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Raising Agricultural Productivity: The Role of Women Farmers

Substantial gains have been made over the past 30 years in enhancing agricultural productivity in developing countries. In the 1980s alone, food production increased by 39 per cent. The record is not, however, as impressive in terms of food production per capita, which increased by only 13 per cent in the same decade, and declined in 75 developing countries, representing three quarters of those in Africa, two-thirds of those in Latin America, and half the countries of Asia (Pinstrup-Andersen, 1994). There is a continuing need to raise agricultural output and productivity in developing countries, both to ensure food availability and to raise the incomes of the large number of rural people who are poor and depend on agriculture for their livelihoods, so that they have better access to food and other necessities which they currently lack.

Women represent a large and significant group of farmers who, so far, have been relatively neglected in attempts to raise farmer productivity. This is because development planners and policy makers, as well as agricultural research scientists and programme implementors, are mostly unaware of the roles women play in agriculture, the contributions they make and their potential for raising farm production. This paper attempts to draw attention to women's roles in agriculture and to improve understanding of their capabilities and constraints so that policies and programmes can be better designed to assist them.

PATTERNS OF PRODUCTION

Since 1970, when Ester Boserup, in her empirical study of economic development, first drew attention to the significant and varied roles of women in agriculture, some progress has been made in making women's roles and contributions in agriculture more visible. Although reliable statistics on the actual size and composition by sex of the agricultural labour force are still lacking, it is now known that women participate substantially in farm production throughout the developing world. Even in societies where women are secluded, it is clear that rural women participate in farm work.

Although there is a traditional division of farm work by sex in most places, the actual tasks performed by women and men differ considerably between and within regions and sub-regions and by agroecological zones. Patterns of

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female participation also vary over time in response to economic, demographic, political and other changes. This section provides a broad overview of the nature of women's participation in agriculture by region. However, because of the great diversity of gender roles at the sub-regional and local levels, and because roles are constantly changing, there may be considerable variation from these patterns at a given time and place.

A common, though not universal, pattern of production in sub-Saharan Africa is a gender division of labour between cash and food crops, with women primarily responsible for food or subsistence crops while men grow cash crops, with a share of the labour provided by women. In many parts of Africa, there are 'female crops' (that is, cassava, swamp rice, other roots and tubers) and 'male crops' (maize and cotton) and women function as independent operators of their own plots which they farm and manage by themselves or with the help of their children. They make their own decisions and have control over their own earnings (Dey, 1984). In addition, they also contribute labour on their husbands' plots.

Altogether, estimates show that women constitute 46 per cent of the agricultural labour force in sub-Saharan Africa (Seager and Olson, 1986). Women's actual participation in farm work is, however, considerably more than is reflected in regionwide statistics. Surveys conducted in two villages representative of farming systems in Southern Cameroon, for example, showed that women, on average, contributed two-thirds of the weekly labour hours in agriculture (Henn, 1988). Women's involvement in particular farm-related activities and tasks may also be much higher. Thus the Economic Commission for Africa estimates that women in Africa contribute, on average, 70 per cent of the labour for food production, 100 per cent in food processing, 50 per cent in animal husbandry and 60 per cent in marketing (Cloud, 1986).

Official rates of female participation in the agricultural labour force of Asian countries tend to be somewhat lower than for Africa and considerably lower for Latin America, as shown in Table 1. However, once again, commonly held perceptions among government and development personnel and regionwide official statistics understate women's contributions. Officials in Belize, for example, widely believed that women represented just 10 per cent of the farm labour force, even though the agricultural census (1984–5) showed that women made up 23 per cent of the total. Yudelman (1994) points out that, although women's participation in agriculture in Central America now averages 25 per cent, official data show only 7 to 8 per cent of women as agricultural workers.

Rates of participation, moreover, vary widely from country to country and even within countries. Thus, within the Asia and Pacific region, estimates of women's participation in agriculture (paid and unpaid) range from under 5 per cent in Jordan to nearly 50 per cent in Nepal (Islam and Dixon-Mueller, 1991). Women are the primary farmers in Vanuatu, while in Yemen they comprise at least one-half of the agricultural labour force (United Nations, 1989a; Warnken and Nicholson, 1989).

