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SUSTAINABLE AGRICULTURAL DEVELOPMENT: THE ROLE OF INTERNATIONAL COOPERATION

PROCEEDINGS
OF THE
TWENTY-FIRST
INTERNATIONAL CONFERENCE
OF AGRICULTURAL ECONOMISTS

Held at Tokyo, Japan
22–29 August 1991

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INTERNATIONAL ASSOCIATION OF
AGRICULTURAL ECONOMISTS
QUEEN ELIZABETH HOUSE
UNIVERSITY OF OXFORD

1992

Dartmouth

ELMHIRST MEMORIAL LECTURE

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Agrarian Structure, Environmental Concerns and Rural Poverty

I feel deeply honoured by the opportunity to address my professional colleagues on this singular occasion of honouring the founder and for a long time the moving spirit of our Association, Dr Leonard Elmhirst. When Professor Longworth invited me to deliver the sixth Elmhirst Lecture, I could not help but remind myself that every one of my five distinguished predecessors had made important contributions to our understanding not only of the rural economy but also of the broader socio-economic system of which it is a part. I cannot claim either the erudition or the sweep or the vision of my illustrious predecessors. But circumstances have enabled me to observe carefully the changes which were taking place in the rural areas of the developing world from a number of vantage points: from the perspective of a village level researcher in poverty-stricken villages in Western India; as an academic in universities and research institutions; as a policy adviser to the state and the national governments and as senior adviser in the World Bank's Washington establishment. These observations, filtered through my early economic training, which was in the true humanistic traditions of the Bombay School of Economics, have led me to arrive at some tentative conclusions on the nature, causes and consequences of rural poverty. Some of these I venture now to share with you.

Poverty eradication and sustainable development are now being recognized as important dimensions of development. Public pronouncements at the national level as well as the policy documents issued by international agencies reflect these overriding concerns; so also does the work of scholars and the stand taken by social activists. Various factors have helped in highlighting these two issues. The 'lost decade of the eighties' had brought to the fore the plight of the poor, particularly in the countries of Africa and Latin America. The development of means of communication has heightened the awareness of the poor regarding their miserable plight. When juxtaposed with the immense possibilities of improving their economic well-being, this awareness has been further sharpened. With the spread of democratic institutions, the importance of the poor as a constituency has been enhanced, and one finds a large number

*Institute of Development Studies, Jaipur, India. The author is grateful to his colleagues at IDS and elsewhere who contributed substantially to the content and logic of this presentation. In particular, the contributions of Deepak Gianchandani, Anil Gupta, Vidya Sagar and Davendra Tyagi are gratefully acknowledged.

of spokesmen for poverty alleviation. Concern for environmental degradation, particularly for unsustainable agriculture, has become urgent with the alarming speed of deforestation and desertification, spread of soil erosion, ingress of salinity, water shortages, increase in pests and crop diseases and other symptoms.

While there is seldom any dissent on the importance of both these issues, there is a discernible lack of clarity on the nature of the interrelationship between rural poverty and environmental constraints which inhibit sustainable agriculture, and a good deal of confusion on how to tackle them simultaneously. This lecture will be a modest effort to discuss some aspects of poverty eradication and (economically and environmentally) sustainable agriculture and the critical role which agrarian structure plays in reaching these objectives. The first section deals with the nature and extent of rural poverty in the developing countries, the impact on poverty during the last few years and the approaches to poverty eradication. In the second section environmental aspects of sustainable agriculture are outlined, pressure on natural resources, particularly land, is highlighted and the question of poverty and over-exploitation of resources is examined. The third section underscores the economic aspects of sustainable agriculture and elicits the importance of structural change in agriculture as reflected in the access to land, an issue which has been generally side tracked in the discussion on sustainable agriculture. The last section points out the scope for conflict as well as convergence between the twin goals of poverty eradication and sustainable agriculture through the mediation of structural change in agriculture which ensures more equitable access to land for the poor.

For empirical support to various premises I have relied heavily on the experience of the developing countries of South Asia, particularly India. This reliance is partly because I am more familiar with this part of the world and partly because the largest number of the poor inhabit the countries of this region. I may point out one more limitation of my presentation. The time-horizon I have selected for the prognosis is medium-term, that is, the decade of the 1990s. I am aware that we are on the threshold of some momentous changes in technology, such as advances in biotechnology, and maybe also in social organization. However, these changes will take time to unfold fully and make their impact felt.

