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ADB Institute Discussion Paper No. 54

**Organic Agriculture, Poverty Reduction, and the
Millennium Development Goals**

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I. Introduction

Of the world's 1.09 billion extremely poor people, about 74 % or 810 million live in marginal areas and rely on small-scale agriculture for their livelihood. In most developing countries, agriculture continues to be the most important sector of the economy, accounting for the biggest proportion of employment (Båge, 2005). As such, unless effective strategies for agriculture development are successfully implemented, ending rural poverty will remain a distant goal.

During the past few decades, the Green Revolution has brought about significant changes in the world's food production systems. It is recognized that while the Green Revolution has benefited better-off farmers in irrigated areas, it has by-passed the poor in marginal areas. Low-external input sustainable agriculture (LEISA) has long been viewed as an alternative for areas where the Green Revolution technologies are not feasible. More recently, one particular alternative that has gained interest is organic agriculture¹, due to its commercial viability. Most farmers in marginal areas practice traditional agriculture methods using very little or no agrochemicals. By adopting organic agriculture (OA), which requires less financial inputs while placing more reliance on natural and human resources, farmers could move towards more sustainable agricultural practices (Scialabba, 2000). Improving the agricultural production system in marginal areas in a sustainable manner and providing market access for the poor hold the key to the mass reduction of poverty.

Recognizing that the needs of the world's poorest are multidimensional and recognizing the needs for people-centered, time-bound, measurable indicators to monitor effectiveness of poverty reduction efforts, the states of the United Nations have agreed to adopted the eight Millennium Development Goals (MDGs) to assess poverty reduction efforts. The MDGs is a set of eight goals derived from the various declarations and commitments adopted in conferences organized by the United Nations. The MDGs cover a diverse set of development outcomes, ranging from halving extreme poverty to protecting the environment and promoting a global partnership in development. Each goal has corresponding time-bound targets, most of which should be achieved by 2015 (Table 1). The MDGs have been universally accepted as a framework for measuring development progress, and have become a blueprint for development interventions adopted by UN member countries and all the world's leading development institutions. At both the national and international levels, policymakers and donors are now evaluating development interventions and strategies in relation to their impacts on the MDGs, with a goal of achieving the targets by 2015.

Agriculture's potential contribution to the MDGs has been widely recognized. More recently, international organizations such as the UN's Food and Agriculture Organization (FAO), the International Fund for Agricultural Development (IFAD), the International Food Policy Research Institute (IFPRI), and the World Bank, have produced a number of discussion papers on agriculture and the MDGs (See IFAD, 2005a; Rosegrant, et al., 2005; von Braun, et al., 2003). In this paper, we look specifically at how organic agriculture can contribute to the MDGs.

¹ The International Federation of Organic Agriculture Movements (2005) defines organic agriculture as a "holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems."

This paper reviews the existing literature on organic agriculture, poverty reduction and its linkages to the Millennium Development Goals (MDGs). The paper aims at informing governments and donors of the potential impact of OA on the MDGs along with identifying the key gaps in the knowledge base on the linkages for each MDG. Ultimately, the paper hopes to provide a starting point for developing a research agenda that can be used for policy formulation to support organic agriculture, particularly in marginal areas where majority of the poor reside.

This paper is organized into five parts. Following this introduction, Part II looks at the status of rural poverty in Asia and explores the factors behind the increasing interest in OA as an alternative strategy for poverty alleviation in marginal areas. Part III reviews the existing literature on the impact of OA and attempts to link these impacts to the MDGs. Based on this literature review, Part IV concludes.

Table 1. The Millennium Development Goals and Targets

Goals	Targets
Goal 1: Eradicate extreme poverty and hunger	Target 1. Halve proportion of people whose income is less than US\$1 per day. Target 2. Halve proportion of people who suffer from hunger.
Goal 2: Achieve universal primary education	Target 3. Ensure that boys and girls will be able to complete a full course of primary schooling.
Goal 3: Promote gender equality and empower women	Target 4. Eliminate gender disparity in primary and secondary education by 2005 and all levels of education by 2015.
Goal 4: Reduce child mortality	Target 5. Reduce by 2/3 under-five mortality rate.
Goal 5: Improve maternal health	Target 6. Reduce by 3/4 maternal mortality ratio.
Goal 6: Combat HIV/AIDS, malaria and other diseases	Target 7. Have halted and begun to reverse spread of HIV/AIDS. Target 8. Have halted and begun to reverse incidence of malaria and other major diseases.
Goal 7: Ensure environmental sustainability	Target 9. Integrate principles of sustainable development into country policies and programs and reverse loss of environmental resources. Target 10. Halve proportion of people without sustainable access to safe drinking water. Target 11. Have achieved a significant improvement in lives of at least 100 million slum dwellers.
Goal 8: Develop a global partnership for development	Target 12. Develop further an open, rule-based, predictable, non-discriminatory trading and financial system. Target 13. Address the special needs of the least developed countries. Target 14. Address the special needs of landlocked countries and small island developing States. Target 15. Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term. Target 16. In cooperation with developing countries, develop and implement strategies for decent and productive work for youth. Target 17. In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries. Target 18. In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.

II. Organic Agriculture as a Strategy for Addressing Rural Poverty in Asia

A. Rural Poverty In Asia

In 2003, close to 700 million Asians were estimated to be living on less than a dollar a day (ADB, 2005a). Poverty in Asia is largely a rural phenomenon: although the magnitudes and ratios would vary across countries, almost everywhere in the region income poverty is disproportionately higher in rural areas (Table 2).

