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Judicious Use of Land and Water Resources for Sustainable Agriculture Development

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This paper examines the vital need of judicious uses of land and water resources for sustainable development of agriculture. The agriculture development and productivity depends on the judicious use of land and water. The green revolution, started in mid 60s has given rise to fast growth in agricultural production and the productivity in some of selected regions of the country like Punjab , Haryana, and western Uttar Pradesh . After Green Revolution north-western part of India and some districts of Krishna-Godavari basin have become rice cultivated dominance area. And Green Revolution has given rise to development of millions of hectare of waste land, water logged lands and saline and alkaline lands. Groundwater practices have fallen dramatically. Keeping in view the gravity of the problems, it has become a prime duty to make the judicious use of land, water and other inputs so that the agriculture development may take place constant and sustainably. It requires consistent efforts by the agricultural scientists, policy makers' extension officials and the community's active participation, they may contribute significantly to lead the sustainable agriculture and ensure the food security for the growing population and environment conservation. Effort to adjust to the exponential trends of our population without compromising the integrity of the environment it is necessary to have a countrywide transition towards sustainable farming. As India's National Agricultural Policy accords high priority to the sustainability of agriculture.

"Nature can fulfill man's need but not his greed" by Mahatma Gandhi

Key words: sustainable development, green revolution, food security**,** community participation.

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INTRODUCTION: India is an agriculture dominant country .Agriculture holds an important position in the Indian economy and allied activities contribute 30 percent of the GDP and 60 percent of the total work force of India. The green revolution, started in mid 60s has given rise to steady growth of agricultural production and the productivity in some parts of the country like Punjab , Haryana, western Uttar Pradesh and some districts of Tamil Nadu. The green revolution which was mainly based on the assured water supply, high yielding variety of seeds and chemical fertilizer which has given the rise to grow the food-grain in a multiple way. Indian agriculture witnessed the break through after the introduction and adoption of package technology based on irrigation facilities with the application of chemical fertilizers after Green Revolution in various regions of north western part India. The new agriculture strategy has resulted into increased productivity and returns for farmers. But in the mid-eighties, the increasing trend in the productivity flattened and ecological consequences of over-irrigation appeared. Similarly given rise to deteriorate the lands, particularly in the 'green revolution' regions of the country. In the context, various reports on ground water depletion have reported that the excessive water extraction means that about 1600 blocks are now classified as critical or over exploited, out of 5723 blocks. It has been observed that there are 15% of aquifers are in a critical condition; in 50 years this could be 60%. The peak theory suggests, extraction will now here to be blamed with economically viable yields eg. Below 200 meters extraction require massive investment, Chaddha, G.K. (1995).According toB.B.Vohra about 87 million hectares of good agricultural land currently under production are in fact seriously affected by soil erosion, water logging and salinity.

The objective of the study:

(1).To finds out the spatio-temporal change in agriculture productivity in context to irrigation and other agricultural inputs in India.

(2)To finds out the spatio-temporal changes in water-logiging& soil salinity.

(3) To suggest judicious uses of land & water for sustainable agriculture.

Data source and methodology:

In this research paper the researcher used both primary and secondary sources of data. Secondary Data has been collected from different department and 'Krishi Vigyan Kendra' located in different districts of Haryana. Keeping in view various agricultural and water indicator we can draw some of inferences from the tabulated data as follows:

PERIODIC TREND OF AGRICULTURAL PARAMETERS OF INDIAN

AGRICULTURAL SCENARIO

Parameter	2001-02	2025	2050
Food Grain Production (million tons)	213	375	581
Net Sown Area (million hectares)	142	142	142
Cropping intensity (in percentage)	136	146	157
Grossed Cropped Area (million hectares)	193	209	223
Gross Irrigated area (million hectares)	79	104	134
Water for Irrigation (billion cubic meters)	606	780	994
Fertilizer consumption (million tons0	17	37	53

Sources: National Bureau of Soil Survey and Land use Planning, Indian Institute of Agricultural Research, New Delhi.

(2).Ministry of agriculture, govt. of India.

Result and Discussion:

Remaining in view the growth trends of food production of the country, it has been observed that the production of food grain was 50 million tons in 1950-51, that has increased 213 million Tons in 2001-2002. With more intensive agriculture, there has been a rising stress on natural resources in many parts of the country. The major environmental problems of intensive agriculture include degradation of soils from over dose of chemicals in a gigantic ways. Due to an excessive use of chemical fertilizer (150-200 kg/ha) as reported from some states like Punjab and Haryana causing destruction of useful microorganisms, insects and worms in soil and declining in crop diversity. Over exploitation underground water has given rise to depletion of water, particularly in rice growing areas of north-eastern region of India. Some other concerns which includes decreasing man-land ratio and conversion of agricultural lands for non-agricultural use.

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In reference to future demand of food grain we can estimate that there will be double and triple increase in crop intensity, cropped land, fertilizer consumption and irrigated area, all these requirement may fulfill only judicious use of land and water resources.

In many areas due to excessive use of water in agriculture many problems have been occurred as water logging and soil salinity. Keeping in view of gravity of this problem that has been depicted as follow:

Projected area under water logging & soil salinity in irrigation commands

year	Area irrigated by canals (Million hectares)	Area affected by water-logging &soil salinity (Million hectare) Actual	Projected	Increase in %per annum
		Haryana		
1955	2.4	0.01	-	
1977	3.2	0.46	-	0.06
2025	3.2	--	2.00	1.10
		India		
1992	17.29	3.47		
2020	45.00	--	9.0*	
2025	50.00	--	10*	

Source: central soil salinity Research Institute, Karnal (Haryana)

*Assuming 20%of area would be affected at any time.

The problem of waterlogging, soil salinity and saline groundwater conditions at shallow depth in Haryana are resulting in a potential annual loss of about US$ 37 million at 1998-1999 prices. In context to above problems that are related to soil and water we must to adopt judicious ways of agriculture especially in developing country like India.

These are following best efforts for sustainable agriculture development:

- We should promote organic based farming so that soil organic matter may be constant. Farmers will have to adopt the recommended doses of fertilizers particularly in cereal based cropping systems especially in wheat and rice.
- We also promote the development of Integrated Plant Nutrient Systems models for dominant cropping patterns under different irrigation and rain-fed regions for improving fertilizer use efficiency and soil health.
- Characterization and monitoring of soil resources using modern tools and techniques, especially remote sensing and GIS in different agriculture regions.
- To shift agriculture to a more sustainable use of water and soil without harming the food security and livelihoods of hundreds of millions of smallholders, substantial improvements of water and soil use efficiency will be required.
- The adoption of drip irrigation, low-pressure sprinkler systems, and other water saving technologies and practices.
- We also address knowledge and information to better uses of water and land resource to farmers, and reducing leakages in delivery systems.
- Reduced use of synthetic chemical inputs, biological pest control, use of organic manures, soil and water conservation practices, crop rotations etc., are all relevant and important technological components of sustainable agriculture.

Conclusion:

After the above reference, it becomes very vital to think and take the preventive and curative measure to combat the waste land, so that a sustainable position may be attained in the agriculture. We should adopt the rationally uses of water and also crops diversification. Especially in Green Revolution areas that are suffered from water logging and soil salinity problems only executive and legislative measures are not enough to solve these problems. Active community participations are required to combat this Menace. So sustainable farming needs to work closely with community to help them understand the critical role agriculture play.

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