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Sustainable Business Operations –'Blue Money': Connecting Management and Economics

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Abstract

This paper is written to create an interest in sustainable business practices on blue-advantages in Management and Economic fronts. A possibility of orienting business improvements in the concurrence of conservation methods is studied by us in prime focus. Conservation of nature and natural resources with revised restructuring on 'Sustainability' is very important in this modern world filled with globalization and liberalization policies. This paper concerns on non-traditional approaches, making water as a social and economic key factor, shaping future of socially sustainable entrepreneurl practices. It is meant for driving the success of sustainability and its industrial survival, possible. Practices are understood with 'Operations Management' techniques in a common sytax equally applicable across diversified fields in the 'Blue Business'. The paper is divided into three sections; following the introduction, presenting general principles making water as a key-element of study, followed by sections dealing with illustrative estimates of outlays and values in business segments with respect to water resources management and the final being providing with a summary of effects and conclusions.

Keywords: Blue Money, Sustainable Operations, Water Business Management, Water Welfare, Leansigma

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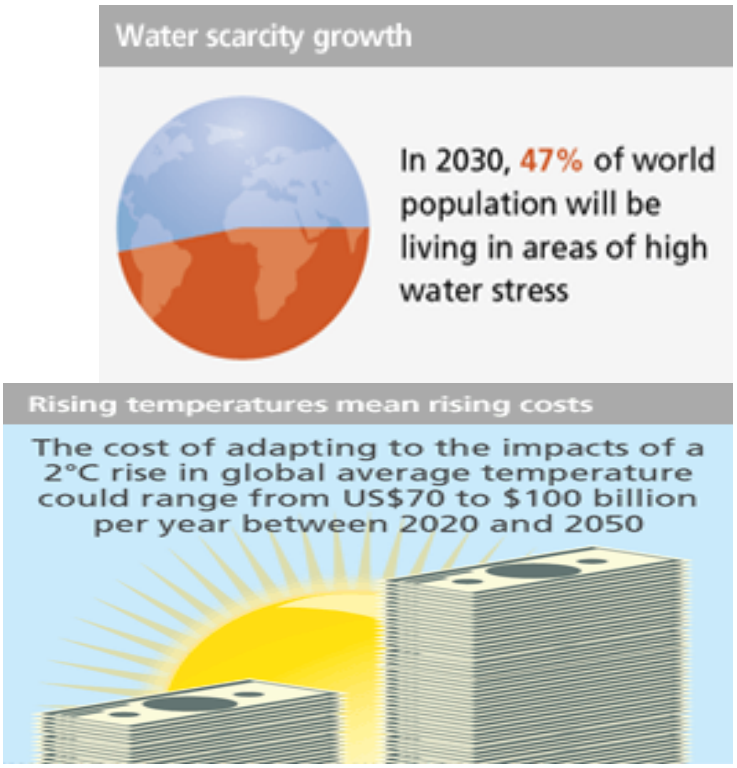
1. Introduction

Global community attends to the calls of constant raise in pollution by untreated Industrial effluents and heavy manufacturing, very well in modern times. Limited availability of natural resources shifts needs for sustainable growth and renewing resources, to an ever gaining importance. It is the right time to concentrate on preserving 'key of all life possibility'- Water. 'Water' is the most endangering among natural resources. Though world is speaking more on water conservation, 'Unlimited-take it for granted' consumption of fresh water by exploiting water resources are not morally perceived from the times of 'Industrial Revolution'.

Constraint of preserving water resources, need for sustainable economic growth, future of water as a depleting natural asset are demanding new 'global management approach' towards water conservation. This business advantage is termed by us, as 'Blue Business'. It needs moral and logical business integration without any blurred visions in Industrial fronts. We need supportive business literatures and they are to be formulated without any overshawdowing of facts. Our paper demands an alarming attention from every stake holders towards two fundamental frontiers: Sustainable Industrial Growth and Conservation of 'Water' as a natural resource! No life is possible without proper 'Ecosystem' balance. It is the right time for the Globe to take maximum advantage of creating and preserving business policies with environmental standards. These policies are needed for higher sustainable values and practices. They are for taking environmental initiatives pressurized as a dominant factor in consumer markets. This creates a trend towards rising conservation standards globally.