Table 2. Headcount Ratio in Selected Asian Countries (latest estimates)

DMC	Population in Poverty (%) (National Poverty Line)			
	Total	Urban	Rural	
East Asia				
China, People's Rep. of	4.6	2.0	4.6	(1998)
Mongolia	35.6	39.4	32.6	(1998)
Southeast Asia				
Cambodia	35.9	18.2	40.1	(1999)
Indonesia	18.2	14.5	21.1	(2002)
Lao PDR	38.6	26.9	41.0	(1997)
Malaysia	7.5	3.4	12.4	(1999)
Myanmar	22.9	23.9	22.4	(1997)
Philippines	30.4	(2003)
Thailand	9.8	4.0	12.6	(2002)
Viet Nam	28.9	6.6	35.6	(2002)
South Asia				
Bangladesh	49.8	36.6	53.0	(2000)
Bhutan	25.3	(2000)
India	28.6	24.7	30.2	(2000)
Nepal	30.9	9.6	34.6	(2004)
Pakistan	32.6	25.9	34.8	(1999)
Sri Lanka	25.0	15.0	27.0	(1996)

Source: Asian Development Bank, 2005a

Rural areas are generally worse off in almost every other aspect of poverty and deprivation: people in rural areas tend to have lower levels of health and education; they are more likely to have limited access to basic services such as water and sanitation; and paradoxically, despite depending on agriculture as their main source of livelihood, they also suffer the most from hunger and food insecurity.

The rural poor are also the most affected by environmental degradation: fifty percent of the poor in Asia are found in fragile ecosystems and vulnerable areas (IFAD, 2002), and their livelihoods largely depend on the available natural resources. Environmental degradation reduces the income of the rural poor disproportionately in comparison with the general population. Perversely, as the incomes of the poor shrink, they are left with little recourse but to deplete environmental resources even further, thus precipitating a vicious cycle of ever-worsening poverty and environmental deterioration. This poverty-environment nexus has become prominent

in the discussions on sustainable development (Dasgupta, et al., 2003; UNESCAP, 2003)².

While many countries in Asia may be poised to meet the MDGs in 2015, these aggregate gains are not likely to translate into better living conditions for the rural poor unless something is done to re-focus attention on rural poverty and agriculture³.

B. Green Revolution and Poverty Reduction

In the past few decades, massive investment has gone into promoting Green Revolution technologies based on the use of chemicals, extensive irrigation, and the use of high yielding varieties, including genetically modified (GM) plant varieties. While there is no doubt that this strategy has led to substantial productivity gains over the past 50 years and has eliminated starvation in many countries, recent evidence shows that the Green Revolution has not been effective as a strategy for poverty reduction for majority of the world's rural poor. While Green Revolution technologies will remain as the major production system in the world, there is growing evidence that the Green Revolution has, at its worst, increased inequality, worsened absolute poverty, and resulted in environmental degradation (IFPRI, 2002).

First of all, while Green Revolution methods have been effective in increasing yields in agriculturally optimal areas, they have been less effective in the case of marginalized and resource-poor areas where farmers have no access to modern inputs and technologies⁴. (IFAD, 2005b; Scialabba and Hattam, 2002). To quote the FAO (2000):

“Even in Green Revolution regions, numerous small, poorly equipped and very low-income farms were unable to gain access to the new means of production. Unable to invest and progress, they saw their incomes fall as a result of the drop in real agricultural prices. Many of them sank to levels of extreme poverty and were eliminated. Above all, vast hilly and barely accessible regions of rainfed or scarcely irrigated agriculture were essentially bypassed by the Green Revolution. The varieties cultivated in these regions (millet, sorghum, taro, sweet potato, yam, plantain, cassava) benefited marginally, if at all, from selection. The same was true for varieties of major cereals (wheat, maize, rice) that were adapted to difficult local conditions (altitude, drought, salinization, aridity, waterlogging). For example, the average output of millet throughout the world today is barely 800 kg/ha, and that of sorghum is less than 1 500 kg/ha. These so-called "orphan" varieties, having been bypassed by the selection process,

² UNESCAP (2003), however, cites data which reveal that the impact of poverty on the environment is weak compared with the damage to livelihood and health which the poor suffer from a deteriorated environment. Instead, the report stresses that the non-poor are largely responsible for environmental degradation. IFAD (2002) likewise reports that as much as 70 percent of the world consumption of fossil fuels and 85 percent of its chemical products are attributable to 25 percent of the world's non-poor. This same inverse relationship is likewise seen in the consumption of forest products and other commodities.

³ It has been observed that in recent years, social expenditures have been given priority over investments in the agriculture sector (Rosegrant, Ringer, et.al, 2005, citing Gautam, 2003). Rosegrant, Ringer, et.al. have further noted that, given their strong social focus, the MDGs could provide additional justification for countries to privilege social expenditures over investments that would lead to pro-poor growth (2005).

⁴ These marginal areas include mountainous, semi-arid and rain fed areas, forest margins, and wetland areas where majority of the poor reside. The common characteristics of marginal areas include complex and fragile ecosystems with inadequate soil fertility and water and difficult access to commercial inputs (Zakri, 2003).

make the use of fertilizer and phytosanitary inputs unprofitable, which only adds to the problems of the regions where they are grown.”

Second, even in those areas which enjoyed substantial productivity gains, in the long-run these gains did not always translate into sustainable improvements in rural poverty. On the one hand, real declines in the prices of agricultural commodities and increasing crop failures due to pests and diseases resulted in a significant fall in farmers’ revenues. Because high yielding varieties often need regular or increasing inputs of chemical fertilizers and pest control, farmers had to borrow heavily in order to sustain productivity. In the long-run, this cost-price squeeze and the declining price trend of commodities in the world market led to significant declines in terms of trade and incomes of farmers.

Third and more importantly, the Green Revolution’s gains have come at the cost of extensive environmental degradation and considerable health problems due to exposure to agro-chemicals. As IFPRI (2002) writes: “Excessive and inappropriate use of fertilizers and pesticides has polluted waterways, poisoned agricultural workers, and killed beneficial insects and other wildlife. Irrigation practices have led to salt build-up and eventual abandonment of some of the best agriculture lands. Heavy dependence on a few major cereal varieties has led to the loss of biodiversity on farm”. And since these costs are not internalized in the price of food, it is the taxpayers and future generations who will end up footing the bill.

Because majority of the poor are illiterate and have no access to adequate training on agrochemical use, they are disproportionately affected by negative health and environmental consequences of the Green Revolution. The inappropriate use of agrochemicals and the premature introduction of mechanization have led to, in many areas, a deeper level of poverty.

With regards to health, one of the key pillars of poverty reduction, it could also be argued that the poor are in greater need of quality food to maintain or improve their health compared to the average citizen. For the poor, OA systems, which are generally more diversified, could translate into higher levels of nutrition intake.

