

## Agricultural Productivity in Soil Saline zone of Purna Watershed

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### Abstract

*Agriculture is known as the backbone of an India economy because most of the occupation is directly depending on it. The agricultural productivity is directly impact on the economy of any region. The agricultural land and its production is depended on the physical factors of that region such as, relief, climate, soil structure etc. Soil is one of the most important factors which impacts the agricultural land and productivity of the region.*

*The volcanic activity during the Eocene period caused the Purna basin to occur like landlocked salt water lake. Present paper has an attempt to discuss the agricultural productivity also impact of salinity on it in saline zone of Purna watershed.*

**Key Word :** Purna watershed, soil salinity, agricultural productivity, impact

### Introduction

“The Purna river valley in eastern part of Maharashtra is characterized by saline ground water zone. TDS and chloride content are very high which results in non-availability of potable water and insufficient water of agriculture and Industrial use” (Pusadkar Sunil Shaligram, 2008).

The soil structure of the region is impact on the agricultural cultivated land also productivity of the region. The middle part of Purna watershed in Amravati division is found affected by salinity. The present paper has discussed the impact of soil salinity on agricultural productivity of saline region in Purna watershed.

### Objectives

The objectives of the present research paper as follows,

- i) To study the agricultural productivity of saline zone n Purna Watershed.
- ii) To calculate the relation between soil salinity and agricultural productivity also impact of soil salinity on productivity of the study region.

### Data Source and Research Methodology

Present investigation is based on the both primary and secondary source of data. Secondary source of data was collected from Village wise Directory of Talathi Office, Agriculture Offices of respective tahsils. Priamry data was collected from field survey during investigation.

The productivity index of agriculture is calculated by Mohammd Sahfi's (1983) method with the help of following formula,

$$(Y \div Y_n) \div (T \div T_n)$$

Y = Production of unit area, Y<sub>n</sub> = Production of total area, T = Area under crop unit area, T<sub>n</sub> = Area under crop of total area.

The impact of soil salinity is shows with the calculation of correlation between soil salinity and productivity. Calculated values are presented in table and distribution is shown on map of the study region. The relation between soil salinity amd productivity is presented by regression line on scattered diagram.

The discussion is based on the year 1990-91 and 2010-11.

### Study Region

Purna River is the tributary of Tapi River, Purna first flows from north to south and then from

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Murtijapur tahsil it flows east to west and meets Tapi River at Chnagdev in Jalgaon District.

The complete Purna watershed in West Vidarbha region is conflicted in between 20° 10' N to 21° 30' N latitude and 76° E to 77° 56' E longitude. And the saline part of Purna watershed is situated in between 20° 47' N to 21° 07' N latitude and 76° 14' E to 77° 41' E longitude.

Study region having total 5464059 populations with density is 314 persons in per sq.km according to the census 2011.

In the salinity part of Purna watershed smaller upper part of Malkapur, Nandura, Jalgaon Jamod, Shegaon, Sangrampur tahsil in Buldhana district, near about more than 50% part of Telhara and Akot tahsil, some lower and upper both part of Balapur, Murtijapur and Akola tahsil in Akola district, upper part of Daryapur, Achalpur, Anjangaon Surji tahsil, right course of Bhatkuli, Amravati and Chandur Bazar tahsil in Amravati district is included.

### **Agricultural Productivity**

Total agricultural productivity of salinity region was also increased in 2010-11 but per yield growth of overall production was very poor in the salinity region.

**Table No 1 - Purna Watershed  
Agricultural Productivity in Salinity Region  
(1990-91 and 2010-11)**

<b>Productivity Index by Shafi's Method</b>			
<b>Tahsil</b>	<b>District</b>	<b>1990-91</b>	<b>2010-11</b>
Telhara	Akola	1.01	1.06
Akot	Akola	0.77	0.81
Balapur	Akola	0.76	0.82
Akola	Akola	0.97	1.11
Murtijapur	Akola	1.02	1.13
Achalpur	Amravati	0.59	0.71
Chandur Bazar	Amravati	0.71	0.79
Bhatkuli	Amravati	0.64	0.72
Amravati	Amravati	0.46	0.48
Anjangaon	Amravati	0.44	0.47
Daryapur	Amravati	1.03	1.07
Jalgaon Jamod	Buldhana	0.42	0.49
Sangrampur	Buldhana	0.56	0.61
Shegaon	Buldhana	0.58	0.62
Nandura	Buldhana	0.99	1.09
Malkapur	Buldhana	0.92	1.03

