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Agricultural Development and Its Consequences on Environmental Degradation: A Case Study of Jind District in Haryana

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Abstract

New agricultural strategy has been initiated in 1966-67 for the goal to achieve self-sufficiency in agriculture. The fundamental of this strategy is the application of science and technology for increasing yield per hectare. This strategy known as New Agricultural strategy or Green Revolution, is based on the extension of high yielding varieties responsive to heavy doses of fertilizer and the package of improved practices in selected area with assured rainfall or irrigation facilities.

By New Agricultural strategy, India has achieved self-sufficiency in food production. However, in Jind district of Haryana this has resulted in continuous environmental degradation particularly of soil, vegetation and water resources. Soil organic matter level are declining and the use of chemical input is intensifying. Newly introduced crops varieties have been responsive to input but this has necessitated both increased fertilizer application and use of irrigation resulting in water contamination by nitrate and phosphate and changes in the ground water-table. Most of the geographical areas already under cultivation, the scope for increased productivity lies in further intensification which is crucially dependent on more energy intensive inputs. Declining nutrient use efficiency. physical and chemical degradation of soil and create the problem of water logging, salinity and alkalinity which threatens the region's food security in the future. In some area, water-table has been sinking and other hand in some area, there are water logging after the shortly rains. Such ecological impacts are motivating the farmers to reduce the fertilizer and pesticide use. This paper discusses the agricultural development and its consequences on environmental degradation and then shows the relationship between agricultural development and environmental degradation.

Introduction:

India has initiated the process of planned development right from the inception of first five-year plan with a view to bring about a structural transformation of economy so as to achieve a high and sustained rate of growth, a progressive improvement in the standard of living of masses leading to eradication of poverty and unemployment and to provide the material base for a self-reliant socialist economy. In order to achieve this objective, the emphasis has kept on changing on different sections of economy during different plan periods depending upon the assessment of overall pace of development. In agricultural sector the nation has decided to follow the course of massive induction technology a time-tested tool to tackle any crisis situation, especially in case of farm implement, irrigation system, improved varieties of seeds, chemical fertilizers, manures and insecticides & pesticidies. This new technology began to bring fruits as early as in the mid-sixties, when several package scheme and new strategies were adopted for development of agriculture.

This phenomenon was hailed throughout the world as "Green Revolution of India". Consequently, a revolutionary change has taken place in agriculture leading to the increase of net sown area from 118.7 million hectares to 142.6million hectares, gross cropped area from 131.9 million hectare to 186.4 million, Gross irrigated area from 22.6 million hectares to 68.4 million hectares, Concept of Green Revolution started in India by wheat crop and area adopted under the region of Punjab, Haryana and western U.P by this process, production of wheat has been increased 12.3 mt (1964-65) to 47mt in 1985-86 and 72mt in 2000-2001. Per hectare production of wheat was 916 kg in 1964-65 and 2590 in 1998-99 production of wheat has been increased by seven times in India. After this, Rice cultivation has been focused. Rice production was 30.6mt in 1965-66 and 53.6mt in 1980-81 then 86m in 2000-2001. In thirty five years, rice production has been increased by 181 percent. Per hectare production of Rice is 1747kg This production is less in comparison of S. Korea (6350kg), Japan (6330kg) and world is 3560kg. Basic barriers in this objective is poor economic condition of farmers under rice area and most of the area is under flood prone. Food grain production of India has been

increased from 50.8 million tonnes to 218 million Tonnes during 1950-51 to 2009-2010.
But this new technology has not been judiciously adopted throughout the country by taking into consideration the overall ecological conditions of different regions. Consequently, the over cultivation of land beyond its sustainable limit, imbalances heavy doses of chemical fertilizers without knowing the actual deficient nutrients in the soil due to its non-testing, own irrigation and mismanagement of canals, over cultivation, excessive and un-scientific use of bio-cides, expansion of agriculture land on other indispensable use of land such as forest land and so on, have resulted into environmental degradation. Environmental degradation has started taking place and is manifested in loss of forest area, loss of bio-diversity, soil erosion, water-logging, salinity and alkanity. sinking of water table, contamination of water and soil etc. Which is causing great concern to the academicians. planners and decision makers.

