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## Sustainable development and its effect on environmental health: In the Context of Sonbhadra District

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**Abstract:** *It is essential to estimate and assess the resource base of any region as it provides the platform for development planning, understanding of spatial diversity and assessment of dynamism in the environment. The present study conducted in the south-easternmost district of Uttar Pradesh. Fortunately, this district is among a few districts of Uttar Pradesh which have some minerals, abundant water, power generation capacity, heritage of rich tribal diversity. At the same time, it is truly unfortunate to have serious environmental concerns and social conflicts.*

*The research paper has objectives to measure a change in natural resource bases and landscape transformation in the region. Along with it, it has intentions to analysis the impact of industrialization and environmental degradation. For the said purpose; river drainage pattern, mining, agriculture, and industrialization have been targeted to acquire data (which is mainly secondary). As it is discussed in the academic arena the study of small areas should be the focal approach of planning, thus block-level setup is considered as a study unit. The eight blocks of the region are taken up for study.*

**Key Words:** Understanding, diversity, environment, Fortunately, minerals, generation capacity, academic.

Change in the cropping pattern and health issues raised due to degradation in the quality of water, air, and soil will be the measure of this research work. This study will help planners, administrators and policymakers in conflict resolution and to have a sustainable outlook in one of the most disadvantaged regions of the U.P. despite its huge potential.

Our planet earth have locational uniqueness which is known as spatial diversity in field of geography. As geography is concern with the identification of places and exploration of phenomena over space, the variation or differences is known as spatial diversity. If we look deeper the term diversity here means peculiarity among resource, population, problems and structure in a given area. The term resource have its broad meaning depending upon level of development, technical advancement, population pressure and aspirations of peoples. So when the term 'Resource Planning' is used it generally means optimum utilization of available natural wealth which can satisfy the requirement of population in the region. Development of any region depends on the sum total of conditions, resources and peoples will at a given point of time and space. Regional development studies at small level are done since the age of Blache (1845-1918) in western countries. With the spread of knowledge Indian academics also followed the same mode of enquiry in regional development studies. In this paper an enquiry has been put forward to study spatial diversity and change in resource base for the development of study area.

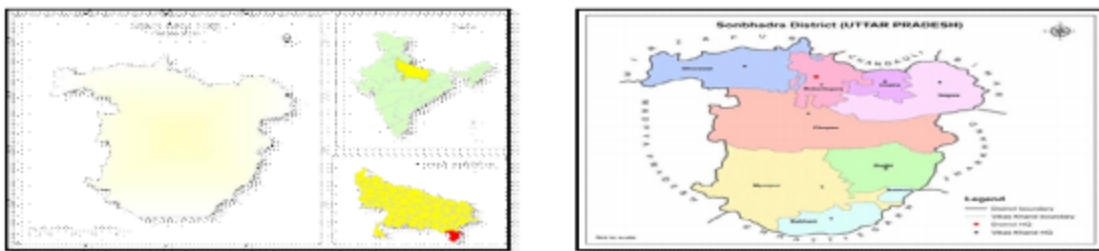
The first systematic stratigraphy of the Son valley area was given by Auden (1933), who described three major geological units exposed in this area, viz., Pre-Vindhyan Bijawars and gneissose rocks, rocks of Semri Series and Kaimur Series of Vindhyan. Prasad (1990) redefined the Basal Stage into Arangi shales and Patherwa Formations. In the area exposed with the Bijawars, now classified as the Mahakoshal Groups (Rogers, 1986), Mondal (2008) have classified twelve geomorphic units in the adjoining Kanhar river basin area with similar geologic-geomorphic set up. According to them, hydro geologically, the terraces of alluvial deposits forms the recharge zone where the groundwater potentiality is good to very good. The buried pediments area forms the infiltration zone, where potentiality is poor to good. High relief area is generally run-off zone having poor potentiality of groundwater.

Using Landsat TM data, Pant et al (1992) have observed that the overall accuracy of classification for forest vegetation type in this area is 88.94%. The study demonstrates the use of satellite remote sensing technique for

the analysis of tropical dry deciduous forest vegetation under acceptable limits of accuracy. While studying spectral separability of vegetation classes in this dry, Tropical region of the area using IRS-1A LISS-1 data, Jha et al (1993), found that the four raw IRS bands produce the best spectral separability for vegetation classification. However, if the number of bands is to be restricted to three, HSI and PCA provide results closer to those from the four IRS bands. The performance of HSI and PCA was found to be far better in comparison to the three IRS bands (2, 3 and 4), commonly used for the generation of standard False Colour Composite (FCC).