EXTENT AND NATURE OF RURAL POVERTY

Over the years an awareness of the poverty problem has resulted in a deepened interest among policy makers and researchers alike in the concepts and measurement of poverty. So much so that, in the words of a researcher, it has become an 'industry'. The cause of poverty alleviation in recent years suffered as the definitions of poverty adopted were either too wide or too narrow. With too broad a definition poverty alleviation could hardly be distinguished from socio-economic development as such, with too narrow a definition the purpose of poverty alleviation, enabling the poor to lead a decent life, is defeated. Thus a UN Report, true to its tradition, defined minimum subsist-

ence to include physiological, legal and social necessities. It did, however, suggest that these were roughly hierarchical: each employing a higher quality of, or additional, goods and services than the *preceding* one (UN, 1969). At the other extreme is the narrow, single index, definition of poverty using per capita income or per capita consumption.

A definition of poverty currently in vogue is one which translates a calorie norm into monetary value and adds expenditure on other non-food items generally consumed by the households in that income bracket which satisfies the minimum calorie intake.¹ The latter, that is expenditure on non-food items, is generally arrived at on the basis of budget studies. A serious lacuna in this definition is the total reliance on *private income*. It is important to remember that in one of the pioneering efforts in measurement of poverty, that by a group of experts set up by the Planning Commission of India in the 1960s, it was explicitly mentioned that, while defining poverty in terms of minimum household income, the group had assumed that *public services* like elementary education and health were available to all (Sushma, 1988). In later discussions this vital aspect – provision of and access to public goods – was ignored. In any event an income-based poverty line can only serve as a first approximation. For a poverty alleviation strategy, access to public goods, like elementary health and education, needs to be taken into account. A partial correction to the income/calorie-based definition is provided by the recent efforts of UNDP to construct a Human Development Index (HDI) for different countries.²

The poor households subsist at various levels of deprivation and their poverty could be transitory or chronic. We are here concerned with the chronically poor, although it should be understood that transient poverty, say due to a natural calamity, can soon degenerate into chronic poverty in the absence of some devices – household, social or public – to absorb adverse shocks. The chronic poor are those who lack the skills, assets and stamina. The intensity of poverty of different sections of the poor households could be measured by the 'Sen Index of Poverty'.³ Less sophisticated but equally remarkable is Lipton's categorization of poor into the poor and the ultra poor on the basis of whether the household is able to meet its calorie needs (Lipton, 1983). These distinctions are important to evaluate the effects of various poverty alleviation measures.

Extent of poverty

For international comparisons, frequent use is made of the World Bank's country-specific statistics on income levels and income distribution. The World Bank also makes use of global norms to arrive at approximate figures of the poor. Thus, according to the *World Development Report, 1990* (World Bank 1990), in 1985 an estimated 1.1 billion people in the developing world lived in poverty. Of these nearly 633 million were absolutely poor. These estimates were based on an income of \$375 per person per year for the poor and \$275 per person per year for absolutely poor (amounts being in constant 1985 PPP prices). The World Bank's estimates are not universally accepted, but they are more comprehensive in their coverage than other global estimates (Saith, 1990).

The geographical distribution of the world's poor as estimated by the World Bank suggests that one-third of the developing world's total population, of which 18 per cent were extremely poor, was living in poverty. Major concentration of poverty was in South Asia, which accounted for nearly half of the developing world's poor, and nearly half of the extremely poor. Sub-Saharan Africa reported an equally high proportion of the poor in relation to the region's overall population, and Latin America and the Caribbean region was not far behind.

Recent developments

In recent years, on the basis of some welfare indicators, such as life expectancy, infant mortality and literacy, one finds that there has been a distinct improvement in living standards in practically all developing regions. Per capita income in developing countries has increased by nearly 3 per cent per year and more people have access to health services, drinking water and better sanitary facilities. The daily supply of calories has improved significantly (UN, 1990). The improvement has not been uniform over the regions or among countries in any particular region. Also the 'average' figures at the country level mask severe deprivation suffered by various groups of people. Yet the fact remains that a remarkable improvement in the living standards of the people in the developing world has taken place, according to these welfare measures.

