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Increasing the Employment Potential of New Land Settlements in the Tropics and Subtropics*

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I INTRODUCTION

New land settlements are defined to include both government and other agency-sponsored settlements and spontaneous settlements, a recent World Bank study on *Agricultural Land Settlement* (1978b) concluding that spontaneous settlements represent approximately 75 per cent of ongoing settlement. Using 1970 data, the World Bank study estimated that approximately 52 million hectares were available

* The research on which this chapter is based is part of a global evaluation of new land settlements in the tropics and subtropics which has been my main commitment between April 1979 and September 1982. Submitted by the Institute for Development Anthropology as an unsolicited proposal, this project was funded by the United States Agency for International Development. Its three major methodological components consisted of an evaluation of the literature; field studies in Egypt, Nepal, Sri Lanka, and the Sudan; and site visits to settlement areas in additional countries including Indonesia, Malaysia and the Philippines. The goals, methodology and results of the study are described in detail in Scudder, 1981b.

for further settlement in Asia aside from China, Mongolia, Democratic People's Republic of Korea, Taiwan, and Vietnam. Though much less than in Latin America and tropical Africa, this is still a significant resource available for employment generation.

In this chapter I have purposely substituted the phrase "new lands" for "agricultural" settlements since *a major reason why settlement projects have generated so little non-farm employment is because they have been planned and implemented primarily as agricultural production schemes emphasising a small number of export crops*. Just as production has been emphasised rather than the net incomes of settler families, so also where some attention has been paid to non-farm employment, that too has been production-oriented—emphasising the processing of agricultural products in spite of existing evidence that the generation of non-farm employment is more closely related to the production and consumption needs of settler families for a wider range of goods and services.

For such reasons as these, the focus of this paper will be more on farming systems than on individual crops, and *on the potential of new lands settlement to catalyze a process of regional rural and urban development (hereafter called integrated area development)*, with special emphasis on non-farm employment and the growth of towns and urban centres within or adjacent to settlement areas. Though there has been a surge of interest in recent years in the potential of new land settlements to create off-farm and non-farm employment, few studies have yet to be completed which enable us to specify this potential in numerical terms. While this is unfortunate, analysis of current sources nonetheless enables us to emphasise a wide range of current constraints to the generation of off-farm and non-farm employment, including national policy constraints and conceptual constraints on the part of those planning and implementing new land settlements.

If these constraints can be overcome, there is reason to believe that the multiplier effects of agricultural development in connection with new land settlements are considerably greater than has been previously realised. There is a paradox here. *Just as national and international planners have tended to overemphasise the speed with which short-term production benefits can be realised, so too have they underemphasised the long-term development potential of new land settlements*. For this reason, it is important to first examine new land settlements as they evolve through time before looking more specifically at their employment-generating capability.

II AN ANALYTICAL FRAMEWORK FOR THE STUDY OF NEW LAND SETTLEMENTS THROUGH TIME

It is commonplace for those analysing settlement projects to divide them into a number of development stages which must be passed through to ensure success.* The time factor is crucial here, since each stage has its own characteristics and problems which influence results, including production, net incomes and living standards of farm families, and employment generation. A major reason why early returns tend to be overestimated and later returns underestimated is because most observers are unaware of the policy implications of different stages for differential rates of development. Though certain analytical problems are associated with a framework based on stages, during our global evaluation of new land settlements we were able to classify nearly 100 settlement areas. "Furthermore, the very concept of stages draws attention not only to the fact that new lands settlements have histories, but also that these histories are remarkably similar" (Scudder 1981a), with each stage characterised by similar features and problems. This point is especially important since it justifies illustrating this chapter with African and Latin American cases where data relevant to Asian new lands settlements is not available to me.

Drawing on his African experience, Robert Chambers (1969, p. 226) separates out three stages, the first dealing with the presettlement period; the second with settlement and organisation; and the third with withdrawal involving specialisation and devolution. Writing on Latin America, Michael Nelson (1973, pp. 73-74) also uses a three-stage model, the stages being, in sequence, pioneer, consolidation, and growth. Though especially stimulated by Chambers' work, my four-stage framework focusses more on settler families and other settlement residents than on settlement agencies, with Chambers' second and third stages divided into three stages of which the first two (stage two and stage three) are dramatically different. Aside from the third, these stages are also less transformational than Chambers since I am convinced from a wide range of research that continuity is an essen-

* For the purpose of this paper, success means that a particular settlement is perceived as socially and economically viable by both the settlers and settlement administrators. Looking to the future, however, I believe that the only legitimate criterion for success is the extent to which new lands settlement initiates a process of integrated area development.

tial component of a dynamic development process—paradoxical as that may seem.

The four Stages are:

1. Planning, early infrastructural development and settler recruitment
2. Transition
3. Economic and social development
4. Handing over and incorporation

The whole sequence takes at least a generation, since I hypothesise that success is not ensured until after the children of the pioneering phase of settlers have taken over from their parents. Ideally, the stages should occur in sequence, so as to realise the returns of development (and the returns on investment) at the earliest possible time. In practice, however, the third and fourth stages may be reversed, that is, the stage of economic and social development may be postponed until after the second generation has taken over and the settlement has been merged into the regional economy. (This is a possible occurrence when wars like the Second World War or national insurrections as in Indonesia slow down the process of development.) Regardless of sequence, however, both the third and fourth stages must occur. Unfortunately, in far too many settlement areas the third stage never comes, so that the settlement merely replicates in a new area a low income and a subsistence-type economy in which future generations become increasingly impoverished as the land base is subdivided.

Stage one is the best understood and most frequently isolated. Indeed, it is frequently divided into two separate stages or substages. The first relates to feasibility studies, planning and design, while the second pertains to initial infrastructural development and settler recruitment. Because of increasing costs per settler family, feasibility surveys should cover a wider range of settlement and non-settlement options, and in the settlement case more attention should be paid to integrating spontaneous settlers with government-sponsored ones, and to realising increased indirect benefits through settlement development in terms of non-farm employment. Not only does available evidence indicate such an approach to be cheaper on a per family basis, but in tapping the initiative of spontaneous settlers, it also has more favourable developmental implications. Under planning, far more attention needs to be paid to the nature of the intended farming systems, and to the relationship of the settlement to regional development. As for the second substage, the use of the phrase "initial infrastructural develop-

ment" implies that the infrastructure should be carefully phased through time, while settler recruitment should be focussed on the interest, skills and experience of both spouses as opposed to just those of the husband.

Stage Two begins as soon as the first settlers arrive. It is a stage of settler adaptation, which can be expected to last for at least two to five years for the majority in well-planned and well-implemented projects, and for a considerably longer period in other settlements. In most cases, settlers need to adapt to a new agro-ecological zone as well as to new production techniques and forms of social organisation; to new neighbours (both hosts and other settlers); and to closer government supervision. For this reason, it is a period of uncertainty for the settlers. Uncertainty involves stress, with most settlers trying to reduce further risks by clinging to the familiar. Hence settlers prefer to live with relatives, former neighbours and co-ethnics, and wherever possible, to transfer to the new habitat old production techniques, crops, forms of labour recruitment and cooperative labour, and attitudes and beliefs, since further change at this time tends to increase the uncertainty and stress level. Land use tends to be characterised by extensive agricultural systems of relatively low productivity rather than by agricultural intensification, hence pointing up the unreasonableness of planner expectations for rapid increases in production during these years. Throughout the transition stage, the majority of settlers tend to be risk-averse—they adopt a conservative stance, their first priority being to meet the food needs of their family. Within the community, the context of social behaviour is simplified, with community activities (including participation in cooperatives, for example) de-emphasised or neglected in favour of family and neighbour oriented activities.

