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ANALYSIS OF WATER RESOURCES AND ECONOMIC DEVELOPMENT

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Abstract: Water truly flows from all aspects of life on earth. Everyone, humans, animals and plants are dependent on water. It helps us to manage our livelihoods by supporting agriculture, industry, energy, health, etc. Water is critical component of our social and economic life. All the sectors: Primary sector (agriculture, fisheries, mining), secondary sector (pharmaceuticals, heavy goods, energy, fuel, processing of goods) and service sector (Hospitality, Tourism) require huge quantity of water. The present paper analyses the relationship between Water Resources and Economic Development. This relationship has to be considered while forming water budgets and policies.

Keywords: Water Resources, Economic Development, Climate Change, Sustainable Development.

I. INTRODUCTION

Half of world's population is working in eight water and natural resource dependent industries like agriculture, fisheries, forestry, energy, resourceintensive manufacturing, building, recycling and transport. Out of which; more than 100 crores people are working in agriculture, forestry and fisheries, the first two are threatened due to freshwater disorders.Thesecurity, repair and growth of water resource infrastructure is required to witness growth in all sectors of economies in all the countries.

Investment in water resources will bring in huge rewards in terms of long-term growth in all sectors, growth in employment, etc. and at the same time it will eradicate poverty. The basic facilities of water, sanitation and cleanliness will make economies very strong and create healthy population. The cost: benefit ratio for developing countries as per OECD is 1: 7. There are numerous ways in stating and

calculating water scarcity. However, the best way of calculating national water scarcity is assessing the per capita renewable water per year. These values are taken to distinguish separate levels of water stress. A country is water stressed if the supply goes below 1,700 m^3 per capita per year, country is in chronic water scarcity if the supply goes below 1,000 m^3 per capita per year and absolute water scarcity if the supply goes below 500 m^3 per capita per year. These estimations can be used to analyze the situations of different countries. The present paper analyses relationship of water resources with various sectors/ variables in the economy.

II. OBJECTIVE

Water is a critical Social and Economic resource which has strong linkages with Economic Development. Therefore, it becomes significant to analyze the relationship between the both.

Hence, the objective for the study is:

- To study the relationship between Water Resources and Economic Development.

III. ANALYSIS AND DISCUSSIONS

In this section, Water resources are analyzed with various sectors/ variables in the economy. There is important relationship between water supply and demand. It is calculated by taking into account the water usage by agriculture, industries and municipalities bytotal renewable water resources. The increasing usage of available water will put higher stress on the supply structure. Water has to be managed efficiently to meet the increasing demands and Sustainable Development Goals (SDG's).

1. Water and Agriculture

Agriculture entirely is dependent on water. Agriculture through rainfall produces 60 per cent of crops worldwide on 80 per cent of the world's cultivated area. Agriculture through irrigation produces 40 per cent of crops worldwide on 20 per cent of the world's cultivated area. Agriculture through irrigation utilizes around 70 per cent of world's total water usages and this percentage is higher in developing countries. Approximately 38 per cent of the irrigation utilizes groundwater. Industries like Food processing, Livestock, etc. are also heavily dependent on water. Further, inland fishery is completely dependent on rivers, lakes and other type of water bodies.

Water resources are also affected badly because of intensive agriculture, industrialization and growth in cities. Water resources are also facing huge increasing competition on one side from agriculture (crop and livestock) and another from urban expansion. There are further pressures of increasing demands

of food production and climate change which will increase such challenges.Analysis ofInternational Food Policy Research Institute(IFPRI) says, 45 per cent of global national income, 52 per cent of global population and 40 per cent of production of grains could be at high risk because of water stress by the year 2050. Therefore, it is very clear that present and future productions of food are in huge threat.

2. Water and Industry

Industries are significant source of employment which presents almost 50 crores of jobs worldwide, this is nearly one fifth of world's working population. In Organisation for Economic Co-operation and Development (OECD) countries; industry comprising construction gave employment to 12.56 crores people and manufacturing gave employment to another 7.06 crores. Worldwide, many water intensive industries provide employment to 2.2 crores people in food and drink (40 per cent are women); 2 crores people in pharmaceutical, chemical and rubber and tyres; and 1.8 crores people in electronics.

