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Green jobs and decent work: An agenda for sustainable agriculture in India

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“Will the ‘BRIC’s Decade’ continue? – Prospects for trade and growth”

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Green Jobs and Decent Work: An Agenda for Sustainable Agriculture in India

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Abstract of the paper

The paper seeks to explore the opportunities created by climate change and mitigation efforts in agriculture sector in India for creating more, newer and better jobs. These new jobs which are termed as green jobs are not always going to be decent jobs and there is also uncertainty about the number of jobs so created vis-à-vis number of jobs destroyed in traditional fossil fuel based economy. Pivotal role played by agriculture in developing country’s economy makes it ideal sector to study in this context. There is growing consensus that organic, sustainable agricultural practices can provide synergistic benefits that include adaptation and mitigation of climate change with addressing concerns like livelihood, employment and working conditions.

In an emerging country like India, sustainable agriculture can help in meeting twin challenges of food security and job creation. This so called “Double Dividend” can positively affect the thinking of policy makers and public at large towards contributing to meeting of mitigation and adaption challenge with respect to climate change. However, this requires close integration of agricultural, environmental and labour policy. The present study is based on extensive literature survey and expert interaction. Paper seeks to integrate these varied factors and it is argued that emphasis on sustainable/organic farming will create more and better jobs in India and help in poverty reduction and improving life standards.

Keywords and JEL codes (if available)

Agriculture, Green Jobs, India

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1 INTRODUCTION

Climate change concerns are gradually shifting to the centre of developmental debate in emerging and developing countries. The main concern of developing countries is the probable impact of climate adaptation and mitigation measures on their economic growth and social development. In this context a lot of attention is being given to nature and quantity of jobs produced and destroyed by these measures. Recent recriminations at Copenhagen COP can be seen in this perspective. It is clear that moving the discussion forward will require a much better job at connecting the climate and development (KOZUL-BRIGHT, 2010). Job creation and sustenance are going to be major factor in this debate. A study by International Institute of Labour Studies (2010) concludes that the employment challenge associated with the goal of cutting CO₂ emissions will be significant as 38 percent jobs across the world are dependent on carbon intensive sectors. However, the move to a low carbon economy also presents major new employment opportunities. Taken together, some groups may bear the brunt of the adjustment process; and individual countries, when acting in isolation, may face competitive constraints.

There is also a big question about nature of new jobs in terms of working conditions, wages and other decent work parameters. As more jobs get eliminated which are based on fossil fuels, the quantity and quality of newly created jobs in green economy will come into sharp focus. United Nations environment Program (UNEP) and International Labour Organization (ILO) have defined Green Jobs as work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially in preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution.(UNEP, ILO,IOE,ITUC 2009)

A green job is one that helps bring about and maintain a transition to environmentally sustainable forms of production and consumption. However, all the green jobs cannot be classified as decent jobs. Decent work is characterized by the following components: a) productive work; b) protection of rights; c) adequate pay and d) social coverage.¹ Further, a fifth essential element has also been added: e) tripartite approach and social dialogue.² For the 2000-2001 ILO program, four strategic objectives are identified which are essential to achieve for ensuring decent work. They are: a) the promotion of labour rights; b) the promotion of employment; c) social protection for vulnerable situations, and d) the promotion of social dialogue. Another definition by the ILO Director General is that of decent work as productive toil in which rights are respected, security and protection are provided, as well as the possibility to take part in all decisions that may affect workers (SOMVAVIA, 2000).

¹ ILO, *Decent Work*, cit., p.15-16.

² Ditto, pp. 4 – 5.

However, convergence between green and decent jobs cannot be assumed as an obvious reality. Some of the mitigation and adaptation measures may lead to poor quality of work and destruction of existing jobs. Creation of new jobs in green economy may not adequately compensate these job losses. If this happens on large scale, incentives available to governments especially in developing countries to pursue enlightened climate policies will significantly reduce and their capacity to manoeuvre public opinion will be severely curtailed. It is therefore important to understand this dimension of climate policy in depth so as to find appropriate policy framework to promote decent work in green economy.

Agriculture still being the biggest source of sustenance in developing countries as well as a big source of CO₂ emissions is the most appropriate sector to study for understanding relationship between decent work and climate adaptation measures along with an added complexity of the question of food security. Internationally, continuing focus on sustainable agriculture to ensure food security as well as for addressing climate concerns makes choice of this sector most appropriate. India, the second biggest populated country in the world has been selected as a representative country for understanding these concerns as agriculture is the biggest source of livelihood and continuing transition to industrial economy brings issues of climate change to the fore. The present paper seeks to examine the job creation potential of sustainable agriculture and relationship between decent and green jobs in the sector in developing countries with special focus on India.

