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ORIGINAL ARTICLE

WATER DEGRADATION OF BIRBHUM DISTRICT

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Abstract:

Water is the primary medium through which climate change impacts the earth's ecosystem and people. Climate change is the fundamental driver of change in the world's water resources and adds additional stress through its effects on other externalities. The UN suggests that each person needs 20-50 liters of water a day to ensure their basic needs for drinking, cooking and cleaning. The world uses fresh water about 70 percent for irrigation, about 22 percent for industry and about 8 percent for domestic use. Another general perception of water quality is that of a simple property that tells whether water is polluted or not. In fact, water quality is a complex subject, in part because water is a complex medium intrinsically tied to the ecology of the Earth. Industrial and commercial activities (e.g. manufacturing, mining, construction, transport) are a major cause of water pollution as are runoff from agricultural areas, urban runoff and discharge of treated and untreated sewage.

The quality of drinking-water is a powerful environmental determinant of health. Assurance of drinking-water safety is a foundation for the prevention and control of waterborne diseases. We have attempt to this study for what are the causes of water degradation and what is its integrated management? Here we found uneven pressure of human beings on Land, the water degradation take place.

KEYWORDS:

Degradation , Water , Drinking-water , Agricultural .

INTRODUCTION

The red laterite soil of the district is highly acidic in nature and hence unfit for agricultural purposes. Development of wasteland requires a package of treatment which includes soil erosion control measures, erection of ground water recharging structures and suitable crop production systems. The source of water depends on several factors e.g. water discharge processes, water reservoir, wet land, landform/ soil characteristic etc.

The objectives of this study are as follows:

1) To develop appropriate mapping and Water degradation assessment, including the identification of related problems, issues and opportunities; and
2) To evaluate the changes in the water of Birbhum district so as to gain insights on the nature and magnitude of these changes.

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It is a part of a broader study focusing on the spatio-temporal assessment of water degradation and environmental indicators in Birbhum district, West Bengal, India.

RESEARCH METHODS

Study Area

Study area lying between 23° 32' 30" and 24° 35' 0" N latitude and 88° 1' 40" and 87° 5' 25" E longitude forms of a part of the lower Ganga, referred to as the self leteritic alluvium locally known as Rahr Land (Spate 1967; Biswas, p.158; Jha p. 20, 2002). Administratively it is comprised of 19 CD blocks and 2467 villages under 19 police stations of Suri, Bolpur and Rampurhat Sub-divisions. Birbhum is one of the most important district of West Bengal sharing 5.12 percent of the state but 3.76 percent of its total population. The district extends over an area of 4545 Sq. Kms.

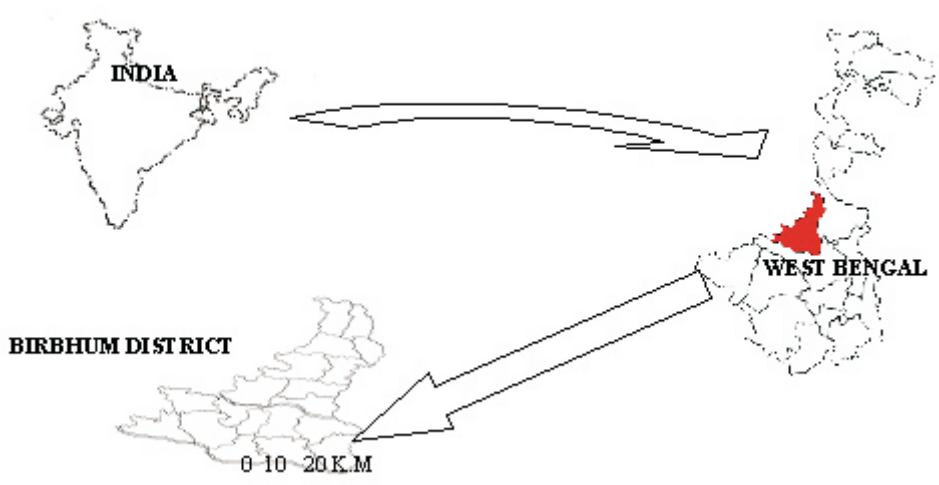


Fig.1: LOCATION OF THE STUDY AREA

In shape Birbhum district looks like an isosceles triangle. The apex is situated at the northern extremity not far south of point where the Ganges and the hills of the Santhal Paraganas of Jharkhand state begin to diverge while the river Ajay forms the base of this triangle. The study area belongs to the moderate morphogenetic region with prevalence of week mechanical weathering, strong chemical weathering, least wind erosion, moderate mass wasting, maximum fluvial erosion.

