

## ***MIGRATION AND AGRICULTURAL DEVELOPMENT IN PUNJAB***

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Rural economy of Punjab has undergone structural transformation. But the dependence of rural population in general and rural labour in particular for earning livelihood from the rural economy continues. This process of rural transformation has perpetuated distress among the rural workforce. It is a strange phenomenon that migrant labour continues to pour into the rural areas. The rural economy of Punjab, due to wage gap, continues to attract huge amount of inflow of people from other poorer states of India. Rural-rural migration is largely seasonal and stays of workers in most cases, is less than six months. The high rate of growth of productivity and value addition during green revolution period in the agriculture sector has given big push to raise the level of living in the rural economy of Punjab. The most important impact of green revolution on the rural economy of Punjab was a dramatic reduction of the proportion of people living below poverty line. This has happened mainly because the availability of employment opportunities in the rural areas of Punjab has dramatically improved. The estimated demand for labour (based on cost of cultivation data) was 443.3 million man-days for the crop sector in the year 1971-72, which increased to 502.85 million labour man-days in the year 1985-86. During the era of early green revolution, the over-all development of rural areas and other sectors of the economy generated huge employment opportunities. The higher wage rate and higher level of living conditions also attracted labour force from other states, which was looking for survival. This has led to increase in the inflows of labour force from other states to both rural and urban locations in Punjab.

The green revolution in Punjab dramatically altered the cropping pattern. During the 1970's and 1980's, the diversified rural economy of Punjab turned towards predominantly wheat-paddy rotation. Crop diversification index for the winter season declined from 0.79 in 1960-61 to 0.297 in 2006-07. This indicates that there has occurred

a clear “reversal” of diversification of the rural economy of Punjab. The assured market and prices of two crops (Wheat and Paddy) provided by the state agencies facilitated this transformation. The predominant two cropping pattern of agriculture has governed the technological changes which significantly affected the employment opportunities in the rural economy of Punjab. A rise in the income of rural households, particularly of farmers, increased the capacity of the farm households to employ innovations to further exploit the potential of yields. Thus, the new technological innovations of threshing, tractor, use of pesticides and insecticides, diesel pump sets and electric tube wells increased the use of mechanical power for tilling and harvesting operations. The biological innovations for making crops free from weeds and pest attack started decreasing the demand for labour in most of the operations earlier done by the labour. This kind of technological progress has reversed the early green revolution’s peculiar characteristic, that is, the increased labour intensity in Punjab agriculture. Mechanical and biological technologies were mainly responsible for the decline in intensity of labour use in the major crops of Punjab agriculture. The capitalist pattern of agricultural economic development has increased the share of hired labour. In fact, the Punjab farmers have turned from peasant to managers of agriculture activities. The pattern of technological progress has reduced the sowing and harvesting operation time dramatically that has impinged upon reduction of family labour and spurt in the hired labour. This is a paradoxical situation of Punjab agriculture, on the one side, during the peak season an acute shortage of labour that is being met by seasonal migration from other states and on the other, surplus of local labour during the lean season. During 1990s, the green revolution technology has shown signs of fatigue. Productivity growth stagnated along with near freeze of prices, which resulted into the decline of agriculture sector’s contribution to the state income. This has created imbalance in the structure of Punjab state’s economy. The share of agriculture sector’s (Crops and dairying) income has sharply declined in the state domestic product. But the proportion of workforce engaged in agriculture sector of Punjab continues to be very high. Furthermore, the 90.9 per cent of workforce in Punjab is engaged in the unorganized sector where the wage rate is very low. The workforce working in the agriculture sector, especially agriculture labour, small and marginal farmers, are earning below Rs. 20.3 per capita per day, which is called

vulnerable by the National Commission on Enterprises in the Unorganized Sector. The low growth of agriculture sector and high dependence of workforce are expected to further worsen the working and living conditions of the rural workforce. This will act as a disincentive for the migratory workforce usually comes to rural areas of Punjab for finding much-needed livelihood. This will either divert these flows to other fast growing states of India or will suffer because of non-availability of necessary skills required to be absorbed in the urban areas.

There was a dramatic improvement in agricultural productivity with the advent of green revolution, which resulted into rise in per capita income. Intensive agriculture has also increased the demand for labour. The high yielding variety of seeds, irrigation network of canals and tube wells have given big push to multiple cropping pattern. This process of agricultural development created shortage of labour force required for intensive agriculture. The successful and sustained agricultural transformation widened the gap of per capita income of Punjab compared to other states of India. The poor people of poorer states have started gradually flowing in the state of Punjab. The total migrants reported in the census 1981 were of the order of 8, 22,377 persons. This increased to 11, 26,149 persons in 1991. The annual rate of growth of migrants in Punjab during the period 1981 to 1991 was of the order of 2.59. The inflow of migrants increased sharply during the decade of 1991 to 2001. The total number of migrants increased from 11, 26,149 in 1991 to 17, 52,718 persons in 2001. The rise in flows of migrants in Punjab during the period 1991-2001 was quite sharp. The annual rate of growth comes out to be 4.52 per cent, which is higher than the previous decade.