The same cannot be said about the performance on the basis of an income or expenditure-based poverty criterion. The East Asian countries continued their commendable progress towards poverty eradication, the Philippines being the main exception, and some of the poor countries in South Asia, for example India, did improve their performance. There was a stagnation in Sub-Saharan Africa and a retrogression in countries of Latin America, mainly because of the burden of external debt and the falling commodity prices. Putting these two facts together – better performance on the basis of some of the welfare norms and persistence of poverty in terms of entitlement for goods and services – it is clear that rigours of poverty have eased, even in the countries where widespread poverty prevails (Jodha, 1988).

Characteristics of the poor

A large number of studies the world over have brought out the main characteristics of the poor. While the situations differ from country to country, certain common features stand out. Most of the poor in the developing world are concentrated in rural areas, and a large number of them depend directly or indirectly on agriculture; they own or control few physical productive assets.

They face a fragmented and exploitative market for their main asset: labour; women are more discriminated against in this market. Those among the poor households who have a land base have marginal holdings and/or are tenant-at-will. They are generally over-represented in the marginal regions.

Their capacity to take risks is probably weak. They have a larger dependence on common property resources.

The poor are handicapped by social disabilities as much as by economic constraints. They are powerless and marginal, in spite of their large numbers in several countries, as producers as well as consumers. They have a larger number of dependants, though not necessarily large-sized households. Mostly they do not possess saleable skills, are malnourished and physically weak. In other words, not only do they not have adequate claim on current production, but also their future prospects are not very encouraging.⁴

Approach to poverty alleviation

Basically, two approaches have been adopted to resolve the poverty problem. These are not exclusive, yet the emphasis on one or the other is quite clear. In one approach a large measure of reliance is placed on the 'trickle-down' effect of rapid growth, while the other relies more on public intervention.

There cannot be any doubt about the fact that without growth poverty eradication will not be a practical proposition. However, a heavy reliance on 'trickle-down' or 'spread effect' of growth raises several questions and is not supported by historical experience. Historically 'trickle-down' has benefited the poor when at least one of the following two conditions had been present: (a) the rate of growth of the economy had been very high, say 8 to 10 per cent per annum, or (b) the poor had some asset base. Neither of the two conditions can be taken for granted.

There are not many examples of countries recording a consistently high rate of growth in recent times. Experience suggests that, even if a spurt in growth rate is achieved, it becomes difficult to maintain the tempo without incurring inflationary pressures or running into balance of payment difficulties, usually both.⁵ I will come back to the transient nature of such growth swings in inequitable societies a little later. Similarly, if the asset base of the poor is absent or depleted – and the assets could comprise not only physical assets, like land, but also assets such as skills and physical stamina – the poor households will not be able to respond to the growth stimuli. That is why even those who put much faith in 'trickle-down' also worry about the *composition* of growth rather than growth *per se*. For example, a plea for labour-intensive patterns of growth is advocated in order to ensure a larger participation of the poor in the growth process (World Bank, 1990).

The interventionist policies by themselves cannot be counted upon to eradicate mass poverty in the developing countries. This is not only because of the faulty project designs and wrong implementation strategies of the poverty alleviation projects, on which much has been written, but is also due to the diversion of scarce resources which could enhance the asset base of the poor households benefiting from these projects. The case of India's Integrated Rural Development Programme may be used to illustrate these points. In scale of operations and clarity of objectives it could be considered as an exemplary programme, yet its cost-effectiveness can be seriously questioned. There has been a massive investment of resources and political support at all levels, but

the impact on eradication of poverty has not been commensurate. A careful researcher has estimated that over a period of ten years this programme has helped nearly 9.3 per cent of the poor households in rural areas to cross the poverty line. Even this small impact was selective in terms of the households and the areas. For example, the households who were nearer to the poverty line received more benefits and the programme fared better in developed regions as compared to backward and remote regions (Hirway, 1990).

Over a period of time there have been some improvements in performance: bureaucracy has become more sensitive, local institutions are getting involved, some forms of participatory management are being experimented with. However, participatory management, which is the king-pin in the delivery of these programmes, has to go beyond tokenism. A prerequisite to genuine participation by the people is an institutional underpinning. With gross inequities in the ownership of assets, particularly with a large section being assetless, it is doubtful whether participatory institutions capable of delivering economic goods and services in an equitable manner would emerge.

