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THE IMPACT OF TRENDS IN AGRICULTURE ON WOMEN AND ON THEIR PARTICIPATION IN THE SECTOR

Differences in agriculture and farming systems are ultimately the basis for the differentiation of the economies of whole continents within the developing world. Though oversimplification is an obvious hazard, strong similarities in agricultural practices occur between Latin American countries including Central America and the Caribbean, within Africa with the exception of the North African littoral and Egypt, and within Asia (though in this case distinctions between South Asia - the Indian sub-continent - and the rest and, as a microcosm of the whole, *within* the Indian sub-continent are fairly pronounced). The "gender dimension" is not a supplementary consequence of variation in agriculture practices, but a fundamental organizing principle of labour use, stemming directly from differences in resource endowment and the carrying capacity of the land.

Variations in farming systems are not demonstrated by aggregate employment and labour force data. But statistics on female participation do show the total importance of agriculture in the various regional economies, and also where it is more important to women as a source of employment than to men. There are far more women relatively speaking in agriculture in Africa. In 1980, 87 per cent of all members of the female labour force in low income African countries were in this sector, compared to 70 per cent of women in India, 74 per cent in China, 66 per cent in other low income Asian countries and 55 per cent in middle income Asian countries. In Latin America the figure is an extremely low 14 per cent, similar to the significance of agriculture to female employment in developed countries (also 14 per cent for market and centrally planned industrial countries taken together but considerably below that level for Western Europe and the United States (ILO/INSTRAW 1985)).

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Participation figures are suspect as a guide to the real level of women's involvement in agriculture however, and official statistics have to be set in the context of ethnographic and detailed labour time use surveys for the information they contain to be properly interpreted. Labour force participation data implicitly use a very narrow definition of agricultural activity, focused on land cultivation, work in the field and large scale livestock keeping; the work involved in seed selection, in storing, preserving and transforming food crops to edible form and in tending small livestock for example, all important parts of the full agricultural cycle which tend to be done by women, are neglected. The importance of women as a source of labour in agriculture in all regions is most probably considerably underestimated as a result.

With all those caveats, it is nevertheless clear that conditions in agriculture are overwhelmingly important for African women, of lesser but still marked importance for Asian women, and of little direct relevance nowadays to the bulk of Latin American women. The relative importance of agriculture for female compared to male employment also varies by continent. Women are more important in agriculture than in other sectors in most regions, with the strong exception of Latin America where agriculture is far more important as a source of employment to men than to women. But apart from the last case, the distinctiveness of the agricultural sector by region is not apparent from these comparisons.

The differences in farming systems are based on shortage of good land relative to population in almost all of Asia, and abundance of land in Africa south of the Sahara. In terms of physical ratios, Latin America is close to the African endowment but the distribution of people to land has been warped by historical and political factors and for the majority of the population land is very short.

The ratio of land to population is not a constant over time. There are several reasons for this: growth of population leads eventually to exhaustion of the carrying capacity of the land; population pressure can actively erode and reduce the physical fruitfulness of the land, reducing the carrying capacity of a given area on the other side of the equation; and technological change - that is changes in the way the land is exploited by the population, in terms of crops, implements and methods of labour use

- can increase the carrying capacity of land and convert bad to good usable land (and more rarely, but importantly, can also bring about deterioration when such changes exhaust the physical capability of the soil). There are complex interactions between all these factors, and the situation in any area can change drastically over time. Most graphically, in large parts of sub-Saharan Africa now many previously cultivated areas are becoming eroded and the limits of usable land are being reached, and population growth is the highest in the world on average. The era of land abundance in Africa may well be near its end. The opposite situation prevails in Asia in respect of both land productivity and population growth.

Changes in the relation of population to land modify labour use only with a lag; even if comprehensive and up to date data were available, only marginal changes in the sexual division of labour would be seen as yet. The predominant patterns in the aggregate still reflect earlier resource endowments. Since the scope for active female participation is greater the larger the resource endowment relative to population, it follows that the role of women is more important in African than in Asian conditions. It has indeed become a convention, following Boserup (1970), to refer to them in these terms, characterizing Africa as having a "female" and Asia a "male" farming system.

