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ISSUES AND STRATEGIES OF SUSTAINABLE WATER CONSERVATION EDUCATION

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Abstract: *This write up reveals many dimensions of water education. The problems associated with development of water education can be removed through implementation of specific strategies. Water is life giving element in this world. Today, problem of unsafe drinking water is growing very fast. Everyone knows the problem of polluted water and implications on human body. In today's world, resources of drinking water are not growing due to some natural and human causes. The sources of drinking water are very limited because of many unwanted natural and human activities. Due to natural calamities and human activities, sources of water like streams, rivers, lakes and underground water are polluting very much. In this regime, need of water education has become an important issue among us. Community driven and community engaged programmes are helpful in the way of water saving practices. The present research paper deals with water education issues and strategies for sustainable development.*

Key words: Water Pollution, Waste Water, Aquifers, Water Conservation.

Conceptual Foundation

"We should minimize our water use – invest in science and technology to ensure that we can grow crops which use less water. In other words, find ways of valuing the crop per drop". –Dr. Manmohan Singh, Hon'ble Ex. Prime Minister of India.

To formalize the water issues, water is demanded for several purposes like drinking purposes; agriculture (About 70%); industry, and for economic development. Water for drinking purposes is depending on population of humans and animals, which may be considered a direct demand, the rest are derived demands. Derived demands associated with demands for agricultural and industrial products. In this modern age, water pollution has become a big environmental problem like population increase, industrial waste, sewage disposal. Because of rapid increase in population and consumerism, water resources of our country are extremely polluted. We know that sewage and industrial disposals are polluting directly our rivers. Due to population growth, requirement of consumer articles are increasing. This has created industrial development in small towns of India. In India around 10% people are in approach of safe drinking water (Basu, 2010). A big part of our population is depending on polluted sources of water. Water pollution is adversely affecting our day to day life. Due to population explosion, use of pesticides, chemicals, fertilizers is increasing. The use of pesticides, chemicals, fertilizers are creating serious problems in our biological life support system (Chapagain and Hoekstra, 2004). Water in this world, is the most precious natural resource. We all know this fact that without water we cannot survive on this earth. Table 1 indicates Inland Water Resources of India with rivers, canals and area of reservoirs, tanks, lakes, derelict water, brackish water.

Table 1 show that 7.3 million hectare (Mha) is total area of other water bodies with minimum area 0.80 Mha for lakes and derelict water. Inland water resources are also polluted due to human activities. Our planet has a limited amount of water. In this regime, low water literacy is affecting crucially our natural resource management. (Water Footprints

of Nations: Vol: 1: published by Institute of Water Education: UNESCO-IHE The Netherlands: p.16.)

Table 1: Water Resources of India (Inland)

Sector	Length/ Area
(A) Rivers and Canals (Length in km)	195095
(B) Other Water Bodies	
1. Reservoirs	2.93
2. Tanks and Ponds	2.43
3. Flood Plain Lakes and Derelict Water	0.80
4. Brackish Water	1.15
Total (Area in Million Hectare)	7.31

Source: Handbook on Fisheries Statistics-Year 2014, Department of Animal Husbandry, Dairying and Fisheries, M/O Agriculture, Govt. of India

Objectives

The objectives of water education cannot be limited. Water awareness among us affects our family's water conservation behavior. Our focus is on present education system, training and public awareness strategies according to following objectives:

- To understand and suggest suitable strategies about water education.
- To examine the various issues associated with water resources.
- To promote the implementation of water conservation policies.
- To integrate the management of water demand and availability.

Research Design

In order to make the research paper comprehensive, secondary sources of data collection have been used. The relevant and required data were obtained from national and international articles as well as websites of several Indian and international water organizations. Present research paper is conceptualized and based on several brainstorming sessions of discussion with the state and central government officers of Irrigation Department and Ministry of Water Resources. Within the limit of the availability of data provided by the state, central organizations, it is hoped that stakeholders concerned would find the paper useful.

Water Education Issues

"At the end of the twentieth century, the world is facing number of challenges affecting the availability, use and sustainability of water resources. It has serious implications for the present and future generations of humanity and for natural ecosystems. In India, 16% of the world's population has roughly four percent of world's water resources and 2.45 percent of world's land area. The distribution of water resources in India is uneven over space and time. Over 80 to 90 percent of the runoff in Indian rivers provides in four months of the year and there are regions of harmful abundance. Our country has to grope with many critical issues in dealing with water resource development and management….."
–MoWR, Report of the National Commission for Integrated Water Resources Development, Volume-I, Sept 1999.