2 GREEN AND DECENT JOBS IN AGRICULTURE- A CONCEPTUAL UNDERSTANDING

RENNER et al. (2008) have presented a classification of green and decent jobs. They have proposed a scheme of green/decent Jobs in four quadrants matrix illustrating linkages between green and decent jobs i.e. (i) green and decent, (ii) green but not decent, (iii) decent but not green and (iv) neither green nor decent. A country can adopt the model of the green economy for development if entire jobs domain converges to 'green and decent'. The matrix can be adapted to agriculture sector and can help in understanding the relationship between green and decent jobs in the context of agriculture.

The contribution of the agriculture in providing employment is well documented in literature and is discussed subsequently in detail in this paper. In terms of employment, there are primarily four direct stakeholders in the agriculture sector. These include (i) agriculture worker directly working in field, (ii) transport workers and other intermediaries between farms and markets, (iii) agriculture scientists, researchers and advisors and (iv) workers employed in agri-business and food processing industry. Movement towards green agriculture will have some common but some differentiated impact on these stakeholders. Figure 1 illustrates the typology of various combinations of jobs in agriculture sector in terms of their being decent and green. The quadrant which represents green and decent jobs is the ideal scenario from the perspective of building low carbon green economy. Examples of these kinds of jobs include well paid sustainable coffee plantation workers certified as fair trade producers, agriculture scientists and advisors working on sustainable agriculture and well paid workers working in agribusiness using produce of sustainable agriculture (e.g. organic juices). However, replicating these examples across the whole spectrum of agriculture economy will require considerable change in the attitudes of customers,

governments and producers. For instance, if fair trade practices³ were to become more popular across the world, it is essential that customers are sensitized towards the issues of environment and working conditions and their willingness to pay for fair trade products is increased.