Methodology: it is based on flowing techniques –

1.Geo-referencing
2.Digitization (Using earth GIS 9.3 SOFTWARE)
3.Analysis

RESULT & DISCUSSION:

Water quality: Chemical and biological characteristics of water are known as Water quality. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose.[1]

Wetland: The wetlands represent the transition zone between highlands and deep-water aquatic systems. The water level in the wetlands varies according to the seasons; being low in summer and high during the winter months. Many processes take place wetlands, which a global impact viz. they can affect the export of organic materials or serves as sink of inorganic nutrients. The wetlands are equally rich in bio-diversity. The main reasons being that these wetlands harbors species of aquatic and terrestrial ecosystems.

Table-1: Classification of Water related Diseases Water-related Diseases

Waterborne Diseases

Disease	Pathogen	Symptoms	Causes	Incubation
Adenovirus Infection	Adenoviridae virus	Vary depending on which part of the body is infected	Drinking contaminated water	5-8 days
Amebiasis	Entamoeba histolytica parasite	Diarrhea, stomach pain, and stomach cramping	Fecal matter of an infected person (usually ingested from a pool or an infected water supply)	2 to 4 weeks
Cryptosporidiosis	Cryptosporidium parasite	Stomach cramps, dehydration, nausea, vomiting, fever, weight loss	Fecal matter of an infected person (can survive for days in chlorinated pools)	2 to 10 days
Cholera	Vibrio cholerae bacteria	Watery diarrhea, vomiting, and leg cramps	Contaminated drinking water, rivers and coastal waters	Two hours to 5 days
E. Coli 0157:H7	Escherichia coli bacteria	Diarrhea (may be bloody), abdominal pain, nausea, vomiting, fever, HUS	Undercooked ground beef, imported cheeses, unpasteurized milk or juice, cider, alfalfa sprouts	1 to 8 days
Giardiasis	Giardia lamblia parasite	Diarrhea, excess gas, stomach or abdominal cramps, and upset stomach or nausea	Swallowing recreational water contaminated with Giardia	1 to 2 weeks
Hepatitis A	Hepatitis A virus	Fever, fatigue, stomach pain, nausea, dark urine, jaundice	Ready-to-eat foods, fruit and juice, milk products, shellfish, salads, vegetables, sandwiches, water	28 days
Legionellosis	Legionella pneumophila bacteria	Fever, chills, pneumonia, anorexia, muscle aches, diarrhea and vomiting	Contaminated water	2-10 days
Salmonellosis	Salmonella bacteria	Abdominal pain, headache, fever, nausea, diarrhea, chills, cramps	Poultry, eggs, meat, meat products, milk, smoked fish, protein foods, juice	1-3 days
Vibrio Infection	Vibrio parahaemolyticus, Vibrio vulnificus bacteria	Nausea, vomiting, headache (a quarter of patients experience dysentery-like symptoms)	Raw shellfish, oysters	1 to 7+ days
Viral Gastroenteritis	Calicivirus virus	Diarrhea, vomiting, nausea, cramps, headache, muscle aches, tiredness, slight fever	Water, ready-to-eat foods (salad, sandwiches, bread) shellfish	24 to 48 hours

Contaminations (fluoride, arsenic etc.): Occurrence of fluoride in ground water:

Fluoride is normal constituent of most soils and rocks. It occurs in calcium granite (500mg/I), in alkaline rocks (1200mg/I), in shells (750mg/I) and in sandstone (270mg/I). The main source of fluoride in natural drinking water are fluorite (CaF_2), Fluorapatite [$3Ca_5(PO_4)_2$-CaF_2],Cryolite (Na3AIF6),Magnesium Fluoride (MgF_2) and replacement of joins of crystal lattice of micas and many others.