In urban areas around 57% people depends on ground water. On the other hand around 70% people rely on ground water in rural areas (Yadav. R.N. 2010). But, the activities like illegal bore wells are adversely affecting ground water storage. Water education consists of many issues like:

- Proper planning in terms of use of water resources.
- Strategic planning of natural resources conservation activities.
- Analysis and use of natural resources for future requirements.
- Analysis of environmental threats for present status of available water resources.
- Integration of different environment conservation programmes.
- Making of policies and strategies in connection with water conservation.

- Making of laws in respect of present and future requirements of water.
- Promotion and integration of conservation policies and strategies.
- Effective solution of water problems through public awareness.
- Development of safe drinking water habits in society.

Lack of safe water is a dangerous obstacle for the people of underdeveloped countries like India for economic empowerment. Universities are not providing a variety of programmes to teach students and young professionals about water education. Water education is not providing to formal and non-formal educators strategically. In the way of water resources management, shortage of skills is one of the biggest risks. In this scenario, water education is extremely important for each of us. For sustaining our life, water conservation is necessary. Education in terms of water conservation has become compulsory. Besides inland water resources, rainfall provides another situation. A summary of rainfall is given in Table 2. In 2013 the rainfall volume was 4085 in comparison to 2012 as 3467. The year wise volume of rainfall trend is not adequate as shown in table 2.

Table 2: Rainfall in India

Year	Total Rainfall (Mm)	Total Volume of Rainfall (BCM)
2007	1181	3882
2008	1117	3674
2009	954	3136
2010	1213	3989
2011	1116	3669
2012	1024	3467
2013	1243	4085

Source: Indian Meteorological Department, Ministry of Science and Technology, GoI, New Delhi

For conservation of ground water resources, it is necessary that the surplus monsoon runoff that flows into the sea should be conserved and recharged. The Central Ground Water Board has made a strategic plan consisting artificial recharge of ground water for the country. Out of total geographical area of 3,28,7263 sq. km. of the country, an area of 4,48,760 sq. km. has been marked suitable for artificial recharge.

National Water Policy-2012

The National Water Policy deals with development and management of water resources. It is governed by national perspective and aims to develop and conserve the scarce water resources. It recognizes the need of effective and economical management of our water resources. The fundamental objective of the National Water Policy is to perceive cognizance of the existing situation of water crisis, to frame a system of laws and institutions and for an action plan with a national perspective with a view of abovementioned issues:

- Water Framework Law
- Uses of Water
- Adoption of strategies for climate change
- Enhancing Water Availability for Use
- Demand Management and Water Use Efficiency
- Water Pricing
- Conservation of River Corridors, Water Bodies and Infrastructure
- Project Planning and Implementation
- Management of Flood and Drought
- Water supply and Sanitation
- Water Disputes Tribunal
- Database and Information System
- Research and Training Needs
- Integrated Water Resources Management Programme
- Water Habits

In the context of India, many rivers are having water resources potential. On the other hand, rainfall with snowfall is also a sound source of water. The Central Ground Water Board (CGWB) has drilled many types of boreholes for sustaining demand of water. As per CGWB, total annual ground water potential is estimated 433 Billion Cubic Meters (BCM). The Central Water Commission-National Register (October, 2014) presents position of big dams in India. Around 5202 big dams are recorded. A number of water resources development projects have been taken by Govt. of India. In this regard, central water commission is balancing availability and use of water resources. In the context of water resources requirement, following Table 3 shows projected water demand in India for year 2025 and for 2050 with different sectors. The projection for year 2050, maximum requirement is 1072 BCM for irrigation sector. Our national water policy should cover this projection for availability, accessibility and use in the process of action plan.