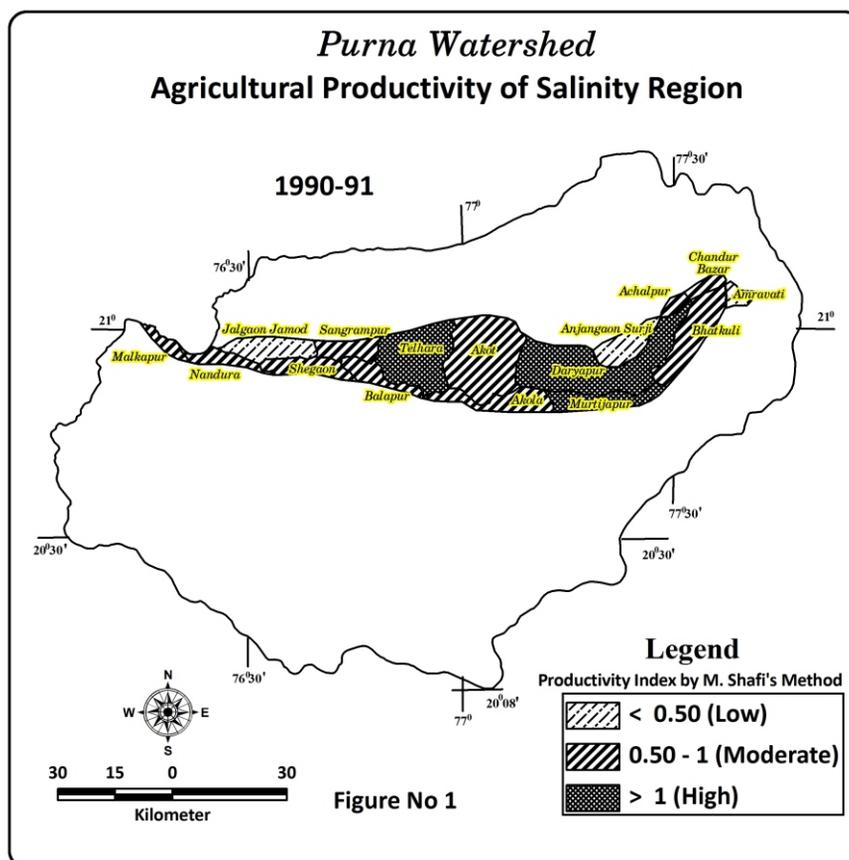
Source: - Calculated by Author

### I) Agricultural Productivity in Salinity Region 1990-91

In 1990-91 agricultural productivity found maximum in Daryapur (1.03), Murtijapur (1.02) and Telhara (1.01) tahsil respectively. Daryapur was the moderate in total region and this tahsil covered its maximum area in salinity region and the productivity was high in salinity region.

Moderate agricultural productivity observed in Nandura, Akola, Malkapur, Akot, Balapur, Chandur Bazar, Bahtkuli, Achalpur, Shegaon, and Sangrampur tahsil respectively (Table No 4.15). The index of these tahsils was found in between 0.50 to 1. Shegaon, Sangrampur, Bhatkuli and Achalpur tahsil was low agricultural productivity in total region and in salinity region they found in high category.

Amravati (0.46), Anjangaon (0.43) and Jalgaon Jamod (0.42) tahsil was recorded lowest agricultural productivity in salinity region (Figure No 1).