The third stage of economic and social development begins when a sufficient number of settler families shift their stance from a conservative to a dynamic open-ended one, which is characterised by an increased willingness to take risks. Though the time period is often measured in years rather than shorter time spans, this should not obscure the fact that a dramatic change in settler attitudes and behaviour has taken place. Preconditions for this change appear to include production of sufficient food staples to meet family needs as well as a growing perception of the settlement area as home. Thereafter, settlers appear to be much more willing to diversify their production strategies.

Though the analysis of more cases is necessary, the ways in which

these strategies are diversified appear to be remarkably similar on different settlements around the world. Often beginning during Stage Two, the first step is to invest in the education of the children, hence showing a willingness to forego immediate returns on their labour. Subsequently, additional farm land is share-cropped, leased, and/or purchased; the farming system is expanded into cash crops (including such labour intensive, high-risk crops as chilies and tobacco); and the cropping component is diversified to include livestock and off-farm activities. The latter tend to start on the settler's allotment, including such activities as small-scale cottage industries, construction of a small bakery or an in-house store selling a few essential commodities, or the purchase of a sewing machine to employ family members as tailors/seamstresses. In larger settlements additional rooms may be added to the home or a separate building constructed for rental to government officials and other non-farm employees. Subsequently, family economic activities expand to include such off-farm businesses as rice mills, boutiques (stores), and other small-scale commercial enterprises, and the hiring out of a wide range of equipment including two and four-wheel tractors, trucks, taxis, and mini and other buses. Initially based within the settlement area, if successful, such businesses may later be expanded off the settlement as is the case in Egypt and the Sudan where a small minority of settlers have purchased land and built rental properties in such urban areas as Alexandria and Khartoum, and opened urban-based businesses.

The sequence of investment strategies outlined above involves not only the head of the household but also his spouse and children. I personally have observed it in Zambia, Kenya, Egypt, the Sudan, Sri Lanka, Nepal, Malaysia, Indonesia, and the Philippines. Being considerably more dynamic than the development models that most planners have for settler families (models which usually attempt to fully employ family labour in the cultivation of a small number of crops for export), this sequence of activities has major implications for the development of new land settlements and specifically for employment generation. Employment generation here relates not just to recruitment of settlers but also to the hire of agricultural labourers, to the reallocation of settler family labour into off-farm activities, and to the creation of additional opportunities for non-farm employment—all these topics will be examined in more detail in subsequent sections.

While the third stage is essential if production, living standards and employment generation are to rise, the fourth stage of handing over

and incorporation is essential for the perpetuation of the settlement as a successful economic and social entity. Handing over refers not just to the successful ability of a second generation of settlers to maintain and increase production levels, but also to the ability of specialised or national settlement development agencies gradually to hand over certain developmental, managerial, and operational (O and M) activities to a wide range of locally based organisations. These include the local departmental offices, for example, of the ministries of agriculture and public works, as well as rural and municipal councils, and such settler participatory action organisations as water-user associations, farmer unions, cooperatives (including women's cooperatives) and a wide range of residential associations. This type of handing over is essential for two reasons. First, recent studies (see, for example, Development Alternatives, Inc., 1975) indicate that active and effective participation of settlers in the planning, implementation, management, and evaluation of development projects (including new land settlements) is correlated with a higher degree of project success, as is the creation of effective farmer organisations from the local to the project level. Second, recent studies also bring into question the ability of centralised and hierarchically organised settlement agencies to maintain through time their financing, their momentum, and especially their efficiency in terms of developmental and O and M activities which are crucial to the continuing success of the project (Scudder 1981 b).

The purpose of incorporation is to end the settlement's status as a special enclave through its incorporation as an integrated part of the encompassing region. Though partially the result of a successful process of handing over, the incorporating agencies must also have the resources and the will to handle, for example, the upkeep of roads with associated culverts and bridges that access settlement areas. Incorporation also need include the integration of such settlement organisations as water-user associations and farmer unions at the regional and national level so that they are in a position to compete for scarce resources. Moreover, "if large and more diversified new land settlements are to realise their potential for catalysing a process of regional development, incorporation must enable the settlement area to play a major role in influencing regional policies and the implementation of those policies" (Scudder 1981 b).

III SCOPE AND SIZE OF NEW LAND SETTLEMENTS

In terms of scope and size, the discussion that follows suggests that increased employment generation and development will be realised where settlement scope is broadly conceived as integrated area development while size involves thousands rather than hundreds of settler families.

Under scope, our evidence strongly supports the insistence of Weitz et al. that a settlement project must be multisectoral.

Agriculture does not develop itself. It requires a complex institutional system to support it, market its products, and provide inputs, credits, and professional advice. The rural community, which is the agent of agricultural development, needs services for its population, such as education, health, public facilities and commercial outlets... The full capacity of employment generation in new settlements beyond a certain size cannot be realised unless there is a simultaneous growth of agriculture and industry... The advantages accrued from the establishment of industries within the project area are twofold: first, the industries spur the process of farm diversification by creating a market for products—raw materials for processing and perishable foodstuffs for consumption by the industrial workers; second, the industrial plants by themselves provide a new source of employment within the project (1978, pp.5-6).

The World Bank's more recent *Agricultural Lands Settlement* (1978b) reached the same general conclusion in stating the need for "an integrated regional framework that includes development of related agro-industrial service sectors" (p.40).

The most successful settlement projects that we have evaluated to date combine agricultural development with the creation of commercial centres and townships with a strong service and manufacturing component. Where planners implement new land settlements primarily as agricultural production schemes, their policies may prevent such settlements from realising their potential simply because the non-farm component is ignored. The same result may follow where planners ignore existing commercial centres and townships, preferring rather to create new towns in the centre of settlement areas. Where these have no relationship to existing centres, neither may realise their development potential, or the existing centre may continue to develop (though probably at a slower rate) while the government new town eventually becomes little more than a ghost town (as is the case in a number of Sri Lankan settlement areas).

The creation of economically and socially viable new land settle-

ment areas is a difficult task, requiring an integrated area development perspective. What is being discussed is not just a process of integrated rural development but of integrated rural and urban development, with the urban component based not on large-scale urban growth poles but on the growth of a series of hierarchically ranked townships and regional centres (see Carroll 1980; Weitz et al. 1978). Not only is some degree of area (or regional) planning essential, but the cooperation of a variety of agencies which often have little relationship to each other is needed. As Carroll notes, agriculturally oriented programmes are administered by "completely different agencies than in the case of municipal or small-town programmes" (p.15). To date settler planners have tended to ignore the need to facilitate the emergence of rural towns almost entirely, Weitz et al. reporting that except for three of the sixty-three projects in their sample "no mention was made of developing either existing or new towns" (p.73). The three exceptions were the Managil extension of the Gezira scheme in the Sudan, the Uda Walawe scheme in Sri Lanka and the Jenka Triangle project in Malaysia. After visiting all three areas during 1980, I would say that the Sudan and Sri Lankan cases are the most successful to date because the emphasis was more on enhancing the development of existing rural towns rather than attempting to develop new towns from scratch.

If they wish to facilitate area development and at lower financial costs, planners should also be more prepared to seek assistance from the private sector in planning, implementing, managing and evaluating settlement programmes. By private sector I mean both those who are supposed to be project beneficiaries, and national and international corporations and private voluntary organisations (PVOs). Not only are settler families the principal risk-takers, but a number of recent studies have shown that project success is positively correlated with active local participation. This means that settlement authorities should encourage, for example, the formation and federation of such local participatory action organisations as water user associations, farmer unions, women's organisations, and rural and municipal councils to which they can hand over a range of responsibilities as the settlement matures. Since success depends on local initiative, obviously the most important resource of the area is the local population, including non-farm employers and employees, so that development planning can start with an improved understanding of the beneficiary population, including both the indigenous residents and project immigrants.

