

Socio-Economic and Political Implications of the Green Revolution in Haryana

Vinod Kumar¹, Surender Kumar², Kuldeep Sharma³

^{1,2}M.Phil. Scholar and UGC NET, Department of Geography, Maharishi Dayanand University, Rohtak

³M.Sc. Geography, Kurukshetra University, Kurukshetra

Abstract: The Green Revolution was a period of technological innovation in agriculture between 1943 and the late 1970s. Many developing countries were exposed to the ideologies of the Green Revolution and it was deemed a success in many nations for the increased production of grains due to new irrigation techniques, fertilizers and seed technology. The Green Revolution, beginning in India around the mid-sixties and involving the use of high-yielding variety of seeds, chemical inputs and irrigation has also aroused a lot of academic interest in terms of its social, economic and political implications. The Green Revolution in Haryana has achieved much progress in agricultural productivity but on the other side it had also impact the society, economy and polity of the state. The increase in the cost of cultivation due to rising expenditure on irrigation, fertilizers, land reclamation and pesticides made the farmers feel victimised due to erosion in profits. The depleted water resources due to tube-well irrigation created refusal to share river waters caused political problems in Haryana. So, the main emphasis of this research study is to delineate the past and present situation of the impact of Green Revolution on the socio-economic and political aspects of Haryana.

Keywords: Socio-Economic, Political, Green Revolution,

Implication

Since the beginning of the industrial revolution, starting in the mid-eighteenth century, the development process has been rapid and concentrated in time. The event was associated with three marked features: technological advancement, fast population growth and intensifying pressure on natural resources. This gradually led to aggravating problems of ozone layer depletion, deforestation, global warming and loss of biodiversity. The Green Revolution, beginning in India around the mid-sixties and involving the use of high-yielding variety of seeds, chemical inputs and irrigation, has also aroused a lot of academic interest in terms of its social, economic and political implications. The impact of the Green Revolution on the Society, economy and polity of the state is the result of the increase of the area, production and yield of the crops due to the use of fertilisers, irrigation, mechanisation, Mandis and energy. A list of all these indicators has been shown in the table below:

Table 1.1: Haryana: Causes of agricultural development over time

Indicators	1966	1976	1986	1996	2006	2012
Fertilizers Consumption (Kilograms per hectares of total Cropped area)	2.88	17.79	66.42	121.19	173.45	208.51
Irrigation Intensity (Gross irrigated area/Net irrigated area*100)	134	156	164	169	186	185

Cropping Intensity (Total cropped area/Net area sown*100)	135	150	155	167	183	185
Mandi (Per lakh hectares of Net Area Sown)	2	3	3	3	3	3
Tractors (Per thousand hectares of total cropped area)	2	5	15	28	38	42
Tubewell (per 1000 hectares of net irrigated area)	20	117	181	199	211	245
Energy (Diesel pumping sets and electric tube-well per 1000 hectares of Net Area Sown)	7	57	113	153	173	214
Green Revolution Intensity (total area of wheat + total area of paddy/total cropped area)	.20	.28	.40	.46	.51	.58

Source: Statistical abstract 2012-13, Director of Agriculture, Haryana.

Haryana is one of the well agriculturally developed states in the country today contributing substantially to the central pool. The developments in agriculture and particularly cropping pattern are the combined result of increase in the use of fertilizers, intensity of the irrigation, tractorisation and increase in the tube-well sets. All this has resulted in increase of cropping intensity. The consumption of fertilizers per hectares of total cropped area increased from 2.88 kg in 1966 to 208.51 kg/ of total cropped area in 2012; an increase more than hundred times in 45 years. The intensity of irrigation increased from 134 per cent in 1966 to 185 per cent in 2012. Irrigation intensity is calculated by dividing gross irrigated area to net irrigated area. The irrigation intensity increased 51 per cent from 1966 to 2012. There is also increase in the intensity of cropping in Haryana. In 1966, the cropping intensity was 135 per cent and it increased to 185 in 2012. The uses of heavy machinery like tractors were also increased. In 1966, there were only 2 tractors per 1000 hectares of total cropped area but the number increased 21 times in 2012. There were 42 tractors per 1000 hectares of total cropped area in 2012.

