ISSN–2277- 8721

EIIRJ Electronic International Interdisciplinary Research Journal

Volume–XII, Issues – III May – June 2023

OPEN ACCESS Original Research

GEOGRAPHICAL ASSESSMENT OF CLIMATIC SUITABILITY OF RICE CROP IN PALGHAR DISTRICT USING ECOCROP MODEL

Shri. D. D. Bombe

Assistant Professor and Head, Department of Geography

Ms. Asavari Waze

UG Student, Department of Geography,

Sathaye College (Autonomous), Vile Parle (East)

Dr. H. M. Pednekar

Rted. Principal, Sonopant Dandekar College, Palghar

Abstract:

Agriculture is an important economic activity in Palghar district where majority of population is depend on agriculture. Agricultural productivity and cropping patterns are immensely affected by the climate, climate change and factors like soil, physiography, capital, market, transport, etc. This research focuses on an analysis of the potential effects of changing climate on the geographical distribution of suitable areas for the cultivation of different crops especially rice. The investigation projects relation of physiography, slope and climate with rice crop cultivation. Rice is a major staple food crop in Palghar District. Large population in the district is depend on rice as a staple food. The present investigation is helpful to find out the climatic suitability for rice crop which is very essential for precision agriculture supports agricultural development and economic progress of nation. The research also focus on distribution of physiography and climate and its impact on rice cultivation as well as find out the relation with population distribution characteristics.

Key words: *Climatic suitability, Rice crop, Ecocrop Model*

Introduction:

Agriculture is an important economic activity in Palghar district where majority of the population is dependent on agriculture. Agricultural productivity and cropping patterns are immensely affected by the climate, climate change and factors like soil, physiography, capital, market, transport, etc. This research focuses on an analysis of the potential effects of changing climate on the geographical distribution of suitable areas for the cultivation of different crops especially rice. The investigation projects relation of physiography and slope with rice crop cultivation. Rice is a staple food and major crop in Palghar District. The present investigation is helpful to find out the climatic suitability for rice crop which is very essential for precision agriculture supports agricultural development and economic progress of nation.

ISSN–2277- 8721

EIIRJ Electronic International Interdisciplinary Research Journal

Volume–XII, Issues – III May – June 2023

OPEN ACCESS Original Research

Aims and Objectives:

1. Study of crop cultivation in Palghar District.
2. Assessment of production and distribution of rice crop in Palghar District.
3. Finding the relation of physiography and land use with rice cultivation
4. Mapping of climatic suitability using the Ecocrop model.
5. Suggest the measures in planning the precision in agriculture.

Review Of Literature:

GIS based Ecocrop modeling to assess potential climate change effects on Sago Palm Suitability Distribution - Research Article by Meriam MakinanoSantillan and Jojene Santillan, Caraga State University, Philippines. Ecocrop model approach for agro-climatic sugarcane crop suitability in Bhogawati river basin in Kolhapur district, Maharashtra, India-Research Article by Vikramsinh Pawar Patil, The New College, Kolhapur. Negi (1994) discussed in his book topics related to physiography of India, forest types of India, forest policies and law, forest management, silviculture, forest protection, forest disease, social forestry, forest research, wildlife. NRSC (2002) The Department of Space on half of the Department of Biotechnology has made a project on characterizing the biodiversity at landscape level in Western Ghats of India using Satellite Remote Sensing and GIS. Indian Space Application Centre, Ahmedabad studied and used remote sensing techniques for mapping forest density, types of forest, encroachment and monitoring in different parts of India especially of Sikkim, Madhya Pradesh and Gujarat.

Methodology:

