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Assessment of Water Quality on Human Health and Sustainable Method for Environmental Resource Management Linking to Sustainable Development Goal 6

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Abstract—*Water is life. Progress in nutrition, health, education, work, equality, environmental protection and international cooperation are related to the availability and sustainable management of water and universal access to effective system for disposing our waste. At the same time, demand for water from industry, agriculture as well as domestic use is rapidly rising water pollution and health deterioration are being made worse by increasing amount of untreated wastewater. Discharging of industrial effluents into water bodies if not done with care through effluent pre-treatment and assurance of compliance with allowable standards can lead to water quality impairment. This study was conducted to explore health hazard from industrial water pollution in Sahibabad, Ghaziabad. Data were analysed using thematic framework approach. Based on questionnaire and few primary data, the study reveals that people faced health problems in this zone on industrial effluents to find out the physic- chemical, toxicological elements which were found on the groundwater were analysed and result were compared with the standardisation limit of WHO. Empirical evidence indicated that the incidence of skin disease, anaemia, peptic ulcer and even renal failure has been reported. This research paper focuses on contribution of water on health and how to manage/prevent them. A study conducted by the Delhi pollution control board a few months ago showed alarmingly high level of hardness in east Delhi's groundwater, a report suggested. In order to achieve sustainable development goal 6, advance implementation of the international decade for action on water, people should be guided and inspired by the fact that individual work will lay the foundations for a healthier, more stable, equitable and prosperous world. We should tackle weak funding, planning and governance of water quality services as a top priority. This paper also discusses about how the managerial implication is needed to control water pollution. New partnership involving stallholders within and beyond the water sanitation sectors, to address these fundamental issues, balance competing needs and act to get sustainable development goal back on track. Industrial wastewater generators are needed to be monitored and regulated through the use of permits for discharge to sewers. It is recommended that discharges of effluent require high degree of treatment before their discharge.*

Keywords*: water pollution, industrial effluents, human health, SDG, managerial implication*

1. INTRODUCTION

"Ensure availability and sustainable management of water and sanitation for all", reflects the increased attention on water and sanitation issues in the global political agenda.

Water source component are river, canals, reservoirs, aquifers; off-stream demand components like industrial plant; in-stream demand components are hydropower, recreation, and environment. SDG 6 includes seven global targets that are universally applicable. They cover the entire water cycle:

Target 1-provision of drinking water

Target 2-sanitation and hygiene service

Target 3-treatment and reuse of waste water ambient water quality

Target 4-water use efficiency and scarcity

Target5- IWRM including through Trans boundary cooperation

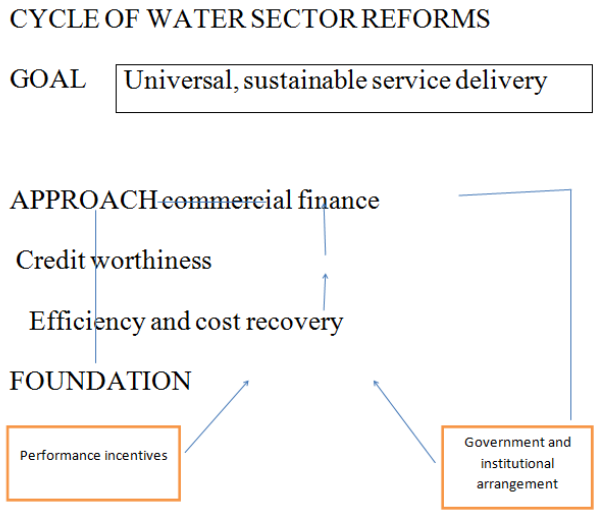
Target6-protecting and restoring water related ecosystems

Target7-international and participation in water management

Clean water is critical to survival, and its absence can impact the health, food security, and livelihoods of families across the world. Although our planet has sufficient fresh water to achieve a regular and clean water supply for all, bad economics and poor infrastructure can skew supply unfavourably. Global goals and national priorities on reliable energy, economic growth, resilient infrastructure, consumption and production, and food security are all inextricably linked to sustainable supply of clean water.

