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Water Footprint and Stewardship: Narratives from the Sharda Basin[1]

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Communities in the Sharda basin, in Uttar Pradesh, are demanding quick and inclusive intervention from the government to address the pertinent water related issues impacting their everyday life. The ecology of the Sharda river and its auxiliary channels like the 'Sootea Nala' is severely disrupted due to the industrial contamination by the leading sugar mills in the region. This is a likely prominent contributory factor impacting the quality of drinking water in the areas surrounding the region because of the unsustainable and non-participatory manner of waste governance by the factories located in the region. Among the most impacted are women who have been traditionally entrusted with the responsibility of household management including the fetching of drinking water for the family. Their limited participation in issues related to water contamination in Palia Kalan has excluded them from decision-making on critical water issues in the area thwarting the possibility of an inclusive and just community-based water governance.

What Ails the Sharda Basin

Every year, November onwards, the sky above the Sharda river in Kheri District of Uttar Pradesh is filled with ash. The ash—waste from sugar production—comes from private and government sugar companies in the area. These companies are a part of very prominent sugar supply chains in the country. While the air pollution is visible to the naked eye, it is the contamination of the water sources that goes largely unaddressed. This contamination can be seen as a subset of the gradually pervading 'invisible water crisis'[3] augmented by the ever increasing water footprint by the various stakeholders in the basin. The region provides platform for a lot of economic opportunities; prominent among which is agriculture and sugar is key contributing not only to the local economy but also to Uttar Pradesh's State Domestic Product significantly. According to records, almost 125 lakh tonnes[4] of sugar has been produced in Uttar Pradesh by the end of May 2020 accounting to nearly 45% of the total sugar cane production in the country[5].

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2 The Author is working as Programme Officer-Disaster Risk Reduction and leading the projects on Transboundary Rivers of South Asia implemented by Oxfam and supported by the Government of Sweden.

[3]Damania, R, Desbureaux, S , Rodella, A.S and Russ, J & Zaveri, E. (2019). Quality Unknown: The Invisible Water Crisis, Washington, DC: World Bank.doi:10.1596/978-1-4648-1459-4. License: Creative Commons Attribution CC BY 3.0 IGO., Accessible at https://openknowledge.worldbank.org/bitstream/handle/10986/32245/9781464814594.pdf?sequence=8&isAllowed=y

[4] Deepa Jainani (2020) 'Uttar Pradesh clocks highest ever sugar production', *Financial Express,* 29 May, p. https://www.financialexpress.com/market/commodities/uttar-pradesh-clocks-highest-ever-sugar-production/1974476/ .

[5] Estimated till 12th May, 2020. Assumptions for May 27th extrapolated based on the reports till May 12th, 2020, Chini Mandi (2020), Sugar production in Uttar Pradesh crosses 120 lakh tonnes; Available on: https://www.chinimandi.com/sugar-production-in-uttar-pradesh-crosses-120-lakh-tonnes/#:~:text=According%20to%20the%20UP%20sugarcane,is%20almost%20double%20of%20Maharashtra, Accessed on 2nd July, 2020

Sugar cane is a water intensive crop with an average water requirement between 1200 to 3000 mm depending on the agro climatic condition[6]. At least 1500-2000 litres of water[7] is required to produce a Kg of sugar which is enough for a single person to consume for more than a year[8].

According to a research by Leenes and Hoekstra (2009), water footprint in India is higher than many developing economies with a water footprint for sugar cane to be more than 1500 metric tonne. Not only is sugar cane a water guzzling[9] crop with a high evapotranspiration rate[10], its journey to being a product also undergoes an exhaustive process. A recent study by Oxfam [11] captured community narratives on water contamination in the Sharda Basin in Uttar Pradesh and found that apart from its high footprint on water resources, the sugar manufacturing industries in the region are also responsible for contaminating the surface and ground water sources because of the poor governance of waste generated from the production process. The study provides evidences of the lackadaisical attitude by sugar companies and highlights the plight of the community living in the areas near those small rivulets of the Sharda—Sootea and Paraspur Nala — which once used to flow freely and uncontaminated.