The experiences of India and other countries suggest that the 'trickle-down' effect of growth depends on the recipients having access to assets, possession of skills or physical stamina. The public programmes of poverty eradication have helped the category of the poor households so endowed. It will be instructive in this context to review the quality of the main productive asset in the rural areas of the developing countries, that is land, and then look into the question of access to this resource by the poor. The next section addresses the first question and in the following section the issues pertaining to agrarian structure are examined.

THE LAND RESOURCES

In the context of poverty eradication there are questions on environmental sustainability as well as economic sustainability of the present mode of agriculture. Let me briefly comment on these two aspects. Current anxiety about the sustainability of the present mode of agriculture,⁶ from the environmental angle, can be ascribed to two related factors: the growing pressure of population on land resources and deteriorating quality of earth resources (land, water, air) at least partly due to intensification of agriculture.

For the poor countries raising agricultural productivity without endangering its sustainability poses a serious challenge. In the past, the 'open frontiers' provided an outlet for the poor. Most of the developed countries of today could circumvent the initial crowding of the people on land by using spaces available within the countries or because migration to other land-abundant countries was easy. This is no longer true for the developing countries whose surplus rural labour cannot find any outlet in the countries where the land is still abundant and labour relatively scarce. The poor in the developing countries have to find the solution to the poverty problem within their own country. In this situation the main source of livelihood in the rural areas, agriculture, plays a pivotal role.

The possibility of raising agricultural production has now to be examined only in the context of intensive, and not extensive, agriculture. This is true globally, and with a few exceptions for a large number of countries. According to Food and Agricultural Organization (FAO) estimates, the amount of arable land in developing countries will increase by less than 10 per cent to 850 m. hectares, by the year 2000. Amount of land per inhabitant in the developing world will fall from 0.85 hectares at the beginning of the 1980s to 0.6 hectares by 2000. New land which will be brought under cultivation will be of poor quality.⁷ In any case, by 2025 no high-quality land will be available for arable purposes. Already the area under severe risk of erosion and salinity is increasing, as the lands on slopes of hills, fringes of forests and borders of deserts are brought under the plough.

Another way the arable area can be extended is through irrigation. Among several possible benefits, such as increase in productivity, or lowering of risks, a major benefit of irrigation is the multi-season cropping. Particularly in areas where concentration of rainfall to a few months makes crop production in non-rainy seasons very risky, if not an impossible enterprise, perennial irrigation contributes substantially to increase in arable areas. In several parts of the developing world, especially Asia and Africa, the land base was significantly augmented with the introduction of irrigation. The area of irrigated lands has trebled since 1950, but almost all easy sites for irrigation development have already been exhausted. Now the cost of new irrigation development is becoming prohibitive. Also ecological damage done by surface as well as ground water irrigation to the soils and environment, coupled with the increasing threat of water-borne diseases, is making the irrigation option much less attractive. As it is, nearly 10 per cent of the irrigated hectares have already become saline. Another 25 per cent show early signs of salinity.

In brief, there is very little scope for extensive farming, either by extension of cultivated areas on fallow lands or by an extension of irrigation. Whatever solutions to poverty and environment degradation we seek should be in the context of fixed, rather shrinking, land surface and water resources. This would require greater ingenuity and greater care to conserve the land and water resources. Eminent scientists such as M.S. Swaminathan have been warning us for more than two decades of ecological disasters if proper methods of conservation are not adopted.⁸

The poor and environmental degradation

It is sometimes presumed that the poor are responsible for the depletion of natural resources, not because of any perversity, but because of the compulsions of poverty. How far are these fears genuine? There is a great dearth of usable data to establish any proposition very firmly. However, a few tentative conclusions can be advanced. In the first place, in the resource-rich regions there is no evidence to suggest that lands cultivated by the poor, in this case the holdings of the small and marginal farmers, are in any way inferior to the holdings of the large or medium-sized farmers. At the same time, in ecologically degraded tracts or the resource-poor regions there is a relatively larger

concentration of the poor holdings. The latter fact by itself does not suggest that the poor are 'responsible' for environmental degradation in these areas.

