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Water Resources Management for Sustainable Development: Study With Reference to Indian Context

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Abstract – Water is one of life's most significant natural commodities. In agriculture output, its growth and management play a crucial part. In order to minimize poverty, maintain the climate and sustained economic growth, adaptation of water resources is crucial. With population, urbanization and industrialization rapidly increasing, there is an ever-increasing demand for water to meet different requirements. Therefore, we face many problems in the water market, including reducing the supply of per capita water, the decrease in groundwater table in many regions, and the accumulation of saltwater in coastal aquifers. Surface and ground water quality is also deteriorating as pollutant loads from different sources increase. The supply and distribution of water supplies can also be negatively impacted by climate change. This article provides an overview of relevant problems related to Indian water resources development and management.

Key Words: Management, Water Resources, Water Management

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INTRODUCTION

For human existence, water is important. In fact, because 60% of the human body is water, water itself is life. No human activity area can be full without water. The world is discussing today whether knowledge flows are more relevant than energy flows. That's a good matter. However, water movement is much more critical. Economics, biodiversity and human equity are crucially relevant. In terms of climate change and associated environmental issues, the problem of water is becoming highly important. Any of the flagship initiatives in India are focused on water. India's modernization can rely to a large extent on its water management modernisation. This is not surprising, as India accounts for 17% of the world's population but only has 4% of its water resources worldwide. Better and better water usage is a problem for both Indian agriculture and business. In both villages and in the suburbs, it must set new benchmarks. 54% of people in India rely on agriculture to support their livelihoods. However they have only 14% of national income. The Indian government has introduced many new projects in order to make agriculture more payful and to improve the prosperity of farming communities. Include these:

1. 'Har Khet ko Paani' (Water for Every Farm): This needs better water supply and affordability.

2. 'Per Drop, More Crop': This includes drip irrigation and similar approaches to increase agricultural production by using the same water amount.

3. 'Doubling Farm Incomes by 2022': In order to accomplish this government of India quickly expands the irrigated region and finishes 99 long-term irrigation schemes. In drought-prone regions, 60% of such ventures are.

India works to raise dramatically the share of its GDP in manufacturing under the 'Made in India' mission. Efforts are being made to raise that to 25% by 2025 out of the existing 17% of GDP. A large volume of water is needed by industry. This relates particularly to the development of electronic equipment, computers and cell phones. And all of these are 'Make in India' fields of emphasis.

Actually, agriculture accounts for 80% of the Indian water, and industry just 15%. This ratio could shift in the next few years. There would also be an improvement in overall demand for water. Consequently, the quality of water usage and reuse must be integrated in the manufacturing designs. Business and sector must be involved in the solution. India is being urbanised at a scale that its past has not seen. As part of the Smart Cities programme, plans are made to build or update 100 new cities. Smart Cities measure metrics like water reutilization, solid waste disposal, improved wastewater systems and procedures. 40 billion liters of wastewater is produced per day in urban India. Technology for reducing the toxic content of this water and for irrigation and other purposes is essential. It is appropriate. This must be implemented with the urban development programme.