The compound growth rate of migrant inflows to Punjab was 3.55 per cent per annum during the period 1981 to 2001. The overall growth rate is higher than the first decade that is 1981 to 1991 compared with the 1991 to 2001. This implies that the migrant flow to Punjab was higher in the decade of 1991 to 2001 than that of the 1981 to 1991. The similar trend was also observed as far as the growth rates of migrants coming from other important states are concerned. The important fact is that the compound rate of growth of migrant inflows from Bihar was the highest compared to other states. There was a sharp rise in the migrant inflows from Bihar to Punjab. When we compare the structure of migrant inflows, Haryana tops in the year 1981 with 31.74 per cent migrants recorded in

Punjab were from Haryana. Uttar Pradesh with 28.18 per cent of the migrant inflows to Punjab was ranked number two. Himachal Pradesh and Rajasthan ranked number 3 and 4 recorded migrant inflows shares 14.37 and 11.76 per cent respectively. Bihar state comes at number 5 so far as migrant inflow proportion in 1981 is concerned. The eight important states in terms of migrant inflows together covered nearly 90 per cent of migrant inflows to Punjab. The changing structure of migrant inflows clearly shows that Uttar Pradesh has emerged as the most important state that sends migrants to Punjab. This is contrary to the widely held belief that the majority migrant inflows are from Bihar. However, the proportion of Bihar migrants in total migrants from other states to Punjab has sharply increased and Bihar is now ranked at number 3rd in 2001 and improved its rank from 5th in 1981. On the whole, the higher growth rate than the average of all states of India was recorded by four states, that is, Bihar, West Bengal, Madhya Pradesh and Uttar Pradesh during the period 1991 to 2001. The relative shares of migrant inflows in Punjab from these four states improved, but the share of migrants declined for rest of the states.

Migration and economic development are closely connected. The workforce, especially of poorer households and of poorer regions, migrates for better employment opportunities. Punjab state has been continuously receiving substantial amount of migrant work force since the ushering in of green revolution. The total number of migrants increased from 8,72,377 in 1981 to 17,52,718 persons in 2001. The inflow of migrants increased at a fast rate during the 1990s compared with the eighties. Uttar Pradesh and Haryana were the major sources, which have supplied migrants to Punjab state. The growth of migrants also increased in Punjab from Bihar but still their proportion remained quite less compared with the proportion of migrants from Uttar Pradesh and Haryana. Haryana and Uttar Pradesh remained predominant so far as rural-rural migrants from other states to Punjab are concerned. The rural to rural migration has increased but at a lower pace compared with influx of migrants to urban areas of Punjab. It is generally believed that Census do not record migrants whose stay in the state is less than six months which may under estimates of migrant inflows. However, the large chunk of migrant workforce comes to Punjab as casual labourers. The majority of these migrant workers (more than 90 per cent) are able to find work in agriculture only up to 50 days in

a year. Wheat harvesting, paddy transplanting and paddy harvesting are three peak seasons when the migrant workers are most needed in Punjab and after the peak season they usually go back to their respective native places. Some of them shift to urban areas of Punjab, during the lean season of agriculture.

Food is moving towards the top of the political agenda, with issues such as obesity, sustainability, and security of supply now impossible to avoid. Farmers, policy makers, consumers, and the big businesses involved in our food chain, stand alongside economists and environmentalists debating the balance between food production, the challenges and value of waste, and the growing use of crops for fuel. Since the beginning of the 1960s, world food production has grown by 145%. The trend is most apparent in developing countries, but even industrialised regions, such as the USA and Western Europe, have seen significant increases in the last 40 years. However, over 800 million people remain malnourished and without adequate access to food in the 21st century. As global population is predicted to reach 9 billion by 2050, food production will have to increase in the coming years to accommodate increased demand. As diets change, food production will also have to provide different types of food. Sustainable agriculture offers signposts towards intelligent strategies to make the most of finite resources during this unique period in history.