Given the above-mentioned reasons, low-external inputs sustainable agriculture strategies have emerged as viable alternatives to the Green Revolution, particularly for the rural poor in marginal areas. For farmers living in these areas, any strategy to improve agricultural production must therefore be based on the use of low-cost and locally available technologies and inputs (Pretty, 2002), in addition to being safe for humans and the environment.

C. Organic Agriculture as a Poverty Reduction Strategy

The worldwide promotion of organic agriculture for poverty reduction was pioneered by farmers themselves and was advocated by NGOs, who worked closely with poor farmers and witnessed the serious negative health and environmental consequences of agrochemicals. More recently, governments and donors have taken note of organic agriculture’s potential as a development strategy, due mainly to the following:

- 1) increasing global demand for safe food and potential price premiums for organic products;
- 2) under the WTO agreement, food exports must comply with higher phytosanitary standards and OA is more likely to be able to meet such requirements;

- 3) mounting evidence that OA can improve the incomes and living standards of poor farmers by building on assets which poor farmers have, i.e., land free from intensive use of chemicals, excess labor, and traditional knowledge of production system; and
- 4) studies which have illustrated how OA can contribute to health, social development and environmental restoration and/or protection.

Demand for safe and organic food is rapidly expanding in both the domestic and international markets. In the urban areas of most developing countries, supermarket chains are responding to increased demand for safe food by contracting farmers to produce crops and livestock organically or with reduced amounts of chemicals.

Many of the poor farmers in remote areas possess a comparative advantage over farmers in intensive areas because the former's current practices are largely organic by default. Unlike their conventional counterparts, they will not require a transition period of 3-5 years before they can be certified organic. This gives them an edge in terms of immediately capturing the benefits of producing certified organic products for the domestic and international markets.

Organic agriculture is likely to benefit the poor living in marginal areas the most, by improving productivity and incomes, and promoting environmental sustainability. In Thailand, contract organic rice farming in marginal areas has produced significant livelihood improvements for participating farmers (Setboonsarng, et al, 2005). In Kandy, Sri Lanka, an organic tea project for resource poor farmers has led to favourable environmental outcomes in an area where tea had almost been abandoned (Halberg, et.al. 2006). Even in Europe, organic agriculture is reportedly more likely to be found in disadvantaged areas, or areas unfavorable to conventional agriculture production (Håring, et. al., 2004).

Due to declining commodity prices, countries are choosing instead to specialize in high-value crops, including organic products. Regarded as both an export opportunity and a sustainable development strategy, many Asian countries have formulated or are now in the process of formulating national policies for OA. Thailand, for example, announced the first policy on organic agriculture in 2001 and declared it as the National Agenda in 2005. Bhutan formally declared its National Strategy on Organic Agriculture in 2006. Some countries, such as Cambodia and the Philippines the promotion of organic agriculture is led by Ministry of Trade.

To the extent that international trade of socially and environmentally beneficial products such as organic products can expand, consumers in developed countries can directly contribute to poverty reduction in developing countries.

Given the multi-dimensional nature of poverty and the broad-base benefits of organic agriculture to the rural poor, the following section reviews the current knowledge on OA's contributions within the context of the MDGs.

III. Organic Agriculture and the MDGs: Impacts Reported in Existing Literature

A. Goal 1: Eradicate Extreme Poverty and Hunger

Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day

Demand for Organic Products

Mounting concerns regarding food safety and increased awareness of negative environmental consequences of modern agriculture have led to a growing demand for organic products, particularly in developed countries. As a result, the global market for organic products has been growing steadily in Europe, North America, and some Asian countries such as Japan. Between 1998 and 2002, the compound annual growth rate of the organic food market was 17.7 percent. In 2004, the market for organic products was valued at US\$27.8 billion, the largest share of organic products being marketed in Europe and North America, followed by Brazil and Middle East (IFOAM, 2006). The organic sector is expected to continue to be the fastest growing sector in agriculture (Willer and Yussefi, 2004; Rocsearch Ltd. 2004). Much of the increase in organic production is occurring in developing countries where farmers are being attracted by export benefits and substantial price premiums (RocSearch, 2004). Organic products enjoy price premiums of between 10-300 percent, depending on the product (Setboonsarng, 2004 citing FAO, 2002), and different studies estimate that farmers receive between 44 – 50 percent of the price premium (Stoll, 2002).

Organic and Production Costs

Employing organic farming methods will lead to higher profits for farmers not only because of price premiums, but also because of lower production costs (Rosegrant, et al., 2005; von Braun, et al, 2003). OA technologies can decrease the costs of production as chemical inputs are substituted by locally available and cheaper organic inputs and more intensive labor which the poor often have in abundance. Adoption of OA systems also lowers the need for credit, which is often expensive and difficult to obtain for small farmers.

Some studies have shown that even in the absence of price premiums, farmers have turned to OA because of lower production costs. For instance, Scialabba and Hattam (2002) cite the case of rice farmers in the Philippines who adopted organic practices which allowed them to save on production costs because they did not have to purchase external inputs, at the same time achieving stable yields.

Organic and Production Risks

Studies also show that OA can lessen the risk of income losses associated with seasonal variations or crop failures. On the one hand, diversification, which is common in organic systems, has been shown to increase farm production by 20 to 60 percent as compared to a traditional low-input system (FAO, 2003). This diversity, in conjunction with greater on and off-farm biodiversity, allows farmers to derive extra income from the sale of additional products or wild crops and non-timber forest products (Rundgren, 2002). Some organic systems also favor the use of traditional varieties which are typically more resistant to local pests and diseases. And since OA allows farmers to save their own seeds, farmers can gradually increase crop resistance to pests and diseases by breeding these seeds for "horizontal resistance" (Scialabba, et al., undated)⁵

Anecdotal evidence also suggests that organic systems are more resistant against droughts and typhoons mainly because organic matter increases the soil's ability to take in water during rainfall events (Sullivan, 2002). In the Rodale Institute Farming

⁵ Scialabba, et.al. (undated) define horizontal resistance as "the ability of a crop to resist many or all strains of a particular pest (which differs from breeding for "vertical resistance" to have a gene to resist one specific strain of a disease)."