WATER RESOURCES MANAGEMENT FOR SUSTAINABLE DEVELOPMENT

India is the 7th nation in the world with a surface of 3,287,590 km2, and the 2nd largest in Asia. The Indian mainland is between 8°48° and 37°68N and 68°78° and 97°258E. It occupies 15,200 km of ground and 75,16 km of coastline. In the People's Republic of China, Nepal and Bhutan, India's northern border is to the Xizang (Tibet). The boundaries are with Pakistan in the North-West of India, with China and Burma in the North-East and with Burma in the East. The southern peninsula spreads through tropical waters of the Indian Ocean with the South-eastern Bay of Bengal and the south-west Arabian Sea. India is divided into 24 Member States and 7 Union territories for administrative purposes. Most of the Indian land mass is characterised by semi-arid tropical belt over three to four months with seasonal rainfall. Agricole accounts for approximately 46 percent of the gross national product, (Harbans, Singh, 1983) and is the key occupation of the people, as well as the duty of government in providing adequate food for a population which makes up approximately 16 percent of the world (Nanda, 1991). The overall absolute future food output in India has been measured at 4572 million tonnes, which is way above the existing 170 million tonne production. They considered that only one constrained gross agricultural area of opportunity is limited to 143 million hectares and in all other respects presumed optimum conditions to reach the full food supply capacity of soils of various grades. Adequate irrigation and supply of nutrients, sufficient air weather, weed control, disease and diseases are assumed for four crops a year. It is also doubtful that 4572 million tonnes of theoretical capacity would ever be attained. A big restriction will be the water availability for irrigation (Ghosh 1987). In 1991 India had a total population of about 843 million (Nanda 1991). The decadal growth trend was 23.5% for the decade. For the 1981 census year the related estimates were 685 million and 24.8%. The period of doubling was considered to be 27 years for the Indian community (Ehrlich and Ehrlich 1974). In 2050 AD Srinivasan (1988) predicted three separate outcomes for the population of India. The population is projected to be 1300 million in the event of an accelerated fertility drop without any shift in mortality, 1400 million for both fertility and death, although normal estimation (current trend) gives the population around 1500 million. The number of fertility deaths declines rapidly. The average growth trend is projected to decrease from 2.15% for 1979–1980 to 0.58% in 2020–2025 according to one forecast (Johnson 1988). By 2050–2060 AD (Condie 1984), the demographics in least established areas are predicted to recover. Total production in 1989 was 173 million tonnes of corn, wheat and cereals (Dhingra 1990). It is projected that 400 million tonnes of food is required for the stabilised Indian population to sustain by 2050 (Verma 1989). India's water supplies are large but are unevenly scattered across many aspects: seasonally, regionally, basin-wide, as a cultivator, and as a crop. Because of the lack of budgeting and preparing national water supplies, starvation is devastating the lives of millions of Indian farmers and contributes to crop losses of many decades of millions year after year in the large areas of the western and sweeping Peninsula and the floods in north and eastern Freedom. In Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu malnutrition, and the lack of drinking water, in particular, has been causing disasters (Figure 1).

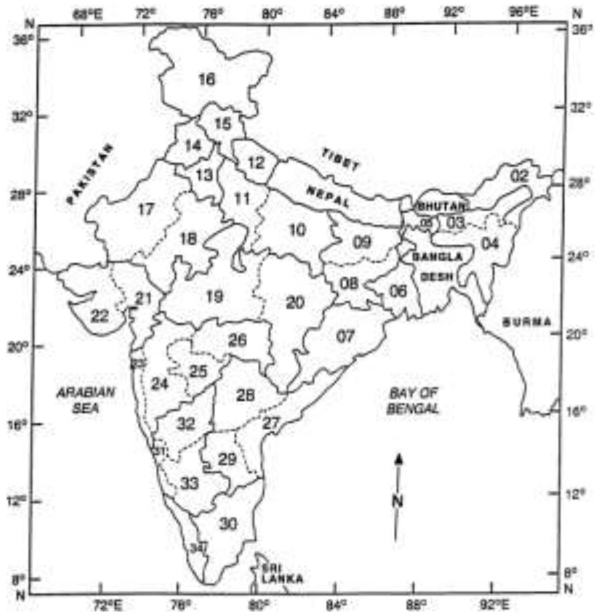

Figure 1. Meteorological regions of India with provinces (scale: 1 cm 5 200 kin). Modified from Mooley and Parthasarathy (1984). 2 5 Arunachal Pradesh; 3 5 North Assam; 4 5 South Assam; 5 and 6 5 West Bengal; 7 5 Orissa; 8 and 9 5 Bihar; 10, 11. and 12 5 Uttar Pradesh; 13 5 Haryana; 14 5 Punjab; 15 5 Himachal Pradesh; 16 5 Jammu and Kashmir; 17 and 18 5 Rajasthan; 19 and 20 5 Madhya Pradesh; 21 5 Gujarat; 22 5 Saurashtra and Kutch; 23 5 Konkan; 24, 25, and 26 5 Maharashtra; 27 5 Coastal Andhra Pradesh; 28 5 Telangana; 29 5 Rayalaseema; 30 5 Tamilnadu; 31 5 Coastal Karnataka; 32 and 33 5 Karnaataka; 34 5 Kerala.