Where development goals emphasise employment generation, in-

come distribution and social equity, the lower income majority should be the main project beneficiaries. This does not mean, however, that local entrepreneurs, private corporations and PVOs should not be involved as providers of capital, management and technical expertise, and employment. A major problem with new land settlements is that planners, policy makers, and administrators try to do too much for settlement inhabitants with the result that settlers become more dependent than entrepreneurial, while the initiative of the local business community tends to be neglected. In terms of the development of townships, far more attention needs to be paid to credit and other development policies for establishing small- and medium-sized commercial enterprises. At the same time, a greater effort should be made to incorporate large-scale private corporations and PVOs in the settlement development process. In Sri Lanka, the Mahaweli Authority is involved in an interesting experiment whereby Hatton National Bank, on a sole source basis, provides credit to small-scale settlers in one irrigation block. In Latin America, Judith Tandler (oral communication) believes that private lumbering firms would be willing to bear some of the public costs of infrastructure development in order to gain improved access to timber resources. I suspect the same would be the case in parts of Asia; in Palawan in the Philippines, for example, it is private lumbering interests that opened up the west coast to spontaneous settlers in a number of areas. As for PVOs, in Bolivia two such organisations developed and ran an excellent four-month orientation programme on contract with the government settlement agency.

As for settlement size, more information is needed on the critical mass of settlers necessary to catalyse a process of integrated area development. In spite of this, it is clear that many settlements are far too small to have much of an effect on the generation of non-farm employment. More specifically, far too many government-sponsored settlements consist of only several hundred settler families with the result that the number of non-farm jobs rarely exceeds 10 per cent. As Weitz et al. put it,

Obviously, the benefits of industry cannot be gained if the project is very small; a minimum volume of agricultural raw materials is required to support a processing plant, and a minimum population is required to create a market for perishable foodstuffs (p.6). In effect, we are talking about the need for thousands rather than hundreds of settler families. In Malaysia, FELDA has increased over the years the average size of World Bank assisted projects from about 400 families in Jenka 1 to more than 1,600 in the Keratong Project (World Bank 1978b, p.40, footnote 11)

Yehuda, as paraphrased by Carroll, reports that in Brazil population centres of over 5,000 residents are "pre-requisites for the establishment of small rural industries" (1980, p.18), while Weitz et al. believe that a regional rural town is needed for every 5,000 settler families.

IV TYPES OF EMPLOYMENT GENERATION

It is important to start this section off with a cautionary remark. Though I believe the development potential of new land settlements can be considerably greater than is usually the case, the capacity for such settlements to absorb large numbers of a country's lower income residents has been exaggerated. As pointed out by the World Bank's Issues Paper on *Agricultural Lands Settlement*, the effect of new land settlement on "employment creation in most countries has been small relative to the growth of the rural population" (1980b, p.17). In spite of its million acre and other settlement schemes, in Kenya settlement over a ten-year period absorbed only 10 per cent of the annual population increment. In Indonesia, massive government-sponsored transmigration projects absorbed only 5 per cent of the population increase in Java (which produced most of the transmigrants), while Nelson reports that new land settlements in Latin America have involved only 2 per cent of the rural population increase between 1950 and 1970 (1973, p.198). This is the general picture, though individual exceptions exist such as Malaysia's FELDA settlements (to which approximately 50 per cent of public sector expenditures for agriculture have been committed in recent years) and possibly Sri Lanka's massive Accelerated Mahaweli Programme (AMP).

New land settlements have the potential to increase three general types of employment. These are, first, employment of owner-operators and their families on farm holdings; second, the employment of permanent and seasonal farm labour; and, third, non-farm employment. With few exceptions the planning and implementation of new lands settlements by government and donor agencies has emphasised the first type of employment while ignoring the other two types. Furthermore, where operators are not owners, sponsoring agencies tend to establish them more often as labourers and tenants than as renters or sharecroppers.

OWNER-OPERATORS AND THEIR FAMILIES

Though planners and policy makers have underestimated and underemphasised the capability of new land settlements to generate employment, this criticism does not mean that they have overemphasised the importance of owner-operators. On the contrary, these are the key to subsequent development including increased agricultural production, rising living standards and employment generation including non-farm employment. In this sense new land settlements are the polar opposite to growth pole development which is based on the assumption that rapid industrialisation in urban centres is the best starting point for regional development.

The Need to Pay Attention to both Spontaneous and Government-Sponsored Settlers

While the settlers are the catalytic agents, too much emphasis has been placed on government-sponsored settlers who receive official allotments as opposed to spontaneous settlers who also take up land holdings in and around the settlements, and as opposed to farmers who may subsequently share crop or lease the holdings of the original settlers. Though attitudes are changing, spontaneous settlers are still viewed with suspicion by many settlement authorities around the world. This suspicion is frequently illustrated by the use of pejorative terms for such settlers who are called "encroachers," for example, in Sri Lanka and "pirates" in Upper Volta.

A pejorative attitude towards spontaneous settlers is unfortunate not only because they tend to be the majority of settlers in most countries of Asia and elsewhere, but also because recent studies show that generally speaking they make better farmers in less time at lower cost than do government-sponsored settlers (see, especially, Nelson, 1973, for Latin America; a more recent doctoral dissertation research by Tusi Uprety in Nepal's Tarai and by W. James in Palawan, Philippines supports the same conclusions). Granted these situations, governments could make greater effort to guide their activities and build their initiative as contemporary pioneers into the development process. There are many reasons for doing this. In regard to guiding spontaneous settlers, this is important not just to utilise their enterprise and energy but also to avoid the low productivity and major ecological costs which all too often are associated with spontaneous settlement, especially where large numbers of otherwise landless bush fallow cultivators introduce extensive systems of agriculture into upper catchment areas

of river basins or along river banks.

As previously mentioned, spontaneous settlers outnumber government-sponsored settlers throughout the tropics and subtropics, this being the case even in Indonesia in spite of the major emphasis that both the colonial and post-colonial governments have placed on the government-sponsored transmigration of Javanese and Sundanese to Sumatra, Sulawesi, and Kalimantan (MacAndrew, 1978). In Nepal's Tarai, in the pioneer areas of the Philippines, and throughout most of Africa and Latin America spontaneous settlers are apt to outnumber government-sponsored settlers by four to one. Even if such a tactic is desirable (and there is little evidence that it is) few governments in Asia, Africa and Latin America would be able to stop this influx even if they tried. It would be far better to try to tap the initiative of those involved and to incorporate both spontaneous and sponsored settlers into carefully selected areas, where attempts can be made to intensify the farming systems of both types of settlers through research-backed extension services, improved marketing facilities (including storage capacity and transport) and favourable rural-urban terms of trade.

Such a strategy makes sense also in terms of employment generation for a number of reasons. First, spontaneous settlers are cheaper to settle so that a given capital outlay can provide for a larger number. This is important not just in fiscal terms but also because employment generation outside the agricultural sector is positively correlated with increased size of settlement. Second, because they often make better farmers in less time than government sponsored settlers, larger multiplier effects can be expected more rapidly than is the case with settlements involving just government-sponsored settlers.