**Study Area-** Sonbhadra district was bifurcated from the district Mirzapur on 4th march 1989. It is the second largest district of Uttar Pradesh (after Lakhimpur-Khiri). The district has an area of 6788 square kilometres and a population of 1,862559 (2011 census), with a population density of 270 persons per sq. km. The district has historic, cultural, and ecological affinities with the Bundelkhand region and it is the only district of UP which share boundary with four states ( Bihar, Jharkhand, Chhatisgarh, and M.P.).

**Fig.1- Map of Uttar Pradesh and Sonbhadra**



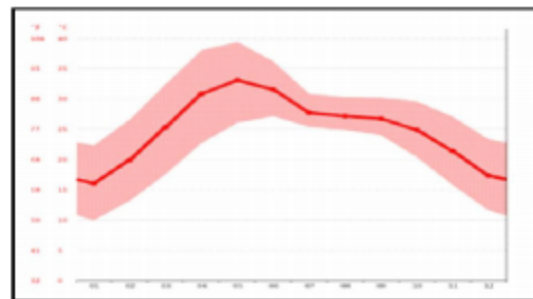
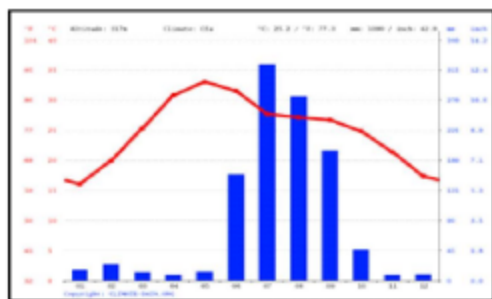
Geographically the district is located between 82°72' to 83°33' East longitude and 23°52' to 25°32' North latitude. In survey of India toposheets 63L/14, 63L/15, 63L/16, 63P/3,63P/4 this area has been published.

Soil in the region have twelve classification (The Department of Agriculture U.P.), which consist clayey loam, sandy, loamy soil, coarse sandy ( bajari), fine sandy, Kewal soil (Black alluvial), acidic aundhi soil (Setuati) gonad soil and soils of carboniferous series. Vegetation in this region comprises Savana grasses, bushes, deciduous trees ( Sevai, Kus, Harra, Tendu, Khair, Mahua, Palas etc.), which get spread in 49.59% of the total area of district i.e. 681935 Hectares. It is located in sub-tropical climatic setup characterised with monsoon. Months of summer (April- June) have high temperature up to 40°C, while winter season (November - February) have moderate temperature between 30-20°C. Rainfall is uneven in this area, almost 90% of rain occurs in months of July - September due to summer monsoon. Below table shows mean temperature and rainfall distribution throughout the year in the study area.

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average monthly rainfall MM.	21	8	8	3	11	98	274	289	199	38	3	4
Average monthly temperature °C	16	18.7	24.1	29.4	33.4	32.5	28.4	27.7	27.6	25.1	19.9	16.4

Source: <https://en.climate-data.org/asia/india/uttar-pradesh/robertsganj-55166/#climate-table> searched on 18-10-2019

The vast stretches of Sonbhadra have paradox of development, some areas of this region has now become industrial ghettos while larger portion remain underdeveloped, which have much





similarity to starving areas of Africa.

Quarrying of stone, establishment of cement factories, thermal power plants and construction of Rihand Dam - Govind Ballabh Pant sagar have resulted in a rapid build-up of human population, settlements, displacement, deforestation, land use transformation and imbalance of natural ecosystem.

**Statement of Purpose-** Modern industrial civilisation created an anarchy in nature along with new vistas of development, by putting heavy demand on natural resources and production systems. The huge pressure of population explosion, which led to increased demand for food, fodder and fuel combined with manufacturing, has essentially causes change in land use pattern.

The real challenge of this transformation faces a severe anomaly, on the one hand agricultural and industrial production has to be increase and on the other this productivity leads to negative repercussion on nature. In this study spatio- temporal changes in landform transformation in Sonbhadra district has been addressed in terms of crop production and industrial unit set up.

**Methodology-** Study area comprises 1441 revenue villages and 46 town areas where about 1863000 people lives. To acquire data regarding the land transformation, researchers made extensive field visit between May 2018 to September 2019 in study area.

The field observation in rural and urban areas of Renukoot, Chopan, Dala, Pipari, Obra, Madhupur and Municipal areas of Roberstganj provides sample evidence regarding change in land use pattern. To understand the phenomena of this change researchers visited many villagers, government officials, academicians, authors and journalist of the area.

