IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# Impact of Agro-Environmental Determinants on Crop Land Use Pattern - Bishnupur Sub-Division, Bankura, West Bengal

**Arijit Kumar Datta, Research Scholar, JIS University, Kolkata, West Bengal**

***Abstract:***

Present research is primarily stressed on the impact of agro-environmental factors on crop-land use pattern and for these purpose blocks *of Bishnupur subdivision has been selected for the study. So,* detail scenario of agricultural land use and block level differentiation of crop land use pattern have been represented and analysed for final extraction of rural development pattern in these blocks. In this regard, proper stress is also given to represent the micro-level land use pattern as well as rural development pattern in the area concerned. The major objective of the present research is to define the determinants of the agro-environmental condition of the research field and to review the land cover and land use pattern of the area concerned with particular reference to agricultural land use and cropping pattern. The harsh climatic condition especially high temperature, low rainfall in that area is not favourable for taking best possible measures for optimal land utilization and management. Crops are uniformly cultivated during the rainy season with the help of rain water, but that also depends on intensity and amount. We have number of crops dominated by paddy in this region. Other crops are potato, Wheat, vegetables, jute, oilseeds etc. All those crops are cultivated in different season during the year. From ground truth observation it has been highlighted that though paddy, till and potato have been highlighted as major crops in mono cropping, double cropping and multiple cropping cultivation but several other crops are cultivated as observed in the crop diversification map.

***Key Words: Rolling plain; Crop-intensity; Crop combination; Crop diversification; Multiple cropping***

## Introduction:

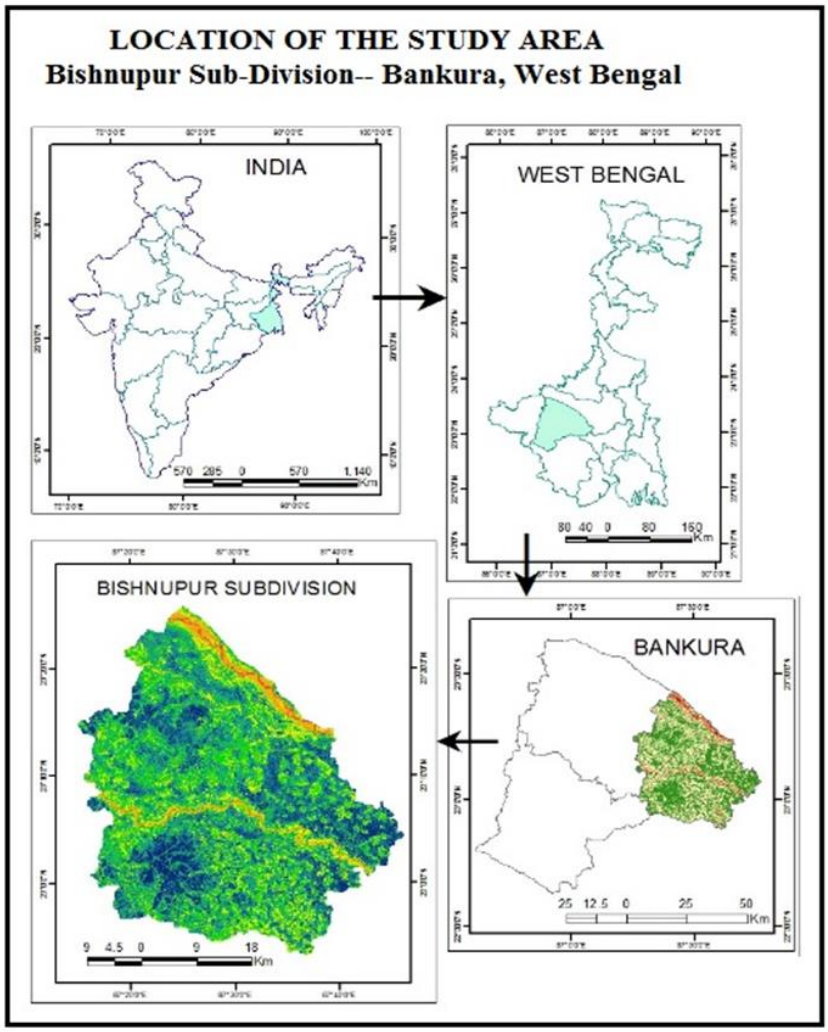
The present field of research is specially concentrated on agricultural land use ***with special reference to crop land use pattern in relation to rural development perspective.*** *For this purpose, blocks of Bishnupur subdivision has been selected for the study. Here considerable parts of almost all blocks are falling under rural environment. Moreover, all blocks of this subdivision also experienced moderate to low rainfall, moderate to low level irrigation facility, unfertile soil etc. which actually forced these blocks to throw into agro-based economy.* Here I have consider block level study for the present purpose and detail scenario of agricultural land use and block level differentiation of crop land use pattern have been represented and analysed for final extraction of rural development pattern in these blocks. In this regard, proper stress is also given to represent the micro-level land use pattern as well as rural development pattern in the area concerned. The area under research is diametrically divided and dissected by Darakeswar and Silai River and their tributaries. The problem defined here is the perspective of

