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Soil Salinity Issues in Indian Agriculture: Selected Observations

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ABSTRACT

In the post-green revolution period, the agricultural production and productivity increased to high level. India achieved self sufficiency in food production in selected food crops. The technological advancement in Indian agriculture has brought several environmental issues, which are to be considered seriously. There was a positive and negative impact of agricultural development on environment. The government of India gave agricultural inputs at subsidized rate, this promoted use of chemical fertilizers, pesticides, irrigation and other inputs. As a whole several environmental problems resulted from this agricultural practice. This paper has analyzed the environmental issues specially the salinity issues in Indian agriculture.

1. Introduction

Indian agriculture has been backbone of Indian economy for several decades. In the twenty first century, the Indian agriculture sector has got significant place with greater potentiality. As on today, majority of the working population (65 per cent) are engaged in agriculture. Once, Indian agriculture was contributing more than half of the gross domestic product (GDP) of India. However, there has been declining trend in the recent years. The share of agriculture in the total GDP is declining over the years. Despite of this, this sector has valid significance, since it provides food grains and other most essential crops for the people. In the promotion of agriculture, government of India brought strategic policy which includes land reforms and technological development. The public investment in agricultural infrastructure increased over the years. The production and productivity of Indian agriculture increased tremendously, which ultimately brought the 'green revolution' in India. India could achieve self sufficiency in the field of food production. As the technical changes were happening, there was emergence of environmental issues related to agriculture. Indian agriculture, especially after the green revolution, has changed at considerable rate in several angles. There was a strong impact of agricultural development on environment. The government of India framed strategic policy to tackle with these environmental issues in India. This paper has analyzed the environmental issues, especially with respect to salinity in Indian agriculture.

2. Objectives of the Study:

2.1 To take review of the salinity issues in Indian agriculture.
2.2 To explore the linkages between Indian agriculture and salinity.
2.3 To explain the extent of soil salinity in selected states of India.

3. Hypothesis of the Study:

3.1 The soil salinity Indian agriculture was increasing over the years.
3.2 There was strong linkage between agricultural development and soil salinity.
3.3 The soil salinity problems are big threat to agricultural productivity.

4. Literature Review:

Sehgan and Abrol (1994) have argued that the Indian agriculture has lost huge due to soil erosion over the years. Parikh Ghosh (1995) has opined that there has been high degree of land degradation in Indian agriculture, which has resulted into huge loss of agricultural productivity. Joshi, Wani and Others (2006) have studied the state of 'Maharashtra' and according to the authors; the potential yield of Maharashtra agriculture in selected crops has declined. Singh and Mathur (2003) have argued that, there has been continuous land degradation in Indian agriculture, which may create big threat to the agricultural sustainability. Pooja Shrivastava and Rajesh Kumar (2015) have argued that, the salinity has put a limit to the agricultural productivity in Indian agriculture.

5. Methodology:

The present research analysis is based on the secondary data. The published reports of the Ministry of Statistics and Programme Implementation (2017), government of India, Economic Survey of India (2017) and Central Pollution Board Report (2016) have been used to analyse the data. Besides these, the researcher also has used other published books and research articles for the analysis.

6. Analysis of Data:

The salinity in India over the years was increasing as the technological advancement was taking place. Before giving the analysis of the salinity, it is important to know the meaning of salinity. The soil salinity is nothing but the actual content of salt in the agriculture soil. The process of increasing content of

salt in the agricultural land is stated as the 'salinity' or the 'salinization'. The salinity could be found in the soil and water as well. The present study has explained the soil salinity existed in the states of India due to various reasons, especially due to excess irrigation. The Process of 'Soil Salinitation' may result from natural and manmade reasons. In case of natural process of salinization, the rock minerals which include high salt may release its content of salt. Later it this salt is absorbed either by water or by surface. The transportation of salt could be done either through water or surface. The process of 'soil and water salinization could be higher across coastal area, since the sea contents are salt based. This salt can spread nearby region. In case of manmade soil salinization, the farmers may practice the improper cropping pattern with excess irrigation. This can result into soil salinization. The poor quality water used for irrigation also can result into soil salinization. The use of industrial sewage for agriculture also can result into salinization. In case of Indian agriculture, the cultivation is being done unscientific. The irrigation facilities are made available nearby regions. The farmers are practicing untrained and unscientific cropping pattern, which includes excess use of irrigation. As a whole, the soil salinization problem in India has been increasing over the years.

The Indian agriculture has changed with its technological advancement. The use of fertilizers, pesticides and pressure on use of resources has led to environmental issues related to agriculture. The introduction of new agricultural strategy brought green revolution in India. The change in the cropping pattern and change in the agricultural practice both have resulted into environmental problems. Irrigation without scientific use also has affected the soil fertility. The agricultural development at the cost of environment was seen in the recent period. The environmental issues in Indian agriculture could be discussed on different front. However, the issue of salinity is given here.

