TRADE IN REAL WATER AND VIRTUAL WATER
International Trade Regime

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*[**Abstract**: Water is an essential element of life. No known living being can function without water. It is abundantly available in nature but its quantity remains limited. Overall availability of water is in excess of the requirement. However, its distribution is skewed among nations and among regions of a single nation. Because of increase in population, agricultural growth and industry expansion, the consumption of water has been rising at an alarming rate. Per Capita availability of water has been declining in many parts of the world and in different regions within a country. Many nation states have reached the stage of water stress where existence is precarious and process of development is threatened. While National Governments are taking initiatives to facilitate access to safe water by their nationals, transfer of water across various regions and states has come into existence in a big way resulting in a regular trade in water from water rich areas to water scarce areas. The growth of trade in the form of bottled water is significant and a large number of multinational companies are already in the fray and have been driving with better prospectus in site. Bulk transfer of water in containers has also begun between the nations and this mode of water trade is being planned in a big way. Besides transfer of water from one basin to another is a distinct possibility. Water is essential for all life systems and trade in any form of this resource has not only to be compatible to environment, but also has to assure its availability to a common man to meet his requirements. Growing Trade in water may attract GAAT regulations in not too distant future. A constructive interpretation would be required so that Member states are enabled to apply for exception to the General obligations in the interest of sustainable trade of water and also concerns for equity get addressed.*

Normal Trade in exchange of goods and services also results in exchange of water in virtual form as water is being used for the production of the goods and services being exchanged. Efficient use of water resources would command that water deficient states should be importing water intensive products and similarly states with excess water should be exporting water intensive products. Market access should be controlled by the International Trade Regime accordingly and such non trade issues be part of the Trade Regime in the larger interest.]

Noted scientist, C.V. Raman, termed the commonest of all liquids, plain water as the elixir of life capable of conferring immortality[1]. Water is the magical substance from which all life springs forth, is essential to every life form on earth. The role of water to living organism has not changed since life's first creation in salt water billions of years ago[2]. Scientific studies conducted on the properties of water from the Hunza Land in the mountains of northern Pakistan where people typically live healthy and well into their 100's revealed that Hunza water was different from all other water in distinct ways whose surface tension was lower than other water, making it more compatible with body fluids and thus was readily absorbed enabling hydration of

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1 Raman, C.V., "The Elixir of Life," II Let's an article, Standard X English Coursebook, Pp. 111–114.

2 Saunders, Terry L. (2011), "Water – The Elixir of Life," http://www.sunherb.com/water.htm

body in the way nature intended[3]. Therefore, to maintain the body systems, humans should not only be drinking prescribed minimum quantity of water every day but that water should be of appropriate physical and chemical properties. Water is prone to get polluted because it is a universal solvent and whenever it travels, water carries chemicals, minerals, and nutrients with it. Though 70 to 75% of the earth's surface is covered with water, usable water is about .007% of the total availability of 1386 million km^3. Most of the usable water is in ground water aquifers, rivers and freshwater lakes. The earth being a closed system, rarely loses or gains extra matter. The same amount of water that existed on earth millions of years ago is still present today[4]. Thus, the quantum of water available on the planet cannot increase though its need (because of increasing populations and human endeavours) may be continuously on the rise, i.e. aggregate supply is inelastic in the face of increasing demands which needs to be met optimally for sustaining life and its quality.

In order to meet water demand, humankind has always modified the hydrological cycle by building wells, dams, reservoirs, aqueducts, water supply systems, drainage systems in large irrigation projects, and other structures. Governments and public institutions spend large amounts of money in implementing and maintaining such installations[5]. Despite all efforts, approximately more than two billion people worldwide live in regions facing water scarcity.[6]

Total water demand in the water was estimated at 3940 km^3 in 2000, or a fraction of the total amount of water available. There is no shortage of water at world level, but the inappropriate spatial and temporal distribution of the resources, and this imbalance can cause permanent water deficits in given areas. Another important factor in determining water scarcity zones is the distribution of the population. An analysis of water availability per unit area in each country shows major differences in the geographical distribution of water resources. These values vary from 388.3 m^3/km^2/year in Mauritania to 1,800,000 in Panama. The same phenomenon occurs