So that misunderstanding be avoided, it is important to emphasise that I am not suggesting that spontaneous settlers should replace government-sponsored settlers or that no attempt should be made to control the process of spontaneous settlement. One reason why spontaneous settlers make better farmers in less time than do government sponsored settlers is that they often have more resources, sponsored settlers tending to come from a poorer strata of the population (this is especially the case in Indonesia and the Philippines, for example, where settlement involves travel between islands). Settlement policies designed to help the landless rural poor must include a significant proportion of sponsored settlers. Similarly, if uncontrolled, spontaneous settlers can rapidly destroy forest reserves, and initiate a process of environmental degradation by moving into upper catchment basins and clearing vegetation from riverine fringes. They can also "mob"

settlement areas before they can be properly laid out if no constraints are placed on their movement. For such reasons, controls are especially important in Asian countries where new lands of settlement potential are scarcer than in Africa and Latin America.

While the approach taken will have to vary from one country to another depending on the availability of land and other factors, one possibility is to incorporate previous spontaneous settlers into a new settlement area as part of the "host population," while restricting new settlements after a certain date to government-sponsored settlers, as is currently the policy in System C of Sri Lanka's Accelerated Mahaweli Programme. Another approach is to encourage spontaneous settlers to seek out non-farm opportunities and to provide labour for sponsored settlers during the initial years of settlement while they are seeking their own land in adjacent areas (as is often the case in Indonesia). Yet another approach would be to "direct" them into certain areas through the use of a site and service approach that provides minimum infrastructure (like potable water and roads) and services (like credit and extensions)—an approach which is best adapted to rainfed agriculture in countries like Indonesia and Malaysia, which still have large relatively underutilised areas available for settlement.

Settlement Development Strategies to Increase Employment and Income Generation

The use of the phrase "employment and income generation" is taken from the 1978 ILO report by Raanan Weitz and his associates at the Rehovot Settlement Study Centre in Israel. The purpose of this report was to assess the conditions under which employment generation could be increased in connection with new land settlements. Though the lack of post-implementation data on the sixty-three projects which the authors assessed forced them to base their analysis on planning documents and simulation modelling rather than on actual results, and although only ten of their projects dealt with Asia, the tentative conclusions from our Institute for Development Anthropology evaluation support and amplify many of their assumptions.

Type and Number of Settlers and Size of Holdings In terms of employment generation, there is no alternative to emphasising recruitment of settlers working small holdings versus those working medium and large holdings. Not only does emphasis on small-holders increase the number of farm owner-operators, but as Johnston and Kilby note, "where income is more or less evenly distributed over

broad segments of the population, the result is large markets for comparatively simple goods" (1974, p.304). Since the production of these requires little technical and managerial sophistication, such goods can be produced within settlement areas, hence increasing the scope for non-farm employment. On the other hand, as Mellor and Lele (1972) have documented for India, and as Johnston and Kilby have stated more generally, larger and more wealthy farmers have an increased demand for more expensive imports or more complicated manufactured goods which cannot be produced locally. They are also more apt to invest in capital-intensive equipment like tractors which, on the one hand, reduce farm employment per unit of land and, on the other reduce non-farm employment since, unlike bullock-drawn equipment, such gear also cannot be produced locally. Furthermore, in terms of increased productivity, there are no major countervailing factors which would support the recruitment of medium- and large-scale settlers since convincing evidence has yet to be produced to show that economies of scale are associated with increased production of a wide range of crops in the tropics and subtropics while productivity tends to be lower on the holdings of middle-class settlers than on lower-class ones (see, for example, Farmer, 1957, p.307, for Sri Lanka). Even where economies of scale are associated with particular crops, other alternatives—still based on the small-scale family farm concept—exist, one example being the communal cultivation of oil-palm sections on Malaysia's FELDA schemes, with profits then divided among those working on a particular section.

There is an upper limit, however, to the number of small-holders who can profitably be settled in a particular area in regard to productivity, rising standards of living, and the generation of non-farm employment. Unfortunately, planners tend to forget this point, so that increasing the number of settlers beyond a certain level actually reduces employment generation since settler net incomes are insufficient to increase the demand for locally manufactured goods and services, and since local production is not sufficiently great or diversified to meet the demand of non-farm workers for locally produced foodstuffs and raw materials for local processing, the farm enterprise becoming mainly a subsistence operation which perpetuates rural poverty rather than alleviating it.

The key factor here is the net income (see below) rather than the size of the holding or full employment of family labour. In the case of Sri Lanka's Accelerated Mahaweli Programme, the currently recommended holding of 2.5 acres might be below the minimum size

necessary to catalyse a broad-based programme of integrated area development. Certainly this possibility deserves more attention than it has received since, as already mentioned, too small a holding in the long run is counterproductive both in terms of farm production and employment generation. As for what the desirable size of farm holdings should be, that will vary according to the crop mix and the nature of the recommended farming system, according to the characteristics of the encompassing agro-ecological zones, according to the degree of intensification, and according to national development policies, including pricing.

Farm Technology In terms of technology appropriate for a combined emphasis on productivity, employment generation and integrated area development, clearly the emphasis should be on techniques which are both yield-increasing and labour-intensive. Double cropping, especially via irrigation and improved water management are crucial although double-cropping possibilities should not be neglected for systems of rains cultivation either. Double-cropping technologies are especially important not just because they more fully employ family labour, hence reducing the amount of seasonal underemployment, but also because they may reduce competition between farm owner-operators and non-farm workers for non-farm employment, hence increasing the total labour force.

Inputs (including equipment) which can be produced and maintained locally should be favoured. This does not mean animal power should necessarily be favoured over mechanised equipment, since some such equipment (tube well components in Pakistan and Tamil Nadu, India, for example) can be manufactured and maintained locally. Furthermore, labour bottlenecks associated with double cropping and other types of intensification may require the use of tractors and other equipment which cannot be produced locally, while essential fertilizers and fuels will have to be imported. Though the proper balance between locally produced and imported agricultural inputs needs to be worked out in each case (and of course the nature of this balance will change through time if the settlement develops), nonetheless it is important that overdependence on external inputs is avoided where possible.

Nucleated Versus Dispersed Settler Communities Though entire monographs have been written on this topic, and strong arguments can be marshalled to support both sides, the ability of new land settlements to catalyse a dynamic process of integrated area

development definitely appears to be enhanced by the placement of settlers in nucleated settlements. According to the World Bank's *Agricultural Land Settlement* (1978b),

Relatively large, nucleated settlements generally can provide employment in a wider range of secondary and tertiary economic activities and support a greater array of social service than smaller settlement schemes with geographically dispersed housing sites (p.12).

Certainly nucleation is the trend at the moment in regard to major government-sponsored settlements in Latin America, Africa, the Middle East and Asia, with major examples in Asia being Indonesia's current transmigration projects, Malaysia's FELDA schemes and Sri Lanka's Accelerated Mahaweli Programme. In Latin America a novel nucleated settlement pattern has been pioneered by Bolivia's San Julian project which has greatly facilitated the design of a successful orientation programme for new settlers (Hess 1980).

Generalising for the tropics and subtropics as a whole, Weitz et al. conclude that nucleated settlements are especially important during the earlier years of new land settlements since they facilitate the introduction of new production techniques and organisational forms. They also provide more socio-cultural security, in the authors' opinion, during those early years. This is an important observation which is supported by our evaluation but only where community members share the same socio-cultural background (this statement does not mean, however, that they should come from the same village but rather that they should be co-ethnic). Though many governments have attempted to use new land settlements as a means for integrating diverse ethnic populations within the same village communities, the global evidence suggests that that approach prolongs the transition period (Stage Two) by increasing the risks of inter-ethnic conflict and slowing the process of community integration, including the formation of communal work groups during the initial years of settlement which often are characterised by serious labour bottlenecks. Rather, integration makes more sense at the project level, with children from different ethnic groups sharing the same higher education facilities, for example, rather than the same village.