agricultural land use with special reference to crop land use pattern and its role on rural development. The major objective of the present research is to define the determinants of the agro-environmental condition of the research field and to review the land cover and land use pattern of the area concerned with particular reference to agricultural land use and cropping pattern. The harsh climatic condition especially high temperature, low rainfall in that area is not favourable for taking best possible measures for optimal land utilization and management. The condition of soil is not so favourable for agricultural environment and low amount of rainfall is also unfavourable for the practice of double or multiple cropping. The nature of land is not also favourable for good agricultural land. The nature of land in the area is also classified into piedmont plain, Undulation or rolling plain and old and new alluvial plain. The red and lateritic soil is not so fertile for good agricultural practice. Among the six blocks Bishnupur and Joypur have undulating, rugged and rolling nature of land. Indus and Patrasayer have mostly gently undulating land and sonamukhi and Kotalpur representing alluvial plain mostly deposited by Damodar and Darakeswar rivers. Roughly 60 % of the total reported area is under undulating, rough or gently undulating category, so have limitations for agricultural operation, though other uses are available. Most of the area under Bishnupur sub-division display rural nature of land use pattern excepting one or two semi-urban or urban areas. More than 80% of the active land area experienced rural land use where agricultural and use is most common. We can get spatio-temporal variation of land use if we traverse from west to east diagonally. Types and nature of crops are most significant aspect of agricultural land use pattern in any region. In the rural India especially, in rural Bengal agriculture is the backbone of the economy and nature of crops grown, types of crop, seasonal pattern of crops, crop calendar are most significant issues to justify the crop land use pattern.

**Study Area:**

Bishnupur sub-division is a significant administrative unit in the Bankura district not only in terms of historical perspective, it offers physical, economic, social, cultural as well as overall distinctiveness in the district as well. ***The latitudinal and longitudinal extension of the Bishnupur sub-division is*** extended from 22° 52′ 30″ N to 23° 25′ 30″ N and 87° 15′ E to 87°46′ E latitude and Longitude respectively.

Bishnupur sub-division is located in the north-eastern part of the district and belongs to the partially undulating and low lying fertile alluvial plains, similar to the predominating rice lands in the adjacent districts of West Bengal. Here, the eye constantly rests on wide expanses of rice fields, green in the rains but parched and dry in summer. Bishnupur Subdivision has six CD Blocks namely, Bishnupur sadar, Sonamukhi, Patrasayer, Indus, Joypur and Kotulpur and ***bounded by*** Sonamukhi CD block ***on the north,*** Indas, Patrasayer and Joypur CD blocks ***on the east***, Garhbeta I CD block in Paschim Medinipur district, ***on the south*** and Taldangra and Onda CD blocks ***on the west***. ***Large forest areas exist in Sonamukhi, Joypur, Bishnupur, Khatra and Ranibandh areas. In relation to agro-environmental*** determinants the present area is controlled by various physical as well as anthropogenic factors.