An examination of the actual tasks performed by women also shows more intensive participation in farm labour than is implied by official statistics and widely held beliefs. In the rice fields of India and Sri Lanka, for example, women carry out 75 to 85 per cent of manual weeding and almost all the work

TABLE 1 *Share of women in agricultural labour force, selected countries*

Regions & countries	Percentage	Regions & countries	Percentage
Sub-Saharan Africa		*Asia*	
Burundi	56	India	24
Cameroon	47	Indonesia	35
Central African	53	Thailand	50
Republic of Mali	15		
Near East & North Africa		*Latin America & the Caribbean*	
Morocco	16	Brazil	10
Turkey	54	Costa Rica	2
		Mexico	12

Source: Quisumbing (1993).

involved in transplanting rice (Ahmed, 1987). A study conducted in Madhya Pradesh, India, a region where researchers previously assumed that women did not participate in agriculture, showed that they contribute at least half the labour used in rice production. They contributed a share of labour to each of eight tasks associated with rice production on medium and large farms, and on small farms in all but three tasks (Marothia and Sharma, 1985).

In Asia, unlike Africa, few women farm independently. Most work as members of a family unit, supplying unpaid labour on family farms. Within this structure, however, women may exercise varying degrees of influence over various aspects of farm management and decision making. In parts of Nepal, for example, where farmers use high-yielding crop varieties, Ahmed (1987) found women making 81 per cent of the decisions pertaining to seed selection, 60 per cent of those concerning the use of improved seeds and 40 per cent (versus 32.5 per cent by men alone) of decisions about fertilizer use. In rural Thailand and the Philippines, women manage household budgets and are often responsible for financial decision making (Tonguthai, 1988). Women in Asia also represent a substantial portion of the farm wage labour force. An estimated 21 to 56 per cent of all wage labourers in rural Bangladesh, for example, are women. They represent from one-half to two-thirds of women from landless households (Mahmud and Mahmud, 1989). Women's participation in the wage labour force is, moreover, increasing in countries such as India, Pakistan and Indonesia, mostly as the result of male migration and increased landlessness (Islam and Dixon-Mueller, 1991; Nagib and Jones, 1987; World Bank, 1989).

In Latin America, women work both in peasant farming and as wage labourers in industrialized and export crop production. Despite cultural ideals that clearly delineate sex-specific tasks, both women and men work in the fields in a variety of activities. Thus women plant tobacco in commercial farms in Honduras, pick coffee in Colombia and harvest subsistence crops in the Peruvian sierra. In Guatemala, although women contribute only 9 per cent of labour

in maize production, they contribute one-quarter of family labour for traditional and export vegetables. Women also provide one-quarter of the labour input in all crops in Peru (Quisumbing, 1993). In Honduras, women make up 40 per cent of the wage labour force in tobacco and 90 per cent in coffee. Export fruit companies in Chile and Costa Rica rely almost exclusively on female labour for harvesting, processing and packing fruits (Buvinić and Yudelman, 1989).

When households headed by women are taken into account, total female participation in agriculture turns out to be even higher in all developing regions. It is important to consider the role of headship because available data show that female headship is relatively high and increasing in many places. Approximately a quarter of rural households in sub-Saharan Africa, for example, are estimated to be headed by women and, in some places, rates can be as high as 50 per cent (Due and Gladwin, 1991). In Central America, nearly 20 per cent of rural households are headed by women (Yudelman, 1994), while in Bangladesh, over a 20-year period, the proportion rose from 5–7 per cent to 16 per cent. Female headship can occur as a result of death, divorce, separation and, increasingly, male migration. This often results in an increase in female labour force participation. For instance, women's participation in agriculture in Tunisia more than doubled between 1970 and 1985 because of male migration from rural areas that left women as the effective household heads (United Nations, 1989a). Women thus became fully responsible for farm production and management. The type and variety of farm tasks performed by women may also increase, as well as their role in decision making. Staudt (1978) found this to be the case in the 40 per cent of farms headed by women in two areas of western Kenya.

