

Mapping of Drainage Pattern to Identify the Inlets of Runoff in Nal Sarovar, *The only Ramsar site of Gujarat*



Interim Project Report *under DST-NCSTC WaSH Programme*



Ms. Arzoo Malik
Grassroots Foundation, Mumbai

Interim Project Report
under DST-NCSTC WaSH Programme

Mapping of drainage pattern to identify the inlets of runoff in Nal Sarovar, the only Ramsar site of Gujarat

WaSH Fellow Name: Ms. Arzoo Malik (Email: arzoomalik8.am@gmail.com)
Supervisor: Dr. Nishith Dharaiya (Email: nadharaiya@gmail.com)

Project Start Date: 1 March 2017

Project site:

Nal Sarovar bird sanctuary is an important and well known wetland in Gujarat. This wetland covers an area of 12,000 ha and is located at 22°46'33"N 72°02'21"E. The wetland is a natural depression formed by the joining of two gulfs on both sides i.e. Gulf of Kachchh and Gulf of Khambhat. The geographic location and climatic conditions of the wetlands aids in sustaining the high diversity of avifauna including resident-migratory as well as migratory species. Among the diverse species of birds some are globally threatened such as the Oriental darter (*Anhinga melanogaster*), Painted stork (*Mycteria leucocephala*), Imperial eagle (*Aquila heliaca*), and White eyed pochard (*Aythya nyroca*).



Map showing the location of Nal Sarovar

Mapping of drainage pattern to identify the inlets of runoff in Nal Sarovar

Project Summary:

The project will be implemented in the only Ramsar site of Gujarat state, Nal Sarovar bird sanctuary. It is the largest shallow wetland having 360 small islets. The bird sanctuary falls on an important migratory route of many migrant waterfowls mostly coming from Northern and Central Asia, Siberia, Europe and Himalayas¹. It hosts more than 200 species of migratory birds every year². The wetland receives runoffs from the northern and northwestern upland of Surendranagar, Ahmedabad and Mehsana districts; even from Kachchh during the heavy rainfall and ultimately reaches to Gulf of Khambat². Along with rainfall runoff, Bhogavo and Brahmani rivers also feed water to the wetland. The major part of land in surrounding area of wetland is utilised for agricultural purposes. Being the tropical country it is inevitable to use pesticides in agricultural fields. These pesticides are then enters the aquatic ecosystem through agricultural runoffs. Therefore, it is important to identify those areas through which agricultural runoff containing pesticides are entering into the wetland, contaminating the water and increasing the possibility of direct and indirect impacts on birds. The present short term work is aimed to identify and map the important drainage areas using slope analysis method that can further help to analyse the possibilities of pollutants entering the aquatic ecosystem.

Objectives:

- To identify and map the inlet points of agricultural runoff in to the wetland
- To inventories the pesticide being used in the agricultural lands surrounding Nal Sarovar

Methodology:

To achieve the proposed objectives following methodology will be followed:

- **Field Survey:** The field survey will involve two phases:
 1. The first phase will be carried out by surveying the site of interest along with the local guides to identify the elevation points. The elevation points will be recorded through GPS.
 2. The second phase will involve interaction with the farmers who owns agricultural land in the vicinity of the study area in order to prepare a checklist of the different pesticides that are being used in different crops.
- **Preparation of Watershed Map:** The map will be generated in three major steps:
 1. The toposheet of Nal Sarovar will be acquired from the Survey of India, Gandhinagar.
 2. With the help Q-GIS®, contours will be extracted from the toposheet for slope analysis.
 3. The data generated after field survey and slope analysis will be overlaid on digitized toposheet to produce the drainage area and map the major points of inlet ultimately leading to formation of watershed map using GIS.

Mapping of drainage pattern to identify the inlets of runoff in Nal Sarovar

Expected Outcome:

- The major outcome of this project would be the watershed map which will depict the inlet points of agricultural runoffs.
- This map will provide baseline information for planning and implementing future research related to pollutants entering in to the wetland through these runoffs.
- A checklist of pesticides being applied in the agriculture lands will help in directing future research and also creating awareness among the locals about the possible effects of the pesticide on ecosystem

Project timeline:

Activities/Months	March	April	May
Survey	Work Done		
Mapping	Work to be done	Work to be done	
Interpretation/Documentation			Work to be done

Work Done:  Work to be done:  

Work /activities carried out so far:

Till now field survey involving two phases have been carried out that includes:

- First phase: The survey of study area has been successfully done with the help of local guides. The GPS points were taken on certain elevation points during the survey and drainage areas were analysed from which runoffs is entering into the wetland.
- Second phase: The information was gathered about the pesticides that are being applied in agricultural lands by visiting the nearby villages and interacting with the farmers.

The toposheet of Nal Sarovar has been acquired from the Gandhinagar office of Survey of India.



A view of Nal Sarovar © Priyanka Lele and Arzoo Malik

Mapping of drainage pattern to identify the inlets of runoff in Nal Sarovar



Site Survey in and around Nal Sarovar © Priyanka Lele and Nishith Dharaiya

Work to be done:

The ongoing and future work involves following activities:

- The geo-referencing of the toposheets of Nal Sarovar.
- Extraction of contours from the geo-referenced toposheet using Q-GIS.
- Slope analysis will be carried out to map the drainage area.
- The data collected from the field survey will be overlaid on the toposheet in order to produce the watershed map.
- Preparation of checklist of pesticide and their classification based on the information collected

The work done so far and the work to be done is going in accordance to the timeline mentioned for the project therefore desired objectives can be achieved in the given amount of time.

Mapping of drainage pattern to identify the inlets of runoff in Nal Sarovar

Future directions:

After identification and mapping of inlet points of runoff, it would be interesting to carry out the pesticide analysis in the water and sediments of the Nal Sarovar to quantify the risk to which birds are probably being exposed.

Further we can conduct interviews with the farmers to understand their level of knowledge about pesticides and how they perceive its consequences on environment.

With the help of this study we can acknowledge the major issue of pesticide usage and its consequences on environment. Through this study, results can be disseminated among the local stakeholders and government, policy makers to implement required actions or policies and create awareness among the farmers. Because bringing the change in farmers attitude towards the environment can greatly enhance the practices of conservation.

Citations:

1. Patel S and Dharaiya N (2008). Marsh Bird Community Index of Biotic Integrity: A key to Study an Ecological Conditions of Wetlands. The 12th World Lake Conference: 558-561.
2. Sasikumar K (2014). Management plan for Nalsarovar Bird Sanctuary, Gujarat Forest Department. 280 pp.

Acknowledgements:

I am grateful to NCSTC, Department of Science and Technology, Grassroots foundations and Earth Protectors for the financial assistance. Thanks are also due to the Chief Wildlife Warden, Gujarat state and Deputy Conservator Forests, Nal Sarovar for giving me permission to work in Nal Sarovar Bird Sanctuary and providing necessary logistics. I am also thankful to Mr. Rameshbhai (Field Assistant) for helping me out in field work.