Original Research Paper Geography

The Significance of Moisture Adequacy in Determining Crop Patterns in Odisha

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ABSTRACT

The level of crop production depends on many factors .One of themost important among them is Moisture adequacy. The moisture that is necessary for the sustenance of crop can be best derived from knowledge of the index of Moisture adequacy. An excess or deficit of Moisture above or below field capacity in the root zone of the soil depends upon the relative magnitude of rainfall over the area. The Moisture adequacy index is a true representative of moisture affectivity, thus can be used in the study of food crop production in relation to climate. The information on spatial and temporal availability of Moisture adequacy index could be help-full for the optimal utilization of water resources

KEYWORDS

Introduction

Growth of the agricultural sector is important not only for ensuring food security and reduction of poverty in rural areas, but also sustaining growth of rest of the economy. In agricultural point of view,Odisha is one of the important State, where the importance of agriculture can be accessed from the fact that nearly 70% of the State's population depends on agriculture. The state of Odisha covers an area of 155707 sq. km with a population of 41947358(2011). Out of this population the active workers alone are considered to be dependant on agriculture and there are several factors which influence cropping pattern. These factors could be natural or manmade. One of the most important natural factors that influence the crop production is the availability of adequate quantities of moisture for proper growth and sufficient yield of crops.

In a state like Odisha, where climatic condition varies to a large extent calibrating the quantities of moisture existing at different areas becomes quite essential. The state has a variety of geographical environment, soiltype,topography, rainfall, which respond differently to the various cropping patterns. The total cultivated land of the state is 61.80 lakh ha,out of which 29.14 lakh ha (47%) is high land, 17.55 lakh ha (28%) Medium land and 15.11 lakh ha (25%) Low land and about 35% of cultivated land is irrigated. Majority of the farmers are small and marginal and have limited purchasing power with low levels of literacy. So most of the farmer depends on monsoon for their agricultural production.

OBJECTIVE:

This study is intended to identify variations in cropping pattern in Odisha for the period of 2009—to 2011 in relation to moisture adequacy.

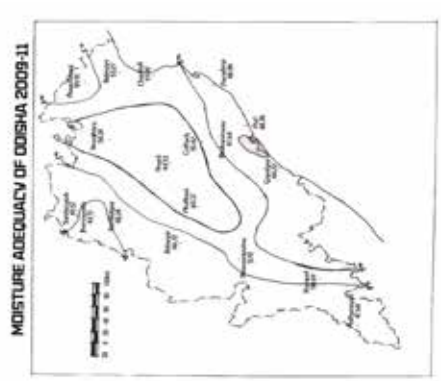
MEASUREMENT OF MOISTURE ADEQUACY:

The Thornthwait's scheme of classification of climate is generally used to measure moisture availability. The Potential Evapotranspiration is made the basis for evaluating the efficiency of climate in relation to the vegetation cover. The Potential Evapo- Transpiration (PE) is defined as the highest value of the evaporation and transpiration that take place from a fully vegetation covered surface. This implies an unlimited source of moisture, usually observed in saturated soil. In contrast to this, Actual Evapo- Transpiration (AE) at a place is the absolute amount of water available from the soil for vegetation. In a very wet region, Actual Evapo-Transpiration is very high and is sometimes equal to Potential Evapo–Transpiration when the soil is saturated. However, in arid regions AE is lower than PE. For practical purpose s the percentage ratio of the two (AE / PE *100) serves as a good indicator of moisture status of the soil in relation to the water need of the climate . This percentage is generally defined as the index of moisture adequacy. A low value of the index indicates poor moisture availability where as a high value indicates good moisture availability.

METHODOLOGY:

In this study mean values of temperature and rainfall are calculated for a period of three years (2009 – 2011), and these mean values were used to work out Potential Evapo- Transpiration and Actual Evapo- Transpiration. The moisture adequacy indices and water deficits are computed for 18 stations in Odisha. The study period of three years was a comparatively dry period with 14 out of the 18 stations recorded rainfall quite below the normal. Four stations recorded rainfall above normal, i.e. Bhadrak, Cuttack, Bhawanipatana and Koraput. The isopleth technique is used for mapping index. The choropleth technique is used to map the spatial patterns of the Intensity of cropping and Intensity of Irrigation for the corresponding time period.

Intensity of cropping refers to the intensity of use of land – values over 100 reflecting double cropping. Intensity of irrigation refers to the use of water from sources like canals, tanks, tube wells etc., and values over 100 reflecting irrigation of some areas twice.



DISCUSSION:

An examining the moisture adequacy fig-1, it revels that moisture adequacy increases from west to east in the State. Very high Moisture adequacyvalue offound in coastal region, namely Balesore, Bhadrak and Cuttack. Except this area high moisture adequacy value of 60.37 is found in Kandhamal (Phulbani) station and the lowest value of 42.13 is seen in Jharsuguda station.High Moisture adequacy is found mostly in coastal re-

gion namely, Balesore, Chandbali (Bhadrak) and Cuttack stations. Except this region high moisture adequacy value is also found in Bhawanipatana (Kalahandi) and Keonjar stations. Though the moisture adequacy is low mostly in the western part of the state mostly in theBolangir, Anugul and Sundargarh station. Except this regions Gopalpur (Ganjam) also having low Moisture adequacy value. . The table – 1 shows the moisture adequacy of 18 stations with cropping intensity and irrigation intensity in association with the main crops of Odisha.