THE VALUE OF WOMEN'S WORK

Because large-scale national and agricultural surveys do not generally obtain gender disaggregated income, production or consumption data, it is difficult to estimate accurately the share of farm output and income generated by women. Moreover, even when information is available, it tends to underestimate women's share because much of their work is unpaid. A larger proportion of female than male labour, for instance, goes into subsistence production or is performed as part of a joint (with a male partner) or family enterprise, and is unpaid. More detailed household level studies completed over the past 15 years have attempted to quantify rural women's unpaid work in farm and household production by imputing economic value to the time spent in specific tasks. Such studies provide valuable indicators of women's contributions to farm production and household income.

Among the Nso people of Northwest Cameroon, Goheen (1988) estimated that women grow over 90 per cent of the food consumed in the household. By converting subsistence production to equivalent cash value, she calculated that women contribute, on average, 41 per cent of total household income. A time allocation survey done in Côte d'Ivoire also showed that women's contribution to household income was quite substantial: their earnings represented a third of the expenditure on purchased food, and their output represented three-

quarters of the subsistence food consumption (Dey, 1984). In Egypt, Larson (1988) estimated that 40 per cent of yearly cash income for an average size farm came from women, primarily from poultry and dairy activities.

Evidence from many countries shows, not only that rural women contribute substantially to the support of their households, but also that their share of contributions to family budgets is greater in poorer households. In rural Bangladesh, for instance, women's earnings account for about half of household cash income while, in India, women farm wage labourers are often the main, or even the sole, income earners in landless or near landless households (Agarwal, 1988; Mahmud and Mahmud, 1989).

Studies examining women's labour productivity in five countries (India, Kenya, Nepal, Nigeria and Peru) and a variety of crops showed, in most cases, that the marginal product of women's labour was lower than that of men (Quisumbing, 1993). Not surprisingly, the returns to women's labour were also lower, with female workers earning from 50 to 90 per cent of male wages. These differences are reflected in the regional data in Table 2. Many studies report that women obtain lower yields than men. These differences do not arise, however, from differences in technical efficiency but, rather, from variation between women and men in endowments and access to productive resources. In fact, the few available studies comparing the productivity of low-resource female and male farmers show little difference between them in managerial efficiency. Moock (1976) found that female maize farmers in Kenya were technically more efficient than males when differences in individual characteristics and input levels were controlled for.

TABLE 2 *Female/male wage ratios in agriculture, by developing region (1988)*

Region	Ratio
Asia	0.70
Asia, excluding China & India	0.54
Sub-Saharan Africa	0.51
Near East and North Africa	0.57
Latin America and the Caribbean	0.73

Source: Jazairy *et al.* (1992).

AN UNLEVEL PLAYING FIELD

Women farmers' productivity is constrained because they are disproportionately poor; they have fewer tools and less access to productivity-enhancing inputs; their rights to land are limited and relatively insecure; they face significant time and labour constraints; and their human capital is less developed. This section examines the nature and extent of these constraints and the potential impacts on women's productivity.

Women's poverty

In 1988, an estimated 564 million rural women lived below the poverty line. This represented an increase of 47 per cent since 1965–70 (Jazairy *et al.*, 1992). The growing numbers of households headed by women are overrepresented among the poor. Women, therefore, tend to have fewer assets, tools and farm implements than men.

In Botswana, Kossoudji and Mueller (1983) found that among the 36 per cent of woman-headed households in their survey area, women had much less access to productive assets such as land, labour and cattle than men had in male-headed households. The latter owned three times more cattle and more than twice the value of equipment as woman-headed households. A study on a Gambian irrigated rice project found less than 1 per cent of women owned a seeder, weeder or multipurpose cultivation implement, compared to 27 per cent, 12 per cent and 18 per cent, respectively, of men. Similar large differences in ownership of tools and implements were also found in Kenya and Zambia (Quisumbing, 1993). Lack of availability of labour-saving tools and implements undoubtedly affects the efficiency of women's time use and undermines their productivity.

Limited and insecure land rights

Throughout the developing world, few women own or have title to land. In Kenya, for example, where women provide more labour than men for smallholder food and cash crop production, less than 5 per cent of women own land (Horenstein, 1989). The problem is particularly acute in south and east Asia, where landlessness is growing and farming or farm wage labour are often the only employment and earnings options available to poor rural women.