Systems Trial, OA was found to significantly improve soil structure and water capture, allowing organic farms to perform better and out-yield conventional farms by significant margins under drought conditions (Lotter, et al., 2003). The same trial also revealed that OA can reduce the potential for crop failure due to erosion in severe storms (ISP, 2002, citing Petersen, et al., 1999).

Organic and Profitability

There is substantial evidence linking OA with improvements in the profitability and income of poor farmers in developing countries. Case studies by UNESCAP (2002) show that certain organic farmers' groups were able to double their income due to the lower cost of organic inputs and lower credit costs.

More importantly, studies show that OA has been particularly profitable for smallholders. IFAD's study in Latin America and the Caribbean (2003) reveals that OA has benefited smallholders the most. In five out of the six countries covered by the study, small farmers dominated organic production for export as well as domestic markets. In Mexico in 2000, smallholders represented 98.6% of all organic producers, accounting for 84.2% of the area under organic production and generating 68.8% of the exports of organic products.

A more recent study by Setboonsarng, et al., (2005) on organic rice contract farming likewise finds that small organic farms are more profitable and efficient than larger farms, and that in general, organic rice contract farming is more profitable than conventional non-contract farming by a significant margin for all scales of operation, even when the non-cash costs are included.

Similar promising trends are reported in numerous studies by other researchers (See MacRae, et al., 2004; Lohr, 2002; Rundgren, 2002; Crucefix, 1998; Von Braun, et al., 1989).

Organic and the Broader Economy

Organic agriculture may generate secondary effects in the broader rural economy. Lohr (2002) reports that U.S. counties with organic farms have stronger farm economies and contribute more to local economies through total sales, net revenue, farm value, taxes paid, hired labor, purchases of inputs, and repair and maintenance services. Horrigan, et al., (2003) likewise argue that profits generated by small-scale producers are more likely to remain in the community and create multiplier effects in the local economy.

Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger

The World Food Summit in 1996 defined food security as "access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." Food security is therefore a broad objective that is concerned with both the quantity and quality of people's diets.

The poor typically spend at least 80 % of their income on food, most of it basic food staples; the poor are also at risk of consuming too few calories for health and efficiency (IFAD, 2001). Although the Green Revolution may have solved food security at the national level, hunger and malnutrition still persist, particularly in rural areas. In some areas, hunger increased as cropping patterns changed from multiple

to monocropping of cash crops for sale, consequently increasing hunger as cash crop prices have been declining.

In rural areas, food shortage is usually the direct outcome of crop failures due to calamities and pests. Farmers who practice monoculture tend to be the most affected when their crops fail, suffering losses in income and difficulty in purchasing food. Such problems would be less daunting in the case of farmers practicing integrated system advocated in organic farming. The organic practices of crop-rotation, inter-cropping and polyculture increase the availability of food throughout the year while lowering risk. The organic system often includes livestock and vegetables alongside the main crop, providing the community with improved dietary diversity and quality, two important aspects of food security.

Organic and Food Security at the Household Level

Findings from literature suggest that OA can lead to improved food security at the household level. Pretty (2002) cites the results of a study by the University of Sussex which revealed that OA resulted in improvements in food production by smallholder farmers through one or more of the following mechanisms:

- ”1. Intensification of a single component of the farm system - such as home-garden intensification with vegetables and trees;
2. Addition of a new productive element to a farm system - such as fish in paddy rice - that boosted the farm’s total food production, income, or both but did not necessarily affect cereal productivity;
3. Better use of natural capital to increase total farm production, especially water (by water harvesting and irrigation scheduling) and land (by reclamation of degraded land), enabling growth of additional new dry land crops, increased supply of water for irrigated crops, or both; and
4. Improvements in per-hectare yields of staples through introduction of new regenerative elements into farm systems (for example, integrated pest management) or locally appropriate crop varieties and animal breeds.”

These findings are supported by the experiences of OA projects in Asia, Africa, as well as in Latin America which show that diversification improves access to food as well as dietary quality (Altieri, et. al., 1998, SIDA, 2004)

Organic and Food Security at the National Level

The extent to which OA can contribute to food security beyond the household or community level is still being debated in the literature. Central to this debate are the issues of yield and productivity.

The impact of OA on productivity depends largely on the previous agricultural system; as noted previously, OA is reported to have the biggest potential to increase yields in marginal lands or lands under traditional agriculture (IFAD 2003, 2005b). Cases from UNESCAP (2002) show that OA was able to increase the yield of those converting from traditional to OA by 200-300 percent, similar to that obtained from conventional farming.

In intensive areas, conversion to OA usually decreases yields in the first year, but by the third year, yields typically stabilize and can be almost identical to conventional yields (IFAD, 2005).

However, the findings of research reviewed by Vasiliokos (2000) show that conversion to OA can lead to higher yields than conventional farming. The Farming Systems Trial at Rodale Institute likewise provides supporting evidence revealing that there was no difference in overall yields of corn, soy bean, and other crops (Pimentel, et al, 2005a, 2005b)

In addition, the ISP (2003) cites data on yield changes in 89 projects which revealed that “farmers have achieved substantial increases in food production per hectare, about 50-100% for rain-fed crops, though considerably greater in a few cases, and 5-10% for irrigated crops (though generally starting from a higher absolute yield base). These projects included both certified and non-certified organic systems, and integrated as well as near-organic systems. In all cases where reliable data were available, there were increases in per hectare productivity for food crops and maintenance of existing yields for fiber.” Most importantly, the yield in OA is expected to be sustainable over time.

B. Goal 2: Achieve Universal Primary Education

Target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Rising incomes from OA may enable rural parents to increase spending on education. However, since OA is often associated with higher reliance on family labor, it could possibly have a perverse impact on education. This remains an empirical question to be assessed. In theory, the decision will depend on how the rural poor would value the opportunity cost of sending children to school rather than putting them to work on the farm. One consideration that could possibly tilt the decision in favor of keeping the children in school is the fact that modern OA, particularly certified organic is knowledge intensive and requires higher managerial and marketing skills than conventional agriculture. This could change the parents' assessment of opportunity costs of keeping a child in school. Moreover, as OA begins to have its impact on the broader economy, the demand for skilled labor in food-related sectors such as processing can be expected to rise.