[3] *Ibid*.
[4] "20 Interesting Useful Water Facts," AllAboutWater.org. See also, "Water Resources in the World," http://hidroweb.ana.gov.br/doc/WRMB/part1.htm
[5] "Water Resources in the World," http://hidroweb.ana.gov.br/doc/WRMB/part1.htm
[6] Brooks, Nina (2007), "Imminent Water Crisis in India," The Arlington Institute.

with water availability per inhabitant in each region. The uneven spatial distribution of both water resources and population worldwide generates the most diverse scenarios. In some cases, water scarcity results from low water availability in the region at a given time and, in others even with plentiful water, scarcity occurs due to excessive demand.

The concept of water stress is based on the minimum water required to maintain adequate living conditions in moderately developed regions located in arid zones. This definition is based on the assumption that 10 litres of water (36.5m^3/year) is needed on a daily basis to meet domestic needs and maintain good health. Further, 5 to 20 times of this requirements of (36.5m^3/year) would be towards meeting the needs of agriculture, industry, power generation, and other uses. On the basis of these numbers, specific levels of water stress have been defined as follows[7]:

> 1700 m3/inhabitant/year	only occasional shortages
1000 < 1700 m3/inhabitant/year	Periodic and regular stress
500 – 1000	chronic shortages
< 500	Absolute scarcity

When availability per inhabitant falls below 1000m^3 economic development and quality of life is negatively impacted.[7]

Many solutions have been conceived and some of them are also under implementation to address the water scarcity. These options range from desalination, recycling, conservation, rational usage, change in crop patterns rainwater harvesting, etc., as per the local conditions and adaptability at macro-level. Wherever there are strong institutions and co-operation, Water Treaties between/among the nations have given positive results in otherwise conflicting situations. For example, the Indus River Commission and Indus Water Treaty survived two wars between India and Pakistan and have served the people on both sides on their water needs. Even the Mekong Committee has functioned since 1957 and survived the Vietnam War. Even the dispute between India and Bangladesh over the sharing of Farakka Water was sorted out. A common feature of all the resolved

[7] *Op. cit*. 5

disputes mentioned above has been that the negotiating parties approached the problems recognising the needs of each other in arriving at sharing the water resource. The international community would need to have a rational, reasonable and open approach to bilateral and multilateral water treaties which have been lying there ineffectively in the largest interest of the precious source like water towards over coming fast approaching scarcity levels. Such treaties need to be reworked to eliminate unequal distribution so that areas with plentiful water resources would not be able to hoard them. Instead, the treaty would be exceedingly beneficial in resolving water disputes as well as reducing tensions and animosity among nations.

When there are regional scarcities, as in water as demonstrated above, the resource has the potential of being redistributed among scarce areas from the areas which have excess of such resources beyond their immediate requirement. In economic terms, such an activity would be termed as 'trade'. In fact, transfer of water from one place to the other has been there from ancient times through animal driven carriers and human carriers. Even today, in India, such a mode can still be seen at various construction sites and places of worship like mosques. Human carriers in India have been known as *Bhistis*, who used to supply water to households in exchange of grain. Their profession was considered pious and the name of their professions is of Persian origin, meaning paradise. This profession ran in the families from generation to generation. Near the Shahi Mosque at Jama Masjid, New Delhi, Bhisti's can be seen serving water to the devotees and they also supply water to the nearby establishments for their requirements. Such mode of water trading is fast diminishing due to availability of faster transport systems[8].

Water trading in the form of Ice trade has been in existence since the Mughal period in India whose elite were fond of cold *sherbat* in the hot and humid climate of Delhi. Ice used to be carried in horse-driven carriages from the Himalayas all the way to Delhi to satisfy the taste buds of the Mughal kings and the elites. In 1833, the New England vessel Tuscany landed at Calcutta with 180 tons of ice[9]. The ice was admitted duty free on the demand of the people. The entire shipload was bought