Totally, industries (comprising energy) utilizes nearly 19 per cent of world's total water usages.According to International Energy Agency (IEA) (2012), energy alone consumes 15 per cent of the total, which leaves only 4 per cent for huge industries and manufacturing.However, it is projected that by 2050 industries alone will increase its consumption by 400 per cent.

3. Human Right to Safe Drinking Water

The right to safe and clean water and adequate sanitation is internationally recognized human right, however vast population of the world do not possess it in many angles (safety, quality,sufûcient quantity, acceptability, accessibility, regularity and affordability) (United Nations General Assembly (UNGA), 2010). There are enormous differencesamongregions and also amongsturban and rural areas.

Worldwide there are annually 23 lakhs work related deaths which occur. Out of this 17 per cent of deaths are caused by communicable diseases and in this group the main causes include poor quality drinking water, poor hygiene and poor sanitation which can actually be easily avoided. Studies show that poor work safety and health procedures reduce global GDP by 4 per cent every year.

4. Climate Change and Extreme Water Events

Water resources have multiple threats from climate change as the frequencies of extreme events are increasing every year. Scientists say climate change will modify stream flows, change precipitation, water availability and worsen water quality. Intergovernmental Panel on Climate Change (IPCC) projects that with one degree of global warming 7 per cent of world's population will be at risk of 20 per cent

water availability. Due to this large percentage of world population will come under water scarcity. This will happen in different ratios in different regions, arid and semi-arid regions are anticipated to be more vulnerable due to high risk of droughts.

Historic evidences show us that changes in degree of floods and droughts are happening due to anthropogenic climate changes. Future predictions indicate that floods will increase mainly in parts of Southeast, Northeast and South Asia and also in South America and tropical Africa. Increase of growing population will provoke socioeconomic losses.

5. Water and Ecosystem Health

Ecosystem health depends upon water and related infrastructure services. The timing, quantity and quality of water and its flow is significant in upholding these functions. Huge number of population's livelihoods and economic opportunities depend upon aquatic ecosystems.Water pollution since 1990's has increased in almost all rivers Asia, Latin America and Africa. The main reasons are increase in untreated wastewater disposals into rivers/ lakes and unsustainable land utilizations. This has led to increase in soil erosion and residue loadings.

This is again increasing due to growth in population, urbanization, increase in number of small-scale industries and agricultural arrangements which are not managed properly and are causing untreated wastewater. It is estimated that severe organic pollution will affect 11 per cent to 17 per cent of Asian riversections, 6 per cent to 10 per cent of Latin American riversections and 7 per cent to 15 per cent of African river sections.

6. Water and Health

Realizing access to safe water, adequate sanitation as human right, mainly for poor will enhance health and life quality of crores of people. Additionally improved management of water bodies will reduce the spread of viral diseases caused by mosquitos and to make sure that lakes and rivers used for water supplies are chemical and biological contamination free could save many peoples and will have large direct and indirect benefits at household and also national level economies.

Several foodborne illnesses are caused due to poor water quality used in food production, food processing and food preparation. Recent studies say that agricultural lands in nearby urban areas are irrigated using largely untreated urban wastewater and this has reached nearly 3.6 crores hectares, equivalent to size of medium sized countries.

7. Water and Urbanization

A majority of world's population (420 crores out of 760 crores in 2018) lives in cities. Forecasts of human settlements, (with a world population of 860 crores in

2030 and 980 crores in 2050) indicate that by 2030 nearly 60 per cent of the world's population will live in cities and by 2050 nearly 66.4 per cent.

Human settlements are continuing to expand and this is putting immense pressure on scare resources like water and are further aggravated due to climate change. Cities are center for economic development, income generation and innovation however they are interrupted with inequalities in water, health and sanitation facilities. Improper management of urbanization has saturated water supplies, service infrastructure and present wastewater treatment plants and due to this people are exposed to health risks related to water availability and quality.