With the increasing of fertilizers and machineries, tube wells had also increased from 20 per 1000 hectares of net irrigated area to 245 tube wells per 1000 hectares of net irrigated area in Haryana. There is 12 times increase of tube wells in between 1966 to 2012 that played a crucial role for the development of agriculture in Haryana. There were only 7 diesel pumping sets and electric tubewells per 1000 hectares of net area sown increased to 214 diesel pumping sets and electric tube wells per 1000 hectares of net area sown. It shows the 30 times increase of the diesel pumping sets and electric tube wells from 1966 to 2012. There were 2 mandis per lakh hectares of net area sown in 1966 and in 2012 there are 3 mandis in per lakh hectares of net area sown. All these improvements in mechanization and use of inputs reveal the intensity of green revolution. The green revolution intensity of Haryana was increased from .20 in 1966 to .58 in 2012. The index of green revolution intensity is calculated by dividing the total area of paddy and wheat to the total cropped area. So, there is a three-fold increase in the intensity of the green revolution in Haryana (table 1.1).

Objectives:

Accordingly, the main objectives of the study may be listed as follows:

- To identify the pattern of regional variations in intensity of the Green Revolution in Haryana.
- To discern the social, economic and political impacts of the Green Revolution.
- To identify the social, economic and political impacts of the ecological change as related to the Green Revolution in Haryana.

Data Base and Methodology:

The Green Revolution in Haryana started around 1966; it climaxed about 1976 and gradually attained a plateau stage thereafter. The year 1966 also coincides with the time when Haryana was reorganised to its present form. The year 1991 and 2012 brings us to a time for which the latest requisite data are available. The study, thus, covers the impact of the green revolution on the society, economy and polity since the Green Revolution started in Haryana, 1966 and particularly the district wise authentic data of Statistical Abstracts of Haryana, 1991 and 2012. This research paper was based on the secondary data, collected from the different issues of the statistical abstract of Haryana, published by the Economic and Statistical Advisor, Planning Department, Government of Haryana, Chandigarh; Department of Water Resources, Department of Agriculture Haryana, Haryana Agricultural university, Hisar; CMIE, States of India.

The methodology of this research paper addresses itself to the objectives of study enunciated in the introductory part of this research paper. Since the purpose is to examine spatially the ecologically impact of the green revolution, it becomes essentially to identify the elements of ecology which would bear the impact of the green revolution, to examine regional variations in the spread and intensity of the green revolution and to detect the spatial picture of the nature and degree of change in various elements of ecology. To achieve the desired results, the index of the intensity of the green revolution is calculated by the area under wheat paddy rotation as a proportion of the total cropped area, was used as an indicator of the green revolution intensity.

$$\text{Index of green revolution intensity} = \frac{\text{Total area of wheat} + \text{Total area of Paddy}}{\text{Total cropped area}} \times 100$$

GIS arc is also used as a tool to draw the maps of the impact of the green revolution on the components of the ecology in Haryana. Some other calculations were also done for the desired result.

Study Area:

Haryana has been adopted as the study area for an obvious reason. The state has earned a wide acclaim for its glorious innings in the Green Revolution. This accomplishment was, of course, not without its impact on society, economy and polity of the state. Haryana is a state in north India. It came into existence on 1 November 1966 as a newly created state carved out of the Punjab state on the basis of language. It has been a part of the Kuru region in North India. Haryana is a state in north-central India. It is bounded on the northwest by the state of Punjab and the union territory of Chandigarh, on the north and northeast by the states of Himachal Pradesh and Utrakhand, on the east by the state of Uttar Pradesh and the union territory of Delhi, and on the south and southwest by the state of Rajasthan. The city of Chandigarh, within the Chandigarh union territory, serves as the capital of not only that territory but also of the states of Haryana and Punjab (Singh, 1998: 24)



Map 1.1

The research assessment of the social, economic and political impacts of the Green Revolution is contradictory. There are scholars who view it as being highly beneficial. Self-sufficiency in food, general upliftment of agricultural classes, including their acquiring political clout, rapid transformation of the countryside and stimulus to agro-based trade and industry are listed among the positive outcomes of the Green Revolution. It is stressed that these benefits were pervasive and penetrated all sections of society (Sen, 1970; Randhawa, 1974; Fernando and Thomas, 1978; Chadha, 1979, Swaminathan, 1985).

The other group of scholars argues on different lines. They point out that the Green Revolution has caused structural distortions. The uneven distribution of the benefits of the Green Revolution, wherein the bigger farmers emerged as the main beneficiaries, is cited as an illustration. The increased dependence of farmers on uncertain sources for their inputs is another point which is highlighted in association with the problems of unemployment, poverty and inequality. At one point, it was feared that the Green Revolution may even turn red due to these issues (Ladejinsky, 1969; Frankel, 1971; Parthasarthy, 1971; Oommen, 1971 and 1989; Griffin, 1974; Morgan, 1978; Rahman, 1979; Dasgupta, 1983; Aggarwal, Arora and Gupta, 1989; Gangrade and Chaturvedi, 1989). Likewise, an accentuation in regional disparities is also attributed to the Green Revolution having confined itself to a few irrigated areas (Raza, 1978; Bhardwaj, 1982; Kundu and Raza, 1982).