In sub-Saharan Africa, there is a pattern of separation of male and female spheres of activity, whereas in Asia (and historically in European peasant agriculture) men and women tend rather to take different parts in a single cultivation process. In African households it is the women's job to provide food. Food production is done by them alone, with the exception of male participation at the stage of clearing the land from bush. Historically, men hunted, then, as the gradual encroachment of population on land made cultivation necessary, they took charge of land clearance and preparation. But these tasks were not time consuming, allowing men's labour to be used mainly for non-food production. Nowadays men specialize in off-farm agricultural wage employment. The colonial administrations which governed most of Africa saw in lazy male labour an underutilized resource and a potential source of state and entrepreneurial gain. (Female labour was not seen at all.) With a greater or lesser degree of physical or fiscal coercion male labour was pressed into cash crop production and mining and their earnings taxed. Other peasant farmers took to earning cash by a different

method, growing cash crops such as coffee and cocoa for export on their own land, using unpaid family labour.

In broad outline the pattern is therefore for women to put their agricultural labour time into food crops and men to work in the cash economy, either in plantations or mines, or on their own land, but producing goods for export and not at all for local consumption. It has been estimated recently that between 60 and 80 per cent of the total agricultural work is done by women, and that in some parts they produce as much as 90 per cent of the food. This is not to take account of strictly household maintenance work, such as cooking, cleaning and childcare, nor of fetching fuel and water, all of which are also predominantly done by women: their total average workload is significantly higher than men's as a result. (UN ECA "The Hunger Project" (CGIAR News 5,2)).

The separateness of women's agricultural activities from men's gives sub-Saharan African women some autonomy in economic terms. Their near identification with food production should not be taken as synonymous with confinement to "subsistence" activity, in the sense of exclusion from the market. Women sell food superfluous to their own needs and have much control over the income generated in this way; their relative economic and social status is better than in other regions as a result.

But female autonomy does not extend to full control of their own activities by any means, let alone to economic equality. Men retain some decision-making powers over agricultural resource allocation and output even in their absence. More importantly, women are disadvantaged in access to the resources complementary to labour necessary to invest in expanded and improved productivity in an agricultural enterprise. Extension services and credit in particular are restricted. In the first case attitudes towards women deriving ultimately (through colonial and post-colonial practices) from conceptions of patriarchal households fail to acknowledge their role as producers; the oversight is compounded by the prevalence of men among extension agents. In the second, the explanation lies in normal business practices whereby lenders require collateral. In conditions of land abundance, property rights in land are strictly unnecessary. But even where settled agriculture done under supposedly common rights of access including women's use of land to grow food, women's rights to dispose of

land are subsidiary to men's. Land rights for example passed through the male line between generations (Lele 1985). Modern systems of land registration (again resting ultimately on colonial practice which held to a benign view of the household as a collectivity with a man as head) perpetuate this tendency. They allocate the land to the men; excluding women from legal title undercuts their ability to raise credit on their own behalf, and in that way has far more serious long term consequences on male and female assets and sources of income than the mere grant of formal title (with use rights in practice undisturbed) would suggest.

The effects of this sexual division of labour on the household are also significant. Women's responsibility for the care and provision of food for members of their household effectively removes men from liability in these matters, should they so wish. Migration of male labour to mines and plantations becomes possible on a permanent and semi-permanent basis because women can, by only slight extension of their traditional role, take over the task of family support in its entirety. The system of male out-migration has developed into a movement of male labour to the towns to search for work in the growing non-agricultural sectors. The search is often in vain, open unemployment being so high, so that the families remaining in the rural areas cannot be sure of receiving cash remittances from their male members. Indeed, on the contrary the level of open male unemployment means that many unemployed males must be receiving support from their subsistence base back home - behaving, in short, as subsidized "secondary" workers while they seek employment, in a manner usually held as stereotypically female. In the case of women, their dependence within the household is often adduced as part of the explanation of their preparedness to accept low wages in employment; in the case of men, such support is held to raise the reserve price at which they offer their labour, and to bolster male conceptions of a proper wage rate (see the literature on internal migration as reviewed in Berry and Sabot (1978)).

Regardless of the employment success of male migrants to the towns in Africa, the consequence is a high proportion of de facto female headed households in the countryside. It has been estimated that in Kenya 40 per cent of rural households are female headed, in Ghana almost one half, in

parts of Zambia one third (Lele 1985, Pala Okeyo 1985). In southern African countries drained of rural male labour by the movement of male workers to the mines in South Africa the proportion is probably even higher. This is three or four times the incidence of female headed households in South and East Asia (though comparable to levels among urban populations in Latin America and the Caribbean, for reasons similarly to do with sexually differentiated patterns of labour use in agriculture in that continent, as will be seen).

