International Research Journal of Earth Sciences _____ ISSN 2321 – 2527
Vol. **5(10),** 23-26, November **(2017)** *Int. Res. J. Earth Sci.*

Review Paper

Curative measures for the polluted Luni River and alternatives for textile industries at Balotara, North Western Rajasthan, India

Deva Ram Meghwal[1*] and Ravi Parihar[2]
[1]Department of Geology, Govt. Dungar College Bikaner, Rajasthan, India
[2]Department of Botany, Govt. Dungar College Bikaner, Rajasthan, India
devajaipal@yahoo.com

Available online at: www.isca.in
Received 19th September 2017, revised 5th November 2017, accepted 21st November 2017

Abstract

The river Luni is known as Maruganga of Marwar region of western Rajasthan which flows in districts of Ajmer, Nagour, Jodhpur, Barmer and Jalore. After originate from Nagpahar of Pushkar valley of Aravalli Range and finally meets to Arabians sea. The city of Balotra is situated on the bank of Luni river and it has got more than 800 units of textiles which are engaged in cotton and synthetic dyeing and printing. These dyeing and printing units discharge about hundreds million liters of effluent per day into the Luni river. The environment around the Balotara is highly excruciating, water in Luni river and ground water is highly polluted, and the atmosphere of surroundings is intolerable due to unmannered discharge of industrial wastes. Hundreds of hectare agriculture land has become barren due to the hazardous chemicals. By the order of the Rajasthan High Court and National Green Tribunal, New Delhi, almost all textile industries were closed for last two years. Now there is need to take some curative measures for the polluted river Luni and rehabilitate the area. There are some alternate industries can be developed to benefitted the stakeholders and local people of area like Handicrafts, Carpets, Darries, Dairies, Guar Gum, Wire and cable, Plaster of Paris industries, Ceramic Industries, Salt processing industries, Fertilizer industries, Stone crushing's, decorative stone and polish industries etc. Raw materials for all such type of industries are available in vicinity of Balotara and these industries can be established easily. There is huge scope of solar plant establishment in the region. So that this part of Marwar region can be take place on path of the development of economical and infrastructural as well.

Keywords: Luni River, Textile Industries, Pollution, Ground water, Marwar Region.

Introduction

The river Luni is known as Maru ganga of Marwar region of western Rajasthan and is the only main river on west of the Aravalli range, which meets the Arabian sea in the Rann of Kutch. It originates from Nag Paharnear Pushkar valley of Ajmer and flows southwest through Nagaur, Jodhpur, Barmer and Jalore over a distance of about 320 km covering a total catchment area of 37,363 km. The Luni river basin has been evolved as a result of typical hydrogeomorphic processes of aridzone, working under the influence of active tectonic lineaments[1].The town of Balotara (N25° 49' 51", E72°14' 24")is situated in Barmer district of Rajasthan and about 110 km Southwest of Jodhpur city. The town is very popular industrial city and famous for hand block printing and textiles industries. Balotara is also well-known for coloring and printing of yarn and polyster fabrics[2]. The city is famous and popular in India and abroad for processing and marketing of various types of cloths. It is leading textile centre from last sixty years. About 800 textile units are running at Balotara, Bithuja and Jasol. The unmannered discharge of untreated or partially treated waste effluents of these industries are thrown into Luni riverat Balotara and near surface water bodies of area. River course has gated badly contaminated and acidic effluents from industries have leached much below the surface and have also contaminated dugwells and aquifers in the villages of region like Asada, Asotra, Tapra, Padru, Dakha, Khed etc. The pollution of land, water and air are on extreme in the area and people affected by this very badly. All the textile industries of Balotara region were remained closed for more than one year because of extreme river pollution but now again they are in working and flowing of effluent in river is on continue. There are some alternatives suggested for these textile industries to overcome the problem of river pollution and its adverse effect on surroundings.