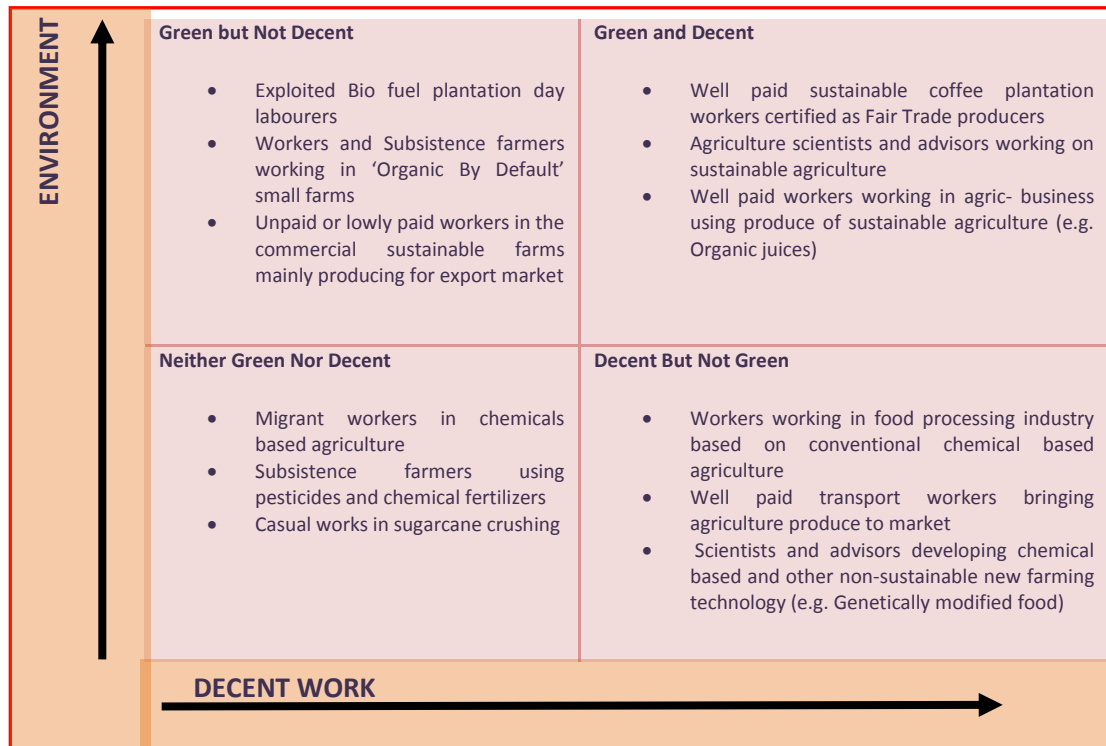


Figure 1: A conceptual framework for green and decent jobs in agriculture sector

The quadrant representing green but not decent jobs is a threat to equitable distribution of rewards of green economy. This phenomenon has the potential of compromising support of working masses for green economy and governing institutions will face a lot of resistance in taking policy initiatives for greening of the agriculture sector. This trend is reflected in the examples of exploited bio fuel plantation day labourers, workers and subsistence farmers working in 'Organic by default'⁴ small farms and unpaid or lowly paid workers in the commercial sustainable farms mainly producing for export market. Too much focus on creating green jobs in these circumstances may backfire and create labour market distortions in agriculture sector.

Jobs which are decent but not green are a big threat to promoting green and sustainable agriculture. This creates a pressure group of job holders who have developed a vested interest in sustaining old way of working in agriculture sector. Workers working in food processing industry

³ It implies a concern of the buyer for social justice for those who work in agriculture, especially with regard to a "fair wage".

⁴ Organic by Default is the term used for farms wherein farmers can not afford synthetic inputs and have no choice but to use natural inputs or no inputs at all.

based on conventional chemical based agriculture, well paid transport workers bringing agriculture produce to market⁵, scientists and advisors developing chemical based and other non-sustainable new farming technology (e.g. Genetically modified food) may derail such relevant policy and ground level initiatives if they are not convinced about the security of their jobs in new paradigm of sustainable agriculture.

Jobs which can't either be classified as decent or green provide an opportunity area as replacement of these jobs will be welcomed by workers and society at large. Migrant workers in chemicals based agriculture, subsistence farmers using pesticides and chemical fertilizers and casual workers in sugarcane crushing are classes of workers who will be whole heartedly supporting such measures. However, such transformation has to face many additional challenges like social discrimination, feudal structures and governance deficit.

2.1 Green jobs, decent work and issue of productivity

Discussion on green and decent jobs in agriculture also has to take into account issue of productivity which is directly related with food security. Agriculture sector is unique in developing countries' economy, not only because it has provided employment and sustenance of large majority of population, but also because the primary need of poor masses for survival i.e. food is dependent on it. If green agriculture is not able to provide decent nutrition to masses then chances of it getting favour of society and decision makers are minimal. The present paper mainly focuses on labour and environment aspect of agriculture, issues related to productivity and food security are also highlighted. The focus in this paper is on organic agriculture⁶ which is one form of sustainable agriculture.

3 METHODOLOGY

The study is based on extensive literature survey and expert interaction. The author visited various relevant organizations like FAO, UNDP, UNCTAD, UNEP, and OECD and had detailed structured interactions with the experts of India's National Organic Farming Institute, V V Giri Institute of Labour Issues and PUSA agriculture university, Delhi. Some of the information and analysis are based on unpublished reports. The author also extensively consulted newspapers, portals and other internet sources.

4 AGRICULTURE AND CLIMATE CHANGE

The role of agriculture role in development and especially, in the in the context of globalization, has generated huge debate in developing countries. Agriculture is now recognized as both contributing to and suffering from the negative effects of climate change. Farming accounts for as

⁵ Sustainable agriculture focuses on local production and local consumption which may negatively affect jobs of these workers.

⁶ Organic farming is one of the several approaches found to meet the objectives of sustainable agriculture. Many techniques used in organic farming like inter-cropping, mulching and integration of crops and livestock are not alien to various agriculture systems including the traditional agriculture practiced in old countries like India. However, organic farming is based on various laws and certification programs, which prohibit the use of almost all synthetic inputs, and health of the soil is recognized as the central theme of the method.

much as 32 percent of greenhouse gas emissions, if deforestation is included (Chatham House, 2009). Negative effects of climate change such as water scarcity, frequent droughts, and floods will have huge impact on agriculture especially in marginal and subsistence farming.

Agriculture can reduce its own level of emissions. One of the biggest opportunities for reduction is in the area of synthetic fertilizer use (KLEINSCHMIT, 2009). However, it is heavily subsidized in developing countries like India which creates big policy distortion.

4.1 Sustainable agriculture: the benefits

In terms of process, sustainable agriculture is a way of raising food that is healthy for consumers and animals, does not harm the environment, is humane for workers, respects animals, provides a fair wage to the farmer, and supports and enhances rural communities (PRETTY AND HINE, 2001).