Thomas Malthus (1798) mentions that, population growth threatens economic sustainability. It becomes very important for any nation to concentrate on scientific advancements in all possible fields to cater demand and supply. Malthus receives credit for aptly taking up discussions on economic sustainability based on the principle of challenges. With World Bank (2013) study trends, propelling exponential growth in world's aggregate consumption of natural resources, it finds a very strong increase of 671% only in emerging economies. It picturizes growing demand and need for managing conservation practices to demand the need to make 'Nature' as a darling of industries.

Figure 1: Relationship between importance of Water and the effects of scarcity



Source: UN WWDR, 2012

Thomas Malthus (1798) plants series of discussions over fixed supply and consumption of natural resources. He compares prices, availability, usage and fears of environmental scarcity with interest of population, indicating clearer economic definitions of 'Scarcity'.Growing nations' water consumption is only 1/17th of the developed world's (World Bank 2013). Expecting the blame of Exploitation as a burdening responsibility at the shoulders of the 'developed' shared equally with the 'developing' best answers growing challenges of 'Sustainability' and existence of 'Water' as an elixir of life!How to conserve natural resources profitably? How to ensure abundance of water for all ages to come? How to deal with industrial advancementsa blessing turned curse on natural resources? How to implement successful operations management practices in 'water resources conservation'? What is the significance of the counter-intuitive relationship of growth and natural resources (Wright, Gavin and Jesse Czelusta, 2006) in profitable business fronts?

These are some of the very important questions we have tried to answer within the scope of our research!

2.Growing Economies and Industrial Water Management

Lethargies in growing economies in preserving water resources is as given by (Branigan, 2008 'The Guardian') the findings, of one-third of China's Yellow River 'unfit for drinking or agriculture'! With demand-supply on water consumption doubling and trippling over last century (UN Water 2013), it is very easy to infer demands for fresh water surpassing its renewable rate! UN Development Programme 2006 and WHO/UNICEF 2009, warn world on nearly 20% deaths among children under age of five, is only because of 'Water Contamination'. Half of world's hospital beds are filled with water-related diseases. Dangerous exploitation on 'Water' as a market product in many of the second and third world nations threatens sustainability. Policies on pricing water and controlling its natural supply to the needy are trying to make 'water' as a 'luxury product'.

From an Industry standpoint, water consumption and usage begins right from treatment of raw materials for production. Process of manufacturing and production consumes maximum water in terms of a product's evolution. Processes like washing, processing, making solvents, treatments, coolant processing, waste water generation, water after production have maximum value of water exploitation index. Industries are formed generally with less consideration on the landscape over which they are built. In emerging economies, planning of an industry or a business area happens with very less importance to water resources or their preservation standards. Highly corrupt governmental setups and presence of international players further worsen the scenes.

2.1 Industrial Stand-point

An American Survey states that (Thomasnet 2013) NA wastes maximum water in the Globe. This may be because of the advanced, superior and most sophisticated industrial setups at the North American region. Per capita drain is estimated to be 1,800 gallons per day. The figure summarizes consumption of water per person over production and power generation averages.

It is also found, that U.S industries consume maximum of water in sectors of steel, petroleum, chemicals, food processing and automobiles.

UN reports, urbanizations and industrializations to dry fresh water resources in a rate getting tripled over last 50 years. Demand for fresh water is increasing in terms of 64 billion cubic meters a year! Very soon, water is going to be an extravagance for 1/4th of world population estimated to be nine billion by 2050. 'No Water Available' stage is fast approaching!Rain water harvesting, proper sewage disposal, softening hard water and sensitivities associate huge needs of money for a safer environment. While it may be very difficult to recover utilized water, it is easy to reuse and reengineer! Untreated Waste water disposal volumes are very high in industries dealing with chemicals, paints and emulsions.

Investigations of Ostrom (1990) on societal approaches in dealing with water and its resourcing views that, IPR (Intellectual Property Rights) over water conservation helps for raised considerations. They help to demand complete government monitored management of water resources. It is also suggested to have distinguishes in 'collective actions' of government and corporates over common pooling of water conservation measures and water reserves.Industries using large water reserves like leather, clothing, dying, automobiles and energy sectors pay relatively less attention towards recoveringthe value of water they use. As a solution, we integrate management, economics and business perspectives of industrial water handling and waste water disposal to overcome existing limitations through this paper. As untreated water volume is increasingly non-regulated, we answer how to make some good sum of money by applying the concepts of operations management like six-sigma, lean and kaizen over 'Blue Business'!