Social Implications of the Green Revolution

The question what was the social implication of Green Revolution on the different strata of Haryanvi rural society? Such a question is important to answer because the impact of Green Revolution is not same for all the categories of farmers. After independence the social, political and economic forces acted in a way which gave no other option to adopt new package in country. The package increased the production and agriculture became market oriented though it was the manifestation of the new package. It provided mobility to the farmers. The package had manifold affects and it was studied by many scholars. The impact of the ecological imbalances has been indirect on society and mostly it is in the nature of hardship or even a life threat to people. This is illustrated by several situations. A regular deepening of water table requires frequent lowering of tubewells whose pits are usually of small diameter and have unplastered walls. A lot of underground masonry and other work are involved. This has, in many instances, caused injury or death to workers due to collapse of walls of the wells under reconstruction. Quite often, farmers go down into the tubewell pits for minor repairs of pumps or removal of entrapped air. Deaths have been known to occur in many cases due to asphyxia caused by the presence of carbon dioxide as well as carbon monoxide. Cases of such mortality are on record for in the districts of Ambala, Karnal, Kurukshetra, Panipat and Sonipat, where heavy use is made of fertilisers.

Among the latest tubewell deaths reported few years ago were those of two brothers in Sohega village in Sonipat district. On July 12, 1992, Ram Kishore entered a tubewell pit to switch on the motor and was instantly killed by the poison gas accumulated inside the pit. A little later his brother Suresh, who was waiting outside, went into the pit to look for him and met the same fate. The villagers rushed to the nearest block office for help in getting out the bodies, but the block employees were not adequately trained to handle the situation. In July-August 1988, tubewell-related deaths numbered 35 in the districts of Karnal, Kurukshetra, Ambala and Yamunanagar, the major share coming from Karnal. In many of the affected villages, rice transplantation came to a standstill as panic-stricken villagers refused to operate tubewells (Hindustan Times,1992). Extension of irrigation in Haryana has caused the spread of diseases like Malaria, which threaten the health of the population. As intensified multiple cropping, associated with the Green Revolution, has resulted in the landscape acquiring a green cover almost throughout the year. This provides the mosquitoes with a place to breed in and hide all the year round. Previously, the dry heat during the months of May and June used to kill them. Now, irrigated cultivation of crops like fodder and later sowing of paddy during these months creates favourable conditions for their proliferation. Malaria, which was once considered as eradicated, has resurged. The number of malaria cases went 33401 in 2011. These occur more frequently in districts which have a high intensity of the Green Revolution, indicating a strong link between the two. Controversially, areas with a weaker Green Revolution intensity, as in the Rewari, Mahendragarh, Faridabad, Gurgaon, Jhajjar etc. have lower intensity of malaria (Table 1.2).

Table 1.2: Haryana: Intensity of the Green Revolution and Positive cases of malaria, 2012

District	Index of intensity of Green Revolution	Number of Cases Of Malaria
Karnal	.88	2559
Kaithal	.87	252
Panipat	.85	535
Kurukshetra	.84	525
Ambala	.82	282
Sonipat	.81	806
Yamunanagar	.75	5212
Jind	.69	656
Palwal	.67	489
Fatehabad	.66	1044
Faridabad	.66	259
Rohtak	.62	1315
Panchkula	.60	418
Jhajjar	.56	290
Gurgaon	.51	530
Sirsa	.50	2575
Mewat	.45	1558
Hisar	.44	9308
Rewari	.26	91
Bhiwani	.23	3661
Mahendragarh	.15	359

Source: Annual report on implementation of National Vector Borne Disease Control Program in Haryana, Director Health services (Malaria), 2012.

Economic Implications

The changes produced by Green Revolution generated interesting debate among the scholars. The economic implications of the new package on the three main social categories: Maliks (landlord), Kisans (the working peasants) and Mazdoors (the labourers) are focus of this section. Initially it was viewed that the benefits of the package was cornered by the large landholders. It is made out that owners of land are more likely to adopt HYV's of seeds than tenants because of the risk factors. So it is said that the fruits of Green Revolution are pocketed mainly by the rich and prosperous farmers, and the disparities between them and the have-nots particularly landless agricultural labourers has increased. The increased disparity leads to a sense of deprivation among the weaker and poorer agrarian classes and their frustrations are manifest in agrarian tensions, occasionally leading to the eruption of violence. It was also viewed that it has affected only small segment of millions of farmers (Chakravati 1973).