C. Goal 3: Promote Gender Equality and Empower Women

In many developing countries, women play a critical role in several aspects of agricultural production and processing. In general, over two-thirds of rural women live in low-income households, and female-headed households tend to be the poorest among these, accounting for 35-40 % of all heads of households in some areas in Asia (Stoll, 2002). While any improvement in women empowerment would be desirable in itself, it would also have implications on the achievement of other MDGs. Many of the MDGs will rely on empowerment of women, since women are the principal caregivers in the household (Rosegrant, et al., 2005).

It has been argued that since AO is labor intensive, it could empower women by providing them with more earning opportunities. IFAD's study (2005b) on OA in People's Republic of China (PRC) shows that women in Jianxi province expressed that the ability to earn in OA provided them with a greater feeling of worth for their contribution. In many OA certification bodies in Asia, women are preferred as farm inspectors, thus expanding employment opportunities for women.

However, as Engel-Di Mauro (undated) and Dolan and Sorby (2003) emphasize, OA's impact on gender empowerment and equality will depend on initial gender relations, as reflected in gender-based divisions of labor, decision-making, housework, and intra-household allocation of resources and assets.

One issue that has been extensively discussed in literature is that of time poverty: while OA may increase women's incomes, this increase may not be enough to compensate for the multiple burdens which women have to carry. It is also possible that in an effort to cope, women will shift some of the domestic burden on to other members of the household who are already vulnerable to begin with, such as the children (particularly daughters) or even other female household members who are already overburdened with work (Dolan and Sorby, 2003).

Another issue that needs to be investigated closely is whether women have sufficient bargaining power or role in decision-making within the household. In fact, the presence of sufficient bargaining power may have a bearing on whether OA is adopted by the household at all⁶. The extent to which women can influence how the extra income from OA is used is also crucial as women are known to be more likely than men to spend extra income on the children and the well-being of the family (IFAD, undated).

One final aspect that needs to be taken into consideration is whether OA would lead to a reduction in, or conversely bring on, violence against women. Anecdotal evidence suggests that since converting to OA entails adopting a new farming attitude of respecting nature as opposed to exploiting nature, family harmony has reportedly increased. Experience in microfinance has revealed cases where violence against women declined as women's incomes, assets, and share in household decision-making improved (CGAP, 2005, Rashid and Matsuert, 2001). It would be helpful to investigate whether OA would have a similar positive impact.

Unless all of the foregoing factors are taken into consideration, it will be difficult to meaningfully assess whether OA would have a positive impact on women empowerment.

D. Goals 4 and 5: Reduce Child Mortality and Improve Maternal Health

Target 5: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate

Target 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

OA can have a direct impact on child and maternal health through lowering the health risks associated with exposure to agrochemicals, in particular pesticides. This is particularly important for farm workers in developing countries where long-term exposure to pesticides has led to serious illness such as cancer and other reproductive problems (Kerdsuk, 2004; Dolan and Sorby, 2003). Health damage

⁶ In Japan for instance, women were responsible for starting the organic movement. In the 1980s, with rapid development of industrial and service sector, men began working in the industrial sector and left the farm to be managed by women. During the same period of time, the use of green house for cultivating crops was becoming widespread but as the negative consequences agro-chemical use, particularly pesticides, became more apparent in green house agriculture, the women farmers decided to form groups to convert to organic agriculture. In the 1990s, marketing groups, generally formed by women, established market linkages with housewife associations and consumer associations (Oyama, 2004, Hashimoto, 2004).

due to pesticides is well documented and findings have been established over a long period of time⁷.

Exposure to other agrochemicals, for example, nitrogen leaching from chemical fertilizers, has also been implicated in child deaths due to nitrate poisoning in drinking water, as nitrate hinders the proper transportation of oxygen in the red blood cells⁸. This is known as the “blue baby syndrome”. While adults are not typically affected by nitrates or nitrites, ingestion of these chemicals by babies can lead to death. In an ADB rural water supply project in Sri Lanka, communities downstream of a watershed area faced serious problems of nitrogen contamination in groundwater leading to illness and even death of babies. By promoting OA in watershed areas, the downstream villagers re-gained their access to clean drinking water while farmers upstream also improved their incomes.

Because poor farmers are largely illiterate or lack accurate knowledge about the harmful effects pesticides and fertilizers, inadequate storage and unsafe handling practices of these chemicals have been shown to widen the risk of exposure to include other members of the household, such as children (Rola and Pinghali, 1993).

Ransom (2002) likewise notes that studies have shown a link between a variety of reproductive health impacts in women and pesticide exposure. Increased incidence of miscarriages, birth malfunctions, still births and delayed pregnancy have been documented among women agricultural workers and wives of men employed in pesticide mixing and spraying. There is also evidence of increased risk of birth defects from parental exposure to pesticides, although the extent of this risk is uncertain (IFAD, 2003; Ransom, 2002).

Surveys conducted by IFAD (2005b, 2003) show that health problems due to pesticide exposure is one of the main reasons why farmers who used to practice conventional farming chose to shift to organic farming. Farmers in Karnataka, India reported that symptoms associated with pesticide exposure disappeared after they shifted from conventional farming to organic farming (IFAD, 2005b). The IFAD study in Latin America reports that organic farming is associated with better health of farmers. The study cautioned, however, that this conclusion is based on qualitative evidence. Nevertheless, the finding shows that farmers generally perceived themselves to be healthier after converting to OA.

Looking beyond the direct impact of pesticides on farmers’ health, consumers may likewise experience deterioration in health as a result of ingesting pesticide residues in food products. Between 1999 and 2003, the Ministry of Public Health of Thailand tested 4,000 food samples from various sources. Approximately half of all samples contained pesticide residues, including 45 percent of Thai vegetables and 50 percent of Thai fruit. The Ministry also found that 55 percent of imported fruits contained pesticides. Grapes and tangerines were heavily contaminated by pesticides, although residues were not detected in bananas, mangoes, jackfruits and pineapples (IPM Thailand, 2004).