Inherent in the notion of sustainable agriculture is “its adaptability and flexibility over time to respond to the demands for food and fibre (both high and low), its demands on natural resources for production, and its ability to protect the soil and the resources” (WILSON, TYRCHNIEWICZ 1995: p. 108). Sustainable agriculture is not just a set of practices but a process requiring skills of adaptability (MILESTAD AND DARNHOFFER 2003). Presence of such adaptation skills is an essential requirement to meet threat like climate change. Another important requirement for adaptation would be farmers’ knowledge, in negotiating complex agro-ecosystems. There is a huge scope for promoting organic agriculture which at present is restricted to 1.6 percent of total area (SoEL Survey, 2004). (Refer to Table 1)

Table 1: Land area of major countries under organic management

S.N	Name of the Country	Area Under organic (m hectare)	Percent of total Agriculture Area	Number of Organic Farms
1	Australia	10.0000	2.20	1380
2	Argentina	2.9600	1.70	1779
3	USA	0.9500	0.23	6949
4	UK	0.7245	4.22	4057
5	Germany	0.6969	4.10	15,628
6	South Africa	0.0045	0.05	250
7	China	0.3012	0.06	2910
8	Japan	0.0005	0.10	-
9	India	0.0370	0.03	5147
10	Pakistan	0.0002	0.08	405
11	Sri Lanka	0.0015	0.65	3301
	All World	24.0700	1.60	462475

Source: SOEL - Survey, 2004

1.6 billion People in the world are dependent on agriculture for livelihood. This demonstrates impact of agriculture on human society as a whole. An egalitarian and just socio-economic structure is not possible without concentrating on agricultural issues. Agriculture is thus a central point to address most society issues. Here agronomists are thus the most advanced scientists

because they are used to decipher complex scientific, social, political, and economic issues at various levels in space and time (LAL, 2009, LICHTFOUSE et al. 2009).

One major concern about sustainable agriculture is voiced that it may affect productivity and food security adversely. CHING (2008) says, “On average, in developed countries, organic systems produce 92 percent of the yield produced by conventional agriculture. In developing countries, however, organic systems produce 80 percent more than conventional farms.” She further cites other evidence, including a finding published in 2006: “In a review of 286 projects in 57 countries, farmers were found to have increased agricultural productivity by an average of 79 percent by adopting ‘resource-conserving’ or ‘ecological’ agriculture.”⁷

Sustainable agricultural practices can provide synergistic benefits that include adapting to climate change. Many options depend directly on government initiatives and programs, technology development, and financial opportunities beyond the farm gate (SMIT AND SKINNER, 2002). The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) sought to examine this question. (IAASTD, 2008). Various scientific inquiries have clearly established that the old methods of industrial farming, as characterized by ‘Green Revolution’⁸ are no longer tenable. However, impact of global warming is not going to be uniform in agriculture sector across the world and this has to be kept in mind while making policies. (IPCC, 2007)

In the context of climate change, adaptability is often referred to as “adaptive capacity,” defined as, “the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences” (MCCARTHY ET AL., 2001: P. 21). In the language of sustainability, the more adaptive capacity a system has, the more resilient it is— the system maintains its integrity despite stresses from internal and external factors (COSTANZA ET AL., 2000) and hence is more sustainable.

Consequently, there is much scope for adaptation and mitigation of climate change through making agriculture and the food system as a whole sustainable, and this is corroborated by substantial scientific and empirical evidence.

For example calculations suggest that 100% conversion to no-till agriculture in Europe could mitigate all fossil fuel-carbon emissions from agriculture in Europe. (SMITH ET. AL.,1998). According to Lal (2004), “The carbon sink capacity of the world's agricultural and degraded soils is 50 to 66% of the historic carbon loss of 42 to 78 gigatons of carbon. The rate of soil organic carbon sequestration with adoption of recommended technologies depends on soil texture and structure, rainfall, temperature, farming system, and soil management. Strategies to increase the soil carbon pool include soil restoration and woodland regeneration, no-till farming, cover crops,

⁷ Source: <http://www.twinside.org.sg/title2/susagri/susagri064.htm>

⁸Green Revolution is the phenomenon in countries like India, which became food surplus from acute food shortage in very short span of time sixties and eighties with the help of new seeds, chemical fertilizers and building of irrigation networks.

nutrient management, manuring and sludge application, improved grazing, water conservation and harvesting, efficient irrigation, agroforestry practices, and growing energy crops on spare lands” (P.1623).

