates to the overall lack of community integration and local leadership in government-sponsored settlements (and quite possibly in settlements of spontaneous migrants as well), at least during the first two phases. I suspect that there are a number of explanations for this situation. One is that settlers are generally selected as individuals according to criteria which deal with their age, family status and size, education and agricultural experience. Though homogeneous in this regard, they tend to come from different villages and even from different castes, ethnic groups and/or religious backgrounds. Frequently arriving at the settlement without their families, they do not constitute a community according to any definition of the term. Rather they are an aggregate of individuals, and, after the arrival of their families, of households.

A second explanation is that settlers often are pioneers, and like pioneers the world over, tend to be highly individualistic and family-oriented. In effect they are preselected as individuals who do not have very strong community ties to start with relative to local leaders in their village of origin. In dealing with these first two explanations, two mitigating approaches immediately come to mind. The first is to pay more attention to the movement of entire villages or at least of village segments, defined in both territorial and kinship terms. In effect the MDB is taking this approach in regard to the priority incorporation of purana villages into settlement projects, although I believe it could also be profitably extended to wet zone villages, with more emphasis being placed on selecting the largest number of people

possible from the same village (that village having been selected in the first place because of major land pressure problems). Certainly it makes sense to relocate as villages populations which must be moved because of dam construction, provided of course a sufficient number of people wish to move as a community.

The second approach would be to put more emphasis on selection criteria relating to community development and community leadership. In this case more attention should be paid to the recruitment of older people who have already achieved the position of respected village elders. Unlike established communities, settlements are dominated, demographically, by younger couples with their children. In this sense they are artificial. Their integration as communities might well be facilitated through the incorporation of older men and women. Strangely enough, selection criteria for settlement schemes tend to ignore the personality, experience, and accomplishments of the settler's wife. Though she should become a partner with her husband in the farming operation if optimum development is to be achieved, where a point system is used in settler selection, as in Sri Lanka and Malaysia, an insignificant proportion of points relate to the background of the wife. Not only should her background be given more emphasis, but special attention should be placed on the wife's capabilities and experience as a leader of women's and village activities.

A third explanation for the slow development of community organization and leadership in new lands settlements is the stress factor. Because of the stress associated with movement to a new habitat, individual settlers tend to be so preoccupied initially with their own

affairs and those of their families that they do not have the time and energy for community affairs. Furthermore, if the settlement is composed primarily of strangers, individual settlers may well shy away from involvement with other settlers so as to avoid the risk of unpleasant encounters which could increase the stress load. Once again, an appropriate government response would appear to be selection of kin, friends and neighbors for settlement as a group. In System H I was very interested to note the positive response to group settlement of those who came together from the area inundated by the Botenna Reservoir and from other wet zone areas. They requested group settlement because they wanted to bring village friendships and kin relationships with them. Yet another government response would be to do everything possible to bring the stressful transition period to an end at the earliest possible moment.

I. DEVELOPMENT OF A BROAD-BASED EXTENSION SERVICE TO DELIVER DEVELOPMENT INPUTS TO CLUSTERED SETTLEMENT COMMUNITIES

This is one topic which is receiving full attention in recent reports, most of which use the Training and Visit System developed by the World Bank (Benor and Harrison, 1977) as a starting point. During my brief visit I did not look into agricultural extension at all. Obviously, the crux of the matter will be to actually implement whatever policy is developed. In the context of settlement, one major question that has arisen is the relationship of the extension service to the settlement authority; that is, does the settlement authority have its own extension staff or are extension staff under the Ministry of

Agriculture. Another question concerns whether or not there is a unified extension staff under common supervision; that is, in the Mahaweli context, what is the nature of the relationship (both in regard to teamwork and supervision) between the KVS, the JPS, the Community Development Assistant and other extension and local government personnel such as Production and Marketing Assistants, Cultivation Officers, and Veterinary Assistants?

Yet another issue concerns the question of orientation for settlers -- when it is to occur, where, for how long, and what role the extension service is to play in this orientation -- the importance of which has been illustrated in a number of different settlement schemes. A major weakness throughout the history of settlement in regard to both orientation and extension is that they tend to focus almost exclusively on the husband and male head of household at the expense of the wife and female head of household. This is most unfortunate not just because of the importance of women in agriculture but also because there is growing evidence that settlement schemes are more stressful for women than for men during the initial phases.

Though I have seen no information on this topic in reports on Sri Lankan settlement projects, I can think of at least two reasons why Sri Lankan women may find settlement more stressful than men. The first is that there is little evidence that women's activities, both economic and social, are built into settlement design. Where women's activities have been ignored in other countries -- Upper Volta, for example, and the Sudan -- the status of the wife within the family and the community appears to do down. The second reason, more applicable to more distant villages, is that women may be less willing to leave their home village

than men. Since their husbands are selected, it may well be that some wives are in effect involuntary settlers. This reason alone is a major one for considering the wife's background, interests, and attitudes more carefully during the selection process, since an unhappy or noncooperative spouse will hardly help production.