*Map No – 01 – Location of the Study area*

**Objectives of the study:**

With respect to the present problems of the present research, the major objective of the research is primarily converged on the impact of agro-environmental determinants and pattern of land utilization with special reference to crop land use pattern in the perspectives of rural development. To know the nature of crop land use pattern is the prime concern in the perspective of agricultural land use; so, objectives of the present research are concentrating the geographical nature of the problem as well as the nature and practice of rural development in the concerned area. Here in the present research the major interest on pattern of agricultural land use and cropping pattern are not only from the economic point of view, but from the view point of socio-cultural as well as physical process in the holistic development plan. So, the major research question is *what are the nature and pattern of agricultural land use to assign the nature and pattern of crop land use pattern.* Moreover, *the role of agriculture and differential crop land use pattern in the perspective of rural development is also the significant concern in the perspective of rural wellbeing.*

**Data Base:**

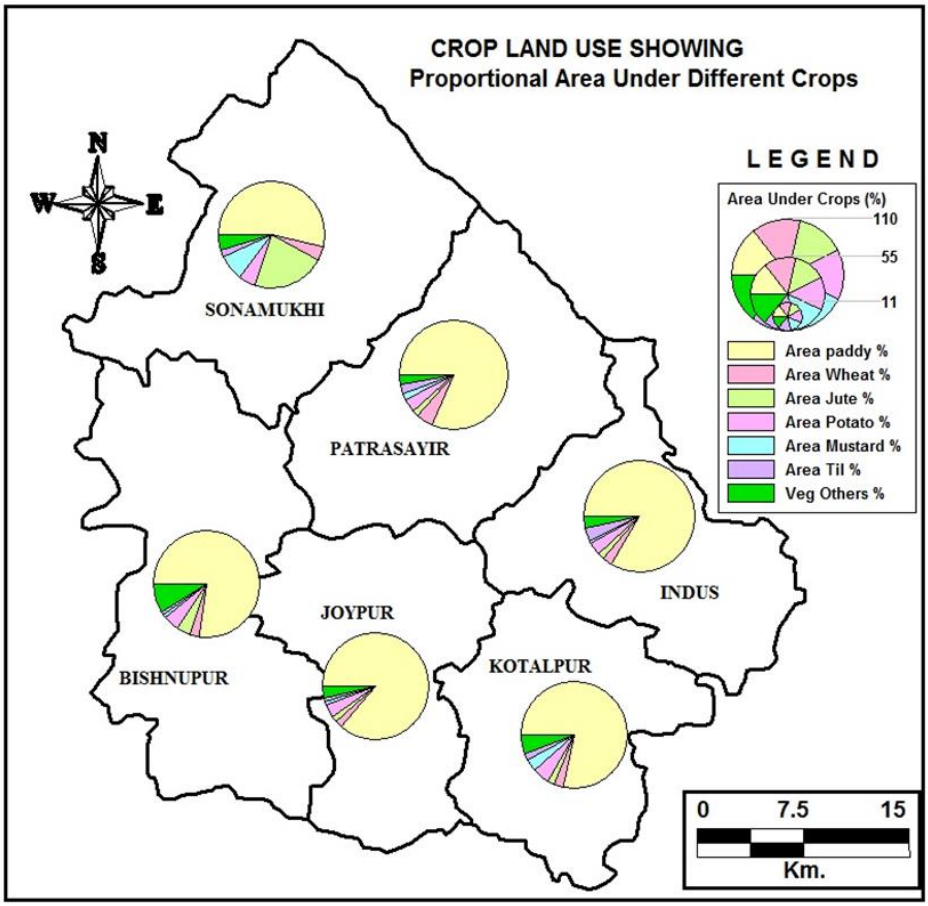
Present research has been carried out with the help of prepared and collected maps, information, literature apart from various traditional materials and accessories. Various multi-temporal Remote sensing images are collected for the preparation of land cover and land use of the area under research. Socio-economic Survey of sample villages have been carried out with the help of door to door survey method and in this regard primary sources of information have been taken into consideration. Moreover, secondary sources information has also been collected from different govt. and non-govt. sources. Various physical, economic, social, land-information and agro-information maps have also been collected and prepared from various sources.