Materials and methods

Extensive field works carried out in the study area and find out the problem of pollution at Balotara at the bank of Luni river. It was generally caused due to industrial effluents in river course near the Balotara town. The river Luni was blessing just few years ago but at present time the river has on extreme pollution and is in the condition of killing. Due to increased industrialization and urbanization, discharge of treated and untreated industrial effluents, dumping of industrial waste to

Luni is on extreme. At the every town situated on the bank of river the heap of garbage and sewage lines are turned to Luni (Figure-1). Due to increased number of industries of dyes and textiles in the region there is heavy consumption of water by textile industries and fast depletion of ground water in the area. Seepage of toxic effluents has gone to wells of the area. Soil gets polluted by textile wastes. Fertility of soil also has decreased in the area. Pollution of Luni possess a serious threats to agriculture in area which is the main occupation of people of the region and about 400 Ha land has become barren. Due to this lifestyle of local people of the area has also got affected. Many diseases of skin and breath are on extreme to the people which are suffering severely. Groundwater quality also affected by polluting river and TDS is beyond the permissible limit of IS Standard. Salinity in ground water has increased, Traditional water resources also getting polluted by this industrial waste dumps and flowing into river course. Due to all these a serious threats also to the Rawal Mallinathji Cattle fair held yearly at Tilwara near Balotara.

Figure-1: Field photograph showing industrial waste flowing in Luni river course near Balotara.

Geology of Area

The Balotara region is a part of Great Indian Thar Desert and desertic sand and sand-dunes are common in area**.** Windblown sand covers surface area which is further followed by rocks of Malani groups like rhyolite and granites. The rock formations are mostly exposed in form of long chains towards north-east and south-east of Balotara town.

The Malani Igneous Suite of rocks are most extensively exposed and are oldest in the area. They consist of volcanic rocks rhyolites and plutonic rocks like granites and associated intrusive like basic dykes of aplites and quartz veins.

Physiography of Luni River: The Thar desert lies in western part of India in which the Luni basin is the major river basin where more than 300m sedimentation has been reported And only an active tectonic basin[4]. River Luni is the only well-integrated river system in the Thar Desert of India[5]. Luni river flows in the western part Rajasthan in the district of Ajmer, Nagaur, Jodhpur, Barmer and Jalore. It originates from Nag pahar near Pushkar valley of the Delhi Suer group of rocks which covers the height more than 550 m. The river begins its course in the Ajmer region and then carry on to flowin Nagaur, Jodhpur, Barmer and Jalore districts of western Rajasthan tothe swampy areas of Rann of Kutch of Gujarat state and finaly meats to Arabian Sea. The river flows over 530 kilometers distance in Rajasthan. The Luni River is also named as the "Lavanavari River", means asalty river because of high concentration of salts in its water[6]. Beyond the town of Balotara the river water becomes totally saline due to textile waste flowing with it. The Luni is a seasonal river, in which most of the drainage comes from southwestern side of the Delhi super group of rocks. Studies on the morphology of slopes and slope-forming factors in the Upper Luni Basin have indicated that the climatic gradation from east to west has greatly influenced the broad changes in slope pattern in that direction[7]. The Luni River basin have 37,363 sq. km. area includes parts of the Ajmer district then moving towards Nagaur, Jodhpur, Barmer and Jalore districts. In Gujrat state the Luniriver flows in the northern part of the state where it touches Mithavirana and cuts the areas of Jordiyali, Mavsari Vav and Radhanpur regions of Banaskantha district. Geomorphologic studies revealed also the presence of several other landforms, apart from dunes also old aggraded alluvial plains are dominant landform in the central Luni Basin[8].

Table-1: The general Geological succession of Barmer district[3].

Formation	Age	Lithology
Quaternary	Recent to sub recent	Blown-sand, sandy soil, kankar, vast gypsum and selenite.
Kapurdi Formation	Lower to Middle Eocene	Fuller's Earth.
Mandai Formation & Akli Formation	Upper Paleocene to Lower Eocene	Clays & ferruginous sandstone, grey and black shales with lignite inter-calations, Bentonite, Siliceous Earth.
Fatehgarh Formation	Upper Cretaceous to Middle Paleocene	Sandstone.
Lathi Formation	Lower Jurassic	Sandstone.
Malani Igneoues Suite of rocks	Neoproterozoic	Rhyolites, granites and associated intrusives.

Source: DMG, Rajasthan.

Tributaries of Luni: The course of Luni river is in the western side of Aravalli hills and all its tributaries are in the same direction. The mainstreams of the Luni River are Sukri, Mithri, Bandi, Khari, Jawai, Guhiya and Sagi from the left side and the

only tributary from right side is Jojari which flowing through parts of Jodhpur district. Luni river has numerous tributaries in Rajasthan itself but the few are also in the neighbor state of Gujarat then it meets to sea in rann of kuchh.