It is quite difficult to gather primary data regarding land use transformation without any financial support and additional working hands, hence researchers decided to go through secondary data of land use in the field. Sonbhadra is agriculture dominated area which have few pockets of industrialisation, so it is worthwhile to examine the prospects of agro- industrial development in the region. Study area have 8 blocks named Ghorawal, Roberstganj, Chatra, Nagwa, Chopan, Myorpur, Dudhi abd Babhani. The study puts a empirical result of land transformation, supported by secondary data.

**Data collection and Result-** In this research paper secondary data published by government of Uttar Pradesh has been used. Researchers made an analysis of temporal-spatial land use change through a span of 26 years in the study area.

The data get retrieved from Statistical Year Book of Sonbhadra District, 1991, 2005 and 2017. Due to some constraints district administration using same data of 2014-15 to following years. Beside this gazetteer of Mirzapur 1956 is also get consulted as this district carved out from that only. Taking three sets of data is required to measure change through the span of last 26 years as after liberisation, privatisation there seems to happen a lot of land transformation in other part of the country.

Land use transformation can be best measured through various agricultural and non-agricultural land use data, hence primary focus is on cultivable and non-cultivable land. Beside agriculture, industrial units been taken as a measure to understand spatial change in land use.

No of large scale, medium and small scale manufacturing units not only provides a preview of landscape but also they indicate about changes brought through non agricultural activities. For primary observation simple random sampling technique been used to visit spots in study area.

These visits were parts of pilot survey before going for a comprehensive excursion of this district as researcher have a larger plan to execute deeper study of this region.

Table 1 shows land use of different block wise data revealed that there is significant change in pattern of land utilisation. Though forest area have a slight change on paper and figures but ground reality is much bitter. In 2005 there is increase in forest cover but data of 2017 shows.



Blocks/ Years	Myorpur	Chhappan	Nagwa	Chhatra	Roberstganj	Ghorawal
1991	153785	166549	91057	29190	4889	81919
2005	127075	168223		25981	4743	83997
2017	139610	156045	90796	26369	5669	82141
1991	8000	70752	60210	530	240	25700
2005	8875	89097	64713	533	721	26670
2017	7911	80134	57943	475	666	23881
1991	8027	11548	3983	249	1276	3374
2005	4114	3057	726	206	28	1218
2017	2799	4480	2793	25	68	1905
1991	10009	10222	4167	381	4369	6639
2005	4887	10689	3831	783	2897	3467
2017	11593	181641	7816	242	7863	7922
1991	1891	23420	1376	479	2740	1240
2005	30	9324	48	320	83	819
2017	1442	8367	547	185	786	1177
1991	6081	12099	5063	4215	4347	4456
2005	3313	14356	5357	249	4487	4576
2017	11286	14676	6215	549	6382	6053
1991	0	130	0	3	27	81
2005	0	137		3	28	53
2017	1	121	0	3	36	53
1991	99	1550	3704	143	46	1133
2005	3817	8323	5992	320	30	1145
2017	9474	9497	10248	338	96	5401

Table: 1 Source: Statistical Year Book of Sonbhadra District, 1991, 2005 and 2017

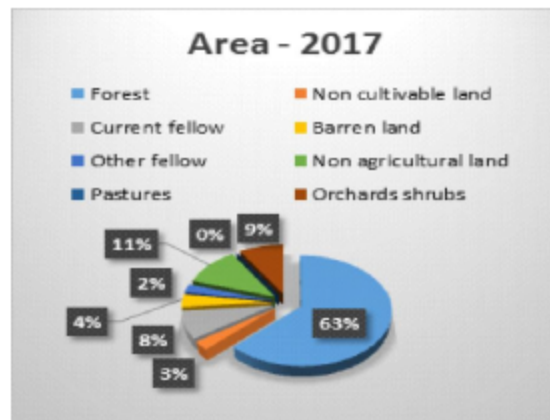
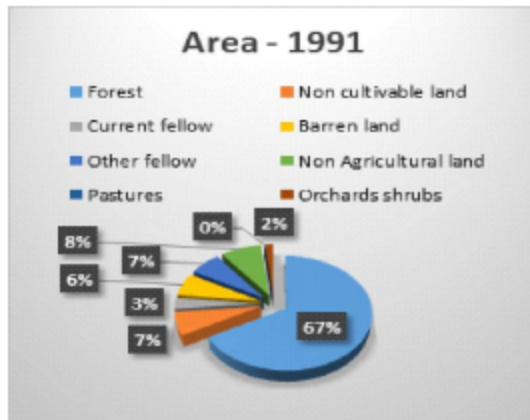
a decline of almost 3000 hectares in the category. Non cultivable land reduced in much smaller size as we are aware that there is huge population increase and technological advancement in recent two decades. An interesting fact comes in notice while browsing current fellow land and other fellow land, that there is great deal of fluctuation since 1992 to 2005 and again in 2017. The most constant decline seems to happen in barren, non-agricultural land and Pasture category due to increasing population density and spread of human settlements in new regions of the study area. Land under Orchards, Shrubs and Trees which nowadays considered as social forestry and agricultural forestry have a linear upliftment in category. Though there is not a single phenomenon which can be perceived all over the district in each and every block yet category wise transformation have common tendency of decline or rise throughout the said span of time. Larger blocks like Chhapan and Myorpur experienced recognisable change in forest barren land, pastures orchards and shrubs category. Urban or semi urban regions of Roberstganj and Duddhi have good improvement in reducing non cultivable land 86% and 34% respectively. Most important thing which attracts attention in this table is land use other than agriculture have a constant increase in its category. All the blocks whether they are in rural setup or in urban setup have the same pattern of increase. Myorpur and Babhani have double fold in other than agriculture setup of terrain utilisation. Nagwa block have maintained its punctuality in reducing barren land.

Year	No of unit registered	Employment	Investment in lakhs
1991	253	753	137
1995	67	194	53
2001	246	894	193
2011	394	1339	3656

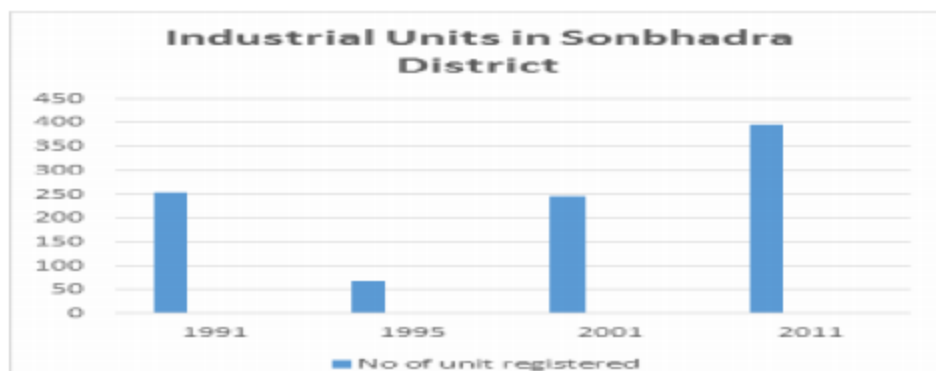
Table: 2 Source: District industrial Profile of Sonbhadra district-2012, Ministry of MSME, Govt. of India

Eastern Uttar Pradesh have very low industrial development but Sonbhadra is fortunate to have few industrial units within its region. Though it is a matter of fact that nine of the major industrial units get established after creation of new district since 1989. Initial years after creation of this district have high numbers of registrations and better investment, but later on it get declined very sharply (Table No.2). but after 2001 there is again a rise in establishments of industrial units.

**Discussion-** Land use is perhaps the most basic concept of agricultural economy. It is the key to an understanding of geographic adjustment of the agricultural resources. Moreover, regional land use patterns are the geographical expression of a large number of societal decisions made at different times for very different reasons which are responsible for an expansion of one category of land use at cost of other. Land use patterns, although, are directly related to the physical controls yet, there are several human and economic elements, which are responsible for land use and its distribution. It is the set of varying social values and certain institutional controls, which create different patterns of land use within the limitations imposed by different agro-physical-economic controls. The impact of physical factors is subtle and interwoven with spatio-temporal forces. The population increase and use of technology leads to a major shift in the pattern of land use. Land use in any region of the world varies due to the variations in the distribution of sunshine, rainfall, topography of the land, drainage conditions, and soil characteristics of the region, differentiation in these elements affects the purpose of land use for agriculture.



After creation of this district, it was expected that it will have a great run-in compare to its neighbour districts as it is power hub of Purvanchal and have few mineral resources too. When we go through the data we can see landform transformation is there, this happen because of rapid population growth 1463468 (2001) to 1863000 (2011), which leads to sprawl in settlements, agricultural land, construction of road etc. though official data shows there is almost stability in forest land use but off the record many government officers admit that there is decline in forest area so in wildlife population too. Pasture land shirked everywhere in country and Sonbhadra is not an exception to it. Most of the pastures get converted in cultivable lands and few in settlements. Beside that fragmentation of large farm holdings led to disintegration of pastures to agricultural transformation. Non Agricultural lands have rise in their categories as in the study area there are 18 towns, 01 municipality, 10 census towns and 07 nagar panchayats. These class III, IV and V towns attracted population from their rural periphery, which resulted as construction of concrete establishment on land, this also leads to transition of agricultural land to non-agricultural land use.



