Introduction

1.1 Background

Water has been identified to be our most essential natural resource having differentiated use. It is needed by all, but managed by none holistically. It has also been described to be a human right, public good, economic good and heritage. It is difficult to think of life without water. It is a part of environment, backbone of the ecosystems and a survival need for human beings. Water provides goods (e.g. drinking-water, irrigation water) and services (e.g. hydroelectricity generation, recreation and amenity) that are utilized by agriculture, industry and households. But it is finite, renewable and exhaustible. As per the estimate of UNEP (UN Water, 2014) the total usable supply of fresh water for ecosystems and humans is about 2, 00,000 ckm which is less than 1% of the total fresh water resources. For sustaining the lifestyle of an average European or North American for each of the global population it may require 3.5 planet earths. In other words the planet earth is not so well placed with respect to available fresh water resource considering the burgeoning population. As per the UN document water scarcity already affects almost every continent and more than 40 percent of the world population. By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world's population could be living under water stressed conditions. This necessitates out of the box thinking on the use of water to bring in equity as well as efficiency in such a manner that it is available to all including the voiceless stakeholders in a sustainable manner.

In early civilizations, water played a relatively simple role. It was needed for transportation and drinking and it provided a fishing and hunting source. Overtime, sedentary agricultural societies evolved and water use became more important. Families began settling near springs, lakes and rivers to supply livestock and crops with water, gradually developing technologies to divert water for irrigation and domestic purposes. Babylonian, Egyptian, Hittite, Greek, Etruscan, Roman, Chinese, Mayan, Incan and other empires constructed water delivery systems such as long aqueducts to carry water to large cities. (Yevjevich., 1992). In fact, until the middle of the twentieth century, most societies were able to meet their growing water needs by capturing reliable and relatively inexpensive sources.

When water is plentiful relative to demand, water policies, rules and laws tend to be simple and only casually enforced. As populations grow and economies expand, water sectors evolve from an "expansionary" phase to a "mature" phase (Randall., 1981). At a certain point during the expansionary phase, the financial and environmental costs of developing new water supplies begin to exceed the economic benefits. A water sector in the "mature" phase is characterized by rising marginal costs of providing water and increasing interdependencies among users. In this phase, conflicts over scarcities and external costs arise. External costs result when one user interferes with another's supply, e.g. when an upstream user pollutes a river and raises costs for downstream users. These conflicts eventually become so complex that elaborate management systems are needed to resolve disputes and allocate water among different users and competing economic sectors.

Developing effective water sector policies is troublesome for a number of reasons. First, water has unique physical properties, complex economic characteristics and important cultural features that distinguish it from all other resources. Second, water resource management is administratively complicated because it involves legal, environmental, technological, economic and political considerations[1]. In most societies, political considerations dominate decisions on water resource use. Nonetheless, most policy options are framed and discussed in economic terms.

Water once viewed to be a local problem got global focus through the UN resolution 44/228, dated 22.12.1989 calling for UNCED[2] (UNCED, 1989), at Rio-de-Janeiro in which all the environmental issues listed in paragraph 12 of Section-I were directly or indirectly related to water. At the Rio, 1992 the famous Agenda 21 carried a separate chapter on fresh water issues (Chapter-18) calling for (UN, 1992) appropriate action by the world community including pricing as in Para 18.15:

"Pursuant to the recognition of water as a social and economic good, the various available options for charging water users (including domestic, urban, industrial and agricultural water-user groups) have to be further evaluated and field-tested. Further development is required for economic instruments that take into account opportunity costs and environmental externalities. Field studies on the willingness to pay should be conducted in rural and urban situations."

[1] For example, water resource management depends on the government's ability to establish an appropriate legal, regulatory and administrative framework. In fact, markets are based on a system of enforceable private property rights. Private water markets require secure and transferable property rights, including the right to exclude other users.

[2] United Nations Conference on Environment and Development (UNCED).

The Rio+20 (UNCSD[3], 2012) declarations i.e. 'The Future We Want' also has identified the importance of water by stating in Para-119 as:

"We recognize that water is at the core of sustainable development as it is closely linked to a number of key global challenges. We therefore reiterate the importance of integrating water in sustainable development and underline the critical importance of water and sanitation within the three dimensions of sustainable development."

The FAO[4] in its document titled *"Economic Valuation of Water Resource in Agriculture - From the sectorial to a functional perspective of natural resource management"* (Brouwer, 2004) has advocated for need to challenge and change the fundamentals of the prevailing techno centric water resources exploitation world view to a more suitable approach to water resources allocation in the new century if the world's population is to be adequately fed, without further degradation and destruction of the planet's critical ecosystem services. Water productivity needs to be greatly enhanced and economic cost-benefit analysis and pricing regimes can play a significant role in such a process buttressed by technological innovation and institutional changes to encourage a more equitable distribution of resources and mitigation of potential international conflicts across 'shared' water basins.