**Methods of Analysis**

The present research in rural geography is purposely presented and ranged thematically. Keeping in view of the aforesaid perspectives the present research is primarily belong to observation and measurements by qualitative and quantitative methods and based on quantitative principles. To fulfil the major objective of the research the subsequent research have been conducted based on the contemporary techniques and methods. Justified and fool proof quantitative techniques have been involved for collection, tabulation, processing, analysis and interpretation and finally drawing inferences to justify the research properly. ***In the preliminary stage*** collection, tabulation, compilation, classification, evaluation and management and extraction deserve special mention. Collections of Secondary data, information, maps, Literature, preparation of base maps are most important steps as preliminary stage of the research. Secondary data, Literature, Information regarding geo-physical environment, existing land use pattern, status of land use collected from various published and unpublished sources have also been collected for conducting the research. Finally observation and ground truth verification have also been taken into consideration for final output generation.

**Results and Discussion:**

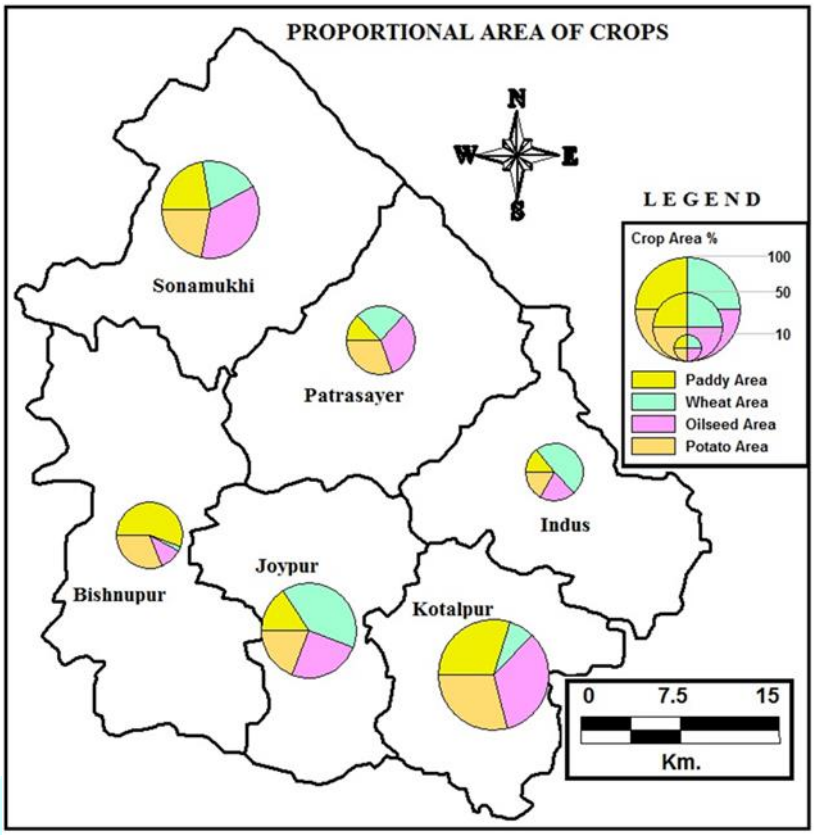
Before justifying the crop land use pattern we should know first the agro-environmental composition especially the nature of land, topography, soil characteristics, fertility status, climate- range of temperature and rainfall and available infrastructure for modern agricultural operation. In my research area I investigated all those things carefully to evaluate the nature and pattern of crop land use. Following diagram is representing crop land use pattern of the present research area which is highlighting the proportional area under different crops. It is clear from the diagram that paddy is the dominant crop in all six blocks of the Bishnupur sub-division. Apart from that except sonamukhi almost all the blocks have very less or negligible area under other crops, whereas sonamukhi has slight diversification in crop land use. From map number 02 proportional areas under different crops with respect to total cropped area are shown where slight different picture has been depicted.