But, even in sub-Saharan Africa, where traditionally women have use rights to land, they are often assigned smaller and lower-quality plots. Studies from five countries in Africa show that woman-headed households have smaller land holdings and cultivate from 31 to 74 per cent of the land cultivated by male headed households (Quisumbing, 1993). Women, moreover, acquire land through male relatives so that, if their relationship changes through death, divorce or widowhood, they lose their land and, hence, access to their livelihoods. Agrarian reform, land titling programmes and resettlement schemes designed to improve access to land among small farmers have not generally benefited women because land titles are usually given to household heads, assumed to be male. In four of 13 Latin American countries for which data were available, Deere (1987) found that women comprised just 4–25 per cent of beneficiaries of agrarian reform.

Lack of proper access to, and control over, land affects farm productivity in a number of ways. First, as banks often require land as collateral for credit, lack of title constrains women's access to loans. Second, tenure insecurity has been shown to reduce risk taking and willingness to make long-term investments that are often needed to enhance productivity. It can also affect the sustainability of land use (Panayotou, 1993).

Lack of education

Although the developing world has made considerable progress in improving women's literacy and education, significant deficiencies persist. In 1985, only 37 per cent of women were literate in sub-Saharan Africa and 48 per cent in Asia. In rural areas, literacy rates were even lower. For instance, in the early 1980s, just 5 per cent of rural women in Pakistan and 12 per cent in Bangladesh were literate (United Nations, 1989a). Even at the primary level, where the largest gains have been made, girls' education lags significantly behind that of boys. In 1990, just 20 per cent of girls were enrolled in primary school in Niger, as compared to 38 per cent of boys (World Bank, 1990). Girls' enrolment at the secondary level drops off dramatically in all regions (Table 3).

TABLE 3 *Female adult literacy and gross female enrolment in primary and secondary schools, by region (1988)*

Region	Female adult literacy (1985)	Primary (1988)	Secondary (1988)
	(Percentage of age group)		
Asia	48	95	32
Sub-Saharan Africa	37	64	13
Near East and North Africa	44	86	41
Latin America and the Caribbean	82	100	52
Least developed countries	32	49	10

Source: Jazairy et al. (1992).

Low levels of education among women also means that few girls have the qualifications to enter agricultural colleges or research institutions, and this is reflected in the underrepresentation of women among researchers, teachers, trainers and extension staff of most countries. The very small proportion of women enrolled in higher agricultural education programmes in Africa is shown in Table 4. There is, therefore, a very small pool of women agriculturalists to draw upon, and this can be a significant shortcoming in countries where, because of social and cultural factors, female staff are needed to reach and influence women farmers.

Studies show that improvements in agriculture are strongly linked to education and that literate farmers are more likely to adopt modern agricultural practices. One study in Africa found that a 10 per cent increase in the number of women completing primary school led to a 65 per cent increase in early adoption of new technology and a 14 per cent increase in late adoption (Quisumbing, 1993). Continuing low levels of literacy and education among

TABLE 4 *Enrolment in agricultural programmes for higher education, Africa*

	Intermediate (%)	Degree (%)	Postgraduate (%)
Male	90	77	86
Female	10	23	14

Source: Jiggins (1986).

rural women, therefore, pose a significant barrier to improvements in productivity.

Time and labour constraints

Time limitations resulting from women's economic and home production roles also significantly affect their productivity. In addition to farm production, women (unlike men) are also responsible for household production such as cooking, child care, and fetching fuelwood and water. These tasks can be

TABLE 5 *Time spent in agricultural and home production by women and men, selected countries*

Country	Agricultural work (a) (Hours per day)		Home production (b) (Hours per day)		Total (c) (Hours per day)	
	(1) *Women*	(2) *Men*	(3) *Women*	(4) *Men*	(5) *Women*	(6) *Men*
Bangladesh	1.71	2.80	5.40	1.27	8.30	8.32
Burkina Faso	7.43	3.48	3.28	0.12	11.53	6.20
Cameroon	4.18	1.73	4.52	0.35	9.64	4.12
Indonesia	2.17	4.24	4.13	0.75	11.97	8.35
Nepal	3.76	4.33	6.13	1.53	10.80	7.52
Peru	1.72	4.43	4.07	0.53	5.79	5.17
	4.24	4.20	3.47	1.13	7.72	6.15

Notes: (a) Includes crop production and processing, livestock care and fishing.
(b) Includes food preparation, childcare, firewood and water collection, tending the sick, food collection.
(c) Total also includes other market work such as trading, handicrafts production and unspecified wage work.