WATER FOR AGRICULTURE

A variety of steps can be taken, for example constructing water harvest infrastructure, public understanding of how to conserve waters, building new water stored structures, connecting water to waterways, refurbishing and renovating current water networks, etc. in order to meet the challenges of the country's overall watershortage scenario. The policy to prevent water-intensive cultivation to a large degree in coordination with the related specialist departments is also important to monitor the water budgeting and the preparation of crop conditions for the upcoming agricultural season. In order to grow more crops per drop, micro irrigation (sprinkler and drop) should be implemented. Six decades of irrigation spending, however have been covered by insured irrigation only for 45% of the 142 million hectares of agricultural land. The change to 'Har Khet ko pani' (water for all fields) by in situ waters conservation under the Pradhan Mantri Krishi Sinchayee Yojana is one step in the right direction, as costs-intensive dam-based major schemes are not likely to extend irrigation. Water management and waste reduction are essential to the irrigation of every farm in the world. This makes it almost as necessary to incorporate sustainable water preservation activities and improve water supplies as to add new irrigation installations. Increasing irrigation water provision includes methods for handling and re-uses urban water. In agriculture, productive use of water by micro irrigation is important for a paradigm shift along with more investments in hybrid and high-yield crop, technology and mechanization science. Climate smart agricultural technology requires study to improve production and guarantee food protection as the climate change spectra increases.

Drought and Flood Management

There are significant geographical differences in India in terms of water experience. In certain northern and western nations, freshwater supplies are being utilized savagely and exhausted. The challenge of overflowing rivers and frequent floods is on the other side, in the eastern and northeastern states. This destroys people's housing year after year and contributes to tragedies in numerous households. These calamities may only be resolved through a multi-stakeholder and multi-stake or strategy. This ensures that the rivers are interconnected as possible. It often includes a basin-wide river systems maintenance, both to preserve safe rivers and to support multiple forms of users. The drought has many meanings, but it comes most of the time typically a season or more, regardless of a lack of precipitation. This deficit contributes to water shortages in many industries, groups and the climate. Drought should be seen in comparison to a sometime average precipitation-evapotranspiration balance state in a certain region, which is sometimes seen as "normal." The timing (i.e. key time, delayed starting season of the rainy season, frequency of rainfall in relation to main phases of crop growth) and the efficacy (i.e. strength of the precipitation, amount of rainfall events) of the planting method are also related. Such climate conditions, such as high temperature, high winds and poor relative humidity, are also correlated with them in many areas of the planet. Weather-related drought (dryness and length of dry period), farm-related drought (links to various meteorological or hydrological drought features to agricultural impacts), hydrological droughts (associated with surface or sub-surface water availability consequences of precipitation periods) as well as socio-economic drought (related to supply and demand). During both time and space, semi-arid areas are influenced by the drought owing to the high variety of rainfall. In typical years, the issues of arid areas where one good crop cannot be identified are quite different from those of semi-arid ones in which one good crop is usually required but is always missed because of low precipitation or because of the rainfall variations. The shortage of rainfall and consequent shift in human water needs often usually exist in rainfall regions. In order to achieve a strong and stable economic foundation particularly in the country's dry and drought-prone areas, water conservation and management actions are required today. No general solutions can be sought. Due to their hydrological features, they need to be unique region. It can also be noticed that the creation of drought propensity areas cannot be modeled on the development of other areas that are in a desirable location. It would need to be somewhat distinct from the trends of the growth of the drought-prone areas. Any approaches to alleviate drought adversities are described below as technological strategies.