***Map No – 02- Crop Land use pattern***

It has been observed that Bishnupur, Sonamukhi and Kotulpur have considerable area under paddy, where other blocks have slight diversification in crop land use. Paddy, wheat, oilseed and potato are the major crops grown in the sub-division all throughout the year. Another interesting facts are highlighted that oilseed has distinctiveness in sonamukhi, Patrasayer, Kotulpur and Joypur. Moreover, potato has also distinctive characteristics in crop land use pattern almost in all the six blocks.

***Regarding subsistence and commercial crops following diagram are revealing some significant facts***. It has been observed from the following map that as there is dominancy of marginal agricultural labour and cultivators and also they are mostly depending on agriculture as well, ***almost all the blocks have considerable area under subsistence crops.*** Only sonamukhi, Kotulpur and Bishnupur have considerable area under commercial crops. Among commercial crops potato, wheat and oilseeds deserve special mention. But in most cases those crops are sailed in local market as the amount is not so remarkable.




*Map No. – 03- Proportional areas of crops with respect to GCA of Blocks*

Crops are uniformly cultivated during the rainy season with the help of rain water, but that also depends on intensity and amount. We have number of crops dominated by paddy in this region. Other crops are potato, Wheat, vegetables, jute, oilseeds etc. All those crops are cultivated in different season during the year. It has been observed from the table no. 5.1 that except paddy, all the crops are grown during the dry season and all those crops are grown with the help of irrigated water. Winter crops are not frequently cultivated as all the years cannot assure the supply of water, because those crops are purely depending on irrigated water which is uncertain. So amount of current fallow is unavoidable in this sub-division.

**Agro-environment and crop land use—correlation and association:**

Agriculture is the significant means of rural economy and it is primarily depend on environmental factors especially the nature of land on which agriculture is practiced. The district Bankura is originally the peripheral part of the chotanagpur plateau where some parts are representing rolling and undulating nature of land. The present research area, the Bishnupur sub-division, has also some diversity in land character where some ups and downs are observed with rolling and undulating nature of land. Moreover, old alluvial flat and newly deposited alluvial plain and flood plain are characterizing the land surfaces which are available for cultivation. It has been assigned from the

***Table No. – 01 – Block wise Ranking of Crop Land Use***

| Name of the Block/Village | Mono-Cropping | Double Cropping | Multiple Cropping | **Rc** |
|---|---|---|---|---|
| Joypur-01 | 64-(3) | 28- (5) | 8- (5) | **13** |
| Kotulpur-01 | 52-(2) | 34- (3) | 14- (2) | **7** |
| Indus-01 | 68- (4) | 22- (6) | 10- (4) | **14** |
| Sonamukhi -01 | 52- (2) | 32- (4) | 16- (1) | **7** |
| Patrasayer -01 | 52- (2) | 36- (2) | 12- (3) | **7** |
| Bishnupur -01 | 48- (1) | 38- (1) | 14- (2) | **4** |

***Table No – 02 – Cropping Season – Crop Calendar***

| Crops Grown | Sowing Season | Growing Season | Harvesting Season |
|---|---|---|---|
| **Paddy** | **July - August** | September - November | **November - December** |
| **Wheat** | **November - December** | December - January | **February** |
| **Oilseed--Mustard** | **October - November** | November - January | **February - March** |
| **Oilseed--Til** | **March** | April - May | **June** |
| **Vegetables- Summer** | **March - April** | April - May | **June - July** |
| **Vegetables- Winter** | **October - November** | November - January | **February - March** |