In study area there are various kind of industries are in function, agro based 470 units are there, about 200 cloths and readymade garments manufacturing units are operating in this study region, mineral based industries, electric and machinery based industries are well established here. Rihand power plant, NTPC power plants, HINDALCO, JP Cement Plant and Grasim chemical plants are working there with thousands of workers. Metal based 1259 units and repairing 1863 units are also functioning here.

This industrialisation create a different kind of problem in the region as most of the skilled labours are not local and residents of the region have to face the adverse impact of environmental degradation. Ground water depletion-contamination, air pollution, quarrying of minerals caused serious threats to human health and lowering down the quality of life in the study area.

**Conclusion and Summary-** On the basis of the study, it can be concluded that in the case of spatial-temporal land use transformation (1991-2017) in Sonbhadra district shows that in 1991 there were 336547 hectares of land for forest cover, which get increases to 363768 hectares in 2005 but witnessed a sharp decline in 2017 to 325720 hectares which means there is reduction of almost 11% of forest land in the district.

In Non-Cultivation category at the time of creation of the district land cover was of 33368 hectares which reduced to 13819 hectares in 2017 which means there is good improvement in cultivable land due to better irrigation and availability of chemical fertilizers. A gradual increase in area under non-agricultural use can be observed in this study from 42435 hectares in 1991 to 46734 hectares in 2005 and up to 59104 hectares in year of 2017, which means there is constant construction work in study area.

Though area under dense forest cover declined in selected frame of time in study area yet under community forestry there is worthy increase of 536% (8444 hectares in 1991 to 45265 hectares in 2017). As one of the latent aim of this study is to perceive environmental impact of industrialisation on surface water, ground water, soil and transition of drainage, land distribution, social conflicts in this patch of land.

Due to constraint of resources and time only units of industries has been taken in consideration. The bitter fact is at time of independence few industrial set up been established in southern Mirzapur which are now in Sonbhadra after formation of this district not much enthusiasm shown by industrialists to invest in the region. Due to dominance of poverty in backward class population, inhabitant of study area, there is a lot of malfunctioning in land holding which led to social conflicts in the region.

## REFERENCES

1. Agrawal, R. R. and Mehrotra, C. L. (1952, 53, 58) - "Soil Survey and Soil Work In U. P.", Vol. 2, 3 & 4., Govt. Press, Allahabad.
2. Auden J. Bicknel (1933) Memoirs of the Geological Survey of India, Office of the Geological survey of India.
3. Bailly, K.D., 1994 Methods of Social Research, Free Press, New York.



4. Ghosh, S., Shanmngam, P. and Mishra, S. P. (1976) - "Structure and Metamorphism of the Precambrian rocks of Bairpan, Dudhi Area, Mirzapur, U. P.", IV (IV A), Stratigraphy, Structure, Tectonics and Petrology, 125th Anniversary Celebration, G. S. I., India.
5. Gust, S. H. (eds) (1958) - "A World Geography of Forest Resources", Newyork.
6. Mohammad, N., 1978 Agricultural Landuse in India, Concepts Publications Delhi.
7. Mondal M.E.A (2008) Ed. Geological Evolution of the Precambrian Indian Shield; Springer.
8. Oldham, R. D., Vredenberg, E. and Dutta, P. N. (1901) - "Geology of the Son-valley in Rewa, State and Parts of the Adjoing District of Jubbalpore and Mirzapur", G. S. I., 31 (1), P. 1.
9. Prasad B. (1990) Observations in the Pre-Cambrian geology of Central India vis a vis adjoining region, Geological Survey of India; Special Publication.
10. Roger J.J.W (2002) Configuration of Columbia, a Meso-Proterozoic super continent Gondawana, Research Gate.
11. Singh K. N. (1968) - " Southern Uplands of Eastern U. P.: A Study in Landform and Settlement Distribution", Published Ph. D. Thesis, Deptt. Of Geography, B. H. U., Varanasi.
12. Yadav, R. S. (1981) - "Resource Appraisal, Economic Development and Planning of South Mirzapur Region (U. P.)", Unpublished Ph.D. Thesis, Deptt. Of Geography. B. H. U., Varanasi, P.-77.

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