[8] Sinha, Chinki (2011), " The Waterman," indianexpress.com
[9] Cowen, Tyler (2004), "The Ice Trade," *Marginal Revolution.*

and American Investors made a neat profit of $10,000/-. By the 1850s, American ice was being exported regularly to nearly all tropical ports, including Rio de Janerio, Bombay, Madras, Hongkong, and Batavia (now Jakarta). In 1847 about twenty-three thousand tons of ice was shipped out of Boston to foreign ports on ninety five ships, while nearly fifty-two thousand tons was shipped to southern American ports[10]. While Britain had been importing ice from Boston, USA, first consignment of 400 tons of Ice from neighbouring Norway arrived in London in 1857 and thereafter Norwegian ice dominated the British market for the next 40 years, when ice manufactured in factories began to compete with natural product. In 1890, the ice export from Norway was of the order of 3,40,000 tons per year. Norway and Britain had developed an elaborate infrastructure to facilitate this trade[11]. Despite artificial factory made ice being available, natural ice imported from Norway retained a strong market position until World War I[12]. International trade in water in its frozen form was occasioned by the demand of elites to satisfy their craving for cold drinks, *sherbats*, ice cream, etc. And further for preservation of food. It was not occasioned by the scarcity of water to meet the basic minimum requirements for sustaining life. Over the years, because of often repeated reasons of increase in population, agricultural growth and industrial production, urbanisation, contributory factors like climatic changes has resulted in about 2 billion people having difficulty in accessing water to meet their basic requirement. In the face of inefficient water distribution systems and water management capabilities of countries, a view has gained support since 1990 that private initiatives are crucial to address the scarcity issues of water. This has paved the way for aggressive merchandising of water, with private companies taking control of water distribution in more and more countries and water itself emerging as a full-fledged commodity packaged in bottles that are branded and sold as consumer goods. Giant transnational water, food, energy and shipping corporations were, and are still, lining up to take advantage of world's water shortage, water pollution and lack of water quality. They began acquiring control of water through the ownership of dams and waterways; the development of

[10] *Ibid*.
[11] canalmuseum.org.uk/ice/iceimport.htm
[12] eprints.lse.ac.uk/22471

new technologies such as water desalination and purification; control over the burgeoning bottled industry, the privatisation of municipal and regional water services, including sewage and water delivery; the construction of water infrastructure; and water exportation[13]. The 'water industry', a relatively ignored industry till the 1990's in terms of investment, had corporations with varied business interests resorting to mergers and takeovers with already existing water companies. The pattern of mergers left no doubt that multinationals with investments in diverse sectors view the water market as just another market and just another source of profit. A number of large pipeline and energy and electricity companies have entered the water field, which promises great profits from convergence[14].

During the last fifty years, human population has increased by 240 per cent to 6 billion people. By 2050, human population is estimated to be about9 billion. Global consumption of water is doubling every 20 years, more than twice the rate of population growth. By 2025, the demand of fresh water is expected to rise to 56% above the amount currently available. This demand for water needed for sheer survival is compounded by the need of water for industries, agriculture, livestock maintenance and other activities. Thus demand will continuously increase and so would scarcity as this natural product is finite and essential for survival. Scarcity persists even in region of developed would like USA, Europe and developing economies like India and China who are endowed with sufficient water resources in aggregate. In a situation of perennial scarcity of a product with no expiry date and a dire necessity to everyone, the tendency in the prices would be always on the rise. Because of generally prevailing skewed economic development, only the richer sections of the society would retain the capacity to pay for commercial water in a rising market. The operators would have a market where profits are guaranteed and that too of a high order while the costs on production are minimal.

When profits sound as they do, there are bound to be intense rivalries among the corporations to the extent of seeking footholds through political manipulations and

[13] Francis, Mohan G. (2002), "Water Tensions and Water Conflicts: 'Merchandising Water', the Catalyst," www.networkideas.org

[14] *Ibid*.

even corruption usurping the profits and preventing other transnational corporations from doing the same—this is all that matters to the one already with the foothold in the market. On the other side, water would also remain a public good issue because of its essentiality to the very survival of life, agriculture and industry. No government and society can leave the issue of water to be decided upon by the business groups, motivated by profits, only. Proper lines would have to be drawn and regulations developed if free trade approach is likely to create unmanageable conflict situations.