Sources: (1) and (2) and (4)–(6) Buvinić and Mehra (1990); (3) Power (1992).

onerous and time consuming. Data gathered from numerous developing countries show that women, because of their multiple obligations, work long hours, often more than men (Table 5).

In a review of 12 rural time allocation studies, Buvinić and Mehra (1990) found that women's work ranged from a low of 5.79 hours per day to a high of 12.49 hours per day, as compared with men, whose daily work hours ranged between 5.17 and 10.8 hours. Thus labour can be a binding constraint for women, especially during peak seasons such as at weeding and harvest time. It is a particular problem in woman-headed households that tend to have high dependency ratios and a shortage of adult male labour.

Although women and men are mutually obliged to exchange labour in many parts of Africa, the terms of trade for this exchange are inherently unequal and more binding on women (Palmer, 1988). If men's demand for labour increases, women are obliged to respond to their labour demands and may have to do so at the expense of their own production.

THE NEGLECT OF WOMEN FARMERS

National development and donor-assisted agricultural and rural development programmes, instead of helping to alleviate rural women's farming constraints and enabling them to improve their productivity as part of an overall strategy to raise farm output, have historically bypassed them. Because governments and donor agencies assumed that women were household rather than economic producers, they either ignored women's roles entirely or provided them with information and training suitable only for their household production roles, and not their equally important economic roles.

The agricultural and rural development projects of the 1960s and 1970s mostly ignored women, sometimes at the expense of project success. A substantial empirical literature has grown over the past 20 years to document these effects in many developing countries. In the more recent literature, Saito and Weidemann (1990) reported on a village livestock project in Burkina Faso that failed because information and resources on small animals were directed at men, even though women were primarily responsible for small livestock production. In an earlier case, in a Bolivian livestock and wool development project, even when project designers altered the situation to accommodate the realization that, traditionally, women and not men were responsible for llama and alpaca herding and shearing, project implementors failed to give women appropriate help, offering them instead training in what they considered were women's tasks – cooking, embroidery, knitting, crochet and artificial flower making. In fact, historically, rural development projects that did take account of women, or included a women's component, emphasized women's household roles.

In the 1980s, some projects attempted to go a little further. They sought to help raise the incomes of poor rural women by involving them in income-generating projects. Unfortunately, the experience of these projects was not much more promising than what had gone before. As Buvinić (1986) showed, many such projects 'misbehaved', in that the intended production goals were

soon replaced by welfare activities such as the delivery of either free handouts (food, clothes or money) or information more appropriate to women's roles as wives and mothers. Few programmes or projects offered women support for their agricultural roles. In particular, they failed women farmers in two critical areas, namely, the delivery of agricultural credit and extension information and technology.

Credit

Credit availability, by increasing risk-taking capacity and the ability to invest, and improving access to other productive inputs and assets, is vitally important for improving farmer productivity and returns. Available data show, however, that women's access to agricultural credit is extremely limited. Their share in India, for example, is estimated at around 10 per cent or less (United Nations, 1989b). In the Kakamega district of Kenya, where 40 per cent of farms were managed by women, Staudt (1982) found that 99 per cent of the women interviewed knew nothing about the extension service's credit programme and no woman manager had ever obtained a loan.

The main difficulty facing women, as most small farmers, in obtaining institutional credit is the perception that they are risky borrowers. Banks are also reluctant to lend because the costs of making numerous small loans are relatively high. Women face additional barriers because they do not generally have title to land which is commonly required for collateral or because they do not have the right to act in their own legal capacity without the approval of their husbands or other male relatives. Women are also unable to obtain loans from agricultural cooperatives whose membership is generally dominated by men. Furthermore, credit funds frequently come as part of a package aimed at improving particular cash crops, generally grown by men.