In Asia, a different pattern of agricultural labour use by sex prevails, in response to long-standing pressure of population on the land and for more intensive (tool and material input using) methods of cultivation. Women's responsibilities, tasks, levels of participation in cultivation and employment status all differ from the sub-Saharan African norm. Male and female labour contributions tend to complement each other within the production of particular crops, rather than between crops. In this sense there is less separation of male and female economic spheres. But the organization of crop production is strongly hierarchical in every case, with women definitely having a subsidiary role.

The main similarity to Africa lies in the prescription that women's special biological role in reproduction extends to care of children and maintenance of the household (social reproduction as it is sometimes called). In agricultural settings this confers on women a range of quasi-agricultural tasks to do with food crop storage and preparation for consumption, care of small livestock (chickens, goats) etc. as well as the often very time consuming tasks of fuel and water collection.

Apart from this, women's productive role in agriculture in Asia is entirely different from that in Africa, bearing a resemblance rather to patterns of peasant family farming in medieval Europe as described by Boserup (1970). Women work in agriculture essentially as assistants to men, at certain points in the cultivation cycle. Their specialist contribution to food supplies for the household consists in care of small livestock rather than production of food such as vegetables, even in small plots, and certainly not in independent cultivation of food crops as in Africa. Subsistence plots are not important because of the general shortage of land.

Typically the division of labour by sex gives men the fundamental work of soil preparation. This comprises a set of tasks which become increasingly important with agricultural intensification. Women's labour goes mostly on planting, weeding and thinning, and is used especially at peak times of harvesting both at the harvest itself and in the post harvest grain operations of threshing and winnowing. The total number of operations which women perform is smaller than that which men undertake.

A major consequence of land shortage in Asia is that large proportions of the national rural populations are either completely landless or own only a plot too small to provide for their own subsistence above poverty level; 40 per cent of the Indian rural population, for example, is estimated to meet this description. Consequently there is a large market in labour, the only resource the landless have. There are significant differences in the hiring of male and female workers in this market in terms of seasonal fluctuations in labour use and wage rates. In general it seems to be the case that the use of female labour is much more seasonal and that female wages are considerably lower than male on an hourly basis. The differentiation of tasks by sex clearly contributes to both: the use of female labour on a smaller range of tasks than men which are not spaced evenly through the cycle explains the fluctuations in hiring; and the limitation of total demand which that entails leads to market determined wage rates lower for women than for men. Whether or not it can be said that there is a wage differential by sex in the strict sense of unequal pay for identical work (Lipton (1983) for one holds that there is not) there is no doubt that women's earnings are lower over time (yearly and hourly) and that this follows from a strict pattern of sexual division of labour in agriculture.

Participation rates in wage labour in Asian agriculture vary with sex, the size of landholding and family income. Since men control the use of any land owned and have the power to allocate family labour among particular tasks or types of work, it is not surprising to find that rate of participation in wage labour is higher among women than men (Ryan and Ghodake 1984). All wage labourers come from families with relatively small (or zero) amounts of land. Men devote more of their time to their own holding, and women, as a supplementary source of labour go to the wage labour market for additional income, to work either on local farms or on plantations (tea, cotton, rubber). The amount of female labour surplus to

the requirements of the family holding is indirectly related to the size of the holding. Of course landless men have no choice but to offer all their labour for sale, but the level of labour market participation is less than women's so long as some land is held.

Participation in the wage labour market is not the same thing here as formal labour force participation in agricultural activity: the lower rate of total labour force activity among women derives from the fact that above a certain landholding size women withdraw from the formal labour force as conventionally defined. This is partly a matter of social prestige, especially in cultures where there is a heavy social premium on the seclusion of women; but partly it reflects an increasing (unrecorded) role for women in agriculture and agriculture-related tasks closer to home. With land and asset accretion, there is more work for women to do tending livestock etc. and less time for outside work. There is a matching correlation, even stronger, between family income levels and the fate of female labour force participation rates; the lower family income, the higher the rate of female labour force participation, the relationship being much more marked for women than men over almost the entire income range. Below some critical minimum severe poverty income level, female participation does however fall off; no doubt such women are discouraged from looking and unable to find work (Lipton 1983).