8. Water and Co-benefits

Water, climate, agriculture have solid linkages to other sectors and stakeholders of economy. United Nations, Sustainable Development Goals (SDGs) of which water goal is most significant and inter connected with all other goals, in fact water goal will enable achieving other all goals. Improving wastewater treatment plants will directly enable in achieving the concerns of SDGs. Human health and settlements are some of the very crucial areas through which water, climate involvements can generate multiple co-benefits. This highlights the importance in framing of policies, appropriate timing, series of reforms and investments.

9. Water and Technological Innovation

Science, technology and innovation have always helped human beings in solving various and diverse problems. The combination of Science, technology and innovation with management of water resources has produced innovative policy measures and organizational changes. These are new break throughs which can lead us in new water researches, decision taking governance and management of water with technological tools. These innovations can solve modern water related issues with scientific expertise and technical awareness.

Earth observation and space technologies, Various Artificial intelligence (AI)-based techniques,Advanced sensor technologies, models and machine-learning algorithms are some of the examples of innovations which will assist decision making or help in predicting availability of water and quality parameters.

10. Water and Employment

Water is primary driver of green growth. The political will is essential to make and execute water policy measures that support sustainable development and job creation. Accomplishing these social goals requires consistent efforts and shared efforts between water, food, energy and environmental policies to make sure incentives of all stakeholders. Water resources and its services strengthens economic progress, decrease in poverty and environmental sustainability.

Sustainable management of water for economic growth and employment is not only a matter of resource availability and money, but also a matter of good policy measures, governance including political, economic, social and administration units which are important in developing, managing and governing water resources and distribution of water services. Achievement of this goal will remove major barriers for women seeking opportunities to go to school, take proper education. Safe and availability of water in houses, schools and training institutes is also required for healthier economy. Investments in water is win-win situations from economic, environmental and social viewpoints.

11. Water and Asia Pacific

The region is vastly exposed to disasters caused by climatic and extreme whether occurrences which are badly disturbing poor and weak groups. In mere August 2017; heavy monsoon rain affected 4 crores people in Bangladesh,India and Nepal taking nearly 1,300 lives and putting 11 lakhpeople in relief camps. Floods could cost South Asia a damage of nearly US$21,500 crores every year by 2030.Floods could also contaminate water resources, destroy supply systems, sanitation facilities and hence become a universal challenge for access to safe water and sanitation.

Climate change and increase in demand for water will put pressure on regional ground water resources as availability of surface water is altered by growing climate changes. Ground water usages in the regions could rise by 30 per cent by 2050. The growth in demand for irrigation has already worsen the ground water in some areas, mainly in Asia's two major 'food baskets' – Northwest India and North China Plain.

IV. CONCLUSION AND RECOMMENDATIONS

There are critical linkages between water and all other sectors of the economy. Water plays essential role in creating employment, giving food security, maintaining health and bringing in huge growth in all the sectors directly or indirectly.The sustainable development of the country or world depends upon the ecosystem for which we are ready to pledge our commitment. It will take political, social, cultural initiatives and commitments to create an environment to secure water resources. The government and their partners need to have comprehensible vision to achieve this target. Water is required to run all kind of institutions and organizations whether it is a school, university, factory or a home, without water it is simply impossible to run any of the essential services or manufacture products. There is very strong relationship between water and economic development.

Every country with its own resources, potentials and priorities; could identify and promote specific strategies or policies. This will accomplish sectoral balance and generate highest output. The strategies should be framed which will not

challenge the environment and maintain sustainability of water resources.The distribution and provision of water resources to various economic sectors with efficiency and effectiveness will bring in growth in the country. Concentrating on the economic sectors which are significant for environment and growth will help in achievement of the goals.For accomplishment of these social and economic goals, an integrated approach which promotes accountability, transparency and participation is required.

Enhanced water management presents various opportunities in climate change adaptation and mitigation. The challenges in technological innovation, research knowledge and competence building will encourage new tools and ways through higher researches.These efforts will not bring in expected results until awareness is created with educational and skill development programs, which should spread knowledge and motivate people in exploring of new and present technologies.

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