To understand how science and technology can contribute to environmentally sustainable and socially responsible food production, the Royal Society of Chemistry held a seminar to discuss the evidence on 9 October 2007. Dame Deirdre Hutton CBE, Chair of the UK's Food Standards Agency, chaired the meeting. Dr Les Firbank, Head of North Wyke Research Station, at the Institute of Grassland and Environmental Research, gave an account of sustainable agriculture in the light of increasing demands on the landscape. Professor Peter J Lillford CBE is Director of the National Non-Food Crop Centre (NNFCC). He focused on the food supply chain, suggesting a number of scenarios for future sustainability. Peter Jones, Director of External Relations at BIFFA explored technological and economic drivers influencing food waste exploitation. Dr. Jonathan Scurlock, Chief Policy Adviser, Renewable Energy, Climate Change and Nonfood Crops

for the National Farmers' Union, explored some of the perennial myths that recur in the food versus fuel debate.

Society makes many demands upon the landscape. In addition to food, land is increasingly needed for energy production, and science provides new techniques to use crops for materials too, as a substitute for oil-based products. Land is now viewed as a potential carbon sink. Following World War II, policies emphasized increased production to meet food shortages, with considerable success. But by the 1960s the push from science and technology in the agricultural arena was very much balanced by a growing realization of the costs to wildlife and the environment through products such as the pesticide DDT. Just a few decades later, food production was no longer the key driver, land was set aside and food mountains grew. In Europe, the focus shifted to the social and environmental benefits of supporting farmers through the Common Agricultural Policy. Today the situation has shifted once more, according to Les Firbank. Society wants it all: increased production for food and energy; environmental quality; and an even greater social use of land for leisure and health. To realize the most potential from a given piece of land, Firbank suggests, a multifunctional approach is needed.

Multifunctional agriculture provides food products for consumers, livelihoods and incomes for producers, and a range of public and private goods and services for citizens and the environment, including ecosystem functions. This approach goes beyond viewing agriculture solely in economic terms, and incorporates a broad and global view of agriculture.<sup>1</sup> Managing resources such as soil and water associated with the land will be a crucial requirement for sustainability in years to come, and to date these ecosystem services have tended to be undervalued. The landscape also has its own intrinsic value for other species and fostering biodiversity as well as for leisure and tourism.

Agriculture and forestry has a role to play in several pressing issues for global development, including climate change, renewable energy supplies, human and animal health and the quality of ecosystems. Pollution from the poor management of nitrogen, from fertilizers and manures, has a major environmental impact arguably second only to climate change in the UK.

There is an increasing demand for food, reflected by increases this year in commodity prices for basic foodstuffs, such as milling wheat, oilseed rape and milk. The increase is global, and not just a result of population growth but also of changes in diet, leading to increasing markets for meat and dairy products in some parts of the world. Other recent pressures include poor harvests around the world, and a switch from some food crops to bioenergy production. However, Jonathan Scurlock suggests that the present worldwide hunger is mainly a result of conflict, economic mismanagement and under-investment, rather than limited supply. “*The world is not short of agricultural land,*” he said, “*the world is short of agricultural investment.*” Issues of food safety also place certain limitations on the food chain: cooking, chilling and appropriate transportation under strict guidelines are not up for negotiation, because consumer safety is at stake. In addition constant vigilance is necessary to guard against food-borne pathogens, and dietary issues have risen to prominence due to the burden on individual health and on healthcare services.

The food chain today is a high technology, global concern. Science and technology have contributed significantly to high farm yields, large scale continuous processing, sophisticated preservation methods and global distribution of finished products. However, this model is based on assumptions that the Earth performs as a limitless energy supply and waste disposal sink. These assumptions are now changing. Players in the food chain are aware of, and share the need to reduce energy and water use, and by-product waste, not least because these will help reduce costs. The food chain is a profit-driven enterprise, but as well as a drive to optimise individual processes’ efficiency, sustainability should be measured in terms of the entire food chain, including the consumer, Peter Lillford argues. The food chain as a whole, from farm to plate, which includes domestic energy use from storing and cooking, is responsible for around 111 million tonnes of carbon dioxide or approximately 17% of the UK’s greenhouse gas emissions .1 Agricultural efficiency will increasingly need to be viewed in terms of “*yield versus emissions,*” Lillford suggests. Farming has a relatively low carbon footprint when compared to subsequent processing and transport. However, fertilisers, soil nitrogen and manure management are all significant issues, since they give rise to nitrous

oxide and methane emissions, which are greenhouse gases. This is an area where scientific research could make a considerable contribution.