Palia Kalan is home to a number of sugar factories essential for the economy of the region. Even though these industries have brought about economic growth they have also been one of the sole actors in environmental degradation. Studies show that the narratives and discourses on water contamination varies largely in the perspective of the corporates and the community, with the former struggling to prioritise the issue of a safe and clean environment.

The Environmental Cost of Sugar Production in the Sharda River Basin

1. Disasters and Livelihood Within the Larger Sugar Economy

Along with associated environmental cost, sugar industries also influence the social and economic well-being of the riparian communities in various ways. With limited income opportunities, most farmers have to depend entirely on the sugar supply chains for livelihood which again stands on the edge of various physical and economic risks. Incessant hydrological hazards[12] often lead to loss of agricultural crops (mostly sugar cane) burdening the small and marginal farmers disproportionately more than others. These perennial hazards[13] multiply with other factors including economic deprivation, caste discrimination, and gender inequality leading to marginalisation and vulnerability. Along with these there have been hurdles in achieving the goals

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[6] Choudhary, H & Singh, Ram & Prajapat, Kailash & Choudhary, G. (2013). Water management in sugarcane.

[7] Leenes, P.W.G and Hoekstra, A.Y (2009) https://www.waterfootprint.org/media/downloads/Report38-WaterFootprint-sweeteners-ethanol.pdf

[8] Nideesh M.K (2016) *Farm sector's irony: water guzzler cane in the time of drought,* Available at: *https://www.livemint.com/Politics/XlpuWzSnQh6eWYo1flnVqI/Farm-sectors-irony-water-guzzler-cane-in-the-time-of-droug.html* (Accessed: May 06, 2020).

[9] Price Policy for Sugarcane, 2015-16 Sugar Season, Commission for Agricultural Costs and Prices Department of Agriculture and Cooperation Ministry of Agriculture Government of India New Delhi August 2014

[10] Chini Mandi (2019) *2,515 litres water required to produce 1 kg of sugar,* Available at: *https://www.chinimandi.com/2515-litres-water-need-to-produce-1-kg-of-sugar/* (Accessed: Nov 19, 2020).

[11] Mukunda Upadhyay, Evy Mehzabeen & Gaurav Mishra (2020) *An Exploration of Water Stewardship in the Mahakali,*, New Delhi: Oxfam India., Accessible at https://d1ns4ht6ytuzzo.cloudfront.net/oxfamdata/oxfamdatapublic/2020-10/Water%20Footprint%20Qualitative%20Analysis%20-%20Draft%204_Oct2020.pdf

[12] PTI (2020) '15 UP District hit by Floods:CM Direct officials to maintain social distancing in relief camps', *Economic Times,* 17 August, p. https://economictimes.indiatimes.com/topic/Kheri-floods.

[13] Shankhyaneel ,S (2020) Major UP rivers flow above danger mark, 536 villages in 16 districts hit by floods, *Hindustan Times,* 06 August, p. https://www.hindustantimes.com/lucknow/major-up-rivers-flow-above-danger-mark-536-villages-in-16-districts-hit-by-floods/story-I2nhuTbHSVDjw1X8H2vaUI.html.

of sustainability which is mostly due to the lack of transparency of information, accountability, integrity, and responsibility [14] in the overall disaster governance regimes.

2. Impact on Drinking water

Contamination of the region's fresh water sources has resulted in increase of harmful pathogens, decrease in soil fertility, and decline in agricultural productivity. Some important common property resource of the past has been reduced to the status of waste lands resulting in lesser space for domesticated animals for grazing. According to the community this is the slow impact of the changing environment. The contamination from the nearby factories have reached alarming levels with fishes dying due to toxicity in the water sources. Though concerned about the future of their children, the locals residing by the polluted sources end up compromising because their livelihood is dependent on the very industries which pollute their water sources.