TABLE-1
Shows Moisture Adequacy in association with Cropping Intensity & Irrigation Intensity with main crops in some Stations of Odisha

STATION	MOISTURE ADEQUACY	CROPPING INTENSITY	IRRIGATION INTENSITY	MAIN CROPS
Baleswar	53.27	155	177	Rice, pulses Ground nut
Chandabali (bhadrak)	53.92	141	118	Rice, pulses Ground nut
Cuttack	55.42	216	159	Rice mung
Paradeep Jagatsingpur	48.86	202	148	Rice, pulses, maize
Khurda (BBSR)	47.64	187	145	Paddy, Maize
Ganjam (Gopalpur)	44.22	191	123	Paddy, pulses Ground nut
Puri	48.36	211	153	Coconut, Paddy
Anugul	44.53	174	164	Pluses, cereals
Mayurbhanja	49.91	135	139	Oil seeds, paddy
Jharsuguda	42.13	149	159	Maize, Cereals
Keonjhara	58.24	153	155	Maize, Wheat
Sambalpur	48.24	159	162	Paddy, pluses
Sundargarha	45.57	133	139	Paddy, Species
Kalahandi (Bhawanipatna)	51.91	172	154	Cotton, Pluses, paddy
Balangiri	46.72	142	160	Pluses, paddy
Koraput	50.69	146	164	Pluses, paddy
Phulbani	60.37	173	137	Species, cereals pulses
Malkanagiri	47.68	167	130	Ground nut Species

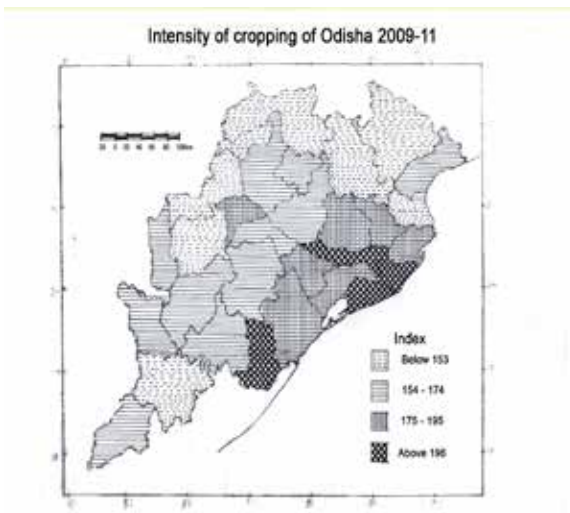


Fig-2

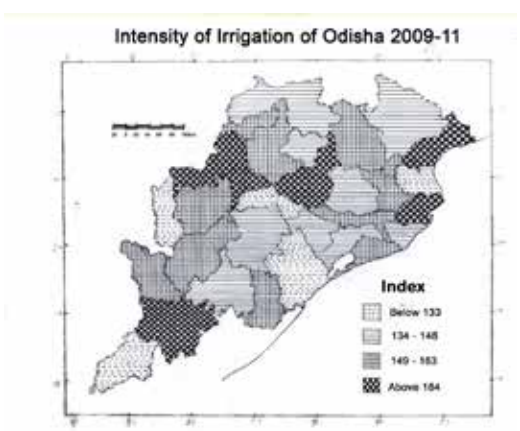


Fig-3

The intensity of cropping, which is the percentage ratio between the gross cropped area and net cropped area, depends upon the water supply and moisture adequacy in addition to soil fertility. Where there is assured water supply, intensity of cropping shows higher values. The fig. 2 shows that, very high intensity of cropping is found in coastal region, mostly in Mahanadi delta region. This region has reached the optimum level in cropped area. Due to assured water supply, most of the land is under cultivation in both Kharif and Rabi seasons. Along with this area, very high Intensity of cropping is also noticed in the GajapatiDistrict. High intensity of cropping is found in Khurda, Ganjam, Sonepur, Jajpur, Kendrapada, Dhenkanal, NayagarhDistrict. Low cropping intensity is noticed in the District, where the soil is infertile, such areas are Bhadrak,Mayurbhanja, Jharsuguda, Sundrgarh ,Keonjhar , Balangir , Koraput , and BaragarhDistricts .

The area wise picture regarding the intensity of irrigation is shown in the fig. 3. This map shows that very high intensity of irrigation is noticed, where the canal irrigation is available, such areas are Kendrapada,Baragarh, Sonepur. Apart from this area very high irrigation is also found in the district of Anugul,Koraput, Baleswar. High intensity is noticed in the district of Cuttack,Jajpur,Gajapati, Puri, Sambalpur, Jharsuguda, the low intensity of irrigation is found in the districts of Bhadrak,-Ganjam,Nuapada, Malkangiri, Boudh,Sdue to mostly unavailability of canal irrigation facility.

The study of the spatial patterns of agricultural variables in relation to moisture adequacy leads to some of the following points.

Cropping intensity reduces with a low moisture adequacy. It is seen that even a higher intensity of irrigation does not yield higher cropping pattern, as in case of Baragarh.

It is quite evident from the table that irrigation in such areas helps only in protecting the crop, but does not help in increasing production. In general, where the moisture adequacy values are higher, Irrigation intensity usually goes hand in hand with higher crop Intensity. But this does not happen in all the areas.

The type of soil also plays a very significant role in determining cropping pattern with identical values of Moisture Adequacy and Intensity of Irrigation. Different types of soil show different combination of crop and cropping intensity.

CONCLUSION:
To explain the crop pattern, moisture adequacy is a natural factor, and the intensity of irrigation is a cultural factor and should be carefully considered.

In this study it indicates that in low moisture adequacy areas, increasing irrigation through artificial means does not help in any way to increase productivity. To mitigate these problems cultivators should grow drought resistant crops and try to increase yield. Areas where moisture adequacy is good and low irrigation intensity, cropping intensity can be increase by providing artificial irrigation. Above all moisture adequacy becomes an important parameter in estimating the minimum irrigation need, and also to explore alternative crop combination which would help in making agriculture profitable without damaging the natural resources like river, forest, soil.

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