If the existing treaty system of international trade and services cannot address the issues in a balanced way, there may be need to workout a specific treaty system to address the concerns of all the stakeholders, animal lives, plant lives and environment in general for the maintenance of sustainable growth in a meaningful manner.

Commercialisation of water resources including for the purpose of international trade, are raising growing concerns among local communities and environmental organisations over the over-exploitation of water resources and the impact of international trade agreements on national environmental policies. The topic of water may come up for discussion at some stage within the framework of WTO.

Bottled water and other drinks containing water such as soft drinks and juices of different formulations have been the most common methods through which water has been traded for long and on an increasing scale. The increasing trade of water in bottled form has been perceived as a source of over-exploitation of ground water deposits with consequential effects resulting in lowering of water levels, increase in salinity and even in pollution.

Water can also be traded in bulk from as well. Traditionally water has been transferred within national territories through canal systems and pipelines. The concept of transferring water in bulk through development of various technologies across the national boundaries has been on the anvil. Historically it has taken place

in the form of Ice trade in the nineteenth century as described in the preceding paragraphs.

At this point of time in history, a range of human endeavours are being made to pursue the possibility of towing icebergs for meeting the shortage of water under the maxim that extraordinary situations demand extra ordinary solutions[15]. In yet another endeavour, an initiative has been taken to transport fresh water in the specially designated containers from Alaska to India and envisioning water hubs in the Arabian Sea, East China Sea and Caribbean Sea, according to its 2010 record quarter U.S. Securities and Exchange Commission report[16]. It appears that new bulk storage and transfer technologies have been developed to make it possible to move large volumes of water across long distances for commercial purposes; growing scarcity of the resources in some countries means that value of water has increased, making the water trade market appealing for the market players. Despite the high cost of transferring water in the world between water rich and water impoverished countries, there is increasing momentum for the establishment of an international water market by Corporations. The bulk transfer of water on commercial basis is becoming a reality and large scale water transfer among states in a distinct possibility. In fact, there are identifiable water pacts between Turkey with countries like Iraq, Israel, Syria, Jordan and Greece. European commission has proposed transfer of water from Austria to Southern Europe. There have been several proposals for division of water from Canada to U.S.[17].

Well meaning concerns have been expressed by the local communities of the water surplus regions and the environmental groups fearing loss of ecosystems, damage to natural habitats, harm to biodiversity and disruption of aquifers and underground

[15] Smith, Lewis (2011), "Water company bosses plan to tow icebergs up Thames," *The Times*, May 17. See also, Grose, Thomas K. (2011), "Just Thaw And Serve," *TIME*, May 29.

[16] Walton, Brett (2011), "Bulk Water Company Plans to Export to India, East Asia and the Caribbean," circleofblue.org

[17] Gualtieri, Alix Gowlland (2008), "Legal Implications of Trade in 'Real' and 'Virtual' Water Resources," IELRC Working Paper 2008 – 02.

water systems. It is feared that even bulk supplies through super tankers would affect water supplies along the coasts[18].

Alix Gowlland Gualtieri[19] has examined the applicability of GATT/WTO regulations on water trade. It has been recognised in this study that water becomes a 'good' when it is transferred from natural state, bottled and sold commercially. Similar would be the case when drinks containing water are sold. Trade of water in bottled form has come to be treated as commodity and water products such as beverages and juices have been identified as 'goods' for tariff purposes. The inclusion of water in the Tariff Heading has been interpreted by some to imply that not only has water been transformed from its natural state, but also that water, in any form, can be considered a 'good' and then be covered under GATT regulations if traded between states. But, there are contrasting views. By merely putting water and its products under Tariff Heading does not make water a 'good' unless it is specifically recognised as a 'good' among the parties to GATT. The classification of water as a 'good' in Tariff Regulations merely is the manner in which customs authorities would deal with water and its products for tariff purposes.

Alix Gowlland Gualtieri puts forth a view that the question of whether or not water in its bulk form can be considered a good or product under GATT is far from being settled, since there have been no disputes report regarding water submitted to Dispute Settlement Body (DSB).