3. Ground Water Contamination

Apart from the visible contamination of the surface water, there are other allied yet serious issues which generally lies hidden and unaddressed. The waste generated in processing sugar, a form of a black mull with a repugnant smell, is claimed to be highly fertile and considered a suitable substitute to chemical fertiliser by sugar mills[15]. The people using this fertiliser soon realised that although the sugar cane became thicker, land got polluted gradually. An Oxfam India study infers that this repugnant granular material could have a potential impact on the quality of ground water and there should be studies conducted to evaluate the quality of water in the region[16]. Kheri district through which the Sharda flows is one of the worst arsenic[17] hit areas in the state with very high toxicity (above 0.05 mg/litre); this is beyond the permissible limit of 0.001mg/litre[18] set by the Bureau of Indian Standards (BIS).

4. Drainage and Irrigation

Drainage is another big challenge for the basin communities particularly for those living near the rivers or those contaminated points which also gets flooded every year during the rainy season. The industrial town of Palia Kalan has been exerting tremendous pressure on the environmental and human resources of the nearby villages because of irregular waste governance including municipal and industrial discharges in the river and its small tributaries. Sharda's once free flowing rivulets Sootea Nala is severely impacted by the growing discharge from the industries and the local areas that it has now been converted into a drain. Women have been the most impacted by such contamination as they are traditionally entrusted with the responsibility of household management including fetching drinking water for the entire family. In addition, limited participation of women in issues related to water contamination in Palia Kalan has excluded them from decision-making on critical water issues in the area.

5. Livelihood Challenges

One of the major challenges faced by the community in the Sharda basin is the disrupted nature of livelihood. Communities which were dependent on fishing, in the past, have had to

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[14] Upadhyay, M. (2020). Pragmatic approaches to transboundary river governance: Exploring pathways for co-operation on shared water resources. World Water Policy. Vol 6. Issue 1 July 24, 2020.Accessible at https://onlinelibrary.wiley.com/doi/full/10.1002/wwp2.12030

[15] Ibid (Upadhyay.et.al, 2020, Page 25)

[16] ibid

[17] Mishra, U (2019).High levels of arsenic found in groundwater in UP, *The Hindu Business online,* 30 May, p. https://www.thehindubusinessline.com/news/science/high-levels-of-arsenic-found-in-groundwater-in-up/article27329332.ece.

[18] Sinha, A (2014) 30 UP districts in grip of arsenic poison, *The Times of India,* 14 July, p. http://timesofindia.indiatimes.com/articleshow/38339052.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst .

abandon the practice due to the dying fish population in the already scarce water bodies. As per Oxfam India study, few fisher folks however engaged themselves in poison fishing leading to the contamination of the already vulnerable surface water sources. This act of poisoning the water bodies is mostly committed by the male members of the communities[19].

6. Lack of Proper and Timely Information

One of the major issues with regard to water stewardship in the community is the non-availability of data. Some communities in the Sharda basin have been facing severe challenges especially in securing their agricultural field, crops and other household property because of the delay in getting relevant information on floods and other disasters. The waiting time to access the information on hazards is very high and the preparedness level is very low in the community. Moreover, communities on both sides of the river in India and Nepal believe that the other deliberately discharge water to the downstream communities. This has led to friction between the two communities.

1. Gender Underrepresentation

According to the study conducted by Oxfam India, gender representation in decision-making related to water is found to be overshadowed by patriarchal narratives which always puts women in a disadvantaged position of merely fetching the water[20]. While on one hand, women are expected to be more vigilant on the quality of drinking water for household, their involvement in community level consultations is inadequate. Women are often trapped in responsibility with no power of autonomy or leadership. Despite this constrained patriarchal setup, in the past some efforts have been made by women leaders in the region to advocate with local administration on improving the quality of water.

Governance and Accountability by the State

The sugar supply chain in Kheri is struggling with similar issues of irresponsible waste management like many other industries in the country which exert tremendous pressure on the natural ecosystem. Realising the growing pressure on water resources in Uttar Pradesh, the Uttar Pradesh Pollution Control Board (UPPCB) in a circular issued in October 2018, notified the sugar mills of the state to examine and control effluence in its production process so that it does not harm the river ecosystem. In 2019, in the Shailesh Singh v/s Bajaj Super Hindustan Sugar Ltd (Distillery Division)[21], the National Green Tribunal directed a joint committee consisting of representatives from the Central Pollution Control Board (CPCB) and the UPPCB to monitor the situation and to provide an action report. In the same year, the CPCB after a joint inspection had submitted to the court its observation that the unit in Palia Kalan was violating its Zero Liquid Discharge (ZLD)[22] action and discharging untreated effluents in the drains inside and outside the industrial premise[23]. The joint committee of the State pollution control Board(SPCB) and the CPCB as directed by the NGT filed an action report on the 4 July 2019 demanding for the closure of the unit in Palia Kalan u/s 5 of the Environmental Protection Act; it imposed a compensation of Rs 58.20 lakh for rules it