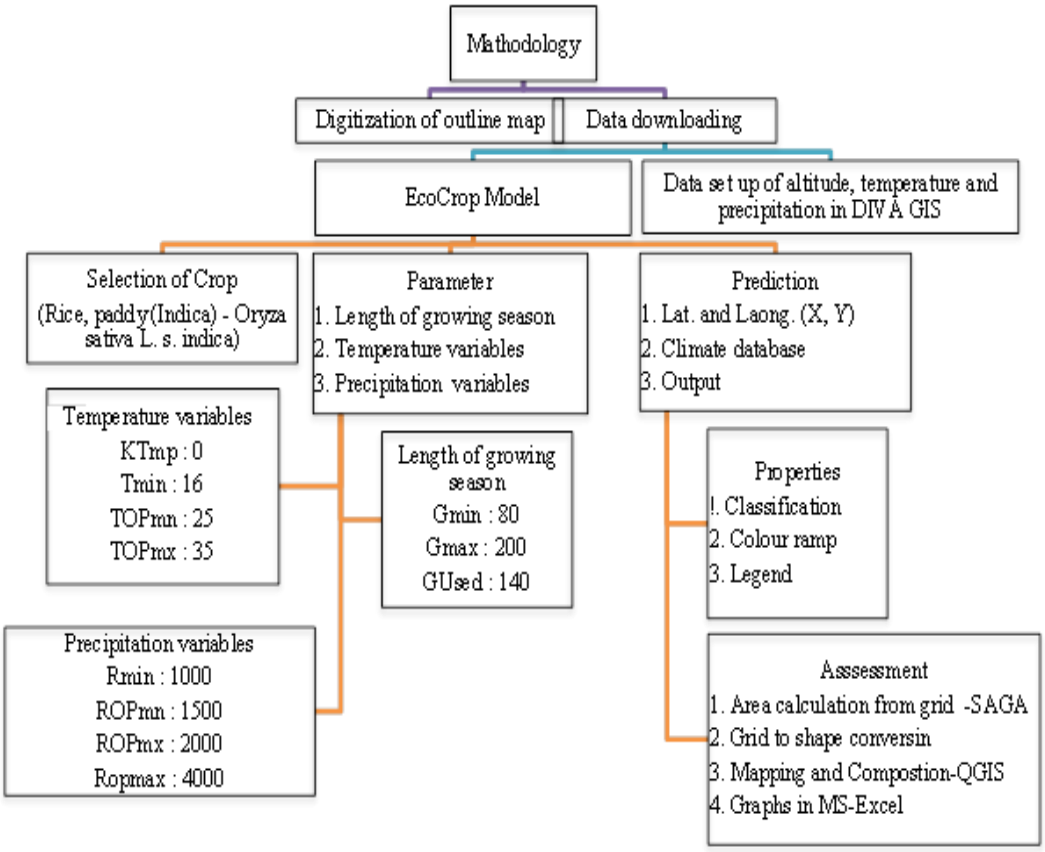
Location map is taken from topmaps. Climate data was downloaded from Worldclim (2.5 minutes spatial resolution gridded temperature and precipitation data) and assessed the climatically suitable areas by using Ecocrop model technique in DIVA GIS software. SRTM DEM of 30 meter spatial resolution satellite image data was used for physiography and slope map which was downloaded from the USGS (NASA) website. Population and Agricultural data is used from District Socio-Economic abstract, Directorate of Statistics and Economics, Govt. of Maharashtra and Census of 2001 and 2011. The maps and diagrams prepared with the help of different softwares Observation of crop and agricultural field was carried out by the field observation. All the data analysis, mapping and graphical representation were carried out with the support of Diva GIS, QGIS, SAGA and Excel softwares. Ecocrop model is a software tool developed by the Food and Agriculture Organization (FAO) used in DIVA GIS. Ecocrop provides data sheets about individual plants or crops with brief information.

ISSN–2277- 8721

EIIRJ Electronic International Interdisciplinary Research Journal

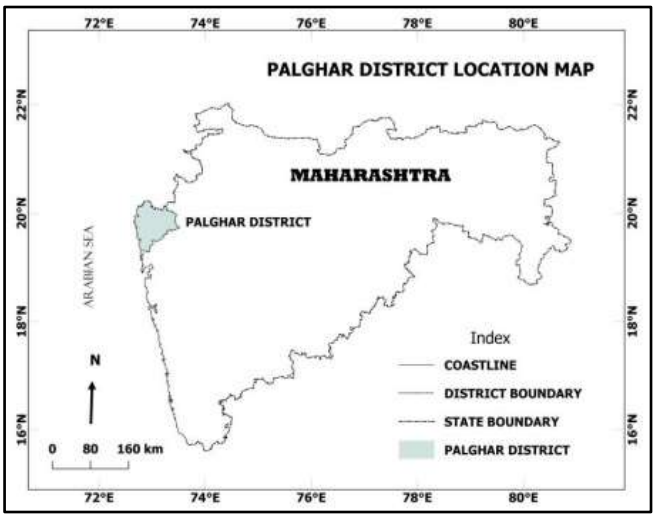
Volume–XII, Issues – III May – June 2023