5 DECENT WORK OPPORTUNITIES IN SUSTAINABLE AGRICULTURE

Sustainable agriculture is labour intensive by its definition and requires year long availability of workforce. Labour costs are an important input in the production process. Many studies find that labour can be a major impediment to the adoption of organic agriculture. LAMPKIN and PADEL (1994) noted that, in many European countries, labour costs on organic farms are high, although some of those costs cover marketing and processing activities. In Australia, in contrast, WYNEN (1994) found that both in the cereal-livestock and dairy sectors, labour requirements on organic and non-organic establishments were not different.

Projects in the UNDP study (1992) showed labour requirements to be high on some organic farms, especially on plantations, as well as on those organic farms where labour-intensive methods were used, such as composting. In the same study, in some cases, labour and total costs were lower on private organic farms. WERF (1993) found that median labour used on the seven Indian organic farms was lower than on the non-organic farms. However, that was by no means true of all projects in which individual farmers were involved.

If we compare with large-scale mechanized agricultural systems, organic systems appear more labour-intensive. This is especially true in areas with low ecological potential. In those countries where employable labour is available, organic agriculture can provide employment opportunities in rural communities. Furthermore, the diversification of crops typically found on organic farms, with their various planting and harvesting schedules, may result in more work opportunities for women and a more evenly distributed labour demand which helps stabilize employment.

The question whether organic agriculture, with its tendency for diversification of crops, brings with it a more evenly distributed time of labour requirement, is yet to be settled. However, as planting and harvesting dates are not similar for all crops, labour requirements are likely to be spread out over the year. While organic agriculture is likely to generate good labour productivity, the issue of wage depends on a number of other factors.

Proper policy and market instruments can help in the process of improving working conditions and wages of agriculture workers engaged in organic farming. Fair trade certification process by including condition of the food products to be organically produced can help in linking organic agriculture and decent working conditions. Many organic certification organizations favourably consider inclusion of "reasonable wage conditions" in the overall evaluation of a project (IFOAM 1997) which if adopted as mandatory condition by all certification programs can act as major catalyst for improving wages and working conditions of workers engaged in organic farming. In the National survey of economic farms in United Kingdom, it was found that organic farming in the UK provided 32 percent more jobs per farm than equivalent non-organic farms (GREEN AND MAYNARD 2006). (Refer to table 2)

Table 2: Employment in organic vs. non organic farms

Organic farms	Commercial non-organic	Increased
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	surveyed	farms (> 4 ESU)	employment on organic farms
Number of farms	1,018	137,950	
Area farmed (hectares)	171,361	15,199,802	
Total people employed	N/A	394,526	
Total jobs (FTE)	3,135	288,612	
Jobs per farm (weighted)	2.77	2.09	32percent
Jobs per farm (unweighted)	3.08	2.09	47percent
Jobs per 100 hectares (unweighted)	2.49	1.9	31percent

Source: Green and Maynard (2006)

Although it is not clearly established that labour requirements on organic farms are more compared to other farms, it is accepted by experts where value adding activities (such as processing and marketing) are developed, more labour input and a different distribution of labour can be required. Even in terms of labour requirements, there is growing body of evidence that organic farming is more labour intensive than chemical farming. Another study on impact of organic farming on the rural economy conducted by the University of Exeter (LOBLEY *et al.*, 2005) after surveying 302 organic and 353 non-organic farms in three English regions has confirmed that the fact that organic farms provide more jobs than their nonorganic counterparts (64percent more jobs per farm, 39 percent more jobs per hectare).

6 SUSTAINABLE AGRICULTURE IN INDIA

The challenges facing Indian agriculture can be grouped in four categories relating to (1) growth (2) sustainability (3) efficiency and (4) equity. There are also other important concerns like food security, livelihood, employment, improvement in standard of living of agricultural population. Addressing these challenges requires efforts on several fronts like incentive structure, infrastructure, technology, market development, extension, regulations, input supply, tenancy etc. However, declining yields (refer to Table 3) and lack of investment are proving to be a major obstacle in the growth and renewal of agriculture sector in India. In recent years, policy makers have started to pay attention to sustainable agriculture practices to provide new vigour to this sector.