T.K Oommen (1971) asserted that the agrarian unrest and the economic disparity believed to have resulted from the Green Revolution. Similarly Wolf Ladejinsky (1969) pointed that the greater the impact of the Green Revolution in an area, the more the disparity between the rich and poor, and the greater the prevalence of agrarian tension. Thus the agrarian problems dwelled on the new ground after the Green revolution. Hence the package was biased toward small and landless farmers. It was shown by many studies that Green Revolution has widened the gap and increased the social and economic problems (Brown 1970). The large landlord is after modern inputs for cultivating the land. The main tractorisation may have helped large farmers in increasing the possibility of multiple cropping and provided the substitute of labour. However, it seems that the adoption of tractors by small and marginal farmers was not always economically justifiable because of its economic constrain. The larger farmers experienced an absolute increase in their output, the gap between large and medium farmers widened.

As an essential corollary of the Green Revolution, the farming operations became dependent on heavy monetary inputs. Additionally, as a result of depletion of water table decrease in soil fertility and increase in pest problem. There was an added burden on the pocket of the farmer over the period of green revolution. The yield per hectare of paddy increased by 1161 kgs per hectare in 1966 to 3044 kgs per hectare in 2012. There is an increase of 3 times in the given period. The yield per hectare of wheat increased from 1425 kg per hectare to 5183 kg per hectare in 2012. There is an increase of 5 times in the yield of wheat in the state (Table 1.3). With the increase in the yield and the production of these crops the consumption of fertiliser also increased. Fertiliser use went up by 2 kg. per hectare of total cropped area in 1966 to 28 kg. per hectare of total cropped area in 2012 (Table 1.1).The high yielding variety seeds required three times as much water as the traditional ones. So the water table of Haryana had dropped dramatically due to intensive irrigation. Farmers had to deepen their tubewells repeatedly and install heavy duty motors to pump out the water. All this pushed up the agricultural costs.

Table 1.3: Haryana: Area, production and yield of some important crops

Years	Rice			Wheat			Pulses		
	Area in 000 Hec.	Production in 000 tonnes	Yield Kg per Hec.	Area in 000 Hec	Production in 000 tonnes	Yield Kg per Hec.	Area in 000 Hec	Production in 000 tonnes	Yield in Kg per hec
1966	192	223	1161	743	1059	1425	1150	563	-
1976	303	625	2063	1226	2428	1980	1193	952	-
1986	584	1633	2797	1701	5260	3094	846	686	-
1996	830	1847	2225	1972	7291	3697	449	450	-
2006	1046	3194	3051	2304	8853	3844	195	11	-
2012	1234	3757	3044	2531	13119	5183	123	107	-

Source: Director of land records, Statistical Abstract, Haryana, 2012

In areas of canal irrigation and associated waterlogging, the farmers had to face economic hardship associated with the cost of reclaiming salt affected fields. Even after reclamation, these soils didn't regain their original fertility, thereby affecting yields and resulting in lower profits. In heavily waterlogged areas, the soils were permanently damaged and agriculture had to be abandoned. Over- emphasis on paddy-wheat rotation, with a reduced genetic base, led to an acute pest problem. To correct it, expensive pesticides need to be applied. This added to the farmer's financial burden.

The reduction in area under pulses has made it a dear commodity. In a hot and vegetarian country, these area a major source of protein. A rise in their price has affected the pocket of the people and also deprived many of this protein sources. The area under pulses decreased from 1150 thousand hectares in 1966 to 123 thousand hectares in 2012 and 563 thousand productions to 107 thousand tonnes in the given periods (Table 1.3).

In addition, no fallow lands were kept and land devoted to self-fertilising, leguminous crops was significantly reduced. Subsequently, expensive chemical fertilizers had to be applied in bigger quantities. Agriculture is the mainstay of economy. It absorbed above 50 per cent of the working force in 2011, as cultivators and agricultural laborers. No less than about 83 per cent of its total area is under plough in 2011-12. The all India figure is 54.66 per cent. About 78 per cent of the net area sown is irrigated in comparison to about 44 per cent in India. Agriculture contributed about 44.48 per cent of the state's domestic product in 1985-86, 31 per cent in 2001 and 21 per cent in 2011-12. The share of agriculture in gross state domestic product is decreasing continuously in Haryana (Table 1.4). This is due to the industrial development in Haryana. The comparatively high per capita income in the state is significantly related to its progressive agriculture.