Apart from lowering risk of exposures to agrochemicals, existing studies view the linkage between agriculture and improvements in health outcomes of farm households as being largely indirect: the impact is traced through an increase in

⁷ See Ransom, 2002; Environmental Justice Foundation, 2002; Kishi, et al., 1995, Rola and Pingali, 1993; Jeyaratnam, 1990).

⁸ Nitrogen is a leading cause of ground water pollution in areas where intensive agriculture is practiced.

income and resulting improvements in food security. Rising incomes could allow households to spend more on food, medicine, and health services leading to lower mortality rates. And as noted earlier in this paper, improvements in food security would go a long way in preventing child and maternal deaths⁹.

Organic and Dietary Quality

Worthington (2001), a nutritionist, reports that organic crops are better at improving dietary quality:

- ”1. Organic crops contained significantly more vitamin C, iron, magnesium, and phosphates and significantly less nitrates than conventional crops;
2. There may be less toxic heavy metals in organic crops than in conventional crops; and
3. Protein content may be less but the quality may be better in organic crops than in conventional crops.”

More recently, Flock et al. (2003) cite the results of a study by the University of Washington which analyzed pesticide breakdown products (metabolites) in pre-school aged children and revealed that concentrations of pesticide metabolites were six times less in children eating organic fruits and vegetables compared to levels found in children eating conventional produce.

E. Goal 6: Combat HIV/AIDS, Malaria and Other Diseases

Target 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

OA's contribution to combating HIV-AIDS may not be clear but its contribution to combating other major diseases may be traced indirectly to its impact on the ecology. Ecological factors play a role in the spread of disease in two ways: they could allow disease vectors to become abundant, or they could suppress them (Allan, undated). As Chivian (2002) writes, ecological disturbances “reduce the abundance of some organisms, cause population growth in others, modify the interactions among organisms, and alter the interactions between organisms and their physical and chemical environments. These disturbances have consequences for human infectious diseases whenever they influence, either directly or indirectly, the organisms involved in the maintenance or transmission of infections.” As will be discussed shortly, OA helps keep these ecological disturbances to a minimum. One way in which OA could make a contribution is through better waste and water management. Improper waste disposal such as animal matter or human waste is a major source of disease in rural areas. Since OA uses these wastes as inputs to the production system through composting, it can lead to a reduction in the prevalence of common diseases. In terms of water management, OA can reduce the risk of water-borne diseases such as malaria. For instance, irrigation projects have been implicated in large and widespread increases of schistosomiasis, and in the 1990s poorly maintained irrigation systems and uncontrolled local irrigation gave rise to “irrigation malaria,” which affected about 200 million people in rural India (Chivian, 2002). In fact, in some developed countries, government waterworks have

⁹ It has been estimated that 49 percent of the 10 million deaths among children less than 5 years old each year in the developing world are associated with malnutrition, which impairs immune systems and makes children susceptible to even the most common childhood diseases. (WHO, 1999, as cited in Setboonsarng, January 2005, Rosegrant, et.al., 2005).

encouraged conversion to OA to reduce the cost of purifying drinking water (FAO, 2003).

Bonner (2002) cites a study in Korea which revealed that avoiding pesticides in paddy fields encourages the growth of a certain fish, the muddy loach, *Misgurnus mizolepsis*, which effectively controls mosquitoes that spread malaria and Japanese encephalitis. There are also some studies on rice-fish integrated farming which provide evidence that the introduction of fish into the farming system leads to a decrease in the incidence of malaria, since the mosquito larvae are consumed by the fish. Similar experiences are also cited in the case of integrating ducks into the rice farming system (de la Cruz, et al., 1992)

F. Goal 7: Ensure Environmental Sustainability

Target 9: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources

Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation

Target 11 : By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers

MDG 7 covers a wide range of issues related to environmental sustainability. Next to MDG 1, this is the second MDG where OA has been documented to have a very strong and positive impact.

Environmental Impact of Conventional Agriculture

Conventional agriculture has played a substantial role in environmental degradation. Stoll (2002) reports that inappropriate agricultural practices has contributed to the loss of 38 % of total agricultural land in Asia and the Pacific, while the ADB (2001) reports that agriculture has been responsible for land degradation amounting to 212 million hectares. Large-scale irrigation projects developed for conventional agriculture have consumed water at unsustainable and inefficient rates, delivering only 40 % of water to crops (Stoll, 2002), causing water-logging and salination. Monoculture and dependence on a few plant varieties has diminished genetic diversity: Scialabba (2003) reports that currently, 1,350 breeds face extinction, with two breeds being lost each week. Furthermore, agricultural activities affect 70 % of all threatened bird species and 49 % of all plant species.

Meanwhile, intensive agriculture's dependence on agrochemicals and non-renewable fossil fuels has accounted for over 20 % of global anthropogenic greenhouse gas emissions (Scialabba, 2003). In Asia, this figure could be slightly higher as most of the fertilizers used in Asia are nitrogen-based (Stoll, 2002) and the industrial process of producing nitrogen fertilizer releases nitrogen dioxide, a strong greenhouse gas, into the atmosphere¹⁰.

All of these damages have come at a considerable cost to society and the economy at large. Stoll (2002) cites figures which places the economic costs of environmental damage at between 1-9 % of GDP, depending on the country and the impacts. Table 3 below summarizes some of the damages associated with intensive agriculture.

¹⁰ Nitrous dioxide is a greenhouse gas that is over 300 times stronger than carbon dioxide. (Saunders, 2004)

Table 3. Environmental Damages and Its Impact Caused by Intensive Agriculture

Environmental damage	Impact
Soil erosion	Low productivity, salinity, water-holding capacity
Sediment damage	Reservoir siltation, increased navigation channel siltation, floods, increased costs of road maintenance, habitat degradation
Over irrigation	Depletion of groundwater, water logging, salinization
Agrochemical damage	Worker health, water contamination, weed choking, cost of mending damage
Soil compaction	Low soil productivity
Deforestation	Soil erosion, crop damage from high wind, loss of genetic diversity
Wetland drainage	Decreased water purification service, genetic diversity loss
Air pollution	Odour, smoke, ozone layer depletion

Source: Karp, et.al., in Crucefix 1998.