Antiquity of Luni River: Stone age archaeological remains near Village Khed reveals antiquity of Luni over a millions of years. Vishnu temple of Khed Village is of 11th century. Nakoda Jain temple at Mewa Nagar is of 14th century and Rawal Mallinath and Rupan De Temple near village Tilwara and Mata Rani Bhatiyani Temple at Jasol are of 15th century of Balotra area. All these temples are historic and have own antiquity in history. These all temple are at the bank of Luni river and also there is largest cattle fair of Barmer district at Tilwara village near Balotara also on the bank of Luni river which held every year. The disappearance of the legendry Saraswati River has been a subject of great interest. Remote sensing studies revealed several courses of a river at various points of time[9-11]. One of the earliest courses of a Himalayan drainage lay in the southerly direction to flow through the present Luni, with the latter being a tributary of the former[9,11].

Blessing of Luni River in Marwar: The river Luni was the blessing of the Marwar and Malani region of western Rajasthan till the years. It provided the drinking water to millions of inhabitants. Agriculture was flourished very well in Luni basin. The wheat, gram, bajara and other seasonal crop production was very high in the basin. Many industries of textiles and dyeing have settled in the town which exist on luni river bank i.e. Balotara, Bithuja, Jasol, Pali etc. urbanization in the region also got higher status because of employment at these places. The central Luni basin has water potential zones which are delineate by aerial photo-interpretation techniques and facilitated the identification of twelve types of aquifers in eight geomorphological settings[12].

Industrial Closure: By the order of Rajasthan High Court and National Green Tribunal, New Delhi almost all the textile and dyeing industries of the Balotara, Bithuja and Jasol were remain closed for more than last one year but now they are in working after bounding some coditions. Due to this fabric and printing work at these places again started. Production and its export also hampered during closure. Business and economy of Millions was on the zero position. Thousands of people have become unemployed due to this and they are workless today and are on the roads. Unemployment had also affected economic condition of employees.

Techniques to Prevent River Pollution: The life of all living beings on earth is totally based upon the water. There is increasing growth of industrialization and urbanization. As the advances in modern civilization of human being, pollution of rivers has become a serious problem.

The peoples of villages are settling in cities where several industries are established and source of employment can be explored. Due to increasing industrialization and unmannered discharge of industrial effluents, sewerage and solid wastes are leading to contamination of water resources. The present study carried out near Balotara town which is situated on the bank of Luni river where pollution in river is on extreme. Authors recommended some preventing techniques to overcome the problem of pollution in Luni river at Balotara.

Pre-treatment or post-treatment of industrial effluents by establishing the large capacity Common Effluent Treatment Plant and treated water should be reused in textile industries so the consumption of groundwater will be minimum and there will be minimum pressure on aquifer. By utilizing the recent Research and Development technologies to minimize river pollution. Rain water harvesting structures should be developed in the region and to make sure to recharge rain water into surface more and more. Recharge structure of wells and other surface resources should be developed, by this groundwater level in the region will be maintain in shallow depth. To construct check dam in river course for irrigation purposes by which crop and vegetable production can be improved in the area. Phytoremediation measures should be taken into action by this contamination of soil and water can be minimizes. Promote a safe water regime in which proper management and development of water resources of the area. To make emphasis on the uses of environment friendly detergent in textile and other industries.

Conclusion

When industrial wastes are discharge directly or indirectly into rivers without proper treatment to remove toxic pollutants it causes serious threats to water bodies as well as environment. It affects the natural biotic community, plant and organisms. Water pollution is a major global problem which requires a lot of attention to be given on this. Luni is only a river of western Rajasthan has badly polluted near Balotara by industrial waste discharge in to it and has extremely affected the surroundings. After the long time the pollution make hazardous causes in river, groundwater, and soil and in atmosphere at adjoining parts of Balotara. Since the river pollution is a serious threat to the local people and also for the next generation. The river Luni is severely polluted by waste discharge of local textile industries in its course near Balotara. Polluted river water has recharged in to surrounding aquifers by which heavy metals and toxic elements have contaminated the subsurface water. Local flora of area has threat to affect by biomagnification due to contaminated river water. Local people are facing threats of severe diseases of stomach and skin. Soil fertility affected and crop production has decreased in surrounding parts of Balotara**.**

Suggestions: Awareness among local people makes their views against the pollution and there is need to mitigate the pollution in the river Luni by taking some remedial measures and make some alternatives to for textile industries of Balotara region. Some suggestions are as follows-Plantation and greenery should

develop along river banks so that the soil erosion will be minimize in the area. There is need to give emphasis on growing more and more species of vegetation which can adapted in desertic climate like *Prosopis juliflora*, *Salvadora persica*, *Acacia tortilis*, *Albizzia amara*, *Tecomella unduleta*, *Prosopis cineraria*, *Dichrostachys nutan*, *Capparis decidua*, *Desmostachya bipinnata*, *Cenchrus ciliaris*, etc. Awareness should be generated in society about the threat of water pollution. Cleanliness awareness programme should be organized in schools and colleges as a part of Swachchh Bharat Mission. Compensation should provide to farmers of region to make their economic condition better whose agriculture land has became barren by industrial effluents. There is huge scope of alternates of textile industries at and around Balotara like handicrafts, Dairy, Carpets, Darries, Guar Gum, Wire and cable, Plaster of Paris industries, Ceramic industries, Salt processing industries, Fertilizer industries, Stone crushing's, decorative stone and polish industries etc. Raw material for all such industries is available in surrounding parts of Balotara and these industries can be established easily. Drainage system of river should keep undisturbed so that water can be flow more during its season. Recycling of waste water should be taken in to action so that water demand can be fulfill. Strict prohibition of thrown garbage and waste in to river by administration. There is huge scope of solar plant establishment in the region. Due to this electricity production in the area can make new dimensions.

By all these remedial measures pollution of river, soil and air in the area will be minimum in vicinity of Balotara town. The Luni River will flow without any pollution in its course and this part of Thar Desert will grow more and more economical and infrastructural as well. The development of region will write a new story in the Thar Desert once again.

Acknowledgement

Anthers are very thankful to Prof. K. L. Shrivastava, Department of Geology, J.N.V. University, Jodhpur for important suggestion in writing manuscript and the first author also wishes to acknowledge Dr. Shishir Sharma, Head, Department of Geology, Govt. Dungar College Bikaner for help and encouragement during field work.

References

1. Bajpai V. N. (2004). Hydrogeological evolution of the Luni river basin, Rajasthan, western India: A review. *Proc. Indian Acad. Sci. (Earth Planet. Sci.),* 113(3), 427-451.

2. Mishra P. and Soni R. (2016). Analysis of dyeing and printing waste water of Balotara textile industries. *Int. Jour. of Chemical Sciences*, 14(4), 1929-1938.

3. DMG Report (2008). Mineral Resources of Barmer District. *Department of Mines and Geology,* 11(1), 1-20.

4. Bajpai V.N., Roy T.K.S. and Tandon S.K. (2001). Subsurface sediment accumulation patterns and their relationships with tectonic lineaments in the semi-arid Luni river basin, Rajasthan, Western India. *J. Arid Environments*, 48(4), 603-621.

5. Kale V.S., Singhvi A.K., Mishra P.K. and Banaejee D. (2000). Sedimentary records and luminescence chronology of Late Holocene palaeofloods in the Luni River, Thar Desert, northwest India. *Catena*., 40(4), 337-358.

6. Roy A.B. and Jakhar S.R. (2001). Late Quaternary drainage disorganization and migration and extinction of the Vedic Saraswati. *Current Science*, 81(9), 1188-1195.

7. KAR Amal (1983). Morphology and evolution of slopes in the Upper Luni Basin, Rajasthan. *Annals of Arid Zone,* 22(4), 367-375.

8. Ghose B. (1965). Genesis of desert plains in the central Luni Basin of western Rajasthan. *J. Indian Soc. Soil Sci.,* 13(2), 123-126.

9. Kar A. and Ghose B. (1984). Drishdavati river system in India – an assessment and new findings. *Geogr. J.*, 150, 221-229.

10. Ghose B., Kar A. and Hussain Z. (1979). The lost courses of Sarswati river in Great Indian Desert: New evidence from landsat imagery. *Geogr. J.,* 145, 446-451.

11. Pal Y., Sahai B., Sood R.K. and Agarwal D.P. (1980). Remote sensing of the lost Saraswati River. *Earth Planet. Sci.,* 89, 317-331.

12. Chatterji P.C., Singh S. and Qureshi Z.H. (1978). Hydrogeomorphology of the central Luni basin, Western Rajasthan, (India). *Geoforum*., 9(3), 211-224.