Net Income of Settler Families In planning new land settlements, far more attention needs to be paid to the net income of settlers than has been the case to date, not just in terms of increasing production but also in terms of increasing employment. I suspect that planners have failed to realise this point because of their overemphasis

on new lands settlements as agricultural production schemes and because of the common policy determination that the farm holding should be cultivated only through the use of family labour, so that its upper size is determined more by the size of the average family labour force than by income considerations.

Emphasis on agricultural production tends to underplay the importance of net income for three reasons. First, in focussing on the total output of a small number of crops for export, it downplays the need for incentives which will motivate the settler family to produce. Second, it ignores the dynamics of the settlement process. Third, it misjudges where the multiplier effects of increased production fall. For integrated area development to occur with increased production in all sectors, rising net incomes and employment generation, every dollar spent on direct benefits in the agricultural sector must also produce indirect benefits through the value added in the service and industrial sectors. These indirect or downstream benefits are labelled multiplier effects. They tend to be underemphasised by settlement planners for a number of reasons, including an overemphasis on agricultural production and the nature of economic appraisal techniques which tend to emphasise short-term direct benefits at the expense of long-term indirect benefits.

Looking to the future, more attention needs to be paid to the producer—in this case the settler family, in order to raise production. The settler family not the land or the water resources, is the main resource, and new land settlements can only catalyse a process of integrated area development if the settler family has the incentive and the opportunity to produce. In planning and implementing new land settlements, governments can do much to provide that incentive and that opportunity, by creating favourable price structures for agricultural produce and providing adequate physical and social infrastructure in the form of roads, marketing infrastructure and a wide range of institutions.

Concerning the dynamics of the settlement process, what is needed for both increased production and employment generation is for a significant proportion of settlers to move from the risk-adverse transition stage to the stage of economic and social development. So long as settlers remain close to the subsistence level, it is reasonable to expect them to be risk-adverse—to adopt a relatively conservative stance for meeting family security needs. As net incomes go up, however, investment strategies change (as previously outlined) and consump-

tion goes up, hence increasing the demand for goods and services which in turn provide increased non-farm employment opportunities. This point has been documented time and again. In their *Agriculture and Structural Transformation: Economic Strategies in Late-Developing Countries*, Johnston and Kilby (1975) note that "as per capita output in the economy rises a growing share of household expenditures are devoted to manufactured and processed commodities." Under manufactured goods, the authors distinguish consumer goods and producer goods. The former include textiles (identified by Mellor and Lele as the most important consumption item for lower income categories in their India survey, 1972), cosmetics combs and brushes, plastic and leather sandals, wooden furniture, transistor radios and fans, bicycles, and bricks, whitewash and paint for home improvement. As for the latter, they include capital equipment like ploughs, carts, and pumps, and such intermediate inputs as fertilizers, pesticides, fuel and cement for upgrading irrigation components at the field level.

Where planners do take into consideration the multiplier effect of increased agricultural production, the conventional wisdom is that most employment generation will be in agro-industry. But what evidence is available (and only some of this applies to settlement projects) suggests that this is not the case. In their World Bank study of the Muda Irrigation Project in Malaysia, Bell, Hazell and Slade (1980, as quoted by Carroll 1980) and his colleagues reported that for every dollar of direct benefits generated by the project, there were 83 cents of indirect benefits. Of the 83 cents, 50 cents came from increased farmer demand for consumer goods and services rather than from agricultural production linkages (with rice milling accounting for only 10 cents of the total). After recounting this case, Carroll adds that agro-industry—commonly thought to be the main non-farm enterprise—may not be the best way to generate rural employment. Referring to a summary of research studies (in the form of an undated manuscript entitled "An Approach to Spatial Planning for Rural Development" prepared by U.S. AID's Working Group on the Rural Poor), Carroll concluded that "small enterprises for production of local household consumption goods engaged about two-thirds of the non-agricultural labour force" (p. 15).

One of the more interesting findings of our global evaluation of new land settlements is that as net family incomes go up, settlers around the world appear to purchase the same sorts of goods and services. Under home furnishings, for example, wooden chairs, dining room

tables, stuffed couches and chairs, glassed-in cupboards (with china and other material possessions on display shelves), wall clocks, radio cassette players and (where electrification is available) fans all tend to be purchased during the stage of economic and social development. With some exceptions like fans and radio cassette players, most of these items as well as bricks and other materials for home improvement can be produced locally. The same applies to a wide range of agricultural equipment including implements, bullock carts, and tube well pumps and components. A major conclusion, for example, of Child and Kaneda's study of small-scale agriculturally related industry in the Pakistan Punjab was that small-scale tube well and agricultural equipment firms require "only half to two-thirds as much capital per new workers employed as does large-scale industry" (1975, p.247). Obviously than as net farmer (or settler) incomes go up, the potential for non-farm employment generation in rural areas is considerable. Reasons why this potential is not being realised relate not just to the too narrow perspective of settlement planners but also to national industrial policies.

Diversifying the Farm System Our evaluation strongly supports the conclusion of Weitz et al. that diversifying the farm system increases production, net incomes and employment, both on and off the farm. The same applies to agricultural intensification, provided such intensification occurs within the context of a diversified farming system. Diversified farm systems have three distinct components which ideally should be integrated. The first is the crop component, the second the livestock component and the third the off-farm component. As Weitz et al. point out, diversification of the farming system has two desirable impacts. First, it evens out the seasonality of the family labour profile (as does intensification through double cropping) reducing family underemployment; and second, it diversifies farm production to meet local and national needs for food and raw materials. Where new land settlements generate a considerable amount of non-farm employment, there will be increased local demand for a whole range of farm products including not just grain staples but also legumes, vegetables and fruits, poultry and dairy products, and meat—a demand which can only be met if the farming system is diversified.

Diversification should not only attempt to diversify the range of crops grown and integrate livestock into the farming system, but it should be implemented in such a way that it improves the social and economic standing of all family members rather than just the head of the household. A major weakness with settlement schemes throughout

the world (a major exception being Malaysia's FELDA project), is that the interviewing of prospective government-sponsored settlers is restricted to the male head of household rather than including both husband and wife. If the wife is reluctant to move to a settlement area, family relationships and family productivity are likely to be adversely affected if such a family is selected. On the other hand, if the wife not only wishes to become part of a new land settlement family but also has various agricultural, livestock and off-farm skills, the chances of such a family more rapidly diversifying their family enterprise are increased. This is desirable not just in terms of more fully employing family labour and increasing production, but also for raising the status of the wife and other female members of the household.

A number of researchers have observed that the position of women within the family—and more specifically their economic and social status—tends to worsen on government-sponsored new land settlements because planners do not include economic activities for women (and female extension agents to encourage those activities) which will replicate whatever economic contribution they made to their family's well-being prior to settlement. There is, of course, a whole range of important productive contributions that women can make to the farming system, activities which should be built into new land settlement planning. Though in some cases they may be encouraged to farm portions of the family's main settlement allotment (as in Upper Volta), more often these activities are focussed on the household or "home" plot, or relate to off-farm employment including trading activities. On the household plot, which needs to be large enough to encourage such activities, the wife may raise vegetables, for example, for the market, or she may concentrate on eggs and poultry, dairy products, small stock, and a wide range of small businesses including working as a seamstress or a baker, or managing a small shop from the house.