Sustainable Industrial disciplines taking care of conservation andwater resourcesmanagement, favourably control healthy business practices. Employinginclusive local governance involving participation of locales in water administration makes self-sufficient rules to support conservation of nature. It is one such observations as supported in the research works of Libecap (1974, 1989, and 1996) studying on possibilities of establishing IPR over natural resources.

3. Virtual Water as a Business

We propose that, there is something existing similar to pricing a bottled water known as 'Virtual Water Value' and knowing it in terms of Economy is very useful.

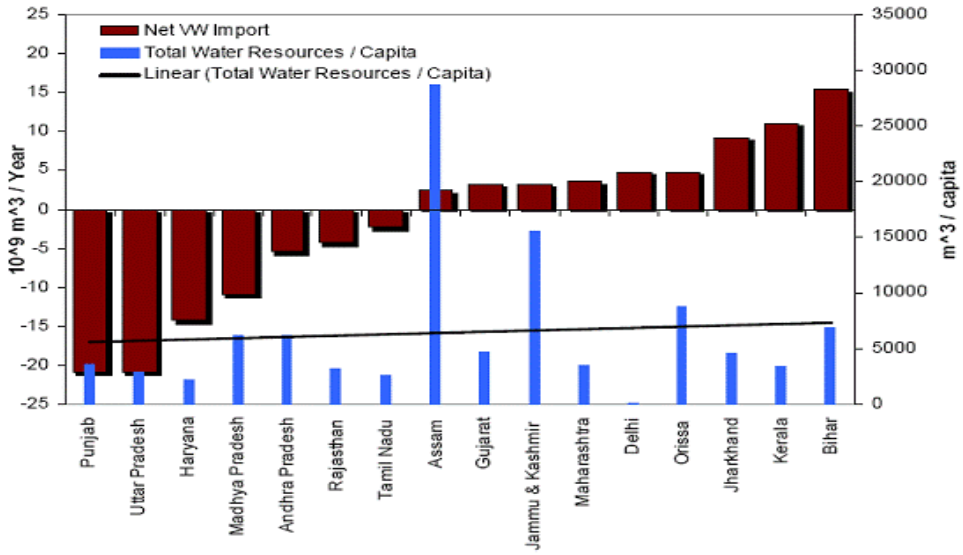
Water is a key driver of economic improvements in a globalized economy (Peter Rogers, Ramesh Bhatia and Annette Huber 1998). Argument of Barbier (2005, 2007) on exploitation of natural resources leading to unwarranted development and unbalanced economic growth is very valid in terms of reaping the economic interests. 'Father of virtual water conceptualization', Geographer John Anthony Allan's definition and research on 'Virtual Water' see, 'water' as a prime factor of determining the fortunes of any Country in the future.

Not just in regions of scarce water, virtual-water guides water abundant countries too. It could be used as warning indicator to show how a nation is exploited because of lack in attending to the concept. Virtual water conceptualization is gaining strength and very soon it would become a measure of determining economical favours similar to those measured presently with 'GDPs'.Geographers match virtual water with every production process and find equivalent quantity of water-money saved within a country, or flown out because of trade processes (Esty, D.C, 1994). Measures of equivalence for produced goods in terms of 'metric tonnes' matched with 'cubic meters' of water employed in the process give perfect economic figures. They are subjective for the need to wake upon 'virtual water management'. With the scope of our research, we are defining this money value associated with 'Virtual Water' as 'Blue Money' or 'Water-Money'.

Understanding Virtual Water in terms of 'need and availability' mapped against import/export policies in a government neccesiates parities like those controlling balances of trades in modern econometrics. Business concepts are blooming up to understand and measure 'eater' associated with imports and exports in terms of what we are proposing, the 'Virtual Water Parity' (VWP).Knowing the value of 'Water Money' is evident from the recommendations in the research works of Humphreys and Sandhu (2007) and Ossowski, (2008, p.3-4, 15, 28) prohibiting exploitations in using funds raised through management of natural resources in a country, the next advanced step in the application of concepts.

They make it very clear that, by earmarking the community funds for developmental activities of education, health, retirement, the concept becomes a futuristic solution for benefiting out the locale, with properly regulated natural resources revenue lessening the burderns of governments. 'Virtual Water Parity' (VWP) is one such effort to guide balances in Natural Resources revenue and to arrive at a scientific equivalence.