The poor could be charged with over-exploitation and consequent degradation of natural resources on two possible counts. Because of a faster rate of growth of population and because of their larger dependence on the natural resources (say, for fuel and fodder) coupled with high subjective discount rates, they may be responsible for fast depletion of some of the resources (mainly forests) and degradation of other resources (such as soils). Of these possibilities the argument based on higher population growth is more serious and has a wider currency. If this is justified, the expanding numbers in poor households would appear to have been pushing cultivation to the fragile or marginal lands, with serious consequences.⁹

But this view has been seriously challenged by some scholars in India and other South Asian countries. In a recent publication results of case studies from four countries – Pakistan, India, Bangladesh and Nepal – and from Bihar state of India, were reported. The authors brought out the complexity of the economic and demographic relationships. Some of their major findings, summarized in an overview by the editor Garry Rogers, may be noted: (a) there is no evidence in the studies that the poor have relatively high fertility, and there is a hint that their fertility may be lower than middle-income groups at least. Moreover, because child survival rates are lower among the poor, the achieved family size appears to be particularly low among the poorer groups; and more explicitly (b) there is a powerful association between household size and wealth – poor households are small (Rogers 1989). The effect of poverty on the exploitation of resources does not arise from the large size of the households of the poor but, as the authors of the study quoted above have put it, is due to 'pre-existing patterns of inequality and exploitation'.

The poor are also blamed for 'over-exploiting' the resources, as they depend heavily on natural resources and also heavily discount the future value of income streams. This is particularly true of the exhaustible resources, such as forest products. However, one should not over-estimate the damage caused to the natural resources by petty pilferage by the poor. This pales into insignificance when compared to the depletion of natural resources by the rich and their wasteful life style (WCED, 1989). More demands on land and natural resources are made by the life style of the rich than by the need-based exploitation of the poor. We will not be able to talk about preservation of environment unless we seriously question, and suggest alternatives to, the present style of living.

The fact that the poor depend heavily on natural resources gives them greater motivation to conserve these resources, provided their interests are not overlooked. No plans of environmental protection can succeed unless they involve the poor as participants *and* beneficiaries, whether those plans be for regeneration of forests or control of water pollution or soil erosion. Unless the poor cooperate the rot cannot be stopped, and in order to ensure their cooperation some tangible benefits should accrue to them. The arguments that environmental protection measures generate positive externalities do not persuade poor households to sacrifice their immediate income for the sake of medium to long-term gains of the community. A cardinal principle of sustainability is to ensure

protection, if not an enhancement, of the incomes of the small and marginal farmers and others whose livelihoods depend on these resources.

Poor households are as much interested in conserving natural resources as any other section of society.¹⁰ The agricultural and forestry practices improvised over generations bear testimony to the ingenuity of the poor to eke out a living from shrinking and depleted resources. In any effort to preserve environment the poor must be stake-holders. It is important in this connection to recognize the role of collective efforts to conserve resources. With their subsistence orientation, the poor cannot be disciplined to conserve resources with reliance on the instruments of pricing and subsidies. They can be disciplined mainly by community efforts. In the past many of the conservation practices depended on community efforts, such as preservation and rejuvenation of village commons. With the disintegration of the relevant social institutions these practices are also being gradually abandoned.

The relationship between the people and their environment was based on a robust system which ensured that the basic needs of the households dependent on natural resources were met and the households in turn preserved and safeguarded the environment. This balance was disturbed by rapacious claims on these resources from the rich and the powerful, by pressure of population from the households which could not find enough alternative sources of earning a livelihood and by the erosion of institutional safeguards to protect the environment. Underlying all these causes was the deterioration of agrarian structure, basically a deteriorating relationship to land.

AGRARIAN STRUCTURE

The countries, and regions within the large countries, where least impact has been made on the eradication of poverty often suffer from an inequitable agrarian structure, or marginalized and depleted resources, or both. Inequitable agrarian structure is characterized by unequal access to land for the rural households depending on agriculture either as owners or as lease holders and a large army of landless labourers depending on wage labour in agriculture. Extreme forms of such structures exist in parts of Latin America. In a number of South Asian countries also large landowners coexist with numerous small owners, owner-cum-tenants, pure tenants and landless labourers. The rigours of small ownership holdings are eased if there is an active lease market, or when non-farm employment opportunities are present and expanding. In the absence of either of these two conditions a strong correlation exists between the inequality in ownership of land and the extent of poverty, as in South Asia, Southern Africa and large parts of Latin America (World Bank, 1990).