Objectives of the Study:

Attempt has been made to

(i) To study the level of agricultural development.

(ii) To examine the level of environmental degradation.

(iii) To find out the correlationship between agricultural development and environmental degradation.

Hypothesis:

(i) Unsustainable agricultural development leads to environmental degradation.

(ii) More use of chemical fertilizers reduces the fertility of soil.

Sources of Data and Methodology:

The present investigation is at block level basis and based on secondary data collected from various published and unpublished records of Community Development Blocks, Statistical Abstract of Haryana and Statistical Abstract of Jind district for the years 1976-77 and 2010-2011. Firstly, on the basis of this data agricultural development has been ascertained at block level by considering the in indicators of agricultural development which have placed into three main categories i.e. agricultural condition, agricultural infrastructure and agricultural production.

Indicators of Agricultural Development

(A) Agricultural Condition

(i) Percentage of net area sown to total area.

(ii) Net area sown per farmer.

(iii) Intensity of Cropping

(iv) Consumption of fertilizers per hectare.

(V) Consumption of Insecticides and pesticides per hectare.

(vi) Percentage of net area irrigated to net Area sown.

(B) Agricultural Infrastructure

(i) No. of tractors per 1000 hectare of Net sown Area.

(ii) No. of energized pump sets per 1000 hectare of net sown area.

(iii) Consumption of electricity per hectare of net sown area.

(iv) Average size of land holding.

(v) No. of cold storage per Thousand sq. kms.

(vi) No. of agricultural marketing centre per 10lac hectare of Net sown area.

(C) Agricultural Production

(i) Average yield of food grain per hectare of Net Sown Area.

(ii) Gross value of agricultural produce in monetary value per capita of rural population.

Study Area:

Jind is a district in the Haryana state of India. Total area of Jind district is 3606 sq. kms. The district lies in the North of Haryana between 29°03′ and 29°51′ North latitude and 75°53′ and 76°47′ East longitude. On its East and North East lie the districts of Panipat, Karnal and Kaithal respectively. Its boundary line on the North forms the inter-state Haryana-Punjab border with Patiala and Sangrur districts of Punjab. In the west and South west it has a common boundary with district Hissar and Fatehabad and in its South and South East lies the district of Rohtak and Sonipat respectively. Jind City is situated about 125km from Delhi; the

capital of India. Jind has a population of 13.34,152 peoples. There are 249,736 houses in the district. The Jind district is further divided into form Tehsils for administrative purposes i.e., Jind, Julana, Narwana&Safidon. District is divided into seven development blocks namely, Jind, Safidon, Pilukhera, Uchana, Narwana, Alewah and Julana.

Results and Discussion:

Agricultural Development:

Although there has been multifarious development in secondary and tertiary sectors after independence, primary sector still contributes substantially to nation income and its lion's share comes from agriculture which has achieved tremendous development during last four decades due to massive induction of new farm technology such irrigation facilities, high yielding varieties of seeds, chemical fertilizer, modern farm implements and insecticides & pesticides. All these components of modern farm technology have boosted all parameters of agriculture. However, in the present study 14 indicators of agricultural development have been taken into consideration which have been grouped into three main categories ie, agricultural condition, agricultural infrastructure and agricultural production. The selected indicators have been standardized by applying the formula of 'Z' score, and the average of each group has been worked out for each community development block and the district as a whole. Finally, composite Index of agricultural development (CIAD) has been calculated by giving weightage to each group and the results are given in