Much evidence on this and other aspects of labour use in Asian agriculture comes from the Indian sub-continent and should not necessarily be taken to apply throughout the whole continent. But the pattern nevertheless is consistent with what one would expect of the resource endowment of the region overall - though of course there are countless local variations in social and economic organization and pockets, some large, with atypical endowments relative to population. The findings need not be rejected as working generalizations in default of comprehensive data.

For whatever reason, rural to urban migration is not such a prominent feature in Asia as in Africa, and the sex selectivity of migration, though still biased towards males, is far less extreme. In consequence the incidence of sexually imbalanced households is much lower and in particular there are far fewer female headed rural households, of the order of 10 - 15 per cent in most Asian societies (Visaria 1980, Lele 1985).

In Latin America the agricultural sector has become of very slim importance to women as a source of employment, though it was not always so. The effects of colonial penetration were more disruptive of traditional patterns than in Africa, where creeping intensification had begun to reduce demand for male labour and made them available for off-farm wage labour. In the Latin American context a much greater shift in the female agricultural burden followed from the drawing away of male labour from what had been previously a complementary pattern of sexually divided work (Flores 1985). Their work load was increased by the need for women alone to provide for the first time for the entire subsistence needs of the family, while at the same time, as in the other regions, they had less access to productive resources aside from their own labour, in the shape of credit and other inputs and ability to mobilize labour from elsewhere. Under these influences something similar to the African pattern of labour use among the rural population emerged, with women providing most of the labour for subsistence production and many men engaged in off-farm agricultural and non-agricultural wage employment, mostly in large colonial enterprises of one sort or another.

Economic factors external to the agricultural sector produced even more drastic effects on labour use in the post war period (Flores 1985). Latin America, in reaction to colonial economic domination, opted for a nationalistic strategy of local industrialization aimed at achieving self-sufficiency in the modern sector. The investment had essentially to come from an agricultural surplus, which had to be generated by increased efficiency in agricultural production. Given the overall low population to land ratio, this meant agricultural intensification based on large scale mechanization. The land reform movement of the 1960s has to be seen in this light as a policy to enhance efficiency rather than equitable distribution of land, its ostensible purpose. In many countries concentration of land holdings was scarcely altered after 20 years of reform. This is not inconsistent with the fact that some redistribution took place, mostly in the event of poor marginal land: there was at the same time increased consolidation among large holdings at the other end of the scale. Capital for mechanization was subsidized as part of the industrialization programme, so that greater economic efficiency was achieved in the larger holdings which produced the bulk of agricultural output by reducing labour input. The use of labour by sex in agriculture was affected insofar as the reduction in

labour demand went along with the ejection of peasant inhabitants of the haciendas (quasi-feudal agricultural enterprises which, until the 1960s, were largely self-sufficient entities with little relation to the outside economy). The subsistence plots which hacienda residents had rented from the landlord were thus no longer available, and the land basis for female subsistence production greatly diminished. Since there was so little total demand for agricultural labour, opportunities for compensating access to wage employment in rural areas were virtually non-existent for women.

There were two consequences. The rate of female labour force participation in rural areas, and the importance of women in the agricultural labour force fell back sharply. Secondly, the lack of employment opportunities gave many women, probably especially from lower income families, no alternative but to migrate to the cities in search of income. As a consequence there is strong sex selectivity of migration in Latin America, the reverse of that found in Africa: more women migrate than men, and the sex ratio of urban populations is biased in their direction. But in terms of the sex composition of households the result is the same: a high incidence of unbalanced families, and of children dependent on their mothers for support. There is no logical need of course for this to be the outcome: separation of adult family members increases the share of single parent (or adult) families, but it need not increase the share of multi-membered female headed households compared to male. That this is in fact the universal consequence is merely evidence that women are expected to bear the burden of daily care and sustenance of children by living with them, though the separated father may of course contribute to their financial support.

How have changes in international transfers of technology and international trade affected women's participation given these regionally distinct patterns of male and female activity in agriculture? The influences of these two markets have been closely intertwined, the outcome very different from place to place as might be expected in view of the almost polar variations in agricultural production and systems of labour use by sex. It should be noted again that the presentation of trends on a regional basis is only a means of attempting working generalizations on an immensely complex set of events, and there is no pretense that the match of agricultural systems and geographical regions is absolute.