There's a long tradition of farmers bringing fresh produce to the marketplace. However, the situation has changed markedly to become global and energy-intensive now that retailers are able to transport fresh produce long distances to meet consumer demand. Despite the increased awareness of food transportation by air, this only accounts for about 1% of the total vehicle kilometers our food travels. Transport by sea is particularly efficient: this represents around 65% of all food movements but accounts for only 12% of total external costs. Figures from the Department for Environment, Food and Rural Affairs (DEFRA) show that our food spends longer on the road than it does in the supermarket. Food in the UK travels 30 billion kilometres through transport, 82% of which is transport within the UK. From supplier to shelf, the total costs are £1 billion each year, comprising congestion (£680m), infrastructure (£164m) and accidents (£194m).<sup>2</sup> A significant proportion of our food is processed. Due to technological capabilities in process engineering, many food manufacturers have become successful globally.

Accordingly they manage their supply chains and manufacturing capabilities on a global level. Multinational food corporations are not bound by national loyalty, and wield considerable economic and marketing power. Ingredient suppliers are a less visible but nonetheless significant contributor to the food chain. Providing flavours or additives to modify and improve food, these chemical manufacturers inject considerable 'added value' to products on the shelves. In developed countries, people are increasingly dining out or eating takeaways. Catering is growing rapidly as a result. As food is prepared in bulk, this makes economic sense and is profitable. Increasingly 'sustainability,' in terms of emissions or food miles for instance, is quoted as a selling point, for all parts in the chain, including retailers. These claims must be examined carefully to assess the real costs and benefits, which are complex and not always transparent to consumers. Using a process engineering model, the food chain can be viewed as a 'biorefinery'. Farming provides the raw materials, and some of the outputs include food, food ingredients and the process of establishing new standards for international commodity trade, such as the sustainability criteria underpinning the RTFO in the UK, and the Roundtable on



Sustainable Palm Oil. By “raising the bar” for standards of production for renewable natural resources, biofuels could become a major driver for sustainable development. Scurlock argues that suggestions of biofuels creating a negative energy balance (cost more in energy terms to make than they yield) are not backed up by science: looking at the entire lifecycle, biofuels are actually unique compared to fossil fuels in having a positive balance. 5 The US Department of Energy’s Argonne National Laboratory calculates that 1 unit of energy at the pump requires 0.76 units to produce from American corn ethanol (and considerably less for other crops or regions of the world), compared to 1.22 for regular gasoline.

‘Next generation’ biofuel feedstocks such as ligno-cellulosic ethanol, made from the whole wheat or maize crop, or from perennial grasses or trees, do offer genuine promise. But Scurlock notes that commercial production using these is about 10 years away, and the UK must act now using existing technology. Biofuels will initially be reliant on subsidies, but all forms of energy, including coal and nuclear energy, receive subsidies too. Subsidies may provide a bridge until the carbon trading market becomes properly established.

Estimating and forecasting the scale of materials used and waste produced has been a major project championed by the waste industry, which can see the future benefits of reusing waste to create energy or nutrient resources. Peter Jones suggests that we will see a major shift in this direction when the increasing taxes on landfill mean that other waste options become viable competitors. He suggests that this transition will happen in the next 4 to 5 years. Jones calls for a holistic material flow analysis to convert the full lifecycle impact of goods, including food, and waste, into units of carbon. This measure of carbon footprints will help with carbon pricing and trading systems. In our current economy, each tones of goods consumed costs 20 tones of embedded materials to produce. Economics, technology and socio-political attitude are three systems available that we might harness to improve this 20:1 ratio and make our resources go further. According to Jones, proven technology exists to deal with and benefit from waste via mechanical, biomechanical, biochemical or thermo chemical routes without the need for extensive investment in R&D. In addition to methods that yield energy, such as thermo chemical or biochemical routes, another alternative is to compost biomass to create

nutrient-rich soil. The cost-effectiveness and revenue yield of these various exit options will drive technology choice. In terms of economic instruments for change, government has been slow to put up landfill taxes. This is now taking place, and provides the economic green light for waste companies to install relatively costly new technologies, which are more capital and labour intensive. Waste companies are increasingly moving away from landfill as taxes are ramped up. Economic factors will drive which technological route companies choose for waste disposal. Indeed, in future, waste companies may be paying for waste as a feedstock for energy or soil manufacture, or to meet recycling requirements. Waste may increasingly become a valuable resource in response to real price rises in global commodities and demand side pressures. The looming shortfall in electrical energy supply emerging in the UK as ageing capacity is shut down is another factor. As coal and oil dwindle there will be a switch to gas, but a chronic energy shortage is likely around 2015, in part because any potential nuclear facilities would not be commissioned before 2020. Early adoption of supplementary distributed energy approaches, some of it fuelled from scrap carbon in the waste stream is thus desirable, even if the latter is unlikely to provide more than 3-5% of baseload electrical capacity at present.

In summary, Jones calls on government to implement a National Resource Flow mapping/data capture system in parallel with a transparent audit framework to convert those mass flows to some form of carbon