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[19] Ibid

[20] ibid

[21] Read the full details here, Before the National Green Tribunal Principal Bench, New Delhi, Original Application No. 1041/2018 Shailesh Singh Applicant(s) Versus Bajaj Hindustan Sugar Ltd. (Distillery Division) & Ors. Respondent(s) (Report filed in O.A. No. 1041/2018) Date of hearing: 01.08.2019 http://www.indiaenvironmentportal.org.in/files/file/Bajaj-Sugar-pollution-Lakhimpur-Kheri-NGT-order.pdf

[22] Shailesh Singh Applicant(s) Versus Bajaj Hindustan Sugar Ltd. (Distillery Division) & Ors. Respondent(s) (Report filed in O.A. No. 1041/2018), http://www.indiaenvironmentportal.org.in/files/file/Bajaj-Sugar-pollution-Lakhimpur-Kheri-NGT-order.pdf

[23] Shailesh Singh Applicant(s) Versus Bajaj Hindustan Sugar Ltd. (Distillery Division) & Ors. Respondent(s) (Report filed in O.A. No. 1041/2018), http://www.indiaenvironmentportal.org.in/files/file/Bajaj-Sugar-pollution-Lakhimpur-Kheri-NGT-order.pdf

was continuing to violate[24].In February 2020, the CPCB informed the NGT that the company has complied by some of the direction including the payment of fines and installation of devices required for treatment of some effluents but their bio-composting operation could not be verified during the joint inspection. The CPCB also informed the NGT that the adequacy assessment of the ZLD System could not be ensured because during the time of inspection, the unit was not operational[25]. In 2019, the CPCB had directed the unit to ensure the required assessment under the guidance of reputed institutes like National Sugar Institute, Kanpur, Vasantdada Sugar Institute, Nagpur or any Indian Institute of Technology[26]. The CPCB has also directed the unit that it can carry out its operation only after obtaining the consent from Uttar Pradesh Pollution Control Board under The Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974. It was clear from the report by CPCB that the future operation of the unit in its regular way will only depend on the ZLD operation and water auditing as directed by the board[27].

Apart from the contamination by the mills, the district is also exposed to high arsenic content (Singh 2019)[28] and other forms of organic pollutants (Maurya et al. 2013)[29] in its groundwater. With rapid urbanisation, excessive population pressure, and declining groundwater table multiplied by natural and industrial contamination, public health and wellbeing is going to be a major concern in the region in the coming decades.

Policy Recommendations

Communities in the Sharda basin are now demanding for quick and inclusive intervention from the government and have advocated for addressing the water issues impacting their daily life. The government needs to step in and prioritise the issue. To achieve the targets of sustainable development and address the grievances raised by community, it is important that the community be involved in every phase of water policy design and implementation. While there are some efforts by the government on ensuring water equity and the NGT taking actions, the sugar mills are struggling to realise their major role in water governance. With rising population, increasing urbanisation, and growth in industrialisation growth of water intensive crops like agriculture is expected to rise in the region. Excessive usage of ground water for irrigation, industries and consumption will lower the water table creating an invisible water crisis in the region resulting in major public health crisis.

The principles of water governance demands display of equal responsibilities and accountability by the private and state actors with an inclusive approach manifested in water and industrial policies. Aiming to achieve a gender-just, transparent, accountable, inclusive and participatory approach is the only pathway to address the water challenges faced by the communities of the Sharda basin.