Technological changes in agriculture have taken place both in products and in production processes. The product changes consist of the modern high yielding varieties of rice, wheat and corn whose introduction about 20 years ago heralded the "green revolution". After complications with the first introductions, to do with their greater vulnerability to certain pests and diseases and stress conditions which offset their average yield increases, successive plant generations have been developed which are in almost every respect an improvement on traditional varieties. They have had the effect of greatly magnifying the carrying capacity of the land where they are grown and contributing in a major way to world increases in grain production over the past two decades.

Production process technological changes introduced in this period do not represent such as discontinuity and leap in capability. But there have been small improvements in implements and in the energy efficiency of powered tools such as tractors, which have steadily reinforced the technical efficiency of agricultural mechanization. Material inputs such as pesticides and fertilizers have also been subject to improvement though in these cases increased availability of supply has probably been more important than qualitative improvements in the products themselves in increasing output in poor countries. Furthermore the benefit from these inputs is much more equivocal than in the case of high yielding varieties - though there has been much contention even about the impact of those on rural populations. Many agricultural chemicals have had counterproductive and even seriously damaging effects on soil fertility, on pest resistance, and on human health, often unforeseen, but sometimes preventable in principle (if not in practice, given sub-optimal methods of application that are normal in the conditions of poor countries).

The net result of combined product and process technological changes in agriculture has been sustained increases in world output of grains considerably above the rate of growth of world population. Normal attainable yields in grain have doubled over the post-war period in the industrialized countries which produce the major part of world grain output (Schuh 1985).

But the selectivity of the output increases must be noted. They have come mostly from the industrialized countries, primarily the United States, Europe and Japan, and from Asia. African productivity has not risen in

grains. Moreover, grains are of much less importance in the total range of crops grown in Africa and agricultural research and development has not so far come up with anything like comparable improvements in crops other than grains. Some of the most important differential consequences for women by region are associated with these limitations a new product technology.

The results of this uneven spread of new product technology in agriculture have been felt in those regions where applications have not been possible through world trade in agricultural, particularly food, products. It is cruelly ironical that it is in the regions where population growth is lowest that increases in food output should have been largest. The excess production of grains from the developed countries has been superfluous to local needs, given that at their high levels of personal income the calorific and nutrition requirements of the population are already met. Extra grains have therefore gone on to the world market. In Asia, population is growing, albeit at a low rate, the food demands are certainly not met in their entirety; for both reasons not all the extra production is available for export in this case (and there would be even less, if income distribution and the level of average incomes were improved sufficiently to allow satiety of local demand for food). Even so, both India and China, the largest countries in the region, have become net exporters of grains in recent years, so that world market supplies of grain have been rising from this region too.

World prices of grains (and by the substitution effect, of other starchy food products) have been falling secularly as a result of increased supplies relative to effective demand. This long-term shift in relative prices of food versus non-food agricultural products on international markets is one of the most notable developments of the post war period. It has had ramifications for the costs and scope of national agricultural and food policy, on the incentives of the two types of crop, and on the allocation of work and rewards between the sexes.

The impact of these changes on Asian agriculture and on the employment position of women in particular has varied over time and with the prevalence of one or other type of technological innovation. The effects may be characterized as primary and secondary, and have occurred in this sequence in time. The secondary effects are only recently becoming

apparent so that this is an area where further stock can and should be taken of an evolving situation in due course. As far as women are concerned periodic re-evaluation is especially critical, because the specific effects for them seem to be different at the two stages. The primary effect has on balance been favourable to women's employment and economic position, but the secondary one is ominously negative in its implications.

The primary effect has been the direct consequence of the product changes, related to the greatly increased productivity of the land which they have ushered in. Land productivity is the determinant of the carrying capacity of the land (resource endowment relative to the population) and as such increases in yields would in principle be expected to lead to increases in the demand for labour. So it proved in practice, though it took some years for increased demand to be realized, and the total incremental demand for labour was in the event less fully proportional to increases in output (Lele 1985).