Table 3 - Compound annual growth rate in yield of important crops in India

Crops	1980-81 to 1989-90	1990-91 to 1999-2000
Rice	3.19	1.27
Wheat	3.10	2.11

Maize	2.09	1.69
Total Cereals	2.90	1.58
Total Pulses	1.61	0.96
Total Food grains	2.74	1.52
Total Oilseeds	2.43	1.25
Sugarcane	1.27	0.95
Cotton	4.10	-0.61
Total Non-food grains	2.31	1.04
All Principal crops	2.56	1.31

Source: Yadav (2003)

According to Indian Government statistics, from a total food production of over 200 million tonnes, the country produced only 14,000 tonnes of organic food products in 2002. India currently has only 5147 organic farms (refer to Table 1). However, in a survey called Land Area under Organic Management (SOEL-survey 2007), the number is pegged at 5661. Though, survey by FiBL and ORG-Marg puts the number of organic farms at only 1426 (GARIBAY, JYOTI 2003). This statistical discrepancy reveals that the weak link in the organic/economic chain is certification. According to APEDA⁹, the total area under organic certification is 339113 ha. (refer to table 5) with a growth rate of 35 percent annually and likely to increase to fifty percent in few years.

Table 4: Status of organic farming in India (2006-07)¹⁰

1.	Total production	585970 metric ton
2.	Total area under certified organic Cultivation	339113 Ha
3.	Number of farmers	141904
4.	Total Quantity Exported	19456 metric ton
5.	Value of exports	Rs. 301.24 crore (3012.4 million)

Under current government policy, it takes four years for a farm to be certified as organic. The cost of preparing the report is a flat fee of Rs. 5000, and the certificate itself costs another Rs. 5000. While these costs are bearable for the new industrial organic greenhouses, they are equal to or more than an entire year's income for the average small farmer, if the costs of travel and

⁹ APEDA (Planning Commission, 2001) is the nodal agency to promote the Indian organic agriculture and its exports opportunities.

¹⁰ www.apeda.com/organic/PresentStatus.htm

inspection are included. Global organic food market is expected to touch US\$ 70.2 billion by the end of 2010 out of which Europe has the largest share of the market. Keeping in mind huge market potential and inherent strengths of Indian agriculture, organic farming has been identified as a major thrust area of the 10th plan of the central government.

6.1 Yield in Indian organic farming

A common worry with organic farming is the productivity of the farm which has implication for food security. RAJENDRAN et al.(1999) in their study of Indian organic farming have shown that the productivity of organic farming may be less in initial years, but the yields increased progressively under organic farming equating the yields under inorganic farming by sixth year (refer to Table 4). A long term experiment as reported by RUPELA et al. (2004) also sustains the view that yield of different crops in low cost sustainable system, the annual productivity (rainy + post rainy season yields), in particular, is comparable to that in the conventional non – organic system.

Table 5: Yields and economics of organic farming vis-à-vis non-organic farming

Year	Status	Yield Q ha	Gross I	Premium (20percent)	Total (Rs.)	Net Income (Rs.)	Surplus /Deficit over conventional
Conventional (Non-Organic)		10	20000	0	20000	9000	0
First Year	Year of conversion to organic	5	10000	0	10000	750	-8250
Second year	Year of Conversion to organic	5.75	11250	0	11250	3750	-5250
Third Year	Organic	6.25	12500	2500	15000	7000	-1500
Fourth Year	Organic	7.50	15000	3000	18000	10500	-1500
Fifth Year	Organic	8.75	17500	3500	21000	13500	4500
Sixth Year	Organic	10.00	20000	4000	24000	16500	7500

Source: Rajendran et al. (1999)

6.1.1 Most farms in India are organic but not certified

The irony and difficulty of the new governmental push for organic agriculture is that 65 percent of the country's cropped area is "organic by default," according to a study by Rabo India.(ECO WORLD 2008). By this somewhat degrading term they mean that small farmers, located mostly in the Eastern and North-Eastern regions of the country, have no choice except to farm without chemical fertilizers or pesticides. Though this is true in many cases, it is also true that a significant number of them have chosen to farm organically, as their forefathers have done for thousands of years.

A study by LUKAS, CAHN (2008) on organic agriculture and rural livelihoods in Karnataka, India found that farmers perceive that they had improved their livelihoods over the long term by the conversion from conventional to organic farming. Reduced costs for external inputs and reduced labour requirements together with similar or higher yields and premium prices resulted in higher net-farm incomes. However, almost all the farmers noted that the conversion period was

difficult due to temporarily declining yields and a lack of information and experiences. This is likely to be a major constraint preventing asset-poor farmers from adopting organic agriculture.