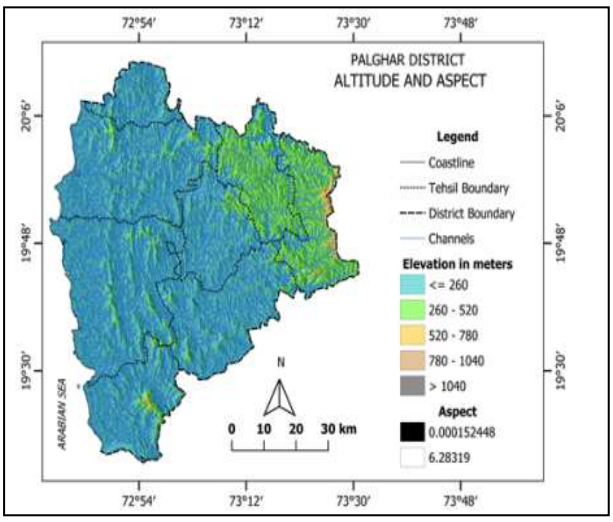
OPEN ACCESS Original Research



Study Area:

Palghar District is located in the north western part of Maharashtra. It has coastal area to is west and hilly area to its east





ISSN–2277- 8721

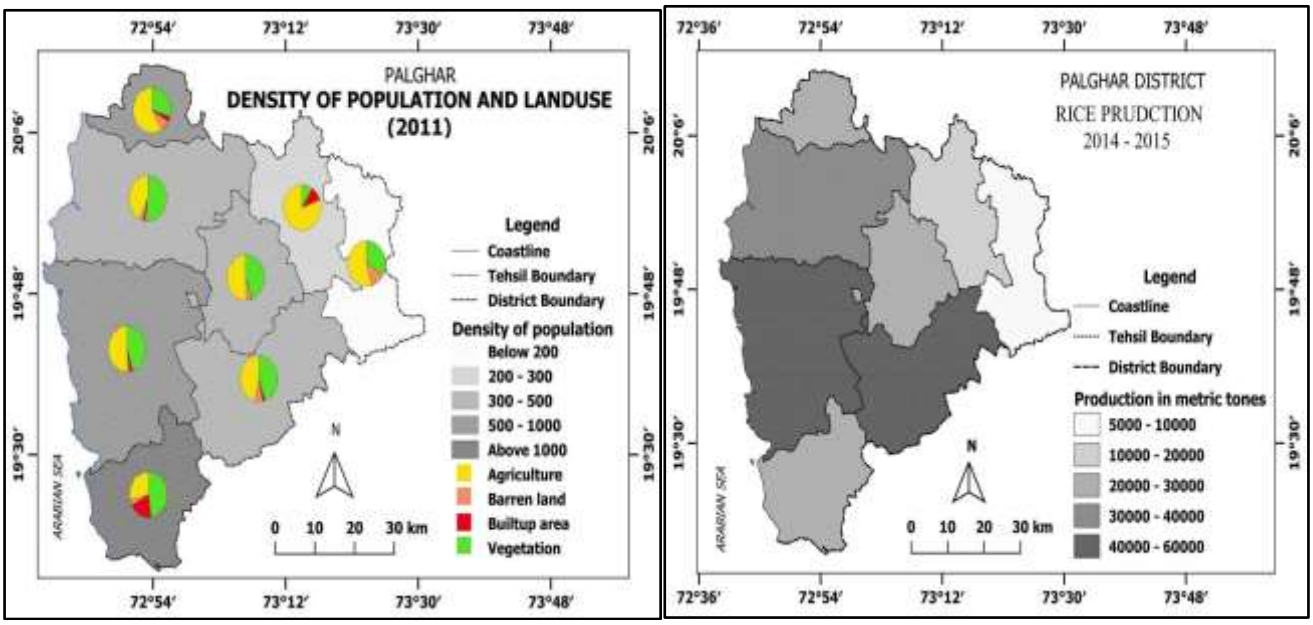
EIIRJ Electronic International Interdisciplinary Research Journal