Environmental Impact of Organic Agriculture

One of the reasons behind the increasing interest in OA, particularly in developed countries, is its demonstrated potential to contribute to environmental sustainability. In contrast to the negative impacts identified in Table 2, organic agriculture provides benefits in the following ways (Lampkin, 1994):

- ”1. Protecting the long-term fertility of soils by maintaining organic matter levels, fostering soil biological activity and careful mechanical intervention;
2. Providing crop nutrients indirectly by using relatively insoluble nutrient sources which are made available to the plant by the action of soil microorganisms;
3. Nitrogen self-sufficiency through the use of legumes and biological nitrogen fixation, as well as effective recycling of organic materials including crop residues and livestock wastes;
4. Weed, disease and pest control relying primarily on crop rotations, natural predators, diversity, organic manuring, resistant varieties and limited (preferably minimal) thermal, biological and chemical intervention; and
5. Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats.”

A Europe-wide study that assessed the environmental and resource use impacts of different farming systems revealed that organic farming performs better than conventional farming across several environmental indicators (ISP, 2003, citing Stolze, et al., 1999).

Shepherd, et al., (2003) provide a comprehensive analysis of the environmental impacts of organic farming and present cases where the evidence of benefits is supported on a per unit area and per unit of production basis.

Impact on Biodiversity

MacRae, et al.'s (2004) review of 33 comparative studies of organic and conventional farming systems found that organic farming led to biodiversity improvements for most of the studied organisms. Results were particularly positive for birds, flora and some arthropods.

Bengtsson, et al., (2005) studied the effects of organic farming on species richness and abundance using meta-analysis of literature published before December 2002. Results show that organic farming often has positive effects on species richness and abundance. On average, organisms were 50% more abundant in organic farming systems. The Soil Association's comprehensive review of 9 independent research studies on the levels of wildlife in organic and conventional farms also revealed substantially greater levels of both abundance and diversity of species on the organic farms (PanUK 2000, citing Azeez, 2000).

Impact on Soil Fertility

With regard to soil erosion and soil fertility, the Rodale Institute's Farming Systems Trial (FST) reports that water runoff decreased in the organic systems. In addition, organic matter increased in the organic systems, whereas no increase occurred in the conventional systems. (Pimentel, et al., 2005b). A study by Drinkwater, et al. (1995) compared the ecological characteristics and productivity of organic and conventional farms in California and found significant differences in soil health indicators such as nitrogen mineralisation potential, which was three times greater in organic compared to conventional fields. The organic fields also had 28% more organic carbon. These improvements in soil health led to considerably lower disease incidence (ISP, 2003, citing Drinkwater, et al., 1995).

Impact on Climate Change

An empirical study commissioned by IFOAM (Kotschi and Muller-Samann, 2004) reveals that OA can lead to greenhouse gas emission reductions, greater adaptive capacity in the face of climate variability and significant carbon and nitrogen sequestration potential. Similar studies report that conversion to organic fertilizers has led to increases in soil carbon by 15-28 %, and in soil nitrogen by 7-15 % (Hepperly, 2003; Cleary, 1999).

Impact on Energy Use

IFAD's study (2005) reports reductions in external energy consumption and water requirements in organic farms. Hepperly (2003) likewise reports that compared to conventional farming, organic farming uses 37 % less fossil energy. Data from the Rodale Institute's Farming Systems Trial (FST) likewise reveals that organic corn systems required 30% less energy (Pimentel, et al., 2005a; 2005b). Meanwhile, a 12-year study by Hoepfner, et al. (2006) on the impact of organic versus conventional management on energy use, energy output and energy-use efficiency reports that: 1) energy use was 50% lower with organic than with conventional management; 2) energy output was 30% lower with organic than with conventional management; and 3) energy efficiency (output energy/input energy) was highest in the organic management.

Impact on Water and Waste Management

Organic agriculture may contribute to better water management through practices such as mulching or water harvesting, thus helping maintain the safety of water sources in rural areas. ISP (2003) cites a review by the FAO which found that OA poses no risk of water pollution through synthetic pesticides and that nitrate-leaching rates per hectare are significantly lower compared to conventional systems.

Meanwhile, the use of livestock manure as fertilizer and the practice of composting could help improve sanitation and lessen leakage of manure into water bodies.

Impact on Urban Population Pressures

Finally, organic agriculture may indirectly alleviate population pressures in urban slums. Since the root cause of urban poverty lies in the rural areas, to the extent that organic farming increases income opportunities in rural areas, it would lessen the need to search for employment in urban centers that are only marginally more attractive in terms of economic opportunities. In Sra Keaw Province, in the poor region of Northeast Thailand, since the introduction of organic asparagus farming by a firm in 2001, migrant workers reportedly returned from odd jobs in urban slums to a better-quality lifestyle in the rural area.

G. Goal 8: Develop a Global Partnership for Development

Target 12 : Develop further an open, rule-based, predictable, non-discriminatory trading and financial system Includes a commitment to good governance, development, and poverty reduction – both nationally and internationally

Target 16 In cooperation with` developing countries, develop and implement strategies for decent and productive work for youth

The previous discussion on MDG 1 highlighted the growing demand for OA as a new income earning opportunity in rural areas. As noted earlier, mounting concerns about food safety and quality has primarily fueled this growth in demand, but two other drivers are likely to provide further impetus for growth. Firstly, the implementation of the Sanitary and Phytosanitary Measures under the WTO is forcing producers in developing countries to change production practice to meet export requirements. Since OA has been an example of a production system, which could meet strict requirements under WTO, and since premium prices exist ifor OA products, firms in developing countries are likely to be motivated to move toward OA or LEISA. Secondly, as incomes increase, more consumers can be expected to make choices on the basis of social and environmental concerns, and not just on the basis of price¹¹. Firms that aim to differentiate their products on the basis of such credence characteristics are likely to start investing in OA to demonstrate their commitment to environmental and social concerns.

¹¹ In response to this, many firms have started adopting corporate social responsibility instruments such as codes of conduct, social reporting and auditing, social and eco-labels as a means of obtaining a comparative advantage (Humphrey, 2005, Wall, Weersink, et.al, 2001). For instance, the ADB (2005b) reports that ISO-14001 certification has grown rapidly in Asia and the Pacific, now accounting for over 40% of the world's total. The number of certified firms in PRC alone grew by more than 200% to 8,865 in 2005 from 2,802 in 2002.