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[24] Read the full details here, Before the National Green Tribunal Principal Bench, New Delhi, Original Application No. 1041/2018 Shailesh Singh Applicant(s) Versus Bajaj Hindustan Sugar Ltd. (Distillery Division) & Ors. Respondent(s) (Report filed in O.A. No. 1041/2018) Date of hearing: 01.08.2019 http://www.indiaenvironmentportal.org.in/files/file/Bajaj-Sugar-pollution-Lakhimpur-Kheri-NGT-order.pdf

[25] *Central Pollution Control Board (2020) Report filed by Central Pollution Control Board in compliance to Hon'ble NGT Order dated 24.02.2020 in O.A. No: 1041/2Q18 in the matter of Shailesh Singh versus Bajaj Hindustan Sugar Ltd. (Distillery Division) and others, New Delhi: Ministry of Environment, Forests & Climate Change, Accessed on 8th December 2020, Available at https://greentribunal.gov.in/sites/default/files/news_updates/REPORT%20IN%20OA%20NO.%201041%20of%202018(%20Shailesh%20Singh%20Vs.%20Bajaj%20Hindustan%20Sugar%20Ltd.%20(Distillery%20Division)%20&%20ors.).pdf*

[26] ibid

[27] *ibid*

[28] Bindal, S., & Singh, C. K. (2019). Predicting groundwater arsenic contamination: Regions at risk in highest populated state of India. Water Research, 159, 65–76.

[29] Maurya, A. K. & Kumar, A. (2013). Organochlorine pesticides in the surface waters from Sharda river region, Uttar Pradesh, India. The SIJ Transactions on Advances in Space Research & Earth Exploration (ASREE), 1(1), 8–10 and Maurya, Ashok Kumar, Sharma, K., & Joseph, P. E. (n.d.). DDT and HCH Residue Load in Animal's and Mother's Milk of Lakhimpur Kheeri (Rural areas), Uttar Pradesh-India.

Some of our recommendations are as follows:

A. For the Government

i. **Data Generation**: Proper survey of all the water sources available in the entire Sharda basin should be conducted annually. A baseline study on the impact of availability, accessibility of water on agriculture, livestock, livelihoods, health, gender, employment of the community people in the river basin is important. It will help in generating tools for basin level planning and governance. The state should also take active role in providing real time information on water quality. While it does provide information on water level, it should use the support of civil society and community-based networks to disseminate the information to each and every person; this will help set up a timely early warning system.

ii. **Irrigation and Drainage**: New techniques of irrigation should be adopted and crop pattern should be diversified through environmental-friendly innovation. Use of surface water should be promoted and made available by the government. Drainage system must be properly channelized in the village and irregular urban growth be checked so that the community's ecological space is not compromised.

iii. **Equal Gender Participation in Community-Based Water Quality Governance**: Equal gender leadership in policy decision making and community level implementation should be at the core of water governance framework. Since there are various structural issues permeating across hierarchy of household and community which triggers gender discrimination and injustice at various levels of management of water resources, providing equal platform of leadership for the different marginalised gender groups becomes important for ensuring a just water governance.

iv. **Water Footprint Monitoring:** The water footprint of industries and manufactured products should be regulated through a state level policy. The CPCB and NGT should rope in civil society organisations for improving citizen science and community-based water quality monitoring. In order to ensure that laws and policies are implemented by the concerned stakeholders, the CPCB should organise dialogues with panchayats, sugar cane mill owners, and the civil society for inclusive plans and policies.

B. For Sugar Mills

i. **Environmental Ethics:** The sugar industry should explore avenues to control their effluent discharge. Regular consultations with researchers, scientists and civil society members should be held to find ways of optimising the production while reduce their footprint on scarce water resources. Moreover, interaction with the communities will help mills understand the plight of those living in contaminated areas and find a solution.

ii. **Implementation of the Zero Liquid Discharge Plan**: The sugar mills should take prompt actions to implement a Zero Liquid Discharge Operational Plan[30] and adhere to CPCB's bio-compositing protocol[31] and water auditing[32]. As per CPCB, the sugar mills should reduce their waste water generation up to 100 litres/ tonnes. The sugar mills should also consider the recommendations of the charter on Corporate Responsibility for Environmental Protection which says that they should initiate the timely operation on effluent treatment and minimise their waste release into the water sources.