Katsuni Matsuoka[20] points out that two years after the UN Conference on Environment and Development in Rio in 1992, at the end of Urugay Round at Marrakesh in 1994, the countries of the world, in establishing WTO, paid more attention to the environmental protection tied up with the notion of sustainable development. In the Marrakesh Agreement, the countries recognised so in its preamble.

[18] *Ibid*.
[19] *Ibid*.
[20] Matsuoka, Katsumi (2001), "Tradable Water in GATT/WTO Law: Need fro New Legal Frameworks?" www.awra.org

The WTO members recognize "the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment". The new arrangement significantly sought to include the phrase 'The Optimal Use of World's Resources" in substitution of the phrase, "the full use of resources". This resulted in bringing environmental issues into the mainstream of the WTO work and significantly DSB started taking more environmentally friendly positions.

While water trade has come to be recognised a means of transferring surplus water to areas of scarcity, states also have a sovereignty to control their domestic water resources and to protect the watershed environment from over exploitation. Environmentalists and naturalists argue that water is different and should not be brought into free market. Scientific Research lends support to the argument that it is impossible to calculate the replacement rate of water resources, most of which are underground acquirers[21].

Katsumi Matsuoka[22] has raised pertinent questions such as: Has international trade law developed sufficiently to balance the conflict of economic goals and need to protect aqua-environment? Can import and export of water be sustained without environmental degradation? Such issues, according to this study are beyond the scope of traditional international law. If we add the dimension of equity of distribution of this life saving resource, the situation would be more complex from the legal point of view. Let us see what scenario would emerge if GATT provisions are made applicable to the International Trade of Water in all forms because it would be artificial to demarcate the trade between large and small scale water standard.

Articles I and III relate to the principle of non-discriminations in two aspects: the most favoured nation (MFN) and national treatment. The MFN treatment principle of GATT, Article I means that all WTO members must be on "equal footing" and grant each other equal treatment of like products originating or destined for the territories

[21] *Ibid*.
[22] *Ibid*.

of other WTO members. The national treatment principle of Article III means that once goods have entered market, they must grant equal treatment for foreign and domestic goods.

Article XI(I) prohibits the quantitative restrictions on import or export of goods except as provided under Article XI(2) (a) as a temporary measure to relieve critical shortages of food stuff or other essential products Article XI(2), however, permits non-quantitative restrictions on export by the use of fiscal measures.

Provision of providing quantitative restrictions has been built in Article XX—which are in the nature of general exceptions to the obligations of the Members. These are as follows:

Article XX (b): allowing a member state to apply export restriction necessary for the protection of human, animal or plant life or health;

Article XX (g): providing for measures relating to conservation of exhaustible natural resources; and

Article XX (j): setting for the measures essential to the acquisition or distribution of products in general or local short supply.

Article XI (2) addresses the issue of temporary scarcity and thus would not be of relevance in seeking exceptions on a long term basis on the subject of Water Trade in order to preserve the environment. Although Article XX does not explicitly mention the environment, it offers a basis for deviating from GATT principles in support of environmental policies necessary for protection and conservation of natural resources and human, animal or plant lives. Thus, if exceptions are sought to be located to the general obligations of Members under the GATT regime, Article XX may be available. Alix Gowlland Gualtieri[23] and Katsumi Matsuoka[24] have separately observed that the scope of the Articles XX (b) & XX (g) is governed by the wording of "Chapeau" of Article XX which is towards maintaining a balance between the right of a state and rights of other states. Thus, when one state invokes Articles like XX (b) & XX (g) in its endeavour to seek exception in the cause of environmental protection the same has to be weighted with the rights of other states enshrined in the main

[23] Gualtieri, *Op. cit.* 17
[24] Matsuoka, *Op. cit.* 20

provisions of GATT. Both the authors, however, note that GATT/WTO decisions have taken a broader view of the term "exhaustible natural resources". In the Shrimp-Turtle case, the Appellate Body of the WTO adopted evolutionary notion of this term referring to "the objective of sustainable development" of the WTO agreement. Katsuni Matusoka has an impression than water likewise would be within "exhaustible natural resources". However, Alix Gowlland-Gualtieri would like to see an actual finding of the DSB if ever a case regarding water trade is brought before it. The exporting state, even if it succeeds to get an exception, has to restrict its domestic consumption also to remain within the meaning of XX (g).