6.2 Link between climate and agriculture policy of India

On June 30, 2008, Prime Minister Manmohan Singh released India's first National Action Plan on Climate Change (NAPCC)¹¹ outlining existing and future policies and programs addressing climate mitigation and adaptation. The plan identifies eight core "national missions" running through 2017 and directed ministries to submit detailed implementation plans to the Prime Minister's Council on Climate Change by December 2008.

6.2.1. National mission for sustainable agriculture

Various national missions have been instituted by the government to work on various areas of climate change. National Mission for Sustainable Agriculture is one of the initiatives. In conjunction with National Mission for Green India, it has the potential to provide active support to sustainable agriculture and afforestation initiatives. National Mission for Sustainable Agriculture aims to support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms, and agricultural practices.

7 LABOUR DIVIDEND OF SUSTAINABLE AGRICULTURE IN INDIA

In India, workforce engaged in farming can be characterized in three categories; small farm owners working on their own farms, migrant agriculture labour and families working on subsistence farming. Even today 65 percent of India's population is dependent on agriculture whose share in GDP has progressively reduced to 32 percent in 2008. As most of the agriculture work force is in informal sector, the labour policies of the government do not benefit them adequately. Agricultural workers constitute the most neglected class in Indian rural structure. Their income is low and employment irregular. Seasonal unemployment is a characteristic feature of Agricultural Industry and under employment of man power is inherent in the system of family farming. According to first A.L.E.C.¹², adult male agricultural labourers were employed on wages for 189 days in agricultural work and for 29 days in non-agricultural work i.e. 218 day in all. They were self-employed for 75 days. Casual male workers found employment for only 200 days, while attached workers were employed for 326 days in a year. Women workers were employed for 134 days in a year. (PADHI 2007).

As explained earlier organic agriculture is more labour intensive and provides steady stream of work to the labourers through out years. Employment related benefits of organic agriculture are multifold and not only confined to quantity of jobs. Health and other working conditions are positively affected by organic farming. A few cases from organic farming sector in India are presented below which clearly demonstrates the double dividend of employment growth with sustainable and green agricultural practices.

7.1 Employment benefits of organic cotton in Punjab, India

¹¹ Available at <http://pmindia.nic.in/Pg01-52.pdf>

¹² Agricultural Labour Enquiry Committee which is constituted at periodic intervals by Labour Ministry, Government of India to inquire into conditions of agricultural workers

Cotton, the most important fibre crop of India, plays a dominant role in its agrarian and industrial economy. It is the backbone of textile industry, accounting for 70 percent of total fibre consumption in textile sector, and 38 percent of the country's export, fetching over Rs. 42,000 crores. Area under cotton cultivation in India (8.9 million ha) is the highest in the world, i.e., 25 percent of the world area and employs seven million people for their living. However, cotton productivity in India is quite low as compared to world standards.

Sharma and Pandove (2010) have reported significant increase in labour utilization in organic farming in Punjab state of India without any major impact on yield. (refer to table 7) Income for farmers is also shown to be significantly higher in organic farms. They have found that the difference in the labour utilized for different operation like nursery raising, land preparation, transplantation, harvesting and threshing is insignificant in inorganic and organic farming, whereas the difference in labour utilized for fertilization, irrigation and plant protection is highly significant in inorganic and organic farming. The table 7 reveals that difference in total labour utilized for inorganic and organic farming is also highly significant. It means that organic farming utilized more labour than inorganic farming.

Table 6: Human labour use pattern on different operations in inorganic and organic paddy (hours/acre)

Operations	Inorganic	Organic
Nursery Raising	8.42	8.11
Land Preparation	4.59	4.17
Transplantation	41.71	40.86
Fertilization	2.71	32.58
Irrigation	95.33	75.29
Plant Protection	4.52	43.19
Harvesting	31.57	31.47
Threshing	27.37	25.97
Total	216.23	261.64

Source: Sharma and Pandove (2010)

If we project results of the study done by Sharma and Pandove (2010) for the whole country, then there is scope of creation of 7780 million additional man-hours of employment which will amount to approximately 2.68 million of additional jobs compared to non-organic farming. Even moderate shift to organic for 33percent of total area under cultivation, will provide approximately one million extra jobs compared to non-organic farming.

In the same study, no significant difference in yield was found. However, gross returns from organic farming were Rs. 9314.14 per acre which were significantly higher from inorganic farming's net returns of Rs. 6448.59 per acre.