Meanwhile, the establishment of organic standards and certification system¹² could in theory contribute to the development of an open, rule-based, and predictable trading environment for organic products. However, very valid concerns have been raised that these standards could serve as non-tariff barriers that would effectively exclude exports from developing countries. To date, certification requirements are developed based on conditions in the Northern countries, mainly in temperate zones, and are therefore not always feasible for sub-tropical and tropical ecosystems. There are also those who claim that standards imposed by developed countries impair the development of own, national standards (Kotschi, undated).

While these criticisms carry a certain weight, there is also evidence to suggest that such standards and systems need not be exclusionary: the answer lies in promoting arrangements that will allow farmers to comply with stringent production requirements and access the growing export market.

One arrangement that is increasingly being promoted in developing countries is contract farming. Since organic products have to meet strict quality requirements that are typically difficult to meet in spot markets, firms are utilizing contract farming to gain better control of inputs, achieve more uniform product attributes, and reduce the cost of measuring quality, grading, and sorting of products. ADBI's studies on contract farming of organic rice suggest that this kind of arrangement can lead to improved profitability and income. In this sense, contract farming for OA can serve as a way of promoting a private-sector led global partnership for poverty reduction.

The UNCTAD's report on Trade and Environment Review 2006 highlights the case of OA as a trade and sustainable development opportunity for developing countries. In the report, Twarog, 2006 wrote:

“Developed-country markets for certified OA products have been growing much faster than overall food markets over the past two decades. This presents some promising export opportunities for producers and exporters of organic products in developing countries. In addition to income generation, OA can offer an array of positive effects at home, related to the environment and to sustainable natural resource use (improved soil fertility, reduced soil erosion, enhanced biodiversity), and in the social sphere in terms of rural employment generation, lower urban migration, improved household nutrition, local food security and greater self-reliance. This multidimensional potential has been recognized in a number of forums, including the World Summit on Sustainable Development in 2002.”

As for Target 16 on OA and employment of youth, since organic farming generally requires more labor for weeding, pest control, and composting, more employment can be generated. In addition, processing and marketing of organic agricultural products could create new off-farm rural employment opportunities, especially when profitable export markets can be accessed (UNESCAP, 2002). A number of empirical studies in European countries likewise reveal evidence of labor absorption in organic farming (Lampkin, 1994). Organic farming's heavy reliance on labor could thus provide employment opportunities for unemployed youth in the rural areas.

¹² Organic certification system, which is currently a largest impediment in the participation of the poor, is a big topic which will be discussed in a different manuscript.

Conclusion

The organic movement, which was started by women's groups, NGOs, and farmers in the 70's and 80's, is increasingly receiving worldwide attention from the private sector, governments, and international organizations. This paper presents some of the fundamental conceptual issues in OA and the MDGs. A review of the existing literature reveals that OA is uniquely pro-poor and has strong potential to meet multi-policy objectives that go beyond reducing income poverty to include the achievement of the various MDGs. However, the review also shows that the magnitude of the impacts would be stronger for some MDGs than others.

With regards to OA's contribution to improvements in income, food security (MDG 1), and environmental sustainability (MDG 7), the linkages are fairly well-defined and there is sufficient empirical and anecdotal data to support these. OA's contribution to improved profitability and therefore income, due to premium price and lower cost of production, is widely documented. OA's contribution to environmental sustainability is now a generally known fact and has been the main basis for subsidies program to support OA in European countries.

OA's contribution to global partnership in development (MDG 8) is increasingly being recognized in the international trade arena i.e. in WTO discussions. It is also generally accepted that improved employment opportunities in rural areas through OA could provide rural youths (target 16 of MDG 8) with jobs, reducing rural-urban migration and alleviating population pressures in urban slums (target 11 of MDG 7).

OA's contribution to health improvements (MDG 4 and 5) due to reduced exposure to pesticides is also widely recognized and very well documented. OA's contribution to maternal and child health due to improved quality of food, although widely perceived by consumers of OA products, is more difficult to prove. Such a study would require longitudinal data which are expensive to collect and generally not available. OA's impact on diseases is also largely anecdotal as establishing cause and effect and collecting supporting empirical data is difficult.

In the case of OA's contribution to education (MDG 2), the linkage is indirect through higher spending on education, given improved household income through OA. However, as OA is known to be more labor intensive, it may increase demand for children to work on farm and not be attending classes. The actual affect is context specific.

Finally, as for gender empowerment, (MDG 3), the linkages have been defined as largely indirect and inconclusive. OA could empower women by providing income opportunities but its impacts will depend on initial gender relations, as reflected in gender-based divisions of labor, decision-making, housework, and intra-household allocation of resources and assets. Nevertheless, since OA practice is generally associated with higher level of social awareness, the risk of women being exploited under OA is lower.

While OA has the potential to address multiple MDG targets, the magnitude of impacts on each MDGs will be context specific. The extents of impacts vary greatly due to several factors i.e. nature of the agro-ecosystem, type of crop, stage of development, initial poverty status, etc. Most importantly, the extents of impacts on MDG would depend on the share of agriculture income in total household income.

In general, OA development appears to be more successful in marginal areas where agro-chemicals have not been extensively used and where employment opportunity is limited. These marginal areas are also where the poorest of the poor reside and where the MDGs targets are at stake. This provides a case for donors and government to look more seriously into supporting OA as a development tool for this group of rural poor.

With increased attention to OA, governments of developing countries around the world are looking to develop various legal and financial programs to facilitate the development of this sector. However, they are all faced with the same problem of lack of rigorous studies to form a basis for policy design. Although there are increasing number of empirical research on OA and the MDGs, the review shows that even in areas where empirical research has been carried out, there has been little consistency in the research framework, indicators, and method for interpreting the findings.

Since mainstream research has overlooked organic agriculture, and since research methodology on the non-income aspects of the MDGs is limited and data are difficult to obtain, rigorous studies on OA are still severely limited, particularly in the context of smallholders in Asia. Addressing this knowledge gap is crucial for the development of effective policies to support OA development for poverty reduction and for achieving the MDGs in developing countries.

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