With advancement in Industrial Growth, agriculture production and population accretion, the capacity of water exporting nations would shrink while the demand of the water scarce countries would increase. The water surplus countries may like to invoke provisions of XX (b) and XX (g) en masse and for justified reasons jeopardising the existence of water scarce nations. Therefore, a solution beyond the present trade regime has to be worked out taking note of the special nature of the product without which no life form can survive. Further, there is a question of equity. In the ongoing scheme of things, precious resource is flowing towards those who can afford to pay whereas the population at the other end of the spectrum is getting less in quantity and lower in quality with each pumping cycle of water from groundwater for trade, say, in bottled water form. Still further, the increase in volume of trade is playing havoc with environment and is a heavy load on oil resources which are expended in producing bottles and in transporting the processed water. When, on the subject of water trade, a note needs be taken of the concept of 'virtual water' which is defined as the volume of water required to produce a given product. The concept of virtual water was developed by Professor John Anthony Allan of the U.K. Water is said to be virtual because once the product is ready or service is rendered, the actual water used for that product or for that service is not visible[25]. Working further on the concept of virtual water, A.Y. Hoekstra and others[26] developed the

[25] "Virtual Water," *Wikipedia.*

[26] Hoekstra, A.Y. and A.K. Chapagain (2005), "Water footprints of nations: Water use by people as a function of their consumption pattern," Water Resour Manage (2006), DOI 19.1007/s11269-006-9039-x

concept of water footprints of nations. The water footprint of a country is defined as the volume of water needed for the production of the goods and services consumed by the inhabitants of the country. Every country is dependent on imports and exports of goods and services. Thus, there is domestic component water footprint and the imported water footprint in the overall consumption of goods and services of a nation. Hoekstra and others[27] have calculated the water footprint of each nation of the world for the period of 1997–2001. According to this study, eight Countries—India, China, the USA, the Russian Federation, Indonesia, Nigeria, Brazil and Pakistan—together contribute 50% of total global water footprint. India (13%), China (12%) and the USA (9%) are the largest consumers of global water resources. Both, the size of the national water footprint and its consumption differ between countries. On the one end is China with a relatively low water footprint per capita, and on the other end is USA. In rich countries consumption of industrial goods has a relatively large contribution to the total water footprint if compared with developing countries. The contribution of the external water footprint to the total water footprint is very large compared to other countries. The consumption of industrial goods very significantly contributes to the total water footprint of the USA (32%); but in India it is only 2%[28].

Hoekstra and others[29], in their paper, have presented the average water content of some selected agricultural and poultry and meat products for select countries. It presents an interesting and important picture about the quantity of water which goes into process of producing a unit of a product; which generally escapes the attention of a common user of that product. For example, in 200 ml of milk, virtual water content is as much as 200 litres or 1 kg. A potato has virtual water content of 250 litres, one cotton T-shirt (250g) has virtual water content of 2000 litres, one hamburger (150 g) has virtual water content of 2400 litres and so on.

The above statistics would explain as to how the water footprints of high consumption economies and also meat consuming nations are high. Countries like

[27] *Ibid*.
[28] *Ibid*.
[29] *Ibid*.

USA, Italy, and Switzerland would fall in this category. Similarly, if the production processes are not very efficient or they are not carried out in optimal climatic conditions, the water footprints would get inflated. This also presents a key to reduction of water footprints by way of promoting sustainable consumption which would include reducing consumption of meat products and also by adopting water efficient techniques in production processes. On an integrated scale, production processes having high water intensity, are relocated to water surplus regions and productions needing lower quantity of water are relocated to regions which are not rich in water resources.

The concept of virtual water has placed in position a management tool for the efficient use of water resources and may serve to create awareness among consumers in general about their consumption of water where they use apparently a dry product, e.g. a computer chip. A rating system could be developed for labelling the products with reference to the virtual water content.