- “Planning for less dependable yield
- Creation of surface storage
- Adjustment in sanctioned water to a reservoir or its releases
- Prevention of evaporation losses from reservoirs
- Equitable distribution
- Reduction in conveyance losses
- Better irrigation practice
- Maintenance of irrigation systems
- Cropping pattern
- Irrigation scheduling
- Watershed development
- Conjunctive use of surface and groundwater
- Integrating small reservoirs with major reservoirs
- Creation of large storages
- Transfer of water from water excess basins to water-deficit basins”

For decades, steps to prevent the floods using geography have existed in India. This can be seen from the ancient slopes designed for the defense of their land by individuals. Inadequacy in individual flood management measures contributed, primarily in the last century, to the government's involvement in the issue. As a result, many well-planned reservoirs on several of the rivers were installed, which incurred repetitive flood harm. These activities largely secured the regulated canal networks in the northern sections of India, and deltaic tracts in Orissa, Andhra Pradesh and Tamil Nadu on eastern rivers. Flood prevention may be categorized into four primary categories:

1. Attempts to modify the flood

2. Attempts to modify the susceptibility to flooding damage

3. Attempts to modify the loss burden

4. Bearing the loss

Both these flood control steps may be categorized as structural or non-structural. Generally speaking, all steps taken under "Flood change" are "structural action" whilst the other steps which are taken as management tools with no important construction operation are classified as non-structural measures" "Non-structural measures".

MANAGEMENT OF GROUNDWATER RESOURCES

In India, groundwater supplies about 60% of the country's irrigation needs, 85% of rural drinking water needs and 50% of urban water needs. Unconsidered usage of wide-scale ground water contributed to a sharp decline of groundwater and water quality in large sections of the world. Based on 2013 estimates, 4 percent of the country's groundwater evaluation units are essential and 10 percent are semi-critical because of over-use and infection. The explanations for this overuse and pollution include increased demand for agricultural, industrial and drinking groundwater; improvements in cultivation trends and development of paddy and cash crops consuming vast amounts of water; low rainfall in desert and semi-arid regions; flat prices and energy free subsidized for exploitation of groundwater in certain countries. Groundwater resources have not been uniformly developed in different parts of the country. In certain areas of the world, extremely intense groundwater production has contributed to over-exploitation and has led to a deterioration of groundwater levels. The country's annual cumulative annual refreshing water resource was measured at 447 trillion Cubic Meters, according to the latest evaluation carried out jointly with the states by CGWB in 2013. The annual availability of groundwater is estimated at BCM 411. Annual draught groundwater is measured at 253 BCM annually for the whole world. The production stage of soil water is 62%. For the restrained usage of groundwater, mass awareness movement is needed. The Central Groundwater Board (CGWB) conducted the decadal water level fluctuation analysis in the last 10 years to evaluate the change in the water level. Pre-monsoon (March/April/May, 2016) water level data when compared with the decadal average (2006-2015) indicate that more than 50% of the wells have registered decline in groundwater level, mostly in the range of 0-2 m, in almost all the States/UTs of the country, except few States namely Arunachal Pradesh, Goa, Pondicherry, Tamil Nadu and Tripura. In pockets in Andhra Pradesh, Chhattisgarh, Dadra and Nagar Haveli, Delhi, Gujarat, Haryana, Karnataka and Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Telangana and West Bengal, the decline has been seen in pockets of over 4 m. One of the main sustainability strategies to avoid the loss of freshwater supplies is to raise resources by refueling groundwater and rainwater. In different parts of the world, the central government has made many moves to facilitate rainwater collection initiatives. Management mechanisms to achieve the sustainable usage of freshwater services must match the emphasis on construction activities. In order to construct groundwater under numerous hydro geological conditions, technical planning is required and appropriate management practices are established. The conservation of freshwater is the biggest issue confronting groundwater organizations in Canada. In order to ensure protection of water through groundwater management, the practices of the organizations and policies concerning groundwater need to represent priority concerns in several sections of the world. Groundwater Resource Management within India needs a mix, based on climate, geomorphology, hydrologic and hydro geological factors, of areas and problem-specific strategies.