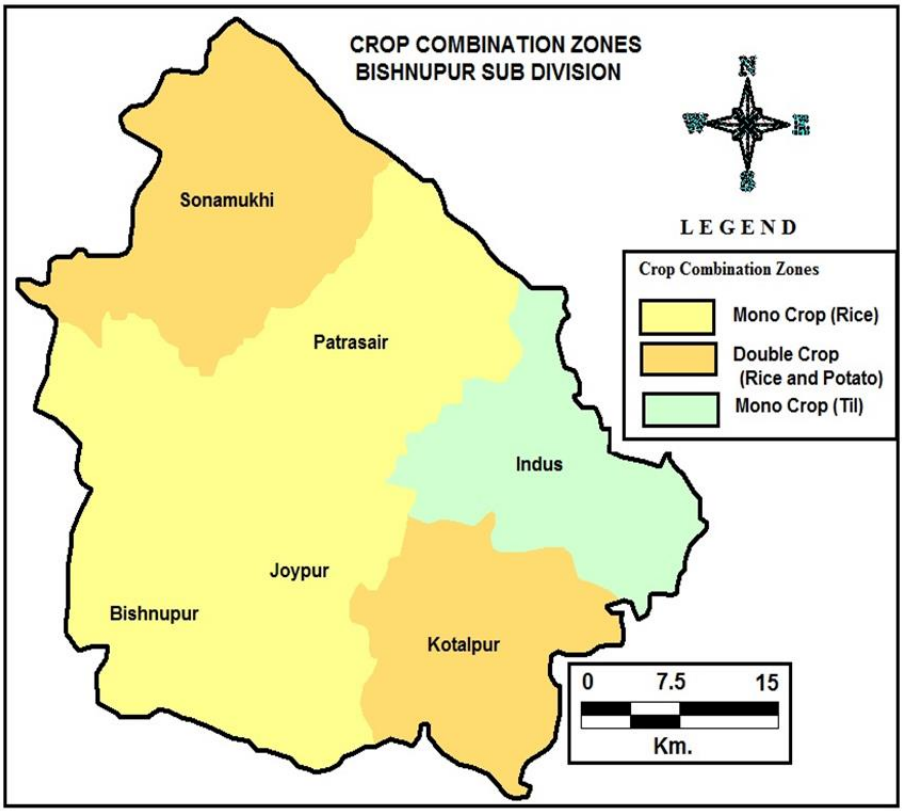
fact that the area has no such marked variation in terms of altitude, but from west-north-west to south-south-east there is variation of altitude. Bishnupur and sonamukhi has relief range from 75 to 100 m. and there is also diversity of land character available for agriculture. From careful consideration I have got 06 distinct nature of land available for agriculture according to the variation of agro-environmental characteristics of the land. ***Those are – i) Tanr land; ii) Undulating upper flat surface with moderate dissection; iii) rolling plain; iv) Old alluvial plain with slight dissection; v) Gently undulating plain; vi) newly deposited flood plain***

***Tanr land is not so suitable for agriculture*** where land has several barriers for smooth agricultural operation soil profile is not ideal in all cases and fertility status is not also good for ideal agriculture. Water retention capacity and storage capacity in the soil is not also suitable for agriculture. ***Land in the undulating upper flat surface with moderate dissection*** has slight better prospect in comparison to the Tanr land, but this type of land has also some barriers for all season agriculture. undulating surface with stony soil character limits the smooth agricultural operation in some cases in this type of land. ***Rolling plain is slightly suitable for agriculture*** but not perfectly ideal for better agricultural operation. This type of land is preferably suitable for winter crop or the crops which need less amount of water. Kharif crops are barely cultivated in this type of land. ***Old alluvial plain with slight dissection*** areas are moderately suitable for all season agriculture if water is available for agriculture in the winter season. In the water scarce zone this type of land is usually treated as current fallow in most of the year as water is not available for agriculture. seasonal agriculture is suitable in these zones. ***Gently undulating plain is mostly suitable for all season agriculture*** if sufficient rain water is available. Both subsistence and commercial crops are grown here and double cropping land is observed in some cases here. ***Newly deposited alluvial plain are usually located in the flood plain areas of the major rivers.*** Spilled water