A safely managed sanitation system is essential for protecting and improving the health of individuals, committees as leaking bowels, septic tank and drains and untreated faecal sludge, water discharged from industry can spread diseases and pollute ground water and surface water used for drinking.

The sustainable development goals have committed the international community to expand international cooperation and capacity building on water and sanitation related activities, programmes to support local communities in improving water and sanitation management. Through goal 6, the countries of the world have resolved to achieve universal access to safe drinking water and adequate sanitation and hygiene to all in the next fifteen years. In India, however 63% of rural and19% of urban households is not using improved sanitation facilities.



This model explains the use of existing resources more efficiently and thus improving performance which leads to increase credit worthiness and access to commercial finance, thus further improving service delivery.

OBJECTIVES

- To gain better understanding of technology option for water management
- To increase access to safe, adequate sustainable water, sanitation and hygiene as per the SDG
- To study and analyse the water quality reaching at home and its health effects
- To understand the challenges in implementing water resource management technique

2. REVIEW OF LITERATURE

It's the human right to have access to water and sanitation is required for sustaining life, for right to adequate housing, the right to the highest attainable standard of health. The UN general assembly and the human right council reaffirmed the human rights to safe drinking water and sanitation in 2015.**(UN, office of high commission for human rights, 2003; UN, economic and social council2010)**

(Shah et al, 2016) established the framework towards integration. He suggested the kinds of interventions needed for each stage in areas of – (1) capacity building

(2)- Investment priorities. (3)- Water pricing and cost recovery.(4)-legal regime

(Palanippan et al, 2010) studied about industrial water. He said industrial water when combined with sewage can have devastating effects on marine health and livelihood.

(Besner et al, 2001) studied about how in-line infiltration causes problem in the deliverypipes. He stated that negative pressure in the pipeline occur when extreme hydrologic events in water takes place. During this event, contaminants from the surrounding soil are drawn into the water table. Replacement of this system can prevent such occurrences.

(Olaguibel and Basomba, 1989)studied about how chromium could affect the respiratory track of humans. chromium hexavalent compounds are present in dye industries can cause asthma to people who consume water equipped with this element. And other symptoms include nasal blocking, coughing, wheezing and decreased expiratory volume especially in elders.

(Wedeen et al, 1996) studied on a group of 30 men and 25 women of particular area who were consuming water with fine elements showed the sign of preclinical renal damage which were examined by urinary level of proteins. He founded that none of the proteins exceeded normal urinary levels in either men or women. The author concluded that long term exposure to chromium dust did not lead to tubular proteinuria.

(Thompson et al, 2011) studied about how oral exposure of chromium hexavalent compounds affects animals. Histopathological changes were observed in rats when exposed to such element. Gastrointestinal haemorrhage was observed in rats when given a lethal dose of potassium dichromate.

3. RESEARCH METHODOLOGY

Data were analysed using thematic framework approach. A survey was conducted in dyeing industry in Sahibabad, one of the cities in Ghaziabad. Comprehensive waste water monitoring comprised tracking of industrial discharge of waste water reused and household water quality checking. Visual

inspection of colour of water in many household were studied and analysed.

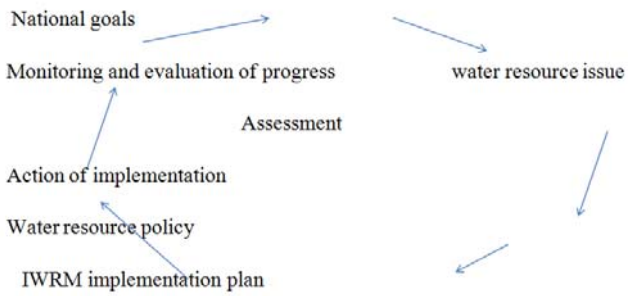
Applied research was used to determine how current knowledge can be applied in solving problems. Like here, the knowledge was used to determine the reason behind the mixing of industrial water and ground water; the solution and outcome of it.

Investigative approach was used to identify the type of element present in the water sample by performing an experiment.

Questionnaire related to environmental management was prepared. It encompasses a participatory spirit for all those involved as an empowering research tool.