Such activities will diversify the farming system, provide a wider range of food products for non-farm families in rural centres and adjacent towns, and strengthen the family as a joint decision-making and production unit. Though I have not seen this hypothesis tested in rural areas, the more active involvement of women in the farming system of new land settlements may also have important demographic implications through time in terms of lower fertility, especially if the woman receives the income from her activities or at least has a say in how that income is to be used.

On the other hand, diversification of the farming system into off-farm activities is a mixed blessing in regard to total employment generation since settlers often become increasingly involved in off-farm activities as the years go by. While this increases the proportion of income within settler family budgets from those activities, it may also decrease the employment opportunities for non-farm families. Analysis of the history of new land settlements around the world as well as analysis of a wider range of small family farms suggests that the importance of off-farm employment for farm families increases through time for two very different reasons.

The first reason why off-farm employment increases is counter-productive in terms of employment generation and perhaps rising net incomes is due to an increasing reduction of the size of the farm-holding—hence forcing family members to look for off-farm employment in order to survive. This is a major trend today throughout the world, with subdivisions resulting both from inheritance patterns within the farm family and from loss of control over land to larger landowners. In Latin America, Carroll (1980) notes that the size of larger land-holdings has been increasing in Brazil, Columbia Mexico and a number of other Latin American countries at the expense of small-holdings and labour absorption. Referring more specifically to the very successful settlement process in northern Parana, Brazil, Katzman (1977) notes how the percentage of farm owner-operators decreased from 60 per cent in 1940 to 50 per cent in 1960—with the proportion of sharecroppers also increasing proportional to owners. During the same time period, the farm size for small-holders was reduced over 50 per cent. Referring to the Matar Taluka irrigation area in India, Shah and Shah (1974) note a similar trend between 1930 and 1965.

Whether in Pakistan (World Bank 1978a), the southern portion of the United States, or elsewhere, as the size of the small family farm decreases the proportion of income derived from off-farm sources (including agricultural labour and off-farm employment) tends to increase simply because the family must diversify its activities in order to survive. Under these conditions of subdivision and land reduction, net incomes frequently drop, and even if they do not, members of farm families must compete with non-farm families for off-farm employment. This undesirable situation can be slowed down and perhaps kept under control by planners of new land settlement projects in a number of ways. Two important ones relate to credit and land tenure. One reason why small-holder farms in the tropics and subtropics are

slowly decreasing in size is that their owners have insufficient access to credit to meet emergencies (such as illness or death in the family or theft or death of draft animals) and major social commitments (such as the marriage of a daughter). As a result, they often must accept credit from local moneylenders and businessmen under very unfavourable terms—often losing their land, which has been put as collateral, when they are unable to pay off their debts. A similar situation may occur in regard to seasonal needs for credit in connection with farm operations, especially where costs of inputs are increasing more rapidly than the sale prices for farm products.

On new land settlements, planners at least have the option of building in sources of credit either through the private sector, as is being experimented with in Block H-5 of Sri Lanka's Accelerated Mahaweli Programme, where the Hatton National Bank is providing settler credit, or, more frequently, through government-lending institutions. But as Katzman emphasises for the northern Parana settlement area, viable settler holdings cannot be maintained through time in the face of adverse national and private sector policies relating to credit; on the contrary, some of the operating requirements to keep settler holdings intact need be "met by the broader society" (1977 : 68). One way of implementing a credit programme is to eventually let such farmer organisations as water-user associations, farmer unions and cooperatives vouch for the credit needs of their members and guarantee loan payments.

As for land tenure, this is a particularly thorny issue. In many government-sponsored projects settlers continue to be government tenants on annual leases decades after their settlement in spite of government promises that land titles would be issued. Although there are many reasons why government intentions to distribute land titles are not implemented, one is the fear of planners, policy-makers and administrators that settlers will sell their allotments after the receipt of the title. Undoubtedly, some would, but even where titles are not given, illegal transfers occur whereby indebted tenants either become sharecroppers or paid labourers on their former holding or lose control of it entirely. Furthermore, strong arguments can be made that lack of title provides a disincentive to the farmer to make permanent improvements to his land and housing, and to invest in perennial crops and livestock. Lack of title often also makes it very difficult for the settler to obtain credit when needed. Hence, the nature of land tenure constitutes a dilemma for the planner. Possible solutions include link-

ing land titles with a viable credit programme, hence reducing the circumstances under which settlers might lose their land through indebtedness. Another, suggested by Weitz et al. is to allow settlers to own their houses and homesite plot but not their fields. These would be transferred to the community in which the settler lives which would then lease or otherwise allocate the lands to settler families. Such examples should not be taken as recommendations, since the nature of land tenure in new lands settlement needs to be carefully thought out on a situation-by-situation or country-by-country basis.

While the less fortunate new land settlers tend to diversify into off-farm occupations as a survival mechanism to compensate for land subdivision and land reductions, we also find that successful settlers also diversify into off-farm employment through time—but for a very different reason. In Section II of this paper, I described how settler families are more willing to take risks during the third stage of economic and social development. At this time they diversify economic activities by shifting family labour into a wide range of off-farm enterprises. This shift is a result of rising income, with the farm family recruiting hired labour for more strenuous and/or less productive (but necessary) and less prestigious farm work and reallocating family labour to more productive, less strenuous on- and off-farm activities. With net incomes going up, this diversification of the family enterprise, on the one hand, increases family demand, but also increases family competition for non-farm business and employment opportunities. While I do not know what the trade-offs are in regard to employment generation, there is also a social equity problem here if too many resources are allocated to settlers in the form of land and subsidies. The risk is that government policy leads to the emergence of a small rural elite which is able to compete successfully for a growing proportion of available resources (see, for example, Higgs 1978, p. 17).

Again I am uncertain as to the trade-offs here, although Weitz et al. are especially concerned by this problem. As a possible solution, their target income within their simulation model is equal to the average national income level within the agricultural sector. While such an approach may have merit in countries where rural-urban terms of trade are favourable and where rural incomes are skewed to the extent that the average income may be well above what the majority earn, such is not the case in many Asian countries. On the other hand, Weitz et al. are correct, I believe, in emphasising that planners should pay more attention to what level of income they wish settlers to have,

although here again we must remember that successful settlements are dynamic—so the income levels can be expected to change dramatically between Stage Two (Transition) and Stage Three (Economic and Social Development). Possible ways to cut down competition between farm and non-farm families over non-farm jobs are, on the one hand, to make crop and livestock production on small holdings more lucrative through favourable pricing and other government policies, and to develop credit and other programmes for non-farm families to encourage them to develop small- and medium-sized enterprises to serve the rising settler demand for consumption and production goods and services, and to process agricultural foodstuffs and raw materials.

SEASONAL AND PERMANENT LABOURERS

With only a few exceptions, including perhaps certain perennial tree crops with relatively low labour requirements, it is unrealistic to expect successful settlers to continue to employ only family labour. Yet time and again settlements are planned on the assumption, often based on ideological considerations, that settlement allotments must be cultivated with family labour, with the size of the family labour force at the time of settlement often being the determining factor as to the size of the settlement allotment. This position not only ignores the natural developmental cycle of the family but it also ignores the dynamic nature of settler investment strategies once Stage Three—Economic and Social Development—begins.