District Jind

Table-I Indices of Agricultural Development 2010-2011

Sr. No	Name of the Community Development Blocks	INDICES OF			Composite Index of Agricultural Development (CIAD)
		Agricultural Conditions	Agricultural Infrastructure	Agricultural Production	
1	JIND	0.56	0.58	0.68	0.61
2	JULANA	0.42	0.43	0.49	0.45
3	ALEWAH	0.48	0.52	0.43	0.48
4	SAFIDON	0.57	0.59	0.64	0.60
5	PILHUKHERA	0.54	0.57	0.56	0.56
6	UCHANA	0.47	0.52	0.53	0.51
7	NARWANA	0.49	0.55	0.56	0.53
8	**JIND DISTT.**	**0.46**	**0.49**	**0.51**	**0.48**

SOURCE: Statistical Abstract of Haryana and Statistical Abstract of Jind District 2010-2011

Table-II District Jind Level of Agricultural Development 2010-2011

Sr. No	Categories	Range of CIAD	No. of Blocks	Name of Community Development Blocks
1	High	Above0.55	3	Jind, Safidon, Pilukhera
2	Moderate	0.50-0.55	2	Uchana, Narwana
3	Low	Below 0-50	2	Alewah, Julana

SOURCE: Statistical Abstract of Haryana and Statistical Abstract of Jind District 2010-2011.

Table 1 shows that range of CIAD is 0.48 to 0.61. Maximum value of CIAD is attained by

Jind and Safidon blocks. Lowest value of CIAD is found in Julana Block, remaining blocks attained value from 48 to 56.

Levels of Agricultural Development:

Taking into consideration the composite Index of agricultural development (CIAD) of each community development block, the level of agricultural development is ascertained by categorizing them into three level ie High, Moderate and low (Table-2)Table two represents that there are three level of agricultural development. The high level of agricultural development is found in Jind, Safidon and Pilukhera blocks. In these blocks there are favourable agriculture condition and proper agricultural infrastructure is available, due to these conditions' agriculture production is also high in these blocks. Moderate level of agricultural development is observed in Uchana and Narwana blocks. The low level of agricultural development is found in Alwah and Julana blocks. In these blocks there is lack of irrigation facilities, underground water is saline and canal irrigation is less develop,due to these conditions, there is low agricultural development exist.

Levels of Environmental Degradation:

Environmental degradation is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystem and extinction of wild life. Population of the area has been increasing day by day due to this, there is need to increase agricultural production results agricultural development is essential to meet the requirement of increasing population. Agricultural development deteriorates the environment in every sphere i.e. air, water and soil. Among some of these problems is the depletion of underground aquifers through over drafting. Soil can be over irrigated became of poor distribution uniformity or management waste waters chemicals may lead to water pollution. Over irrigation can cause deep damage from rising water-table that can lead to problems of irrigation salinity. The range of CIED is found 0.99 to 2.36. Highest composite Index of environment degradation is found is Jind block. In this block there is high level of environmental degradation is found i.e. declining of area under forest, increasing of soil erosion and water logging. Salinity and alkalinity of soil has been increased and water table is sinking. Lowest level of environmental degradation is found in Julana. In this block area under forest, soil erosion and water logging are less effected than other blocks of Jind district.

Table-III District Jind Indices of Environmental Degradation 1977-2011

Sr. No	Name of The Community Development Blocks	Forest Area/ Cover	Net Sown Area	Fallow Land	Soil Erosion	Water Logging	Salinity& Alkalinity	Sinking of Water	Composite index of Environmental Degradation on (CIED)
1	JIND	2.39	2.88	3.11	1.12	1.92	4.83	0.29	2.36
2	JULANA	0.89	0.98	1.84	0.52	0.19	1.26	1.28	0.99
3	ALEWAH	0.97	1.03	2.68	0.63	0.25	1.34	0.21	1.02
4	SAFIDON	2.14	2.46	3.06	1.27	2.02	3.79	0.19	2.13
5	PILHUKHERA	2.03	2.13	2.98	1.08	2.17	3.63	0.23	2.04
6	UCHANA	1.35	1.17	2.06	0.56	0.08	1.23	2.21	1.24
7	NARWANA	1.86	1.29	2.43	0.67	1.64	1.79	1.32	1.57
8	**JIND DISTT.**	**1.66**	**1.71**	**2.59**	**0.84**	**1.18**	**2.55**	**0.82**	**1.68**