J. A CONSISTENT POLICY TOWARD ENCROACHERS WHICH MAKES USE OF THEIR INITIATIVE WITHOUT FAVORING LAND SPECULATORS

This topic has already been briefly discussed under G.

K. STRATEGIES THAT ALLOW MORE EXPERIMENTATION THROUGHOUT THE ACCELERATED MAHAWELI DEVELOPMENT PROJECT, COUPLED WITH A FARMING SYSTEMS APPROACH TO DEMONSTRATION FARMS IN SETTLEMENT AREAS

Different approaches to crop diversification, land preparation using buffalos and tractors, size of land allocations for agriculture and homesites, settler selection and integration, and extension all require experimentation and a capability within the Mahaweli Development Authority and other relevant agencies to carry out that experimentation. Using the farming systems approach, a small number of carefully selected areas might be set aside where the necessary research and demonstration could occur. Wherever possible these areas should include pilot settlement communities so that the research and demonstration can be carried out on settler holdings, with economic returns, labor organization and inputs, and community involvement studied in addition to agronomic and water management issues.

L. THE CORRECT PHASING FOR INFRASTRUCTURE DEVELOPMENT FOR SETTLER COMMUNITIES GRANTED THE PROBABILITY THAT EVERYTHING CANNOT BE DONE AT ONCE

Crucial in the early phases are:

1. Roads and bus services.
2. Adequate temporary quarters (where an advance alienation policy is followed.
3. Malarial control and safe domestic water supplies.
4. An adequate and more diversified food supply based both on WFP type "food for work" assistance and encouragement of local boutiques.
5. Early implementation of a policy which encourages other service-providing, nonfarm families to settle under favorable conditions within the project area.
6. Construction and staffing of schools and medical facilities so that normal family services can begin to function as soon as possible.

These activities should be coordinated to enable the settler to bring his family at the earliest possible moment.

M. CREATION WITHIN THE MAHAWELI DEVELOPMENT BOARD OR AUTHORITY OF A MONITORING AND EVALUATORY MECHANISM BASED ON CAREFUL SAMPLING, PERIODIC ASSESSMENT, INTEGRATION OF AGRICULTURAL, ECONOMIC, AND SOCIOLOGICAL PERSPECTIVES, AND FEEDBACK TO THE POLICY MAKING LEVEL

While the Socio-Economic Unit of the MDB is a possible starting point, this unit currently has the staff only to carry out a small number of socio-economic surveys among such populations, for example, as those who must relocate in connection with the construction of the Kctmale Dam. Even for this work, the unit is understaffed and underequipped, needing

at the very least supplemental staff to form a second research team along with the necessary supporting equipment, including transport. While this unit has the capability to carry out one-time surveys, it does not have the capability to monitor developments on carefully selected settlements through time. Since settlements are dynamic, such monitoring is absolutely essential if problems are to be identified before they reach crisis proportions and if particularly effective adaptations and problem solutions are to be discovered and refined for introduction elsewhere. The need here is not just for staff increases but also for the recruitment of a wider mix of supervisory staff. Currently the Socio-Economic Unit is headed by a sociologist, who receives some backup from an economist based in Colombo. Needed at the very minimum is an agricultural economist and an agronomist, as well as backup monitoring capability in the universities and such research institutes as the Agrarian Research and Training Institute (ARTI) and the Marga Institute.

N. THE PROVISION OF FORESTRY PLANTATIONS FOR WINDBREAKS, FIREWOOD, AND LUMBER

This issue is self-explanatory in terms of the discussion under number 3 on page 16.

O. DEVELOPMENT OF A CONSISTENT POLICY FOR THE COMPULSORY RELOCATION OF THE CURRENT RESIDENTS OF FUTURE RESERVOIR BASINS

Two brief articles are annexed to this report which discuss the major problems that accompany reservoir relocation.

## FOOTNOTES

1. Actually a similar process is going on in older settlement projects. In Nachaduwa, which was settled between 1933 and 1955, Jogaratnam (1974) reports that 22 percent of the farmers in his sample utilized 3.2 percent of the land, while 11.2 percent utilized over 40 percent. Irrespective of government policy toward sales and subdivisions, this kind of situation is commonly reported for other well-established irrigated settlement schemes outside Sri Lanka, including, for example, in Egypt and the Sudan.
  
2. The question of what kind of agricultural experience is relevant, and how much, is a tricky one (see A. S. Kunasingham, 1975).

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