The earliest pessimistic studies of the impact of the "green revolution" did not come to this conclusion. In the view of many analysts writing in the later 1970s the high yielding varieties were having a deleterious effect, especially on the poor: the new varieties were seized on by larger farmers and the distributional effects were thought to be disastrous. The initial benefits were probably felt in the first instance by larger farmers who tend to have better access to extension services and to credit than smaller ones and to be in the vanguard of adopting innovations for these reasons. The pessimism therefore was to some extent justifiable at the time - and also showed a laudable sensitivity to the plight of the poor. But the balance of opinion now is that small farmers and labourers have not been discriminated against and have benefited just as much from the new varieties (Lipton 1985). In fact they may have benefited proportionally more, in that there has been an increased use for hired labour in relation to family labour, and wage employment is of most benefit to the poor and landless who supply most of the wage labour.

But the secondary effect is not likely to be so benign. The first round employment benefits may be jeopardized. The increased demand for labour was in fact more than could be met at all times, even by mobilizing all previously economically inactive members of the labour force, and local

labour bottlenecks appeared at peak periods, notably the harvest. This constraint seems to be provoking greater mechanization by farmers, despite its high capital costs (Lipton 1985). The labour displacement that ensues applies not only at the peak, but will impinge to a greater or lesser extent throughout the cultivation cycle. In a mirror reflection of the employment increase, this decrease will tend to affect hired before family labour, and it therefore has the potential of especially harming the income prospects of the poor.

The ramifications for women of these changes in labour use rest on women's distinctive employment status (their greater propensity to supply hired labour) and on the specificity of the cultivation tasks they carry out. The implication of the first round changes which increased the use of labour, especially hired labour, was that employment prospects for women were improved relatively by the introduction of high yielding varieties. In India for example, where the total increase in output attributable to the new varieties was considerable, there was a significant rise in the female labour force participation rate in rural areas between 1971/73 and 1977/78 (Krishnamurty 1985), probably stimulated by the increased demand for agricultural labour in this period: in fact the rate of female unemployment is also estimated to have risen, but it remained very low (at 2 per cent at the end of the period) and almost all the incremental female labour force was absorbed.

Agricultural mechanization is generally acknowledged to displace female labour more than male (Sen 1985, Pala Okeyo 1985). This is a direct consequence of the sexual division of labour, which confers the sorts of small scale, repetitive "mechanical" jobs such as weeding and harvesting on women. As the adjective suggests, these operations prove particularly amenable to mechanization. The stage of technological development which seems to have been reached in agriculture has superseded the mere refinement of tools, which can enhance the labour intensity of production, and consists in replacing human hands with mechanical arms or procedures. The high capital cost of many such innovations is no longer a disincentive to farmers when the alternative is an absolute shortage of labour at critical periods. Many of the tasks at harvest, the main seasonal peak, are done exclusively by women (whose own seasonable participation in wage labour is at its highest at this point). Mechanization directed at superseding labour

shortages at the harvesting peak, in combination with the greater general susceptibility of female labour to displacement means that this secondary impact of the high yielding varieties looks doubly set to undermine women's employment prospects.

Thus the balance may be tipping, after an initial advantage, against women in Asian agriculture. This is an effect on women as producers in the field (albeit as wage labour, rather than as landholders). There is an undoubted consumption benefit to them from reduced grain prices, as to all members of the population, especially the poor whose diet contains a proportionally large amount of staple grains. But contrary to usual opinion, women do not, according to an authoritative recent review, constitute a disproportionate share of low income groups - with the very major qualification however that they are unduly heavily represented among the lowest few percentiles of the population as opposed to the several deciles falling below the poverty line, i.e.: among the ultra-poorest (Lipton 1985). Thus, with the exception of that critically vulnerable group, women cannot fall back on their consumption laurels as it were: as in all other sectors, their economic position depends most importantly on their employment prospects. This is true even more for them than for men in agriculture, because women lack access (relatively, if not always absolutely) to other income-generating resources and have only their labour to sell.

The main ill-effect of the introduction of modern high-yielding varieties in Asia has been on those not able to grow them (Lipton 1985). The yield increases have been so great that marketed supplies have increased significantly and brought grain prices down, to the detriment of farmers growing the same or competing crops in climatically different areas. Failing to achieve increases in output themselves, their income falls proportionally. The same thing has been happening at the regional level. Africa's miserable agricultural state cannot be seen in isolation from what has been happening elsewhere in the world. The impact of technology on African agriculture has been felt indirectly through its contribution in raising Asian (and North American, European and Japanese) agricultural productivity and bringing down food prices on international markets.