SOURCE: Statistical Abstract of Haryana and Statistical Abstract of Jind District 1976-77&2010-11

Table-IV District Jind Level of Environmental Degradation 1977-2011

Sr. No	Categories	Range of CIED	No. of Blocks	Name of Community Development Blocks
1	High	Above2.00	3	Jind, Safidon, Pilukhera
2	Moderate	1.00-2.00	3	Uchana, Narwana, Alewah
3	Low	Below 1.00	1	Julana

SOURCE: -Statistical Abstract of Haryana and Statistical Abstract of Jind District 1976-77 & 2010-11.

Based on the indices of each CDB mentioned in table-3 the levels of environment

degradation has been worked out by grouping them into three main categories i.e. High, Moderate and Low Table 4 shows that high level of environmental degradation is found in Jind, Safidon and Pilukhera blocks. These blocks represent the central part of Jind district. Modrate level of environmental degradation is occurred in Uchana, Narwana and Alwah blocks. These blocks cover the north part of district. Low level of environmental degradation is found in Julana block. There are less development results less degradation in environmental factors.

Relationship between agricultural development and environmental degradation:

Although the above investigation shows that higher the level of agricultural development more is environmental degradation. In order to establish the relationship between these phenomena three techniques i.e. Tabular. Cartographic and statistical have been applied. A cross classification of agricultural development and environmental degradation is worked out in Table V.

(CIAD) X	$x = X - \bar{X}$ $\bar{X}=0.53$	x^2	(CIED) Y	$y = Y - \bar{Y}$ $\bar{Y} = 1.62$	y^2	xy
0.61	+0.08	0.0064	2.36	+0.74	0.5476	0.0592
0.45	-0.08	0.0064	0.99	-0.63	0.3969	0.0504
0.48	-0.05	0.0025	.1.02	-0.60	0.3600	0.0300
0.60	+0.07	0.0049	2.13	+0.51	0.2601	0.0357
0.56	+0.03	0.0009	2.04	+0.42	0.1764	0.0126
0.51	-0.02	0.0004	124	-0.38	0.1444	0.0076
0.53	0.00	0.0000	1.57	-0.05	0.0025	0.0000
$\sum X = 3.74$ $\bar{X} = 0.53$		$\sum x^2\ 0.0215$	$\sum Y = 11.35$ $\bar{Y} = 1.62$		$\sum y^2\ 1.887$	$\sum xy = 0.195$