The concept of virtual water when built in the commodities which are subjected to trade, would give rise to the concept of virtual water trade that gets built in when conventional trade takes place. A water scarce country, in search of balancing its trade, may be exporting this virtual resource thus limiting its options. Some countries like Israel do discourage the export of oranges (relatively heavy water guzzlers) precisely to prevent large quantities of water being exported[30].

Vijay Kumar and Sharad K. Jain have presented a picture of status of virtual trade from India[31,] relying on estimates made by Hoekstra and others and referred to above. This study has brought out that during the period 1997–2001, India on an average exported 45.72 Gm^3/year of water and imported 71.62 Cm^3/year and thus was net importer of virtual water to the extent of 25.93 Gm^3/year.

This study has highlighted a view that virtual water import policy may not be of relevance to India as it has many socio-economic implications but virtual water

[30] *Op. cit.* 25

[31] Kumar, Vijay and Sharad K. Jain (2007), "Status of virtual water trade from India," *Current Science*, Vol. 93, No. 8, 25 October 2007.

management needs to be integrated into policies and practices. It has further pointed out that strategy of virtual water import has not been included towards assessing the water needs of India, say, in 2050.

The study by Vijay Kumar and Sharad K. Jain referred to above adds a dimension towards appreciating relative issues of water from the perspective of different states in the scenario of existing state of natural endowments. States like Punjab, which do extensive cultivation of cotton and paddy for export to other countries and other regions within the country, export huge quantities of virtual water and thus look forward to an accommodating stand from these states that compete with them for water sharing. Similarly, the contribution of states like NE in terms of their contribution on account of virtual trade by providing potential for hydropower needs to be appreciated in allowing them special treatment for development of their infrastructure. Appreciation of such an approach by respective states needs to be kept in view when there are water sharing issues among the states.

Alix Gowlland Gualtieri[32] has attempted to workout the relationship of Virtual Water Trade with International Trade Rules. International Trade in Virtual Water would better fit in the exchange of products and services if such a trade is deliberately towards using world's resources of water efficiently and in a sustainable manner. It would rest indeed on the further development of global trade liberalisation by developed and developing countries in order to encourage water scarce countries to increase imports of agricultural water intensive products and for water rich regions to grow water intense products for export world wide.

International Trade already involves significant part of products whose production is water-intensive. It is important to assess whether the international trade rules allow for the integration of the social and environmental values of water when trade in water intensive crops takes place.

The Agreement on Agriculture grants special and differential treatment for least developed countries and developing countries in recognition of their particular

[32] Gualtieri, *Op. cit.* 17.

situations and problems. This classification does not take into account the differences in water needs of various member states. In the Ministerial Conference in Doha, a note was taken of non-trade concerns, such as environmental protection; food security and rural development. However, water scarcity as one of the non-tradable concerns has not been mentioned directly. Trade negotiations on agriculture were suspended in 2006. In renewing the market access regime, it is for member states to take into account not just trade factors such as competitiveness, but also the particular requirements of water intensive agricultural products. In this approach, tariff level and minimum access would be determined in light of water conservation requirements with a view to reducing access to market of water intensive products to countries with excess water and increasing access to market of water intensive products to countries with water scarcity. Tariff structures could be built to take care of seasonal fluctuations of water availability. Such a division would enable the water scarce countries to use this scarce and essential resource for basic human needs.

Some domestic subsidies do result in excessive use of water. For example, excessive irrigation subsidies and power subsidies can encourage farmers to be liberal in the use of water detrimental to environment and sustainable growth. Continuation of such subsidies may encourage unsustainable water trade. Water related subsidies in relation to the intensive use of water need to be addressed. Domestic support measures resulting in virtual export of water could be placed in Green Box Category. Initiatives of well meaning thought processes and non trade considerations for protection of water resources have to be included in the WTO framework.

Trade in Real Water and Virtual water is a reality and in a scenario where availability of resource is limited and the level of consumption is bound to grow and the resource is vital for the survival of human, animal and plant life, its potential for growth is phenomenal. At the same time, it becomes pertinent that the resource is used judiciously, scientifically and in a sustained way with the twin objectives of growth and equity to be met simultaneously. The present international trade regime has to integrate the twin objectives with their scheme by way of objective interpretations and if necessary, by a way of an agreed supplementing regime.