areas are usually treated as this type of land. Both rain water and irrigated water are available for kharif and Rabi crop cultivation.

**Findings and Suggestions:**

Possible combination of crops and their diversification are the major aspects of crop land use pattern. As there are widespread lack of agro-environmental condition, excepting paddy, as major crop, other crops are grown according to the suitability of the crop growing situation. We have three cropping zones according to the number of crops grown in the particular land area. Those are – i) Mono crop; ii) Double crop and iii) Multiple cropping areas. From the following maps 5.5 and 5.6 we have got clear ideas regarding the number of crops grown and its diversification pattern. Bishnupur, Patrasayer and Joypur are regarded as mono cropping (Paddy dominated) area, though there are several other crops grown in the pocket zones as per the availability of irrigation facilities. But due to lack of proper irrigation facilities lands more than one crop grown are very few in the sated areas. Indus also regarded as mono cropping zone as till is the major crop apart from paddy.




***Map No. – 04 – Crop combination zones***

**Table No. – 03 --Area, Production and Yield of Major Crops**

| Blocks | Area (Hectrs) | | | | |
|---|---|---|---|---|---|
| | Paddy | Wheat | Oilseed | Potato | TOTAL |
| Bishnupur | 37829 | 14 | 763 | 2005 | 40,611-2 |
| Joypur | 19258 | 450 | 2958 | 2384 | 25,050-4 |
| Kotulpur | 49321 | 104 | 5319 | 4633 | 59,377-1 |
| Sonamukhi | 29087 | 404 | 1083 | 2843 | 33,417-3 |
| Patrasayer | 9447 | 152 | 2139 | 2030 | 13,768-5 |
| Indus | 7921 | 235 | 2430 | 940 | 11,526-6 |

| | PRODUCTION (Tones) | | | | |
|---|---|---|---|---|---|
| Blocks | Paddy | Wheat | Oilseed | Potato | TOTAL |
| Bishnupur | 10600 | 100 | 700 | 26873 | 38,273-4 |
| Joypur | 52000 | 2000 | 3300 | 21585 | 78,885-2 |
| Kotulpur | 144000 | 300 | 4900 | 28196 | 177,396-1 |
| Sonamukhi | 80000 | 800 | 800 | 29578 | 31,178-5 |
| Patrasayer | 29000 | 300 | 1600 | 12578 | 43,478-3 |
| Indus | 21000 | 500 | 2100 | 6368 | 29,968-6 |

| | YIELD (Kg/Hectr) | | | | |
|---|---|---|---|---|---|
| Blocks | Paddy | Wheat | Oilseed | Potato | TOTAL |
| Bishnupur | 7345 | 2138 | 751 | 13403 | 23,637-1 |
| Joypur | 7962 | 2324 | 802 | 9054 | 20,142-3 |
| Kotulpur | 9137 | 2349 | 930 | 6086 | 18,502-4 |
| Sonamukhi | 7725 | 1896 | 600 | 10402 | 20,623-2 |
| Patrasayer | 8384 | 1927 | 750 | 6196 | 17,257-5 |
| Indus | 7425 | 1921 | 815 | 6774 | 16,935-6 |