Since there is in general a strong pattern of specialization by crop by men and women agriculturalists in Sub-Saharan Africa, with women responsible

for food crops, it follows that male and female income and employment benefits are directly related to the prices of their respective products. Between 1970 and 1983 the real world price of wheat declined at an annual rate of 1 per cent, rice by 1.3 per cent and maize by 2.6 per cent (Schuh 1985). By analogy again with the distribution of benefits in Asian agriculture, these prices should at least have brought a benefit to the poorest people in Africa as consumers. But this does not universally follow in this case. It is true enough for urban populations, but not for rural. Land scarcity and therefore landlessness are not (as yet) a problem in Africa and the non-agricultural sectors are very small in the rural areas, so food is primarily a producer good for the rural poor, the source of income and the basis of purchasing power, rather than an item to be purchased from income gained in other ways.

World prices of tropical non-food crops grown in Africa have fluctuated tremendously in the post war period. The prospects of those whose incomes derive from these products has accordingly been very unstable over time, and not in any sense the direct converse of those based in food crops. (The picture is complicated however by normally compensating fluctuations in output, which do a great deal to stabilize incomes for the average producer.) There have been two periods of very high prices, around 1950, the time of the Korean War, and in the late 1970s when inflation in the developed countries increased import demand and fuelled speculative commodity purchases. Since 1980 however the prices of coffee, cocoa and the like have virtually collapsed on international markets.

The price paths of food and non-food commodities have had their impact on producers in individual countries mediated by local price and investment policies in the agricultural sector. Producer incentives have been improved on the whole for production of non-food cash crops (with some notable exceptions, such as the persistent holding down of the cocoa price in Ghana) and decreased for food crops in a misguided attempt on the part of governments to improve living standards for the poor. Compounding the imbalance, such investment and research and development as has taken place locally has been concentrated on the cash crop sector and traditional food crops have been entirely neglected. International agricultural research efforts have so far failed to compensate as no progress has been made in developing new tropical foodstuff varieties.

The implications of these developments for women is despressingly obvious. African food producers are women. The fact is not irrelevant of course in explaining the chronic lack of interest of governments in this sector to date. Even apart from the absence of new varieties, which is certainly in part due to inherent scientific difficulties in devising new plants for African soil and climatic conditions - other ways of increasing output were not applied. For example, increased application of fertilizers and better irrigation could have raised yields on traditional crops, but they were not available to women who lacked access to credit to purchase such inputs or political leverage to press for infrastructural improvements. Agricultural changes instead took the form - in an attempt to maintain food availability for a growing population - of ever greater exploitation of the land by existing labour intensive methods. The process was not sustainable in the long run and has begun to result in massive environmental degradation of vast tracts of territory south of the Sahara. Women and children, as the bulk of the rural population, form the majority of the millions of environmental refugee who have had to flee the land as a result. The only resource women have had available to themselves was to make more child labour, in the shape of more children to help in agricultural production. But this individual rationality has had the sad effect of worsening the problem still further, increasing population growth rates far above the feasible carrying capacity of the land. The poverty and dependence on agriculture of the whole region make it almost impossibly difficult for any surplus to be generated locally for investment in more productive activities outside agriculture, and external credit is used up with imports of food to feed the people.

There are some indications that as well as the impoverishment to which African women, along with all other members of the population of the region are subject, their relatively strong economic position vis-à-vis men in their societies, based on traditional use rights in land and autonomy in some production activities, may be undermined by another consequence of the deterioration of the land resource base. Land shortages are emerging for the first time in parts of the region, e.g., Kenya. This change in the relative resource endowment is one which will, if principle and practice elsewhere are any guide, disadvantage women and prejudice their access to land and complementary inputs in the future, via the tendency for formalization of land title to be done in men's name. Much research effort at

the international level is going on at last into improving means of food production in this region and the essential role of women is at last being recognized in this connection. Should new varieties of tropical foodstuffs be successfully introduced then the disadvantages for women of recent international changes in this region ought to be redressed. But women will not be in a position to adopt the new varieties and benefit from increased productivity and incomes, if, meanwhile, a tendency sets in to deprive them of returns for their labour and, indeed, access to land and credit.

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