The European Union (EU) in its Water Framework Directive (EU WFD[5], 2000) also recommended change in approach by mentioning:

"The use of economic instruments by Member States may be appropriate as part of a programme of measures. The principle of recovery of the costs of water ser-

[3] United Nations Conference on Sustainable Development (UNCSD).
[4] Food and Agriculture Organization (FAO)
[5] European Union Water Framework Directive (EUWFD)

vices, including environmental and resource costs associated with damage or negative impact on the aquatic environment should be taken into account in accordance with, in particular, the polluter-pays principle. An economic analysis of water services based on Long-term forecasts of supply and demand for water in the river basin district will be necessary for this purpose."

The National Water Policy (NWP) of India, 2012 (MOWR[6], 2012) also talked of water pricing in Para-7.1 and 7.4 as follows:

"Pricing of water should ensure its efficient use and reward conservation. Equitable access to water for all and its fair pricing, for drinking and other uses such as sanitation, agricultural and industrial, should be arrived at through independent statutory Water Regulatory Authority, set up by each State, after wide ranging consultation with all stakeholders." and

"The principle of differential pricing may be retained for the pre-emptive uses of water for drinking and sanitation; and high priority allocation for ensuring food security and supporting livelihood for the poor. Available water, after meeting the above needs, should increasingly be subjected to allocation and pricing on economic principles so that water is not wasted in unnecessary uses and could be utilized more gainfully."

The state of Maharashtra which is pioneer in the water sector reforms in India passed its Maharashtra Water Regulation Act, 2005 where pricing of water was included as one of the functions of the Regulator, by stating:

"to establish a water tariff system, and to fix the criteria for water charges at sub-basin, river basin and State level after ascertaining the views of the beneficiary

[6] Ministry of Water Resources (MOWR) is the nodal ministry for assessment and allocation of water resources in India.

public, based on the principle that the water charges shall reflect the full recovery of the cost of the irrigation management, administration, operation and maintenance of water resources project "

All the above global, supra-national, national and sub-national declarations display the fact of wide spread convergence on treating water as an 'economic good' as it is a scarce resource having competing uses. But it is not clear as to how water should be priced so that it can play an important role in the economy and help towards its sustainable use. Water in sea or river can be considered as a 'common good' due to its non-excludable and non-consumptive pattern of use but water supply in any form is finite and rival in use hence an 'economic good' which needs appropriate economic instrument for its management and equitable distribution. For better water use efficiency, protection of the environment and creating avenues for innovations in water sector as well as bringing social equity it may be necessary to know its true economic value. In this context the present study is an attempt towards understanding the linkage of 'water pricing[7]' to the sustainable development agenda and review the adequacy of the policy paradigm in India. Further effort has also been made to find out the appropriate pricing mechanism for this sector in India considering its vulnerability.

1.2 Objectives

Pricing has always been identified as a management instrument towards achieving a goal particularly in case where there is scarcity of a resource. Further it promotes economic activities, creates gainful employment while ensuring equitable distribution through government interventions where ever necessary. The

[7] The "price" is "the amount of money to gain a product or service".

purpose of this study is to identify appropriate pricing method for water resources in India as it is felt that:

1. Appropriate water pricing would help in meeting the challenges of water scarcity, its equitable distribution, improvement in water use efficiency through innovations.
2. It is also expected to help in water conservation and reduce the tradeoffs between water, food and energy nexus thereby helping sustainable development.
3. Water pricing can be an economic instrument for the government to enforce social equity and target subsidy towards the neediest ones without affecting the quality or quantity of service.
4. Benchmark pricing of water should be able to promote water trade across basins as well as across political boundaries.
5. Pricing would help in deciding the true value of other products carrying virtual water[8] thereby helping the natural ecosystem and preservation of natural capitals for the future generations.
6. Appropriate pricing mechanism only can bring in investments from private sector and financial institutions to this sector which has been dormant till now.

1.3 Material and Methodology

The purpose of this research is to find out the gap in the approaches towards pricing water resources in various countries particularly in the advanced European countries and that of India. Since, the available time was not sufficient for

[8] Virtual Water refers to the hidden flow of water if food or other commodities are traded from one place to another.

collecting data from the field it was decided to pursue this study based on the literature available and the data from secondary sources. Moreover, the research aims at a holistic view of the water pricing issues across the world and compare it with that of India and examine if the policy responses are adequate to meet the commitments made at Rio+20 for which collecting large amount of primary data was not feasible. Therefore, effort has been made to refer to the data and studies from the authentic secondary sources published through papers, articles, reports, conference proceedings, court judgments and books with the objective of establishing a theoretical framework to facilitate the understanding of 'water pricing' in relation to sustainable development agenda with special reference to India.

1.4 Scope and Limitation

This research has no intention to give a pure theoretical contribution in water economics. It only takes a look at the conceptual framework of water as an economic good with the aim to understand how to link water pricing to sustainable development in all its three dimensions.