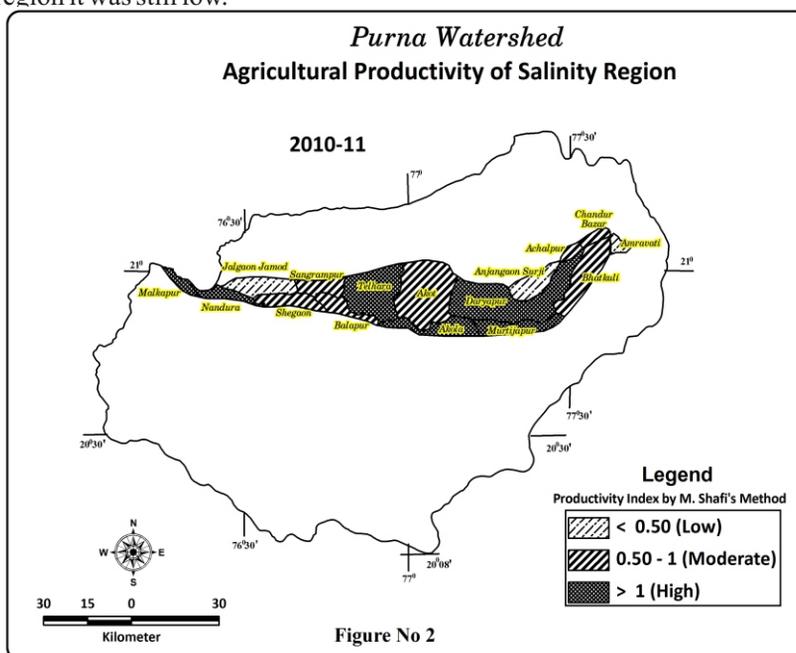


### II) Agricultural Productivity in Salinity Region 2010-11

In this period overall agricultural productivity was increased and this growth mainly occurred in cash crops and oil seeds section. In the year 2010-11 index more than 1 found in Murtijapur (1.13), Akola (1.11), Nandura (1.09), Daryapur (1.07), Telhara (1.06) and Malkapur (1.03) tahsil respectively. Productivity in Akola, Malkapur and Nandura tahsil was moderate in previous decade and it was in high in 2010-11.

Moderate agricultural productivity was observed in Balapur, Akot, Chandur Bazar, Bhatkuli, Achalpur, Shegaon and Sangrampur tahsil respectively, the index of these tahsil was 0.50 to 1 (Figure No 2).

Jalgaon Jamod (0.49), Amravati (0.48) and Anjangaon (0.47) tahsil was again lowest in the region. The productivity in salinity part of this tahsil was also increased but compare to the other tahsils in the region it was still low.



Overall total agricultural productivity of the salinity region was increased in 2010-11 compare to the year 1990-91. Therefore positive changes occurred in every part of the region but the growth in productivity was very poor.

### Salinity of Soil in Purna Watershed

Soils are considered as the integral part of the landscape and their characteristics are largely governed by the landforms on which they have developed (Sharma et al, 1999, Sawhney, et al, 1992).

Tahsil wise pH value of soil in salinity zone of Purna watershed is presented in table no 2.

**Table No 2**  
**Purna Watershed: pH Value of Soil**

Tahsil	pH Value of soil
Telhara	8.45
Akot	8.92
Balapur	7.65
Akola	8.25
Murtijapur	8.46
Achalpur	7.52
Chandur Bazar	7.69
Bhatkuli	8.15

Tahsil	pH Value of soil
Amravati	7.92
Anjangaon Surji	8.12
Daryapur	8.76
Jalgaon jamod	7.96
Sangrampur	8.12
Shegaon	8.27
Nandura	7.96
Malkapur	7.68

Source:- Soil Testing Department, Amravati

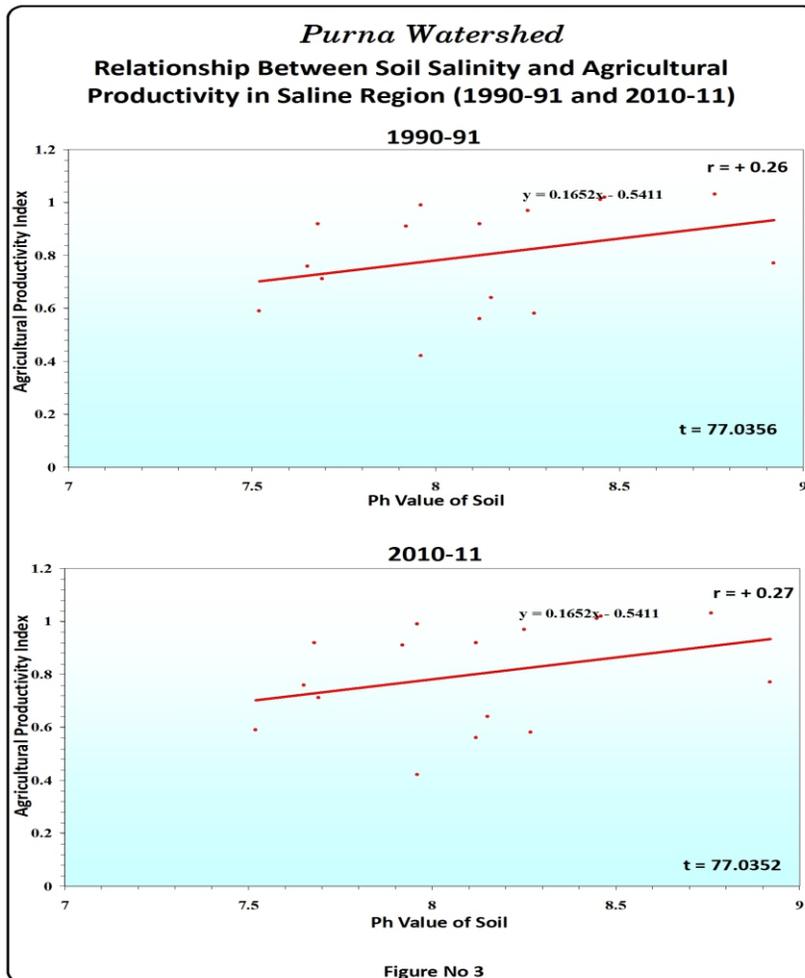
Tahsil wise average pH value of the region varies from 7.52 to 8.92 and it clears that the soil of the region is alkaline. The maximum salinity i.e. maximum pH value observed in Akot (8.92) tahsil and Minimum observed in Achalpur (7.52) tahsil.