Women, therefore, borrow from friends and relatives in informal markets where terms and conditions are more flexible and collateral is not required. The disadvantage, however, is the high cost of borrowing, which drives down the profitability of potential investments and may constrain women farmers' incentives to invest.

Agricultural extension

Data from numerous developing countries show that government agricultural extension services (the main source of new information and technology for growing familiar crops better and for adopting new ones) are seldom available to women. A survey in Nigeria's Ogun State Agricultural Development Project revealed that extension agents visited just 10 per cent of women farmers every week, whereas 70 per cent of the men were visited weekly (Elabour-Idemudia, 1991).

Apart from outright discrimination, a number of other factors account for women's low participation in extension programmes. The methods used to disseminate technical information, such as the contact farmer approach and the

use of training centres, tend to channel information to wealthier and better endowed farmers, who are generally men (Berger *et al.*, 1984). The content of the information is often of less interest to women because it is biased towards cash crops that tend to be grown mostly by men. Programmes aimed at women tend to focus on home economics and nutrition rather than farm production and processing.

Women are underrepresented, and sometimes not represented at all, among extension staff and trainers. A survey of 46 African countries showed that, in 1985, only 3.4 per cent of extension agents were women and, in some countries, women comprised less than 3 per cent of extension staff (Aw, 1989). This is especially a problem in societies where women are traditionally secluded. Finally, women may not be able to participate in extension programmes because they lack education, or because the programmes are not sensitive to women's multiple roles and time constraints and do not maintain flexible training schedules which would enable women to attend.

The limited empirical data available suggest that the pattern of neglect prevents women farmers from improving their productivity. Staudt (1978), for example, in comparing joint- and women-managed farms in Kenya, found that, over time, the extension services' preference for aiming at male rather than female farmers adversely affected the productivity of women and increased the income gap between the sexes.

The shift from project- to policy-based assistance, in the 1980s and 1990s, should be more favourable to rural women because it emphasizes changes in the structure of incentives. But, as Mehra (1991) suggests, the extent to which women farmers can benefit from economic policy changes still depends, to a large extent, on the provision of appropriate support services because of the particular constraints facing women farmers described above.

TECHNOLOGICAL CHANGE: UNCERTAIN EFFECTS AND RATIONAL RESPONSES

Even though women farmers have been neglected by development programmes, one might expect that they would, in any case, have benefited from the tremendous improvements in agricultural technology that have occurred in the post-war period. Actually, the limited evidence available on the gendered effects of technological change suggests that, while rural women derived some gains from technology, more often they either did not benefit or even suffered losses.

In a review of 21 empirical studies examining the effects of technological change on labour use and employment, mostly in Africa and Asia in rice and smallholder production systems, Buvinić and Mehra (1990) found that the impact on women was mixed. The adoption of high-yielding rice varieties (HYVs) in India, for example, raised the demand for both male and female labour, although it raised the demand for female labour relatively more. Real wages, however, declined between 1965 and 1975, the period when the area under HYV rice expanded greatly. The drop was at least partly due to increased landlessness and the larger supply of wage labour. By contrast, Acharya and Patkar (1985) found a positive income effect for females and a slight

reduction in the gap between men's and women's wages as a result of HYV rice adoption in the five Indian states they studied.

Sometimes, as noted above, women could not benefit because new technology was not introduced to them, the notion being that women were not really responsible for farming. Perversely, certain technologies were introduced to male farmers even though women were actually primarily responsible for the particular crop or task affected. In such cases, women's own production and income were undermined. In a classic situation, in Cameroon, the introduction of irrigated rice as a cash crop grown by men raised the demand for women's labour. Women had previously independently cultivated swamp rice on their own plots but, after irrigation, were forced to become wage workers on their husbands' rice farms. While they earned their opportunity wage, this amounted to less than a quarter of the net increase in household income generated by their labour (Jones, 1986). In this case, women received financial compensation. In other situations, a new technology may raise the demand for women's unpaid labour and undermine their independent income, as von Braun (1989) found in a non-traditional vegetable crop production project in Guatemala, where women were forced to substitute unpaid household farm work for off-farm income-generating work of their own.