Figure 2: Virtual water trade and per capita total water resource availability in India As estimated by Kampman et al. (2008)



VWP serves as a 'Parity' factor to control and measure the equivalence of water involved in direct production and other processes associated with production in 'Absolute/relative Advantages' in terms of 'Water Availability/Need'.There is a new need to understand and bag advantages of 'Virtual Water'. It is by smartly accepting or avoiding product/process involving high rates of virtual water, by a Country. The smart management leads to a sustainable development in terms of foreign exchanges. A country rich in water could avoid getting exploited economically by dominating nations, with awareness on 'Virtual Water Economy'.

Going with the course of the paper we try to explain on how nations could include 'Virtual Water' involved and adopt to operations management techniques with every product and process while involved in the economic activities like taxing and business activities of integrated water management solutions. So that, money hidden with cattle, textiles, automobiles, IT Services, E-commerce supplies are checked for not carried outside a country's controllable economic limits. In the future, a country becoming rich, strong, and a super-power, continuing to hold global trends, all depend on a powerful factor 'The Blue Money' which is 'Virtual Water Money'.In lieu of this consumption, World Business Council for Sustainable Development (WBCSD) has come with a powerful initiative (initiative spread 2007-2013).

It is towards water consumption in the form of making a 'Water Tool' helping companies in India, to asses and regulate their water usages. The initiative was chaired by more than 14 companies representing diversified backgrounds. They found an increasing link between a company's consumption of water and its impact on local watershed measured in terms of money. This tool helps in water auditing.Let it be service industry or production sector, every business activity is associated with water or virtual water. Business water management scope increase largely in fore-coming ages. It is for the 'Virtual Water' benefit, International community's attention towards it is well developing.

4.Water - from Crisis to Business

US Central Intelligence Agency's research conducted by the National Research Council (2012) tells us that, climate crisis contribute to maximum depletion and disruption of water supply. Alteration in water supply and the artificial limiting, contribute to precarious effects in food supply, public health, and global supply of commodities in fore coming decades. Global communities have started feeling heats of 'Water' becoming a main reason for futuristic 'World War'! (Gyawali, Allan et al., 2006). With absence or highly limited supply of water and dried water resources, it will surely cause unimaginable humanitarian, geographical, political, social and operational instabilities and non availability of food, labour and raw materials.

The 2013 US National Association of Water Companies and U.S. Chamber of Commerce launched a campaign, "Water Is Your Business," to create awareness among public on water conservation at Industries.

It sees conservation as not just an environmental friendly initiative, but as a money-reaping business. Just in 'ending water leakages in pipelines' the US Chamber of Commerce smelt a $1 Trillion Business. US water infrastructure pipelines leak 1.7 trillion gallons of water every year. In 2007, water drought brought $300 million loss for the US Tennessee Valley Authority over its reduced hydropower generation.

Opportunities and needs in preserving water resources and industrial water management is getting to peaks. Real achievement is not in making 'Water preservation' initiatives but opening ideas of 'Water preservation as a profitable public business'.(The WERRD project, FP5 - ICA4 CT 2001 10040).

Operations Management was once seen as just to improve product quality, and was later proved to be an efficient way of minimizing and avoiding wastages. We propose Operations Management techniques applied in 'Water Management', to bag cost advantages and other conservation standards. It is the necessity for many companies to develop operational strategies for products and services driving profitable water management.

Box 1. Agricultural production-related Water Footprint Effects

- 13 litres of water for a tomato
- 25 litres of water for a potato
- 35 litres of water for a cup of tea
- 70 litres of water for an apple
- 75 litres of water for a glass of beer
- 120 litres of water for a glass of wine
- 140 litres of water for a cup of coffee
- 170 litres of water for a glass of orange juice
- 184 litres of water for a bag of potato crisps
- 200 litres of water for a glass of milk
- 2400 litres of water for a hamburger

Source: Water Footprint Network - the University of Twente, the Netherlands (http://www.waterfootprint.org/)