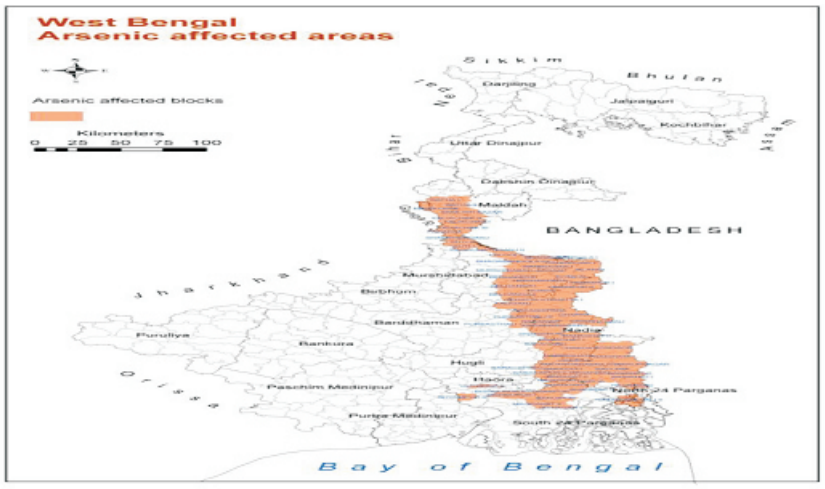
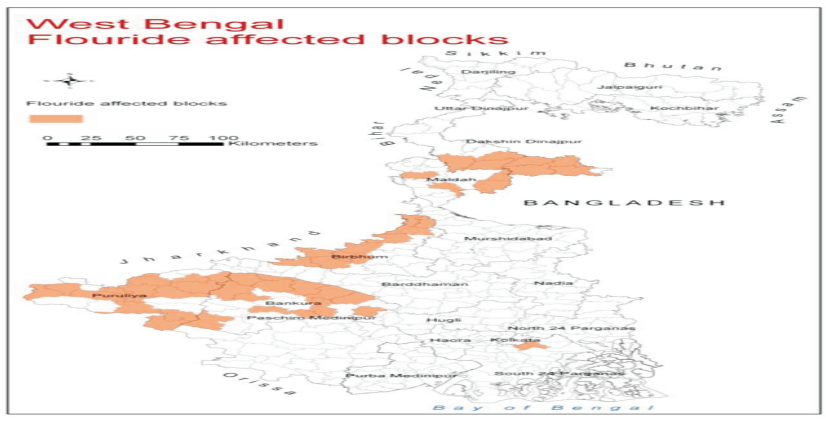


Figure- 5: (a) Arsenic affected blocks, (b) Fluoride affected block
Source : WBPCB, 2009



In Birbhum district the following water related disease is recorded. The groundwater resources in 95 villages of Birbhum district is reported to have excess fluoride content. Already SWID has stopped giving clearance in Rampurhat I and Nalhati I blocks.

Table-2: The block Level summary on Cultivable Command Area in respect of Ground Water and Surface water is given below:

NAME OF BLOCK	GROUND WATER(ha)	SURFACE WATER (ha)	TOTAL CCA (ha)
Suri I	301.80	2060.47	2362.27
Suri II	442.13	1407.35	1849.48
Sainthia	4265.87	2965.95	7231.82
Dubrajpur	2233.14	4576.41	6809.55
Khayrasole	1397.82	5236.67	6634.49
Rajnagar	139.39	2451.89	2591.28

Md. Bazar	339.37	3495.91	3835.28
Bolpur	3320.86	4266.67	7587.53
Illambazar	5797.02	5173.65	10970.67
Labpur	5302.45	3453.31	8755.76
Nanoor	7040.47	2969.70	10010.17
Mayureswar I	1366.22	2413.49	3779.71
Mayureswar II	2447.68	1398.81	3846.49
Rampurhat I	1036.96	2211.87	3248.83
Rampurhat II	2588.44	1701.78	4290.22
Nalhati I	2844.98	2429.03	5274.01
Nalhati II	3209.79	1068.27	4278.06
Murarai I	1878.23	957.19	2835.42
Murarai II	4216.65	4707.60	8924.25
TOTAL	**50169.27**	**54946.02**	**105115.29**

From the above table it may be observed that balance between MI structures relating to Ground water and surface water is more or less equal.

Existing Water Related Concerns in Birbhum

Floods: About 22% of the district area is flood prone and is manifested across the block by various modes. Floods can be due to excess water carried over from transnational and inter state borders. For example, floods are caused in eastern part of Birbhum, by flood waters received through rivers Mayurakshi , hingolo, pagla from Jharkhand. Extreme rainfall, relating to late monsoon cloud bursts also lead to floods here. The infrastructures such as roads and railways with inadequate culverts intercept cause expansion of floods. Poor drainage is also a cause due which the flood spreads.

Droughts: Every summer many parts of Birbhum (covering the south-western part of the district) suffer water shortage with respect to the entire state. The tradition of storage of water in ponds has slowly being forgotten. The governments' efforts to supply water for drinking and irrigation are dependent on the reservoirs of Hinglo valley Project, Mayurakshi. The storage capacity of these reservoirs has reduced over the years, mainly due to siltation rendering the region bereft of adequate water during summers. Also introduction of water intensive crops in the region has lead to higher crop failures making the region and its people vulnerable.

Water Pollution: The increasing exploitation of ground water exceeding replenish able limits has been causing irreparable damage and leading to arsenic and fluoride contamination in the eastern and western parts of Birbhum respectively (see figure 5.4 a and b) . The arsenic in ground water is spread over 81 blocks belonging to eight districts (Govt. of WB,2007) and about 225 villages in 43 blocks of 7 districts have been found to contain fluoride in ground water. Depletion of ground water is causing desiccation of rivers during non monsoon months, as the capacity for effluent seepage towards the river is reduced. Over dependence on ground water has lead to the decay of tradition of practicing lift irrigation.

Table-3: Water related diseases found in Birbhum district.

Name of the District	Disease/ Illness	No. of Cases/ Deaths*	Date of Start of outbreak	Current Status
Birbhum	**Acute Diarrhoeal Disease**	37 / 0	04.07.10	Under control
Comments / Action Taken: Cases reported from neighboring villages of Mathmahula, Mahula subcentre, Mayureswar-I Block (20 cases) and Vill-Pakha, Gopogram subcentre, Nalhati-I Block (17 cases) due to consumption of contaminated water. House to house survey conducted by medical and Paramedical teams to find new cases. Halogen tablets and ORS packets distributed in the locality by the medical team of Mollarpur BPHC. Health education given regarding hygiene and sanitation.				

* Cumulative no. of cases/deaths reported this week.
Source: INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP) 34th week (ending 22nd August) 2010 by NATIONAL RURAL HEALTH MISSION.

The terrain has a gradient towards the East and most of the rivers and drainage channels flow towards the east and merge with the Ganges or Bhagirathi. Besides these there are a large number of seasonal surface water bodies which serve as a source of irrigation for agricultural activities. 65 % of the net cropped area in the district is under assured irrigation. The irrigation structure is having a cultivable command area up to 2000 hector is classified under minor irrigation.

CONCLUSION:

State Water Investigation Directorate which has one district office in Suri that help and guide people in construction of MI structure. SWID has completed Ground Water assessment based on GEC norms in 2001. As per the assessment, out of 19 blocks, 3 blocks Viz. Nalhati II, Nanoor, Murarai II are categorised as 'critical' where as others are under 'Safe Category'. The level of development in Khoyrasole block is near about 50 % and that in Suri-II and Illambazar blocks are around 40 %. The Department has since stopped giving clearance for submersible pump sets in the blocks of Nanoor and Labpur.In the remaining blocks the level of development is well below 30 % indicating a large potential available for development. Incidentally groundwater clearance has been put on hold by SWID in parts of Rampurhat-I and Nalhati-I blocks where fluoride contamination beyond the human tolerance level prescribed by WHO is found in the underlying aquifer. The contamination is mainly found in the areas bordering Jharkhand state.

REFERENCE:

1.Johnson, D.L., S.H. Ambrose, T.J. Bassett, M.L. Bowen, D.E. *Crummey, J.S. Isaacson, D.N. Johnson, P. Lamb, M. Saul, and A.E. Winter-Nelson (1997). "Meanings of environmental terms." Journal of Environmental Quality. 26: 581-589.* doi:10.2134/jeq1997.00472425002600030002x
2.Johnson, D.L., S.H. Ambrose, T.J. Bassett, M.L. Bowen, D.E. Crummey, J.S. Isaacson, D.N. Johnson, P. Lamb, M. Saul, and A.E. Winter-Nelson. 1997. *Meanings of environmental terms. Journal of Environmental Quality 26: 581-589.*
3."ISDR : Terminology"*The International Strategy for Disaster Reduction. 2004-03-31. Retrieved 2010-06-09.*
4."Water." Climate Institute. Web. Retrieved 2011-11-03.
5.Young, Gordon J., James Dooge, and John C. Rodda. *Global Water Resource Issues. Cambridge UP, 2004.*

6.Frederick, Kenneth D., and David C. Major. *"Climate Change and Water Resources." Climatic Change 37.1 (1997): p 7-23.*
7.Ragab, Ragab, and Christel Prudhomme. *"Soil and Water: Climate Change and Water Resources Management in Arid and Semi-Arid Regions: Prospective Challenges for the 21st Century." Biosystems Engineering 81.1 (2002): p 3-34.*
8.Konikow, Leonard F. *"Contribution of Global Groundwater Depletion since 1990 to Sea-level Rise." Geophysical Research Letters 38.17 (2011).*
9.Raleigh, Clionadh, and Henrik Urdal. *"Climate Change, Environmental Degradation, and Armed Conflict." Political Geography 26.6 (2007): 674-94.*
10.MacDonald, Glen M. *"Water, Climate Change, and Sustainability in the Southwest." PNAS 107.50 (2010): p 56-62.*

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