In the absence of a buoyant non-farm sector which, as I will discuss later, itself is predicated in the countries we are referring to upon a dynamic agriculture, two important factors could contribute to the relaxation of limitations imposed by an inequitable agrarian structure: functioning of the land and labour markets, and technology. Unfortunately, in countries with large concentrations of poverty, as in the countries of South Asia, these factors reinforce the inequities.

Land and labour markets

In a situation of grossly unequal access to land the functioning of labour and land markets does not provide the poor with an alternative of non-farm work or of augmenting their holdings with leased-in land. The labour market is fragmented, not only on the basis of skills compounded by difficulties in transport and communication, but also because of the differences in gender, castes, tribes and other social characteristics. All these impose restrictions on the mobility of labour. The macro policies of the governments, especially those pertaining to pricing and subsidies, inhibit whatever limited opportunities may arise to expand non-farm employment. An abundant supply of rural labour with limited and more or less fixed demand in agriculture and related activities results in low wage rates, except during the time-constrained seasonal operations.

In any case, as is now well documented, the employment elasticity of labour in agriculture is quite low. Even in the intensively cultivated areas it will not at the margin exceed 0.5, compared to addition to the workforce in the farm sector which exceeds 2 per cent per year or more in the countries of South Asia (Asian Development Bank, 1978). Further, most of the additional employment even in the good agricultural years gets translated into fuller employment for under-employed family labour rather than additional work for wage-labour. The dependence of labour on the landlords in other markets, for example for credit, compounds the handicaps, which in extreme circumstances lead to what are known as semi-feudal conditions (Bhaduri, 1973).

Following the Marshallian formulation many commentators on the rural scene have concluded that the organization of production on leased-in lands, especially when these are under sharecropping arrangements, may not be as efficient as on the owner-operated holdings. These findings have recently been questioned (Otsuka and Hayami, 1988). There is a large body of empirical evidence, and plausible logic to explain it, which suggests that, even in circumstances of overcrowded agriculture, crop-sharing provides for the landless rural labourer and marginal farmers a better alternative to limited opportunities for wage-labour. That is why, despite the numerous lacunae in lease contracts, the poor households do take recourse to sharecropping. For example, in India the area under cultivated holdings is larger than the area under owned holdings in the lower-size groups of land holdings. The difference is obviously accounted for by land leased in by the small and marginal landowners.

However, this option of augmenting land is not available to many poor households when the large holdings are cultivated extensively, or in some cases left uncultivated. Another situation, where access of the poor to land is circumscribed, arises when, because of capital-intensive technology or other socio-economic considerations, an 'inverse' tenancy system prevails, with medium and large farmers leasing-in land rather than the small farmers having access to it.¹¹ The imperfections in the lease market are compounded because of misplaced policy interventions (for example an insistence on owner operation in much land legislation), which have only resulted in 'concealed' tenancy and made the terms of lease more onerous for small tenants.

Finally, I touch upon one other alternative which, in the past and at least in some countries, was favoured as a panacea for increasing the incomes of small farmers: joint or collective farming. For quite some time this solution had an ideological appeal. However, even in those days perceptive writers had unravelled all the inconsistencies in the logic on which a case for joint farming was based.¹² The subsequent historical developments, first in China and now in Eastern Europe and the Soviet Union, have clearly demonstrated, if such evidence was at all necessary, that technological and social correlates of agriculture militate against the principle of collectivism at the production stage.

Technological developments

Technological development in agriculture in the developing countries in recent years have been mostly aimed at yield augmentation to ensure food security at the national level. The major vehicle for yield augmentation was high yielding varieties (HYV) of seeds, mainly of wheat and rice and to some extent maize, which with the complement of assured water supply and chemical fertilizers and pesticides promised a remarkable increase in yield per hectare. In theory this technology was divisible and neutral to scale, but in practice it favoured medium to large farmers who could have recourse to their own savings, or had easy access to financial institutions to obtain credit, to purchase inputs. It is true that over a period of time state interventions in the credit market did ease the conditions of access for small farmers in a number of countries. Thus those who had smallholdings in the well-watered areas could take advantage of the advances of HYV technology, though only after a time-lag. The implicit bias of technological development was clearly in favour of the resource-rich farmers in the resource-rich regions. In regions with uncertain or inadequate water supply, that is in the large, rain-fed tracts, no yield-augmenting technology of the type of HYV technology was available. There the access to land and poverty were more clearly and inversely correlated.