4. RESULT AND DISCUSSION

This research evolved into the comprehensive water research program between water resources and its treatment plant.in other words, in water resources management modelling, the inter relations between water sources, demands, and economic benefits have to be considered in an integrated modelling framework to provide essential information for policymakers in the resource allocation. The reason for water safety is also because in coming future transportation of microbial safe water over long distances cannot always be performed cost effectively. Managers need to have the flexibility to imagine and adopt novel solutions to water resource problems.



4.1 TYPICAL DYE HOUSE WATER QUALITY IN GENERAL- a table 1.1 is depicting it

PARAMETER	CONCENTRATION
Water hardness	<5ppm
Colour	Colourless
pH value	7-8
Dissolved solid	<1ppm
Nitrate	<50ppm
Chromium(6)	0.2 □□/□3
Copper	<0.005ppm

Questionnaire was prepared which included question like –

- Do people know what sustainability is? (18 respondent "yes", 7 for "no")
- Do people think that world's resources and environment are in severe danger? (23 for "yes" and 2 for "no")
- What responsibilities do industrial worker have in regard to resource use and environmental preservation? The answer consisted of various parameters like recycling of water, save energy, and to get education.
- How often everyone tries to teach oneself and learn about resource use and environment?

4.2 WATER RESOURCE MANAGEMENT AND ITS IMPLICATIONS

Industrial waste water treatment is a process used to convert waste water into an effluent that can be returned to the water cycle with minimum impact on the environment, health. Industrial waste water generators need to be monitored and regulated through the use of permits for discharge to sewers periodically. Waste water monitoring comprises tracking of (1)-household waste water treatment on site and off site as per the national standard. (2)- Industrial discharge of waste water reuse.

4.2.1 Public participation is important for water management. Local community participation in water and sanitation management has the potential to yield benefits such as empowerment of marginalised groups and sustainable service delivery. Water management should be based on participatory approach, involving planners and policymakers at all levels. Public-private partnerships have emerged as a desirable model for development. Stakeholders, NGO'S and volunteers play an active role in such efforts.

4.2.2 Effluent treatment plant –improving performance and reducing pollution

Improving effluent treatment plant performance by reduces operating costs, complying with discharge consent conditions and minimising environmental pollution is high on the agenda of industrial organisations. The five steps to effective effluent management are-

(1)-firstly, characterise all effluents produced on-site

(2)- Secondly, implementing a waste minimisation programme to reduce the volume and strengths of effluents

(3)-thirdly, by incorporating in-process conditioning and treatment

(4)- Fourthly, determining and installing segregation facilities to tailor treatment options

(5)- Lastly, optimise the performance of ETP

A survey was conducted at dye industry to understand and analyse how industrial water is being discharged in to ground water and thus affecting human health.

●Work flow-

Project implemented through EPCM contract. Vendors were selected after technical evaluation.

●Site execution-

It was done by progress monitoring by conducting weekly meeting reviews.

●Quality checks-

In this, checked the quality of work during execution as per the WHO standard was checked. Analysis of fine particles present in industrial water was done. Also analysed the water absorption and compressive strength testing for fly ash brick. Salts like carbonates and chlorides of sodium magnesium were checked.

Result-It was found that water after passing from primary source into settling pond, had been containing fine sand particles and hexavalent chromium. If particle size are smaller than 0.02mm then coagulant aids in sedimentation and clarification of water. But, here it was found to have more than 0.02mm size.And there has been a direct emission of dye waste water into ground water.. It has been found that textile industry discharges carcinogenic chemicals by cloth dyeing unit's thus contaminating ground water which is the main source of drinking water in the area, indirectly affecting human health. These industrial units in Sahibabad have been blatantly gushing down untreated, poisonous effluents in the groundwater through secretly installed borings.

Test for chromium

Step1- Taken two test tubes. One filled with water sample(here industrial water) which was found to be reaching at everyone's home in Sahibabad. In it added 0.2 ml test solution. In other test tube, no test solution were added (acts as a blank sample)

Step2- compared the colour of liquids in the two test tubes.

Step3- the colour turned red in that test tube which had mixed ground water and industrial water, which confirmed that the sample contained chromium.