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[30] Central Pollution Control Board (2015) *Guidelines on Techno-Economic Feasibility of Implementation of Zero Liquid Discharge(ZLD) for Water Polluting Industries reg.*, New Delhi: Ministry of Environment, Forests & Climate Change

[31] Sanaullah, A & Khan, S & Mogalle, M (2016). Managing sugar-mill liquid effluent to zero discharge -a case study of Mehran Sugar Mills Limited. Proceedings of the International Society of Sugar Cane Technologists, Volume 29, 294-303, 2016. 29. 294-303 to understand how we can achieve zero liquid discharge

[32] ibid

C. For Academicians and Researchers

i. **Scientific Assessment of Water Footprint**: Proper scientific tools and techniques should be used to assess the contamination of surface and ground water sources in geospatially vulnerable areas. Regular studies on pollution should be conducted regularly by Research Institutes to assess the impact of industrialisation on the eco-sociological health of riparian areas.

ii. **Research and Gap Analysis:** Academicians from universities and institutes should come forward to support the state and the civil society in improving water governance in the remotest of the villages with new ideas. They can engage students in pragmatic research through field-based learning for identification and solution of community problems associated with water availability and quality. Institutes like NSI, Kanpur, VSI, Nagpur and IIT's can support the Sugar industries on assessment of the ZLD system of sugar industries located in riparian areas like Mahakali.

C. For Civil Society Organizations

i. **Environmental Awareness:** Awareness campaign on environmental issues and effective water governance should be conducted on regular basis with the involvement of all the stakeholders. Streamlined communication channels should be developed at all levels to promote various government schemes and programmes. Relevant stakeholders through various consultations may come to an agreement if any diversified agriculture could be promoted considering the agro-climatic orientation of the region. In a more pragmatic sense, CSOs should also help communities transition to less water intensive sugar cane varieties.

ii. **Robust Information System on Environmental Rights and Ethics:** The CSOs should reach out to networks and communities to provide information on environmental and water rights; these can be done through offline and digital system of information dissemination. This will not only provide information on the right to safe water and sanitation to the community but can also imbibe a culture of responsibility through various educational messages.[33] They should also create platform for dialogues between various stakeholders for pragmatic solutions so that the community can use the policy designed for them.

iii. **Advocacy:** CSOs are the best agents of creating platform for social change. It can be a bridge between various stakeholders for devising effective water related plans and programmes. They can take the most unheard voices and advocate with the policy makers on their behalf. Through various community-based consultative process, they can identify the core issues to be presented to other stakeholders and thereby create a platform for progressive dialogues and policy level discourse. CSOs can act as a doorway towards water equity and justice.

iv. **Citizen's Governance**: CSOs should inculcate transformational leadership in the community through the methods of Citizen Science. This will help the community to identify issues around water quality and disasters and take action accordingly. The role of the civil society is to prepare the community to become change agents.

D. For Communities

i. **Rain Water Harvesting**: Rain water harvesting system should be adopted to recharge the ground water for summers. Rejuvenation of other surface water sources should also be considered.

ii. **Citizen Science**: Community leaders can take up issues related to water contamination themselves with the support of village-based institutions and influence their local administration to take the necessary action. They can use the

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[33] As a model, one may refer to the platform https://www.wgcan.org/ developed by Oxfam India wherein one can find demonstration of achieving a just water governance through the use of digital information system, virtual consultative dialogue forums, Citizen science and field based experience sharing.

method of Citizen Science to generate data on water quality and thereby monitor the situation in their neighbourhood. They can then use this data for community-led advocacy on environmental rights with local government and mills.

iii. **Diversified Livelihood and Awareness on Government Schemes:** Diversification of the sources of employment and livelihood promotion should be ensured by the local state and private actors by involving the community and civil society. The local people should be made aware of various government schemes and programmes associated with water for different consumption purposes.

iv. **Ownership:** The panchayat should encourage water management committees to apply the principles of sustainability in the everyday life of the community and provide platform for equal representation on decision-making related to water issues

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