POVERTY, AGRARIAN STRUCTURE AND SUSTAINABILITY

Let me at this stage pose the basic question: can one by-pass a defective agrarian structure and lift the poor households in rural areas from the mire of poverty? The relationship between poverty and access to land could be subjected to several qualifications. Population pressure, quality of land, nature of technology and development of non-farm activities make this relationship rather complex (Mellor and Desai, 1986). However, if we take into account the medium to large countries, where a large proportion of the rural workforce is dependent on agriculture, the links between the agrarian structure and the extent of poverty are fairly general. Contemporary history hardly provides an example of a relatively *swift and sustainable* transformation taking place in the context of an inequalitarian agrarian structure in such societies.

The underlying logic is not difficult to follow. Under special circumstances a section of the farm sector can develop, irrespective of the overall stagnation in agriculture, and can forge strong linkages with the non-farm sector, for example, with the modernization of agriculture on large holdings or export-oriented developments on these holdings. Thus a farm sub-sector catering to a sizable urban demand or export markets can coexist with a largely stagnant rural sector. In such cases, really, two worlds, of the poor and the non-poor, exist without close interaction. These cases, although rare, are not unknown. Even in these cases sustainable development is questionable in the absence of some mechanism which ensures an expanding rural demand. And expansion in the rural demand, especially if the sector is dominated by a large number of poor households, will require a more dynamic small-farm sector or a substantial rise in real wages. An inequitable agrarian structure mitigates against both these developments. Even if the overall growth rate is high, in the absence of an equitable agrarian structure the sustainability of such growth is always doubtful. Brazil in Latin America and the Philippines in Asia provide good examples of the need for an equitable agrarian structure as a precondition for sustainable growth.

However, the reverse is not automatically proven. What we can say now – without revisiting the now famous size productivity debate – is that there is enough evidence to suggest that size by itself is not a constraint in raising productivity. A more important question is whether this type of small farm-dominated system would be environmentally sound, and whether and how it would make agriculture sustainable. By itself a small farm-dominated and economically viable agriculture is no guarantee of sustainable agriculture. But it could pave the way for it. By generating surplus it enables poor households to invest in skills and diversifying enterprises, thus relieving pressure from land. Even then the tasks of facilitating skill formation by education and training, and diversifying enterprises with the provision of infrastructure and development of markets, falls on public investment policies. More than investment policies, the policies on science and technology are of critical importance.

Technological developments

Even in the past, technological developments have yielded several land-augmenting measures. From perennial irrigation to non-photo-sensitive and short maturing varieties, a number of technological interventions can be identified which have increased the usable land surface. Also the small farmers, especially those who were potentially viable, could be made viable by generating and extending a technology which enabled them to generate higher values of products from their limited land base. In other words, where quality of land could, to some extent at least, substitute for quantity. This could mean high-value crops but it could also mean a different enterprise mix. The crops grown by the small farmers and the resource base available to them generally do not attract the attention of the mainstream scientific establishments to improve their economic prospects.

A small farm-dominated agriculture will by definition be in nature an intensive agriculture. With the present-day technology this would mean high-yielding varieties of seeds, chemical fertilizers and chemical pesticides. These are not the ingredients for sustainable agriculture. If there is a threat to sustainability it comes largely from these sources. The only way to cope with this problem is to harness technology to solve the problems of soil nutrients, pests and diseases in a way that does least harm to the environment. There are several promising leads in different regions. But today these efforts do not constitute the mainstream technological research. It is only by according priority to these efforts and providing them with resources that a credibility will be built up and the technology generation in these directions given a fillip.