Groundwater Legislation and Aquifer Recharge

As waters are subject to the national laws, the State governments involved are solely liable for implementing sufficient legislation to control groundwater use. In 1970, the Union Government released a Model Bill to control and track the production of groundwater in all States/UTs to safeguard the groundwater regime and to enforce steps against over-exploitation, and ensuring that this resource is allocated equally. In 1992, 1996 and again in 2005, the Model Bill was recalculated for implementation. To date, the groundwater regulation has been introduced and enforced by 15 states/UT in the Model Bill lines. Seventeen other States/UTs have launched Model Bill action to enact and enforce it. A scientific paper titled 'Master Plan for Artificial Groundwater Recharge in India involving experts and researchers from groundwater has been established by the Central Groundwater Board (CGWB). It provides for the construction, at an estimated price of Rs. 79,178 crores, of 1.11 crore rainwater harvesting and of artificial recharge structures in the country to harvest 85 BCM (billion cubic meters). The rising resources of groundwater would strengthen the availability of drinking water, domestic commercial water and irrigation water. For its execution, the Master Plan was distributed to all state governments. The Central Groundwater Authority (CGWA) released Guidelines on steps to promote/adopt artificial recharging for groundwater/rainwater harvesting to Chief Secretaries of all countries and administrators of all UTs. Thirty states/UTs made the collection of the roof-top rainwater obligatory by enacting legislation or by formulating rules and regulations or by making by-laws or by providing relevant general orders. To date, CGWA has notified 162 Critical/Overexploited areas for the management and regulation of groundwater supplies in sections of the NCT Delhi, Haryana, Punjab, Andhra Pradesh, Rajasthan, MP, Gujarat, West Bangladesh, Uttar-Pradesh, Karnataka, Tamil-Nadu and Diu UT. Deputy Commissioners/ District Magistrates were guided in compliance with Section 5 of the Environment Act, 1986 to govern groundwater production in these modifiable areas for the introduction of regulatory measures in these areas.

CONCLUSION

A Basin-by-Basin analysis is needed for the variability of water resources in India. Variation of precipitation ensures that over time, replenishment is inconsistent. This renders water conservation much more important than the absolute amount of water accessible, like storage facilities for recharge. It takes an hour to find a water treatment solution. It should encourage the towns and communities in their neighborhood and improve their water supply control, allocation and valuation. Any water strategy of the 21st century would take note of the idea of water importance. It requires facilitating the extension and graduation of all stakeholders, including populations, in the assignment of a quantum of water to a quantum of benefits. This sum of advantages would of course be complex. The mapping and prediction of subsistence trends in human society is eventually linked.

REFERENCES

1. Harbans, Singh (1983). Crop production in India. Agricultural Situation in India 38: pp. 635–639.

2. Nanda, A. R. (1991). Provisional population totals. Census of India, 1991. Registrar General and Census Commissioner of India, New Delhi, p. 20.

3. Sinha, S. K., and M. S. Swaminathan (1989). Deforestation, climate change and sustainable neutron security: A case study of India. Climate Change 19: pp. 201–209.

4. Ghosh, R. (1987). Irrigation development through surface and ground water in India. Diamond Jubilee Commemorative Volume. CIBF, New Delhi, 54 pp.

5. Ehrlich, P. R., and A. H. Ehrlich (1974). Population, resources, environment, issues in Human Ecology. W. H. Freeman and Co. San Francisco. 76 pp.

6. Srinivasan, T. N. (1988). Population and food assessment of issues, models and projections. Pages 11–39 in A. C. Rogers and T. N. Srinivasan (eds.), Food and rural development. Clarendon Press. Oxford.

7. Condie, J. 1984. Rapid population growth in developing countries. in P. K. Ghosh (ed.), Population, environment and resources and third world countries. Green Wood Press, Westport, Connecticut, 121 pp.

8. Dhingra, B. S. (1990). India—1990. Government of India Publication, Patiala House, New Delhi, 929 pp.

9. Verma, A. (1989). Manpower development and utilisation in agricultural research. Presidential address, Section of agricultural science, 76th meeting of Indian Science Congress. Indian Science Congress Secretariat, Calcutta

10. Katchwana, M. S. (1981). Groundwater quality in Rajasthan and managing water supplies. Pages 1053–1057 In W. van Duijvenbooder, P. Glassberger, and H. van Lelyveld (eds), Quality of groundwater, proceedings of an international symposium, Noordwijkerhout, The Netherlands. Studies in environmental science. Elsever Scientific Publishing, Netherlands.

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