Management of ETP-In order to remove chromium especially hexavalent , many parameters were introduced in effluent treatment plant like- reaction channel, larger capacity of clariflocculator which have higher retention far more than efficient suspension. And pressure sand filters for complete removal of all precipitates were introduced.

4.2.3 Health effects of chromium are

It is carcinogenic and a reproductive toxicant for both males and females. Short and long term exposures can lead to eye and respiratory irritation, asthma attacks, nasal ulcers, dermal burns, anaemia, acute –gastroenteritis, vertigo, haemorrhage convulsions, damage or failure of liver and kidneys.

4.2.4 IWWC

Industrial wastewater committee (was established in 1943 and revised in 2002). Their purpose is to treat, design, manage, operate, maintain as well as promote and improve the industrial waste water. The committee provides technical information exchange; professional networking opportunities and programs addressing industrial water, waste water, prevention, remediation and reuse of industrial water in order to stop water borne diseases.

4.2.5

To ensure sustainable management of water and sanitation for all, it is essential to look at the water cycle. Countries need to move away from sectorial development and management of water resources, in favour of a more integrated approach that can balance different needs. Management, thus making SDG 6 a major step forward towards sustainable water.

4.2.6

IWRM is a process which promotes the co-ordinated development and management of water, landrelated resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.it follows a common approach which include a strong enabling environment; sound investments in infrastructure, comprehensive institutional roles and effective use of available management. These are the practical elements of implementing IWRM. The concept of integrated water resources management is embedded in the 2030 agenda and requires government to consider how water resources link different parts of society and how decisions in one sector may affect water users in other sectors. It is an approach that must involve all stalk holders from all levels so that it is managed equitably and sustainably.

4.2.7 Water technologies for a sustainable future-there is an indispensable need for introducing, replacing, rehabilitating and upgrading technologies so that water wastage and pollution can be controlled. It include waste water treatment, distribution, quality of ground water, irrigation, recovery and re-use, water use efficiency, water harvesting, flooding and drainage control, water testing.

4.3 Challenges in prevention of water pollution-

- ●Obstacles are challenging for small and medium sized enterprises which may not have the capacity to make continuous improvements.
- ●The main challenge across the water management is to enable and accelerate progress towards achieving SDG 6 and its target. The water sector is struggling to improve water resource management and to increase the coverage and quality of water and sanitation service.
- ●The main issue for industry is less about water quantity than the quality of water discharged after use. Industries in modern economics have statutory duties to clean up their

effluents to national and international standard before discharging into water bodies such as lake.

- Other challenges include no cost effective replacements for toxins used in industrial processes. Timing and amount of water available may not meet actual needs when considering wastewater reuse. Costs may be greater than the economic benefits to be gained from switching to more sustainable technologies.

5. CONCLUSION

Our water resources, irregularly distributed in space and time, are under pressure due to major population change and increased demand. Access to reliable data on availability, quality of water and its variability form the necessary foundation for sound management of water resources. All component of the hydrological cycle, and the influence of human activities on it, need to be understood and quantified to sustainably develop and protect our water resources. It is concluded that water deterioration was due to human negligence. Lack of funds and help from government is the other reason leading to discharge of industrial water into groundwater. Clean water act had declared all discharges into the nation's water is unlawful unless such discharges were specifically authorised by permit. The act set ambitious objectives to restore and maintain the biological, chemical integrity of nation's water and to implement treatment of waste water. In order to achieve SDG6, advance implementation of the International decade for action on water, we should be guided and inspired by the fact that individual work will lay the foundations for a healthier, more stable, equitable and prosperous world.

6. SUGGESTION

It is recommended that discharges of effluent require high degree of treatment before their discharge so that human do not suffer from health issue by drinking contaminated water.

7. ACKNOWLEDGEMENT

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LIST OF ABBREVIATION

SDG: Sustainable Development Goal

WHO: World Health Organisation

IWRM: Integrated water resources

Management

UN: United Nations

NGOs: Non-government organisation

ETP: Effluent Treatment Plant

EPCM: Engineering procurement and

Construction management

IWWC: Industrial wastewater committee

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