Though age criteria vary, often young settlers are recruited with pre-school children. As Barnett (1977) has shown for the Sudan's Gezira scheme, the ratio of active family members to dependents rises and then drops as the household head ages. At the same time, source after source shows that settlers in Latin America, Africa and Asia encourage kin to join them to reduce bottlenecks, both seasonally and during the early years of settlement, especially where families not only must adapt to a new habitat but also must clear and plant new lands and build their homes. Subsequently, as net incomes rise, settlers begin to substitute non-family labour for family labour in regard to less desirable/less productive agricultural activities. This recruitment of seasonal and permanent labour occurs even on relatively small holdings (four acres of irrigated rice at Mwea in Kenya and 2.5 acres of double cropped rice lands in Sri Lanka's Accelerated Mahaweli Programme). Though I have earlier mentioned this as a mechanism whereby fami-

ly labour is reallocated to more productive activities, family labour may also be withdrawn for social rather than economic reasons—the husband, for example, forbidding his wife to work in the fields so as to increase the family's social status. Regardless of the reasons for the reallocation of family labour, however, as net incomes rise, family labour tends to be underemployed in regard to the crop component of the farming system (see especially Abayaratna, 1972).

Against this background it is unrealistic for settlement planners to assume that settlers will not hire seasonal and permanent farm labour when they can. Furthermore, it is not in the interests of either employment generation or the welfare of those labourers to pretend that they do not exist or to de-emphasise their existence. In large-scale irrigation-based settlement projects in the Sudan, seasonal workers during the cotton and groundnut harvesting seasons outnumber adult settlers. Furthermore, it is not uncommon for the more successful settlers in old irrigation-based settlements, like Minneriya in Sri Lanka, to have one permanent wage labourer. Though hire of labourers is less significant in regard to farming systems based on rain cultivation, even there large numbers of seasonal labourers are used during certain stages of the production cycle of both annual and perennial crops.

Where seasonal and permanent labourers are ignored, social services in terms of schools and medical facilities tend to be inadequate to service their needs. At the same time, I am aware of no programmes designed to help the more enterprising labourers improve their economic position. Although there is less evidence than in the case of settlers, labourers also appear to pursue a sequence of economic activities whenever possible. Briefly, seasonal labourers who are not circulatory labour migrants try to become permanent labourers, after which they attempt to become sharecroppers and leaseholders of farm land—with a small proportion eventually acquiring land either through marriage or through the purchase of a settler allotment. Where the children of settlers are not interested in working on the land, it might be possible to work out some sort of arrangement whereby renters, share-croppers or permanent labourers could purchase the land without jeopardising the retirement years of the previous owner-operator. Certainly, the current situation is undesirable, with labourers, especially female labourers, often suffering from low wages and inadequate nutrition, housing and social services.

NON-FARM EMPLOYMENT

I have already discussed the importance of non-farm employment on settlement schemes in a number of previous sections in which it was emphasised that new land settlements should be multisectoral in scope and that as the net income of settlers rose so did their demand for a variety of consumption and production goods and services most of which could be produced locally, hence generating further employment. To further discuss non-farm employment, some reference to the general literature on linkages between agriculture and industry, and more specifically between irrigation projects and industry, is necessary simply because the literature on this topic is sparse (especially in regard to new land settlements) and often contradictory. Yet, available material underlines three conclusions. First, that the potential multiplier effects of agricultural development would appear to be considerably greater than realised in terms of employment generation in rural areas; second, that national development policies must share much of the blame for the failure of new land settlements to realise their development potential; and, third, granted the importance of the topic, knowledge as to what has occurred on new land settlements and why it is totally inadequate.

The inadequacy of research makes it virtually impossible to quantify the direct and indirect effects of agricultural intensification in the tropics and subtropics through irrigation- and rain-based farming systems on both new and old lands. On the one hand, few members of the academic community have attempted to carry out the type of systematic long-term research which is necessary, the work of Vimal Shah and C.H. Shah in the Matar Taluka irrigation area in Gujarat, India, being an exception (Shah and Shah 1974). On the other hand, the large majority of post-implementation evaluations carried out by both multilateral and bilateral agencies focus exclusively on direct effects, a major exception here being research under World Bank auspices on Malaysia's Muda Irrigation Project (see, for example, Bell and Hazell 1980). Referring more specifically to agriculture—industry interactions, Johnston and Kilby note that "the study of variable linkages between the agricultural economy and industry in the early stage of economic development is a comparatively unexplored field" (1974, p.299), a comment which can be generalised for other agricultural linkages as well.

In spite of inadequate data, what information is available suggests that carefully planned and implemented new land settlements can

generate considerable non-farm employment. In Africa and Asia over half of all non-farm employment is still in rural areas, a situation that we tend to forget because of the increasing influx of rural peoples into urban areas. According to the World Bank's *Rural Enterprise and Nonfarm Employment* (1978a), non-farm activities in rural areas (as opposed more specifically to new land settlements) provide a primary source of employment and earnings to approximately one-third of the rural labour force where *rural towns are included* (emphasis mine), with this proportion rising to 40 per cent where town populations in rural settings increase to 20,000-30,000 residents. Referring more specifically to Asia, Chuta and Liedholm (1979, pp.3-4) note that 20 per cent of the rural labour force in India is primarily engaged in non-farm activities, while 24 per cent is so engaged in Indonesia, 28 per cent in the Philippines, 32 per cent in West Malaysia, and 49 per cent in Taiwan (with its major focus on the decentralisation of industry—Ho 1979). While Taiwan is the exception as far as national proportions go, it should be possible to achieve similar one-to-one ratios elsewhere in Asia through careful planning and implementation of development on an area basis, especially in regard to specific large-scale irrigation and new land settlement projects.

Such ratios have been achieved, or are being currently sought, in only a small number of new land settlements, in all of which settlement planning and implementation included an integrated process of rural and town development. "Perhaps the most successful example of regional development planning in Latin America" (Katzman 1977, p.53) involves the activities of a privately organised and funded land development company (Companhia de Terras Norte do Parana) in Northern Parana. After purchasing 2.5 million hectares, the company spent two years clearing land titles so that settlers subsequently would not be involved in the type of stressful and financially costly land disputes which so often characterise relationships between settler and host populations within settlement areas.

Land for rains cultivation was usually sold to owner-operators in blocks of 24-48 hectares—which, though large by Asian standards, were small by Latin American new land settlement standards. Each holding was laid out to have access to a feeder road, while a railroad was built through the colonisation area not as a capital intensive up-front investment "but at the same pace as land sales, one period's sales financing the next period's development" (Katzman 1977, p.59). Throughout the railroad's length, market towns were planned at 15-kilometre intervals.

During the 1920s when the company was founded, the settlement area was essentially uninhabited according to Katzman. By 1940 the population had risen to 100,000, reaching 400,000 in 1950 and approximately one million in 1965, with non-company lands outside the settlement area growing at a rapid but slower rate. As for the railway towns, two had populations of over 100,000 in the 1960s while other centres ranged from 10,000 to 50,000 inhabitants. Though I have seen no figures on the ratio of primary non-farm to farm jobs, according to Nelson, by "1968 the population was estimated at about 1.7 million, of which 40-50 per cent was urban" (1973, p. 123). Since the number of farm holdings created was 39,000, it would appear that at least one non-farm job had been created for every farm job. While Katzman doubts that this success story can be replicated elsewhere in Latin America because of a number of especially favourable circumstances, Nelson believes that "the success elements in the project do offer insights for the design and implementation of land settlement in the humid tropics and subtropics" (1973, p. 121).

Though I am aware of no government-sponsored settlements where such dramatic results have been achieved, the World Bank is certainly optimistic about the employment generation potential of Malaysia's *Jahore Land Settlement Project*. According to the Bank's *Agricultural Lands Settlement* (1978b), the Bank's 1974 appraisal assumed that the project would provide permanent employment for 4,900 workers on the communally farmed oil palm holdings (most if not all of whom presumably would be recruited from 4,400 prospective settler families), along with 5,000 jobs for permanent workers in local villages and townships. An additional 6,000 workers would be employed during the four year development period.