The other constraints which have to be faced by the small farmers are their limited access to cash resources and hence inability to use high capital-intensive techniques. Coupled to that is their inability to take risks. Both these aspects take us from the field of technology to that of macro policies. The critical role of macro policies in rural poverty alleviation is now fully appreciated. The role of pricing, subsidies, exchange rates and trade policies are well documented. What is largely missing in this discussion is (a) how the poor can benefit from the free markets and (b) how they can be insured against the attendant risks. The poor face two difficulties *vis-à-vis* markets. In the first place, they find it difficult to 'enter'. This may not be as much of a handicap in the markets for agricultural products, because of the competitive structure of these markets. However, it may not be so in the case of the labour and lease markets, as noted above. These markets are fragmented and extra-economic considerations do play their part. The second major handicap is the return to small farmers, again, in the lease and labour markets. Because of uneven bargaining power it is not easy for them to secure a 'fair' wage or a 'fair' share from gross produce (in the case of leased-in land).

The role of macro policies, pricing, trade and subsidies, will become more important once technologically feasible solutions are available. They will fine-tune the basic thrusts provided by institutional change and technology. This has been amply demonstrated by the experience of the High Yielding Varieties Programme in some countries, such as India, where the institution of price and credit policy helped once a superior technology was available for extension (Vyas, 1989). The role of the state in this respect is important. State policies should facilitate an easy entry and ensure fair returns. The other aspect is the regulatory aspect. However, in both these cases more than the state efforts the organizations of the poor can play a critical role. The implementation of the legislative provisions for minimum wages or the stipulated tenant's share in the case of leased-in land illustrate the regulatory role of the state as much as the critical part played by peasants' movements.

If we are not yet fully equipped to use the market institutions in favour of the poor, we are at a very rudimentary stage in our understanding of the risks faced by them, their coping strategies and the institutions and macro policies which can either help them to minimize the incidence of risk or equip them to face the risk or compensate them in the event of an adverse outcome. Here again there is a role for researchers, for social activists and the state to devise appropriate 'safety-nets'.

The task of poverty alleviation is as important as the move towards sustainable agriculture. In fact, properly conceived poverty alleviation could be a step in the direction of an environmentally safe world. For poverty alleviation, an access to assets is important. The earlier we realize the interdependence of agrarian structure, environmental sustenance and poverty eradication in the over-populated developing countries, the more realistic will be our approach to attaining sustainable agricultural development.

NOTES

¹It seems that in this respect the concept of poverty is going in circles. In the early part of this century, English social commentators, notably B.S.Rowntree (Rowntree, 1901, quoted by Scott, 1981), defined primary poverty as the 'minimum necessary expenditure for maintenance of merely physical health'. Note that this concept was not much different from the current definition of absolute poverty.

²The methodology and justification for the use of the HDI is provided in a recent study by the United Nations Development Programme (UN, 1990).

³Fully described in Sen (1973).

⁴In an as yet unpublished document, Subodh C. Mathur has presented a review of literature bearing on the characteristics, economic environment and behaviour of the rural poor in India. My account draws heavily on his work.

⁵A discussion of the failure of different types of models of economic growth to sustain a 'trickle down' effect is available (Saith, 1990).

⁶A satisfactory definition of sustainable development was adopted by the FAO Council in 1988: 'The management and conservation of the natural resource base, and the orientation of technological and institutional change, in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations.'

⁷In fact the new land often proves not to be of much help. An estimated 20 per cent of new ranches in the Amazon basin 'failed within a few years. The loss of existing agricultural land through erosion is estimated at between 6 and 7 million hectares per year, with an additional 1.5 million hectares being lost through waterlogging, salinity and excessive alkali' (World Resources Institute, 1990).

⁸This was the theme of Swaminathan's Presidential Address to the Agricultural Science Section of the Indian Science Congress at Varansi in January 1968.

⁹Subodh C. Mathur (see note 4) quotes a number of studies in India suggesting that as a general rule poverty and large households are closely linked.

¹⁰Professor Anil Gupta of IIM, Ahmedabad, India, in the Newsletter *Honey Bee*, published on behalf of an international network for documentation of local innovations, has drawn attention to numerous examples of eco-friendly techniques, and also suggests that small peasants have a logical basis for environmental concern.

¹¹I have drawn attention elsewhere to the phenomenon of 'reverse tenancy' in the early years of the green revolution in India (Vyas, 1970).

¹²A critical review of issues in collectivization of agriculture in South Asia is provided by Deshpande (1977).

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