The green revolution and thereafter, the Indian agriculture were under the pressure due to rise in the demand for food products. The government of India gave subsidized fertilizers, pesticides, credit and irrigation, which resulted into rise in the agricultural production and productivity. However, this also had created a vast pressure on Indian fertilize land. The government of India accepted the liberalization policy in the year 1991, which again has created a pressure on Indian agriculture. The demand for food crops and non-food crops increased tremendously, which resulted into a huge pressured on agricultural land. In order to produce more and more, Indian farmers started to utilize the available subsidized inputs without measuring it. There was calculation of these modern inputs and agricultural productivity. This continued for decades, which resulted into salinity issue in agriculture. (Table No.1).

Soil salinization was a global problem; however Indian agriculture was gradually becoming a part of salinity effect. Soil salinity has two implications, one is that, it puts a serious threat to agricultural productivity and two is that, it also reduces the net cultivable area. Further it also has serious effects on human beings and their livelihood. According to Bhattacharya (2015), around 127 million hectors of agricultural land in India was under the clutch of soil degradation, out of which 23 million hectors of land was under the salinity problem.

Table No. 1
Area under Soil Salinity in India: selected States

States	Total Salinity Area (in mill ha)	Per cent of the total net area (in %)
Gujarat	2.22	33
Uttar Pradesh	1.37	20
Maharashtra	0.60	09
West Bengal	0.44	6.5
Tamil Nadu	0.37	5.5
Andhra Pradesh	0.27	4.1
Haryana	0.23	3.4
Punjab	0.15	2.2

Source: National Remote Survey Agency (1996)

According to the report of 'National Remote Survey Agency' (1996), the salinity in the post-green revolution period has increased. The data shows these indications. According to the report, the highest rate of salinity was found in the state of 'Gujarat', where around 2.22 million hectors of its total land was under the salinity effects. This comes around 33 per cent of the net cultivable area. Uttar Pradesh state was also under the salinity effect, but comparatively less than the state of 'Gujarat'. In Uttar Pradesh around 1.37 million hectors of land was under salinity, which comes around 20 per cent of its total net cultivable land. In case of 'Maharashtra' state, around 0.60 million hectares of land was under salinity, which comes around 09 per cent of the total net cultivable area. In case of West Bengal, Tamil Nadu and Andhra Pradesh the salinity was measured as 0.44 million hectares, 0.37 million hectares and 0.27 million hectares respectively, which comes around 6.5 per cent, 5.5 per cent and 4.1 per cent of the total net cultivable area in respective state. Most surprisingly, the state 'Punjab' and 'Haryana' was far below these states. In case of 'Punjab' and 'Haryana', the salinity was measured as 0.15 million hectares and 0.23 million hectares, respectively, which comes around 2.2 per cent and 3.4 per cent of its total net cultivable area in respective states. This performance of 'Punjab' and 'Haryana' was appreciable in case of salinity, since the 'green revolution' was emerged in powerful way in these two states.

There could be several reasons for salinity in India, but it is a fact that, over the years it has been increasing at alarming rate. The repetitive cropping pattern with excess irrigation also has contributed to the salinity in India. The increasing irrigation projects also have made available the irrigation facilities to the farmers. The increasing salinity has made a big threat to Indian agriculture. The continuous rise in 'salinization' has set limitations on agricultural productivity and production. The salinity has adversely affected the agricultural productivity in India.

7. Results:

It is a fact that, the Indian agriculture has been facing the soil salinity problem over the years, and if it is not controlled with scientific measures, it would go beyond our limit. The data analysis can be ended with certain results.

i) The soil salinity in India over the years was increasing at alarming rate.

ii) The technological advancement and natural process, both were responsible for the soil salinity in India.
iii) The process of 'soil and water salinization has been higher across coastal area of India.
iv) In case of Indian agriculture, the cultivation and practice of agriculture was being done untrained and unscientific, which had resulted into manmade soil salinity.
v) The increasing use of fertilizers, pesticides and irrigation has led to environmental issues in Indian agriculture.
vi) The government of India gave subsidized fertilizers, pesticides, credit and irrigation, which resulted into rise in the agricultural production and productivity. However, this also had created a vast pressure on Indian agricultural land.
vii) Soil salinization was a global problem; however Indian agriculture was gradually becoming a part of salinity effect.
viii) The salinity was in the state of 'Gujarat' was highest as compared to the other states of India.
ix) The main reason for the highest salinity in 'Gujarat' was coastal area and rock minerals.
x) Around 33 per cent of the net cultivable area of Gujarat was affected by the soil salinity.
xi) Uttar Pradesh state was the second highest, where the salinity was found. Around 20 per cent of its total net cultivable land was under salinity.
xii) 9 per cent of the cultivable land of 'Maharashtra' state was under salinity.
xiii) In case of soil salinity, most surprisingly, the state 'Punjab' and 'Haryana' was far below than other selected states of India.

8. Conclusion:

Indian agriculture has accepted technological advancement especially for the promotion of agricultural productivity. The green revolution was the result of the new agricultural strategy. However, improper use of agricultural strategy has resulted into the salinity. The problem of salinity has been increasing over the years. This issue need to be addressed at micro level. The state of 'Gujarat' has longest coastal area, which could be linked with salinity. The Indian agriculture must tackle the issue of salinity with seriously. The government of India has undertaken the measures through its research and development agency. The efforts have addressed the issue of salinity. However, the farmers also need to learn the process of salinity, in order to reduce the extent of it.

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