The agricultural basis of the *Jahore* project is primarily the rain-fed cultivation of oil palm and rubber, although more recent attempts are being made to diversify into other tree crops. As Weitz et al. point out (1978), generally speaking, irrigation-based settlement projects have greater potential for non-farm employment generation than do settlements based on rain-fed cultivation (though the potential is there also as shown by the Northern Parana case). While detailed data on actual employment are rare, two government-sponsored irrigation settlements in the Sudan, three in Sri Lanka, and at least one in Indonesia have generated a significant amount of employment for both seasonal and permanent farm labourers and for non-farm employees and employers. The Sudanese cases are the *Gezira* and *New Halfa*

schemes; the *Sri Lankan* examples refer to the *Gal Oya*, *Minneriya* and *Uda Walawe* projects; and the Indonesian case refers to *Metro* in South Sumatra. Although the information that follows on the *New Halfa* (Sudan), *Metro* (Indonesia) and *Minneriya* (Sri Lanka) cases is incomplete, they are nonetheless suggestive, since the proportion of non-farm jobs to farm jobs is significantly higher than on most settlement areas. It should be noted that these examples are exceptional as are the Malaysian cases in that each includes one or more rural towns.

At *New Halfa*, a large-scale irrigation project in the north-eastern Sudan, a significant number of the original group of 40,000 plus settlers (including wives and other dependents) shifted into Stage Three (Economic and Social Development) during the early to mid-1970s. When Dr Hussein Fahim and I visited this project in 1980, we were impressed by the size and vitality of the principal service centre, even though development had recently slowed because of the decreasing capacity of the settlement agency to provide water, agricultural machinery and other essential services. During our visit, government and World Bank sponsored research surveys were under way as part of a programme to rehabilitate the scheme. None of the research teams could give us figures on non-farm employment; in fact, one economist underestimated the number of businesses in *New Halfa* by a factor of three, our very rapid count revealing over 1,000 versus the 300-400 estimated by the consulting economist who had been working in the area for an extended time period. Though our data are still incomplete, subsequently El Tayeb completed a more detailed count which totalled the number of permanent non-farm jobs as approximately 15,000 (of these, approximately 6,000 are in government service, 5,350 in small- and medium-sized commercial operations, 2,400 in and 1,200 in transport). Seasonal non-farm jobs totalled another 17,000. These figures are also an underestimate, since our Sudanese associates were unable to count those employed in an adjacent illegal settlement area which provides a wide range of illegal services to the settlers.

Settler tenancies number approximately 22,500. Approximately, one-third of these are *Halfawyeen* who constitute the earliest and more enterprising settlers; indeed, there is little evidence that a significant proportion of the remaining two-thirds have yet to reach Stage Three, which is when the multiplier effects of new land settlements can be expected to increase significantly. In other words, the diversified far-

ming system, higher net income and demand of the 7,000 Halfwayeen settlers no doubt is disproportionately important in stimulating the proliferation of small businesses serving the settlement population.

A second example relates to the area around Metro in South Sumatra. Though no figures are available, this area (including the urban centre of Metro) is thriving, no doubt partly because of a well-implemented irrigation-based colonisation project started by the Dutch in the 1930s. Settler housing is not only high grade but is being increasingly enlarged and modernised, and I would assume that settler net incomes are high enough to have stimulated much of the business activity in the Metro municipal area. (The same is certainly the case in regard to the Malaysian township of Sungai Jerik where the number of commercial establishments have increased from less than 30 to over 130 during a twenty-five year period. This development is largely a response to increased net incomes of rain-fed FELDA settlers at Ulu Jempol and adjacent settlements in the Jenka Triangle area, Sungai Jerik siphoning off a good bit of the business that planners had hoped would be directed toward the much slower growing government planned and implemented new town of Bandar Pusat.)

The third example, Minneriya, is considered by Abeywickrema and Wimaladharmā in this volume. According to Wimaladharmā's field data, the Minneriya area is characterised by considerable non-farm employment. Of those employed, approximately 41 per cent are farm owners-operators versus 37 per cent non-farm employees and employers and 22 per cent labourers who combine farm with non-farm labour. Even when employees of the government textile mill are omitted from the above totals (the mill being a footloose industry with no direct relationship to Minneriya as a settlement scheme), the area has generated significantly more non-farm employment than three other Sri Lanka settlement areas (of roughly similar size) to which it is compared by Abeywickrema and Wimaladharmā. The main reason for this difference appears to be higher net incomes which the authors attribute to larger farm holdings, more reliable supplies of irrigation water, better service and support facilities, and more farming system diversification. On the other hand, Minneriya is still predominantly a rice production scheme. Though highly successful in terms of settler income, the scheme has stimulated very little agricultural or other industry. Furthermore, with 5,000 to 6,000 residents, the associated rural town is relatively small in comparison to New Halfa, and the urban centres associated with the much larger Northern Parana settle-

ment area—Minneriya being a medium-sized settlement project in comparison, which is not articulated to other settlements and urban centres.

Even though there is insufficient data to calculate non-farm family employment ratios in these Brazilian, Malaysian, Sudanese, Indonesian, and Sri Lankan examples, still the situation in each case is quite different than the current situation in so many new lands settlement areas, where non-farm activities probably constitute a primary source of employment for only 10 to 20 per cent of the rural population. Where rural towns are carefully incorporated within the settlement area and where a strategy for facilitating integrated area development is followed, it is reasonable to expect non-farm employment to eventually exceed farm employment in carefully planned and implemented large-scale settlement areas.

V KNOWLEDGE AND POLICY

It should be clear from the preceding sections that we have insufficient knowledge of the later stages of the more successful new land settlement projects around the world, this lack of knowledge being one reason why long-term development potential has been underestimated by national and international planners and scholars alike. Especially lacking is information on multiplier effects—on their extent and on their nature.

As for policy, it is also clear that it is very difficult for new land settlement projects to sustain themselves through time in the face of adverse national development policies and private sector policies. Where rural-urban terms of trade are unfavourable to the rural sector (and work by Lipton and other scholars indicates such a situation applies throughout most of the tropics and subtropics), new land settlements face a major constraint from the start. As for the generation of non-farm employment through the development of small-scale enterprises including manufacturing and other types of industry, new land settlements also face major constraints since industrialisation policies to favour the development of large-scale urban-based industries through a range of direct and indirect subsidies. As Katzman points out, throughout most of the world growth pole advocates favour the approach that emphasises "a set of tightly interlinked, capital-intensive,

large-scale manufacturing enterprises" (1977, p. 7), in spite of the fact that there is little evidence that such an approach in the tropics and subtropics catalyses development of the rest of the economy. Child and Kaneda are particularly critical of the situation in Pakistan where they argue that the government should re-examine policies which favour large-scale enterprises through a "variety of subsidies, licensing procedures, tax concessions, special credit arrangements, and protection from import competition." Such policies, they argue, unintentionally have not only "inhabited the efficiency and viability of small-scale enterprises," but even threatened their "survival" (1975, p. 273). Yet such enterprises are no less efficient than large-scale ones; indeed, the "small-scale industry studied here requires only half to two-thirds as much capital per new worker employed as does large-scale industry" (1975, p. 274). Government and private sector credit policies may be especially critical for both the agricultural and industrial components of new lands settlements, Katzman arguing that the increasing proletarianisation of the agricultural labour force in the northern Parana settlement area of Brazil is due in part to adverse government and private sector credit policies.

In sum, the design and implementation of successful new land settlements in terms of increased production, rising living standards and employment generation must not only be multisectoral in scope but must also be nurtured by favourable long-term development policies at the national level.

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