### Impact of Soil Salinity on Agricultural Productivity (1990-91 and 2010-11)

The soil structure is also impacts on the overall agriculture production. In salinity part of Purna watershed the impact of soil salinity on the agricultural productivity was found positive in both year 1990-91 and 2010-11 also.

The relationship between these two factors in 1990-91 ( $r = +0.26$ ) and in 2010-11 ( $r = +0.27$ ) found positive and it was also low degree positive. The cropping pattern of the saline region was not according to the soil structure. Therefore this correlation was calculated positive but low degree. The positive correlation calculated only because of the cultivation and production of cash crops in saline region. Cotton is the main crop in salinity region but many cultivator tries to other crops than cash crops which are not growth properly and therefore the productivity of the region was found lower than non salinity region of Purna watershed (Figure No 3).

According to the calculation of 't' value in 1990-91 ( $t = 77.0356$ ) and 2010-11 ( $t = 77.0352$ ) it is valid up to 99.90% of confident level.



### Conclusions and Suggestions

Though the total agricultural production was increased but it was not found sufficient compare to the increased rate of cultivation. The impact of salinity is shows on the production of agriculture. Production in saline region was comparatively less than total region.

Total agricultural productivity of the salinity region was also less than total region. Total agricultural productivity of salinity region was also increased in 2010-11 but per yield growth of overall production was very poor in the salinity region.

Soil structure of Purna watershed in salinity zone is affected and impact is clearly found on the agricultural production of this region. The soil in salinity region is mainly useful for black cotton soil and low water crops. Most of the farmers in the region are seen cultivating various crops which are not conducive to growth in this soil. Therefore, the average agricultural yield in this salinity region is lower than other Purna river basin regions.

In the saline zone of the Purna River, the expected yield will increase if the crops are planted according to the water capacity and the fertility of the land. For this, it is necessary to guide the farmers here and also to provide them with the necessary seeds of the crops that will grow well in this region. Proper study of soil texture as well as its right strength will help in increasing the productivity per hectare of agriculture in the region.

### References

- 1) Gudadhe Yeshpal P (2019), "Impact of Salinity on Agricultural Land Use in Purna Watershed: A Geographical Analysis", Unpublished Ph.D. Thesis, Sant Gadge Baba Amravati University, Amravati, pp 156-160, 252-254.
- 2) Pusadkar Sunil Shaligram (2008), "Ground Water Quality in Saline Purna River Basin", Research Gate, National Seminar on Integrated Water Management and Sustainable Water Pricing 8-9 February 2008, pp 57-62
- 3) Sawhney, I.S. (1992), "Pedogenesis In Relation To Physiography In Semi-Arid And Arid Tracts Of Punjab, India, Arid Soil"
- 4) Shafi Mohammad (1983), "Agricultural Productivity & Regional Imbalances" Concept Publishing Company New Delhi, pp 172- 155.
- 5) Sharma R.C., Mandal, A.K., Saxena, R.K. And Verma, K.S. (1999), "Characterization, Formation And Reclamability Of Sodic Soils Under Different Geomorphic Plains Of Ganga Basin", Extended Summary, International Conference On Sustainable Management Of Sodic Lands, Feb 9-4, 2004, Lukhnow, India Vol. I, pp 168-170

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