Table 1.4: Haryana: Gross state domestic product in Agriculture at current prices: base year 2004-05 (Rs. In Million): 1980-81 to 2013-14

Years	GDP	Agriculture	Percentage of Agriculture in GSDP
1980-81	39281.8	18417	46.00
1985-86	76001.4	30023	39.50
1990-91	158180	60759	38.41
1995-96	320372	109647	34.22
2000-01	595724	172639	28.97
2005-06	1088845	217537	19.97
2010-11	2606212	516549	19.82
2013-14	3928940	747993	19.03

Source: CMIE, States of India, Gross state domestic product, Economic outlook, Agriculture Outlook (1980-81 to 2013-14)

But Mandal and Ghosh (1976, p. 110) stated that Green Revolution has been able to increase income and employment in the villages under study without creating any social tension in the wake of development. Economic values rapidly replacing the former social values and generated urban oriented individualistic behavior between the landowning and the former services castes and even the landless labourers (Kahlon et al.1972, p. 6).

Political Implication:

The Green Revolution made water a very precious resource. There is 88 per cent net area sown is under the irrigation. People of the state have become sensitive to any sharing of water. They are not allowing the construction of the Satluj-Yamuna Link canal, which as a part of an inter-state agreement, was to carry water to the adjoining state of Haryana. Any effort on the part of the Haryana government to complete its construction work faces a strong political opposition from the farmers. This canal project is assessed as one of the contributory causes of the Haryana problem. The core of the Haryana problem has been the Sikh community's demand for greater autonomy vis-à-vis the central government. Such a demand has also been voiced by several other states at times. This is a natural reaction to efforts at greater centralisation of powers on the part of the national government. Water-sharing agreements in India have led to conflict over control and its quality (Singh 2000). Scientists seems to feel that the best answer to these problems is to dig more wells and canals, yet the peasants are striking back, "In the Punjab, farmers are actively campaigning to halt the construction of the Sutluj-Yamuna Link canal, which will take water to Haryana to irrigate 300,000 hectares for Green Revolution agriculture, whilst in Haryana, local politicians are lobbying hard for its completion. In 1986, irate farmers in the Ropar district of the Punjab, where the Link Canal begins, virtually forced the Irrigation Department to abandon work on the project. In May 1988, 30 labourers were killed at one of the construction sites" (Singh 2000).

In Haryana, in the wake of the ecological implications and economic costs of the Green Revolution coming onto the surface in the early eighties, the farmers started feeling restless. With the construction of a new Hansi-Butana canal by the Haryana government, to arbitrarily draw water from the Sutlej-Beas Rivers; the water issue has acquired a new dimension in already complicated disputes between Punjab and Haryana. Haryana has dug a 109km long canal with a cost of Rs.260 crores. It is ready for use, but its functioning is stalled by the Supreme Court of India, entertaining a Special Leave Petition from the Punjab government and referred the case to Central Water Commission for

examination. Keeping in view the past practices and bias of the CWC against Punjab, it is likely that its findings would go in favour of Haryana. For the past three years, we have increasingly lost money from sowing all our acreage with wheat and paddy. We have been held hostage to feed the rest of India. We are determined that this will change. Such expressions intensified the political heat of the difficult Haryana situation. Happily the scenario has dramatically changed in favour of peace now.

CONCLUSION

The Green Revolution transformed the country's status from a food-deficit one to food surplus. The high-yielding varieties program was launched in 1966 in selected areas with assured irrigation. The high yielding varieties of seeds included those of paddy, wheat, maize and millets including sorghum and pearl-millet. About 1.89 million hectares of land were covered under this program during the year (Government of India, 1969). These changes in the production of the crops and transformed the society, economy and polity of the state. A regular deepening of water table requires frequent lowering of tubewells whose pits are usually of small diameter and have unplastered walls. A lot of underground masonry and other work are involved. This has, in many instances, caused injury or death to workers due to collapse of walls of the wells under reconstruction. Extension of irrigation in Haryana has caused the spread of diseases like Malaria, which threaten the health of the population. As intensified multiple cropping, associated with the Green Revolution, has resulted in the landscape acquiring a green cover almost throughout the year. These are the impacts of the Green Revolution on the society.

Economic implications of the Green Revolution deals with the increase in the production and yield of the crops like paddy, wheat etc. But with the prosperity, there is also economic disparity between poor and rich farmers. Political implications of the Green Revolution deals with the disputes of Satluj-Yamuna canal between Haryana and Punjab. With the construction of a new Hansi-Butana canal by the Haryana government, to arbitrarily draw water from the Sutlej-Beas Rivers; the water issue has acquired a new dimension in already complicated disputes between Punjab and Haryana.

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