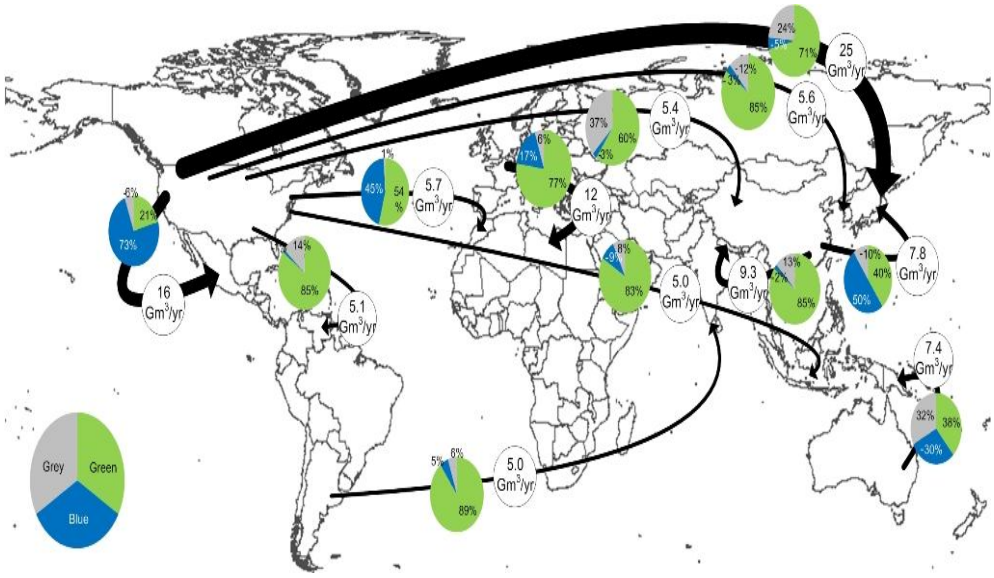
Powerful virtual water concept is yielding new approaches towards oil, mining, utilities, beverages, technology, manufacturing and automobile sectors to end exploitations. They are insisting reuse, treat water consumed, estimating to an annual saving of $50 to $60 billion for next two decades.

US Government has started the water conservation business as a policy decision across its operative levels to aid 'cost cut' and 'cost reduction' measures, as well as a sustainable business possibility. Given irresponsibility of global players, corrupted governments of world, uncertainties in climatic conditions and industrial exploitations (Hultman et al 2010), sustainable management at every levels of regulatory, production and policy making becomes very important. UN IPCC (2007) states a 17% and more of annual CO_2 emissions because of illicit felling of trees and forest degradation by consumer durables producers! Cosmetics, soaps andcooking oil manufacturers are blamed for destruction of animal habitats!In an emerging economy, sustainability measured in terms of natural resources is very important.

Preserving water is not just conservation. It takes serious turns on a company's survival too (Ulfelder, Jamy, 2007). Several environmentalists and agricultural associations have blamed 'International Beverages'brands to be reasons of most of the water problems occurring in rural areas especially in developing nations. They natives see theinternational beverages as a water-sucking giant who would drain up all their livelihoods which are closely connected with water.

Though corporate brands are refuting these claims, there is a strong smell of truth behind. There are continuous protests and public agitations against beverage giants across India. Southern Indian village of Plachimada in Kerala faced severe drought conditions and it resulted in pressures demanding to close a $25 million water-intensive bottling plant in the village's vicinity (The Environmental Magazine, June 2006). Industrial reputation suffers and foreign companies are forced to shut off, for surcharges.

Figure: 3 Global water savings associated with international trade in agricultural products (1996-2005). Only the biggest water savings (> 5 Gm3/yr) are shown



Source: Depiction of statistics on the green, blue and grey water footprints related to agricultural and industrial production and domestic water supply per country, (based on: Mekonnen and Hoekstra, 2011- National water footprint accounts).

Water footprint of national consumption (in m^3/yr) is calculated by adding direct water footprint of consumers and two indirect water footprint components, which are agricultural and industrial commodities consumed. Direct water foot print refers to consumption and pollution of water in domestic consumption. (Hoekstra et al., 2011)

5. Industrial Water Management Business

Improving process and knowing possibilities of making a successful business from water management is very important in profitable 'Industrial Water Conservation'. Process needed is dynamic and change engineering is a key. Complexity of the proposal is understood from the need to identify and manage 'virtual water' advantage. Virtual water as a cornerstone in Business Strategy puts a large system to modification. Every production process, every product design, every service associated with business activity have 'Water' component in them. Either water is directly involved or it is virtually connected. As and how recommendations to use 'video conferencing' is chosen for 'fuel conservation' in avoiding frequent flights, 'virtual water management' shall beconsidered for 'water conservation'.

5.1 Business of Water Resources Conservation and Industrial Water Management

Paradigm of evolution in business is a great deal, working with lead times, accomplishments, departmentalisations and analysing objects with respective scopes. 'Water-money' fits in every frame of becoming a successful business. Process of converting water as a key business factor tends to catch customer eyes. Like Green vehicle models, these 'Blue' processes benefit an organization, not simply as a corporate social responsibility (Henriques I. and P. