Ananya Malik

Programme: M.Sc.(Water Science and Governance)

Project Title: Suggesting Rainwater harvesting interventions for groundwater recharge

Host Organization: TERI School of Advanced Studies

Year: 2019

Abstract:

Rapid urbanization has led to decrease in groundwater table in many areas by hindering the process of infiltration. Thus, the reduced infiltration with high levels of abstraction has resulted in rapid decline of groundwater table in a semi-arid region Sohna block, Gurugram, in Haryana. Recharge of groundwater water table can be done by directing the rainwater into aquifer. Various techniques are used to artificially recharge the groundwater. The study investigated how the decline in groundwater levels affected the surface water resources in the area. Water stress faced by the residents can be addressed through rainwater harvesting and putting it in aquifers to improve the water levels in lakes and ponds which are connected to the aquifers. This shall result in a better ecology and economy. From the survey, it was evident that people were not much aware of the effectiveness of rainwater harvesting. As part of this study, rainwater harvesting structures were designed in an aesthetically appealing way through rain chains and rain gardens to promote this practice among the community.

Project Outcome:

This study has been carried out as part of the consultancy project with the Guru Jal Society, a society constituted under the District Administration, for integrated water resource management in Gurugram. The design recommendations on rainwater harvesting structures have been submitted to the Gurugram District Administration and disseminated among the concerned village level stakeholders through a training programme.

Field/ Experiment photographs

Fig. Meeting with the Sarpanch of Ulhawas

Fig. Residents survey on unmanaged drainage system

Fig. Site visit to government hospital in Sohna MC

Fig. Checkdam in Gairatpur Bas

Fig. Sprinkler irrigation, Gairatpur Bas

Fig. Rainwater harvesting system in municipality office

Fig. Rainwater harvesting structure in a government school, Sohna MC

Mayuri Phukan

Programme: M.Sc.(Water Science and Governance)

Project Title: Numerical simulation of stream aquifer interaction to assess groundwater flow and contaminant transport: A study on Hindon River, Saharanpur

Host Organization: National Institute of Hydrology

Year: 2018

ABSTRACT:

Throughout the country, many seasonal streams have been turning into effluent carrying drains due to untreated or improperly treated sewage and industrial waste discharge. Hydrological interactions of these streams with the aquifers lead to transport of contaminants from surface water to groundwater. Hindon is a monsoon fed stream whose flow is generated entirely by effluents during non-monsoon season. It originates in the Saharanpur district of Western Uttar Pradesh and joins River Yamuna near Delhi. Saharanpur has seen rapid urban growth with industrial clusters throughout the district. Thus, the shallow aquifer system which provides drinking water to the region is at high risk of contamination.

The study builds a computational flow model using visual MODFLOW (stream aquifer interaction) that shows the movement of groundwater from North West to South East direction in the region. It has been found that if the concentration of contaminants in the river increases, or extraction increases, greater concentration of contaminants will get captured by wells and pose threat to the health of the population residing in villages near the stream. Since remediation of groundwater is a complex process, it is essential to regulate the contaminant load in the streams. The knowledge of attenuation mechanisms of contaminants in different geological conditions and scenario-based numerical modeling can support in formulation of groundwater pollution control and management plans.

Project Outcome: Recognition/award/publication (provide supporting document)/ Grassroot Impact

Hindon River is one of the most polluted rivers in India and the population settled along its river banks are at high health risk due to polluted river and groundwater. The dynamics between surface and groundwater is always a complex phenomenon. This study on ground water contamination from waste water sources can assist in regulating the discharge of waste into the Hindon River and also to estimate the potential limits of groundwater extraction in the region. The study also emphasizes the importance of sustainable water conservation strategies for the region.

Field/ Experiment photographs

Fig. Study Area showing Hindon river in village Issupur, Saharanpur

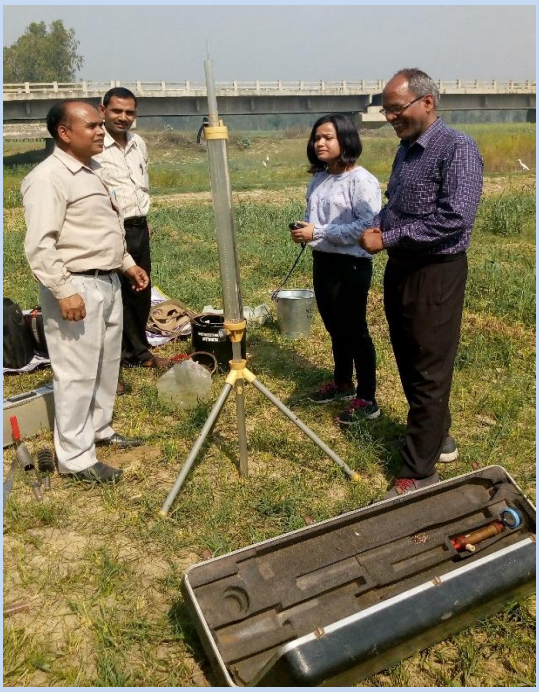

Fig. Setting up Guelph Permeameter test in Hindon river bank (Village: Issupur, District: Saharanpur)

Yapri Jamatia

Project Title: Management and conservation of Rudrasagar wetland, Ramsar site in Tripura

Host Organization: TERI School of Advanced Studies

Year: 2019

ABSTRACT:

This study focuses on the significance of wetland services and its benefit on human well-being and thereby emphasizing how the communities depend on the wetland for their sustenance. Communities in the study area revolve around pisciculture-agriculture for their economy and livelihood. This dynamics has shaped the community's dependency on the wetland to a larger extent. The importance of paddy cultivation in the wetland has been contrary with the fact that the wetland is degrading and shrinking due to ongoing reclamation into agricultural land. The ecological status of the wetland has been discussed briefly by assessing the physiochemical characteristics of the system. The study also brings out the current scenario of the wetland and discusses the threats and how to mitigate them. In order to realize the importance of conservation, participation approach is needed and understanding the community's perception towards achieving conservation. For long term conservation, co-ordination of various multi-stakeholders and proper management processes could resolve the threats due to anthropogenic activities. This study has been carried out with the support of Hemendra Kothari Fellowship 2019.

Project Outcome:

Recognition/award/publication (provide supporting document)/ Grassroot Impact

Many recommendations were given to the village communities through awareness programmes and focus group discussions which were held in the Chandanmura village in presence of Vice-President of the fisherman society. Male and female participants were present in the programme. Some of the valid points included: 1) Practicing of paddy cum pisci-culture in the wetland which is more eco-friendly as chemical fertilizers will not be utilized; 2) Community's participation will lead to better understanding about the degradation of wetland and how it could be more vulnerable in the near future if monitoring activities are not carried out; 3) Cleaning of the

wetland by mobilising the members among villagers could create a sense of ownership and maintaining the lake aesthetically; 4) Creating a buffer zone or a limitation zone for human uses to protect the lake from further encroachments. Near the palace the lake has been filled in with the sand continuously for grazing purposes. Controlling access at least in the most degraded areas will lead to effective management; and 5) Eco-hydrological study of the wetland is recommended for better understanding of the hydrological processes and biological diversity.

Field/ Experiment photographs

Fig. Sluice gate-Kachigang channel

Fig. Flood in Letamura Rudrasagar area- sudden onset of rainfall in February

Fig. Neermahal-Water palace


Fig. Village households in Rudrasagar area


Fig. Different types of fishing gear

Anju Bhaskaran

Project Title: Spatial quantification of groundwater depletion: Case study of Gurgaon Tehsil

Host Organization: Centre for Ecology Development and Research

Year: 2019

ABSTRACT:

Gurgaon is grappling with the conundrum of managing floods on one hand and dealing with the swinging fall in groundwater levels on the other. With the city burgeoning, pressure on its water resources is increasing unsustainably. The groundwater levels in the Tehsil have fallen below 220m in some areas. Water quality parameters suggest the water in north-western parts of the Tehsil is not suitable for drinking or irrigation. The dissolved solids and electrical conductivity levels exceed the BIS standards of 2000 and 3000 respectively. TDS measures as high as 2800 mg/l and EC 4000 mS/cm was recorded in the North-western part of the Tehsil. The current water demand-supply gap of the city has been calculated to be a whopping 224.5 Million Gallons per day. In the wake of increasing water demand, the city has to find measures to reduce the demand-supply gap in the water supply. The supply-side measures like reducing loss, increasing reuse of wastewater and rainwater harvesting are already being considered by the water supply authorities. The study summarises the current groundwater situation and the extent of overexploitation of the resource. The urgent need for sustainably reducing the demand-supply gap in water supply without depleting the easily exploitable groundwater resource is highlighted through this study.

Project Outcome:

Recognition/award/publication (provide supporting document)/ Grassroot Impact

Demand-supply gap indicates pressure on groundwater resources. Current groundwater levels have already fallen so low that the region is classified as overexploited and polluted. The declining groundwater levels and water quality have influenced the agricultural practices to adapt to the groundwater issues. Hence, this study aims to take measures to augment the excess demand through conjunctive use of different sources of water. The study recommends the use of

various water conservation strategies like rainwater harvesting, smart metering and online register of tube wells. Moreover, the spatial pattern of groundwater depletion obtained through this study helps in priority-based decision making in integrated water resources planning and management for the region.

Field/ Experiment photographs