In other instances, women are unable to benefit appropriately from technological change because of the constraints they face in production. Von Braun and Webb's (1989) findings relating to the adoption of irrigated rice by men in the Gambia are an example. Women switched into cash crop production but, because they did not have access to labour-saving tools and had less time than men to devote to agriculture because of competing demands from household work, their labour productivity was consistently lower than men's by an average of 70 per cent.

Finally, if technological change displaces rural women from traditional occupations, they are less well equipped, in terms of education and skills, to find alternative employment. Mechanization of field and processing operations, both accompanying the adoption of HYVs and otherwise, while reducing women's labour in large- and small-landed households in Bangladesh, has also displaced landless female labour from wage employment in Bangladesh and elsewhere. Scott and Carr (1985) estimate that displacement of landless labour due to rice mechanization in Bangladesh reduced the incomes of the poorest 5 per cent of women by 55 per cent annually, a loss of 15 per cent of family income. In Indonesia, mechanical rice processing eliminated about 1.25 million women days of labour in Java, the equivalent of $50 million in annual earnings. In most cases, the women displaced by mechanization have virtually no other options for employment.

Some studies appear to indicate that women farmers are more reluctant to adopt new technologies, but closer examination shows that this is because the technologies are often inappropriate for the crops women produce or the tasks they perform. When the technology is appropriate, women seem to adopt it readily. For example, women were unwilling to adopt new coffee growing methods in Kenya but quite willing to do so in Côte d'Ivoire (Quisumbing, 1993).

In some cases, there is evidence that women are more responsive than men to improved incentives. Henn (1988) found that the opening of a major new road in southern Cameroon, which improved market access and raised farm-gate prices in the village of Bilik Bindik, caused both men and women to increase food production. Interestingly, men increased work on their crops one additional hour per week, raising their total to 32 hours per week, whereas women put in an additional 4.6 hours on their crops, thereby raising their weekly workload to 68 hours. Women's incentive to raise their incomes clearly outweighed the limitations of a demanding workload. This occurred even though the returns on the crops women grew (peanuts, corn, melons and onions) were lower than those on men's crops.

REALIZING THE POTENTIAL: POLICY AND PROGRAMME IMPLICATIONS

There is no reason to believe that women will not respond to incentives to enhance their production. However, as this paper has attempted to show, women need more support and better access to tools and inputs, and more services, than they have received until now to raise their productivity. They also need better access to land and greater tenure security, and more and better education and skills training to be better farmers, to reduce their vulnerability to technological and economic change and to enhance their employment options. Institutional changes such as those related to improved access to land and better education can be relatively long-term propositions because of political and cultural factors that impede progress in these areas. Nevertheless, they should not be ignored. Furthermore, other steps should be taken that can yield benefits for women farmers almost immediately. These include the following:

(1) The recognition by policy makers, donors and programme personnel that women, besides being home producers, are farmers engaged in economic production in their own right.
(2) Ensuring that women's roles in farming in particular locations (the crops grown, tasks performed and their total labour obligations) are taken into account in the design of projects to minimize undermining their roles and to maximize service and technology delivery.
(3) Improving the responsiveness of agricultural extension services to women's needs by, if necessary, hiring more female staff, directing information at women farmers at times and in ways that reach them most effectively. The World Bank found that employing female extension agents to work with women farmers in Kenya made a significant difference in raising their yields (Quisumbing, 1993).
(4) Making available directly to women appropriate labour-saving technologies for the crops they grow and the tasks they perform, along with complementary inputs and services, if needed.
(5) Improving women's access to institutional credit. Numerous credit programmes have demonstrated that women are credit-worthy and that institutional barriers (such as lack of title to land) to women's access can be

circumvented in the short term through group lending, guarantee schemes, and by other means.

Enabling women farmers to realize their potential as economic producers through these types of changes is neither difficult nor costly. They do not require major additional investments, which is an important consideration at a time when the financial resources of governments and donor agencies are becoming increasingly constrained. They can be accomplished, largely, by reallocating available resources and services to women. Because women's labour is at present an underutilized resource, the marginal returns to such a shift in development resources is likely to be high. It would also be more efficient *and* more equitable.

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