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \times \sum y^2}}$$

$$r = \frac{0.1955}{\sqrt{0.0215 \times 1.8879}}$$

$$r = \frac{0.1955}{0.20146922841}$$

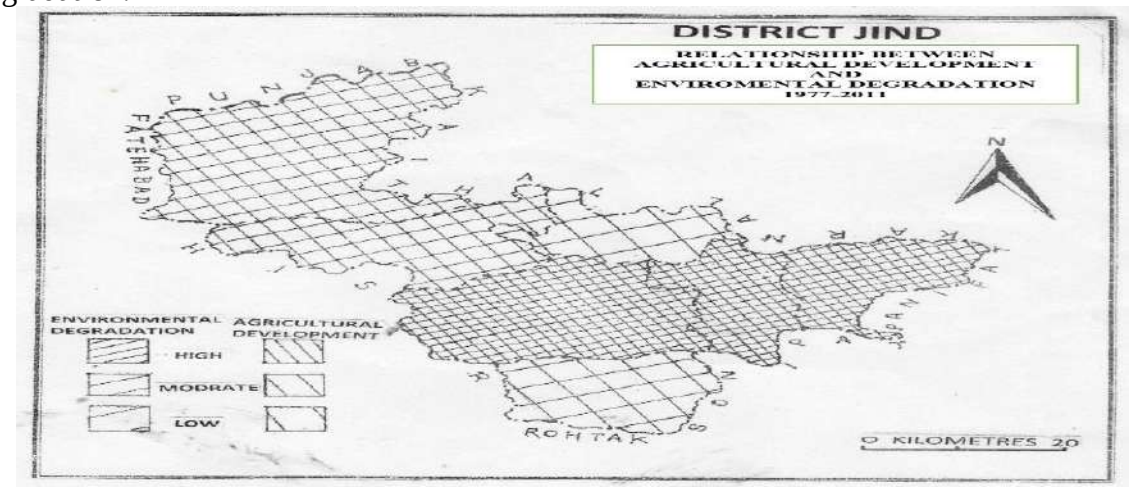
r =0.97037151302

r =0.97

(CIAD) X Composite Index of Agricultural Development

(CIED) Y Composite Index of Environmental Degradation

In table V there are two variables i.e. X and Y. X variables is related to composite Index of agricultural development and Y variable is concerned to composite Index of Environmental degradation. Finally, co-efficient of correlation is worked out on the basis of above said variables. After the calculation, co-efficient of correlation is found +97. Which shows that there is highly positive relation between agricultural development and environmental degradation.



In other words, we can say that the blocks namely Jind, Safidon and Pilukhera are highly developed in agriculture results high level in environmental degradation. Uchana, Narwana and Alewah blocks are modrate in agricultural development results moderate level in environmental degradation. Julana block is under category of low level in agricultural development as a result low level of environmental degradation is found. Thus, we can say there is perfect positive relationship between agricultural development and environmental degradation in Jind district

Suggestions to minimize the environmental degradation:

There are some suggestions by which we can minimize the environmental degradation due to agricultural development.

1. Sustainable resource management:

It is a planning and decision-making process that seeks to coordinate and balance the social, economic and environmental demand on resource use to achieve long term sustainable benefits and reduce conflict among resources.

2. Soil Management:

Soil management is an integral part of land management and may focus on differences in soil types and soil characteristics. Specific soil management practice is needed to protect and conserve the soil resources.

3. Sustainable Agriculture Management:

Management provides the tools, knowledge of the progress, the goals and organization that sustainable needs to be sustainable. Sustainable management of agriculture means that the system that is being managed is sustainable in all respects, Production should be modeled after natural system, instead of using human made system.

4. Agricultural nutrient Balance:

Excessive fertilizer use can create the problems of acidification, ultimate change and the taxi contamination of soil, water and air. Lack of fertilizer application may cause the degradation of soil fertility. Gross nutrient balances of the total quantity of N.P and K, respectively applied to agricultural land through chemical fertizers and livestock manure, input in irrigation, rain and biological fixation minus the amount of N.P. and K absorbed by agricultural plants.

5. Agricultural Biodiversity:

Biodiversity of plants and livestock used for agricultural production is important to conserve the agro-ecosystem balance. However, the dependence on a limited number of varieties and breeds for agricultural production may increase their susceptibility to pests and diseases. Biodiversity measurement is reflected by the total number of varieties/breeds used for the production of major crops/live stock and the number of animals and microorganisms in the production.

6. Economic and Social Consideration:

Aspects and sustainable agriculture sustainability of agro ecosystem is reflected not only in environmental factors but also in economic soundness and social consideration. These aspects are included as real net output (real value of agricultural production minus the real cost), and the change in the level of managerial skills of farmers and land managers in income and farming practice.

References:

- Singh Jasbir: Jasbir and S.S. Dhillon: Agricultural Geography, Tata M Graw Hill Pub. Co. New Delhi, 1984.
- Singh, Serendre, Agricultural Development in India: A regional Analysis, Kaushal Publications, Shillong, 1994
- Bala Krishan, P. and M. Parames weran (2007) "Understanding Economic Growth in India: A Prerequisite", Economic and Political Weakly, 42: 2915-2922
- Tripathi Marnath and A.R. Prasad "Agricultural Development in India since Independence", Journal of Emerging knowledge on Emerging Market, Volume 11 November 2009.
- Statistical Abstract of Haryana 1976-77.
- Statistical Abstract of Haryana 2010-11.
- Statistical Abstract of Jind district 2010-11.