Volume–XII, Issues – III May – June 2023

OPEN ACCESS Original Research

Rice Cultivation:

Rice crop requires hot and humid climate for agriculture. In Maharashtra, rice crop is grown mostly in the Konkan region that is the western coast. Palghar district is located in the northern part of konkan division with coast towards its west and hills towards it east. Here, rice crop is grown mostly in the coastal areas and plain areas



Palghar District : Rice Production

Sr. No.	Tehsil	Total area in hectares	Total arable land in hectares	Land under cultivation in hectares	Area under rice cultivation in hectares	Rice production in metric tones
1	Palghar	107577	54154	42415	21377	42000
2	Vasai	53944	21417	17784	11300	21500
3	Dahanu	95532	40398	41012	18081	38000
4	Jawhar	39636	31796	30727	5327	13000
5	Talasari	26718	15639	15150	9634	26400
6	Mokhada	47305	25621	24904	2001	5800
7	Vikramgad	49539	25183	22803	9340	23600
8	Wada	78596	37229	36229	17312	50300
Total		498847	251437	231024	94372	220600

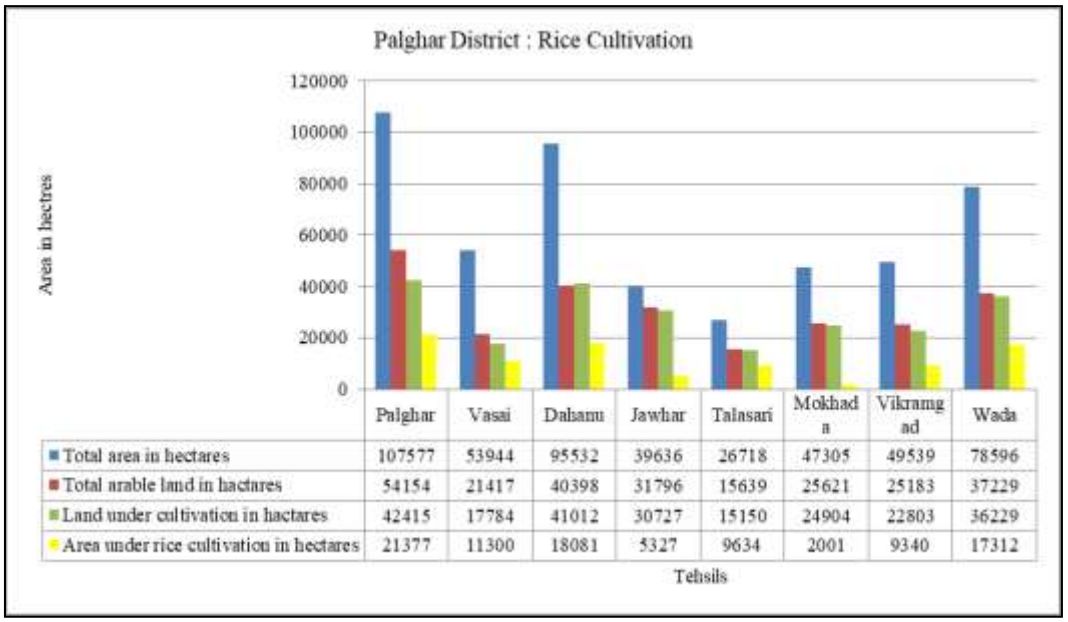
District Socio-Economic Review of Palghar - 2016, Directorate of Economics and Statistics Planning Department, Government of Maharashtra, India