Due to unfavourable agro-environmental condition cultivation of major staple crop paddy is also faces serious barriers in these blocks. But apart from till as a dominant crop other crops are also grown here. Sonamukhi and Kotulpur represent somewhat different condition in relation to crop land use pattern. Here considerable double cropping areas are observed. Rice is the staple crop here and during winter season potato also cultivated as distinctive crop. Moreover, till, vegetables, pulses are also cultivated as observed from the primary survey. ***From ground truth observation it has been highlighted that though paddy, till and potato have been highlighted as major crops in mono cropping, double cropping and multiple cropping cultivation but several other crops are cultivated as observed in the crop diversification map.*** Kotulpur, Sonamukhi and Patrasayer have high to very high crop diversification status, which reveals the existence of double and multiple cropping lands in these blocks. Though Indus and Joypur have no such dominant and distinctive crop list in the combination map, but those blocks also

represented as moderate crop diversification zone. Bishnupur is regarded as low diversified zone, but in ground reality Bishnupur has number of crops cultivated in favourable agro-climatic environment.

***So, it can be concluded*** *that due to the lack of water and irrigation during the dry season and unfavourable nature of land most of the blocks are dominated by mono cropping cultivation, but double cropping and multiple cropping cultivation also practiced in pocket zones as subsistence cultivation and partly as commercial cultivation in local scale.*

**Acknowledgement:**

Present author is deeply indebted to various Govt. and Non-Govt. organizations and local personalities for their immense help and suggestions for preparing this paper.

***Reference:***

Ahmed Khan, Md. Zulfequar , *Changing Pattern of Crop Diversification in West Bengal (1977-78 to 1988-89),*1996( APH publishing corporation, pp.171-174)

Bai, Z. G., Dent, D. L., Olsson, L. and Schaepman, M. E. (2008). Proxy global assessment of land *Bankura, West Bengal*. Government of West Bengal, Kolkata.

Bharadwaj, K. (1982) "Regional Differentiation in India: A Note", *Economic and*

Bhattacharya, B. B. and Sakhivel, S. (2004) "Regional Growth and Disparity in India: Blocks, Burdwan Dist, West Bengal Using Remote Sensing and GIS. *Indian Journal of Landscape*

Bureau of Applied Economics and Statistics, (1992) *District Statistical Handbook,*

Bureau of Applied Economics and Statistics, (2012) *District Statistical Handbook,*

Census of India, 1991 Series-26 (on *West Bengal, - District Census Hand book, Bankura District*), General Population Tables, Part XII-A, and *Census of India*, 2011 (on *West*

Das, Debashis , *Disparities in Agriculture in West Bengal,* 1996, (APH publishing corporation, pp. 145-146)

Guha, P.K. (2008). *Remote Sensing for the Beginner.* New Delhi: Affiliated East-West Press Pvt.Ltd.

Jha, V.C (2008). Land Degradation and Desertification and Integrated Management of Laterite

Jha, V.C. (2003). *Land Degradation and Desertification,* Jaipur & New Delhi: Rawat Publication, pp. 405.

Kumar, P. et al. (2010). *Monitoring of Deforestation and Forest Degradation Using Remote Sensing and GIS:*A Case Study of Ranchi in Jharkhand (India).Retrieved from http://www.sciencepub.net/report/report0204/03_2578_report_0204_14_20.pdf

Mapping Techniques for Developing an Integrated Land Use Mapping Approach: *A Case Study of Political Weekly*, XVII (Annual Number), *pp*. 605-614.

Prakasam. C and Biswas, B. (2009). Land use, Land Cover Change Study in Ausgram I & II

Sabins, F.F. (2008). *Remote Sensing- Principles and Interpretation.* New York: Wiley.

Saharia, Umesh Chandra: *Crop Diversification Pattern and Disparities In Agriculture in North-East India*, 1996 (Concept publishing company, pp. 163-172.)

Singh, J and Dhillon, S. S. *Agricultural Geography*, 2006 (Tata mc graw hill publishing company limited. pp. 256-264)