7.2 Employment benefits of organic sugarcane in Maharashtra, India

India is the largest producer of sugar and sugar cane. Sugarcane is cultivated in approximately 4.2 million ha area which is second only to Brazil. However, in Brazil a significant portion is used for production of ethanol. Total production of sugarcane is estimated 283 million tones of cane with productivity of 72.6 MT/Ha

KSHIRSAGAR (2010) has found significantly higher and study use of labour in his study on sugarcane in two districts of Maharashtra, a state of India. The study was based on primary data collected from two districts covering 142 farms 72 growing Organic Sugarcane (OS) and 70 growing Inorganic Sugarcane (IS) in Maharashtra. The sugarcane sector is one of the important employment generating sectors employing over 7.50 per cent of total rural population in India (GOI 2004). The data presented in table 8 also indicates that sugarcane cultivation, especially the Organic Sugarcane cultivation, needs large number of human labour days. For example, on an average the human labour use was found to be higher by 16.90 per cent for Organic Sugarcane crop than the Inorganic Sugarcane crop. This is mainly attributed to increased labour requirement for carrying out operations such as preparatory tillage, manuring, green manuring and managing the pests and diseases on Organic Sugarcane farms. Furthermore, the intercropping typically found on Organic Sugarcane farms, with crops having various planting and harvesting schedules, may distribute the labour demand more evenly which could help stabilize employment. This implies that Organic Sugar cane farming may provide an opportunity to rural masses of sustained gainful farm employment through out the year.

Table 7: Input use pattern on organic and inorganic sample farms in study of two districts of Maharashtra

Input	Organic sugarcane Units per Hectare	In organic Sugarcane Units per Hectare	Percent over organic Sugarcane Units per Hectare
Human Labour (days)	251.08	214.79	16.90

Source: Adapted from Kshirsagar (2010)

Estimation of total job creation potential of organic sugarcane is difficult because of differing productivity levels and different climatic and soil conditions in which sugarcane is cultivated in India. However, based on above discussion, it can be estimated that total additional job potential in organic sugarcane compared to no-organic sugarcane is approximately 155.4 million man days of work which corresponds to 0 .42 million of additional jobs.

In the study, average yield of the organic sugarcane crop was 96.63 tonnes per hectare as against 103.56 tonnes per ha of inorganic sugarcane crop showing that organic farmers were realizing 6.79 percent lower yield. However, stability of yields was found to be much higher in case of organic sugarcane. Famers in general were confident that in subsequent years, organic farming would be able to meet yield gap. Further, the gap was adequately compensated by higher profits in case of organic sugarcane which were 15.63 percent more than the inorganic farming.

It is evident that organic agriculture can provide impetus to job creation with ecological and climate benefits. With its year long requirement of labour and intensity of work, it can provide these classes of workers a steady and long term flow of income which may improve their living standards and reduce poverty in general. Increased focus of Government on Sustainable Agriculture and helpful policy environment can go a long way in attaining these highly desirable goals.

8 Conclusions

Employment generation with decent working conditions is one of the biggest challenges faced by many emerging countries. Increasing concerns about climate change and felt need of moving towards low carbon economy have created an unprecedented opportunity as well as threat for these countries in particular and world at large in general. Climate Change adaptation has acquired urgency as it is to essential save livelihoods and sustain economic progress. This new paradigm requires innovative policy solution and enabling Government and Private sector support. Convergence of different areas such as agriculture, labour and environment and a comprehensive policy package to deal with them is quintessential for addressing the interwoven issues. Segmented approach will not give desired results.

Agriculture is the biggest employer of workforce in the world. It is also one of the major emitters of greenhouse gases. To get the climate change response right, emphasis on this sector is of paramount importance. As the movement towards organic agriculture gets traction, it is important that concerns of workers and subsistence farmers are taken onboard. There is evidence that organic farming will lead to better health conditions for workers. However, there are questions about the quantity and nature of jobs so created. Movement towards Fair Trade should be coupled with organic farming initiative to bring in double dividend of better job creation and climate adaptation without compromising on productivity or economic growth. Question of food security is also relevant to workers, as in case high food inflation, marginal farmers and land fewer labourers are going to be most affected. In countries like India, where most of the farming is by default organic, it is essential that scientific knowhow is transferred to farmers and workers. Further, policies to encourage creation of decent green jobs in agriculture through public works programme and private participation should be framed and implemented. Further, a detailed analysis of impact of sustainable agriculture on nature and quantity of jobs should be undertaken to find multiple variables which may assist greening of agriculture and at the same time help in generating decent employment.

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