ISSN–2277- 8721

EIIRJ Electronic International Interdisciplinary Research Journal

Volume–XII, Issues – III May – June 2023

OPEN ACCESS Original Research

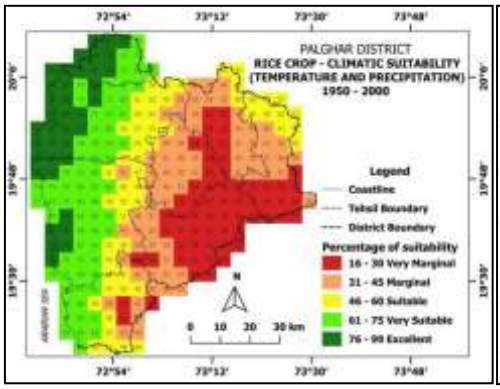


	Palghar	Vasai	Dahanu	Jawhar	Talasari	Mokhada	Vikramgad	Wada
Total area in hectares	107577	53944	95532	39636	26718	47305	49539	78596
Total arable land in hactares	54154	21417	40398	31796	15639	25621	25183	37229
Land under cultivation in hactares	42415	17784	41012	30727	15150	24904	22803	36229
Area under rice cultivation in hectares	21377	11300	18081	5327	9634	2001	9340	17312

In Palghar district, agricultural area is highest in Talasari and Jawhar talukas, moderate in Palghar, Dahanu, Wada, Vikramgad and Mokhada talukas, lowest in Vasai. The highest production of rice crop is in Palghar and Vikramgad talukas; least rice crop production is in Mokhada taluka; there is moderate rice crop production is in Vasai, Dahanu, Talasari, Wada and Jawhar of Palghar District.

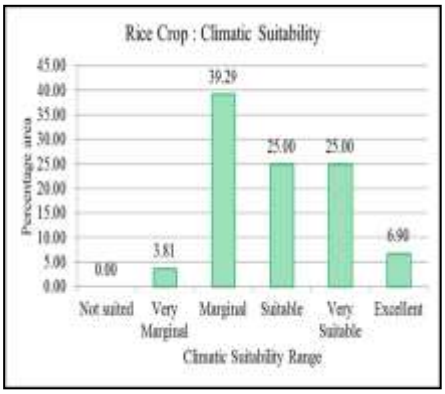
Ecocrop model is a software tool developed by the Food and Agriculture Organization (FAO) used in DIVA GIS. It identifies many plant species for various environments. It contains a database for environmental requirements of crops. It was designed with relatively basic information. This model was designed to include many species as well as species that are less known. Ecocrop provides data sheets about individual plants with brief information.

Ecocrop Model (Suitability Of Climate-Temperature And Rainfall) : Rice Crop



Palghar District : Rice Crop Climatic Suitability
(1950 to 2000)

Sr. No.	Range	Area in sq. km	% Area
1	Not suited (00 – 15)	0.00	0.00
2	Very Marginal (16 – 30)	203.58	3.81
3	Marginal (31 – 45)	2099.43	39.29
4	Suitable (46 – 60)	1336.00	25.00
5	Very Suitable (61 – 75)	1336.00	25.00
6	Excellent (76 – 99)	368.99	6.90
	Total	5344.00	100.00



Findings:

Rice is a major staple food crop. 2) Density of population is high in the talukas of Vasai, Palghar and Talasari; moderate in Dahanu, Wada and Vikramgad; low in Jawhar and Mokhada. The high contration of ST population is found in eastern talukas compare to western talukas. The very high sex ratio is found to eastern talukas compare to western talukas. The rural highest population under BPL found in eastern Talukas compare to wastern talukas due to effect of