Table 3: Projection of Water Requirement in India

(Water Demand in Km3/BCM)

Sector	Year 2010	Year 2025	Year 2050
Irrigation	688	910	1072
Drinking Water	56	73	102
Industry	12	23	6
Energy	5	15	130
Others	52	72	8
Total	813	1093	1447

Source: Basin Planning Directorate, Central Water Commission, Govt. of India -XI Plan Document. Water Statistics-2015

Strategies for Water Education

Here, we are discussing some strategies for development of water education. These are as follows:

- Use of media for public awareness in the shape of Printed materials like magazines, newspaper articles, publishing of books.
- Use of T.V. channels, Internet through advertisements, slogans by social media-face book, twitter and blogs.
- Use of group discussions, workshops, seminars and counseling sessions.
- Use of conventional methods like CHOUPAL in rural areas.
- Use of water ambassadors by rural boys and girls.
- Use of social talks in social gatherings as and when available.
- Use of water conservation campaigns through education system like schools, colleges and universities.
- Promotion of water education related quiz, essays, poem, drawing, painting drama, biodiversity tour, formation of water clubs, road shows, street dramas and restoration activities in the campus and neighborhoods with collaboration of local bodies, public representatives and non government organizations.
- Use of curriculum and syllabus based activities in education system.
- Use of case studies, small projects related with water conservation and safe drinking water habits.
- Encouragement of scientific research assignments.
- Strategic incorporation of biodiversity modules in training programmes of human resources in different government and non government organizations.
- Celebration of International Biodiversity Day, World Environment Day, and World Water Day is also effective for awareness.
- Promotion of actions by government and non–government organizations in connection with water resources planning.
- Enhancement of appropriate mechanism for public awareness in terms of water utility.

- Development of ground water level conservation practices, solution of water problems in Urban as well as in rural areas of different states in India.
- Creation of safe and pure water consumption and conservation practices, awareness for saving water through water tanks in houses, factories and buildings.

Water education is important for solution of various environmental problems. It is a long term programme for livelihood. Water education focuses on various multidimensional water problems. We can use simulation methods, case studies for creating awareness in rural as well as urban areas. It is necessary to recognize the need of protection in terms of water issues to ensure the human survival.

Conclusion

In our ecosystem, water flow, weather conditions are not in our hands. We are totally depends on our natural reflections. In our ecosystem we should make a mechanism for continuous monitoring of water flows and levels, purification of water. In our education system, teaching and learning tools should be accompanied with conservation of water and healthy consumption habits. In most developed countries, surface water pollution is a big environmental problem. Water pollution has disturbed our life. Due to human activities, rivers, lakes, tanks are polluted like gutters. Due to excess use of industrial and agricultural chemicals, water quality is degrading day by day. In industrialized countries, surface water is also extremely polluted because of uncontrolled human activities. Water education is only a way for sustaining human life. Conduction of mass awareness programmes on rain water harvesting and artificial recharge of ground water throughout the country involving Central/State/ NGO's, resident welfare organizations, educational institutions, industries and individuals. Conduction of training programmes to generate resource persons as a measure of capacity building for designing rain water harvesting structures. The Central Ground Water Authority & Ministry of Water Resources should include provision of roof top rain water harvesting in building bye laws for augmentation of grounds water resources. Due to human greed, natural assets are deteriorating so much. We all should think about sustainable development. We must concentrate on planning and effective execution so that this problem cannot be an ecological disaster.

References

1. Annual Report 2014-15, Ministry of Water Resources, River Development and Ganga Rejuvenation, Govt. of India.
2. Bhardwaj, T.R., *Education of Human Values*. Mittal Publication. New Delhi.
3. Bose, shish, Urbanisationand Slums (eds), Har-Anand Publications, New Delhi.
4. Chirashree Ghosh, 2004. Integrated Vermi- Pisciculture-an alternative option for recycling of solid municipal waste in rural India. *Bioresource Technology* 93, 71-75.
5. National Water Policy-2012, India
6. Parashar, D.C., Gupta, Prabhat K. and Sharma (2001) Chhemendra, *Chemosphere Global Science.* 3,171-174.
7. Patra, A.K., (2004), *Environmental Studies*, Kalyani Publishers, New Delhi.
8. Reports of Central Water Commission, Govt. of India.
9. Srivastava, Y.N. (1989), *Environmental Pollution*, Ashish Publishing House, New Delhi.
10. Water Footprints of Nations: Vol: 1: published by Institute of Water Education: UNESCO-IHE The Netherlands: p.16.
11. www.india-wris-nrsc.gov.in
12. www.mdws.gov.in
13. www.cgwb.gov.in
14. www.cwc.nic.in
15. www.wrmin.nic.in