ISSN–2277- 8721

EIIRJ Electronic International Interdisciplinary Research Journal

Volume–XII, Issues – III May – June 2023

OPEN ACCESS Original Research

physiography and climatic suitability on food crops. 3) In Palghar district, agricultural area is highest in Talasari and Jawhar talukas, moderate in Palghar, Dahanu, Wada, Vikramgad and Mokhada talukas, lowest in Vasai. The highest production of rice crop is in Palghar and Vikramgad talukas; least rice crop production is in Mokhada taluka; there is moderate rice crop production is in Vasai, Dahanu, Talasari, Wada and Jawhar of Palghar District. 5) According to the climatic suitability mapping assessed by using Ecocrop Model, the climatic suitability for rice crop with reference to temperature and precipitation for the time span of year 1950-2000 is Very Marginal in the hilly areas in the eastern part of the district and very suitable in the western part which in a coastal region. Very Marginal suitable area (3.81%) in parts of Wada, Vikramgad, Jawhar and Mokhada; Marginal suitable area (39.29%) in parts of Wada, Vikrangad, Jawhar and Mokhada; Suitable area (25%) in parts of Mokhada, Vasai, Palghar and Dahanu; Very Suitable area (25%) in parts of Vasai, Palghar, Dahanu and Talasari; and the climatic suitability for rice crop is Excellent suitable area (6.9%) in the north western part of Palghar, Talasari and Dahanu talukas. We can conclude that 1) Rice is major crop cultivated in Palghar district due to soil, climate and other suitable factors. 2) In general high population density areas should have larger area under cultivation but it is not observed in Palghar district. For example, Palghar and Vasai Tehsil having high density of population but less agricultural area due to urbanization and industrialization. The concentration of high density, literacy, male population is concentrated in western coastal tehsils than the eastern hilly area. 3) In coastal plain areas, rice productivity is high in comparison to the eastern hilly area. 4) The assessment of climatic suitability for rice cultivation in Palghar district by using Ecocrop model, it is projected that in coastal plain areas have climatic suitability for rice production in comparison to the eastern hilly areas of the district. The poverty and illiteracy is high in hilly tehsils than the plain coastal areas. Further Research can be carried out to assess suitability of multiple factors for rice cultivation as well as other crops. There are opportunities for further research in Climate change impact on Rice cultivation as well as other crops.

Conclusions:

1. Rice is major crop cultivated in Palghar district due to soil, climate and other suitable factors.
2. In general high population density areas should have larger area under cultivation but it is not observed in Palghar district. For example, Palghar and Vasai Tehsil having high density of population but less agricultural area due to urbanization and industrialization.
3. In coastal plain areas, rice productivity is high in comparison to the hilly area.
4. The assessment of climatic suitability for rice cultivation in Palghar district by using Ecocrop model, it is projected that in coastal plain areas have climatic suitability for rice production in comparison to the eastern hilly areas of the district.

Suggestions:

Further Research can be carried out to assess suitability of multiple factors for rice cultivation as well as other crops. There are opportunities for further research in Climate change impact on Rice cultivation as well as other crops. The further scope for research is in identifying demographic trends and effect on development as well as resources conservation for sustainable development. There are opportunities for further research in Climate change impact on Rice cultivation as well as other crops.

References:

Arif, Saad, Dean C. Adams and Jill A. Wicknick, 2007. Bioclimatic modelling, morphology, and behaviour reveal alternative mechanisms regulating the distributions of two parapatric

ISSN–2277- 8721

EIIRJ Electronic International Interdisciplinary Research Journal

Volume–XII, Issues – III May – June 2023

OPEN ACCESS Original Research

salamander species. Evolutionary Ecology Research 9: 843–854.

Berger, JD, 2007. Ecogeographic and evolutionary approaches to improving adaptation of autumn-sown chickpea (Cicer arietinum L.) to terminal drought: the search for reproductive chilling tolerance. Field Crops Research 104: 112-122.

Ganeshaiah, K. N., Narayani Barve, Nilima Nath, K. Chandrashekara, M. Swamy and R. Uma Shaanker, 2003. Predicting the potential geographical distribution of the sugarcane woolly aphid using GARP and DIVA-GIS. Current Science 85:1526-1528.

Hijmans, Robert J. and David M. Spooner, 2001. Geographic distribution of wild potato species. American Journal of Botany. 88:2101-2112.

Sunil, N., N. Sivaraj, K. Anitha, Babu Abraham, Vinod Kumar, E. Sudhir, M. Vanaja and K. S. Varaprasad, 2009. Analysis of diversity and distribution of Jatropha curcas L. germplasm using Geographic Information System (DIVA-GIS). Genetic Resources and Crop Evolution 56:115-119

https://www.worldclim.org (Worldclim is a database of high spatial resolution global weather and climate data).

District Socio Economic Report Palghar 2016, Directorate of Economics and Statistics.https://censusindia.gov.in (Census of India).

https://www.researchgate.net (Research Articles).

https://www.fao.org. (Food and Agriculture Organization)

Cite This Article:

****Shri. Bombe D.D.,**Ms. Waze A. & *** Dr. Pednekar H.M. (2023).*** *Geographical Assessment of Climatic Suitability of Rice Crop in Palghar District Using Ecocrop Model,* ***Electronic International Interdisciplinary Research Journal****, XII, Issues – III, May -June, 2023, 81-87*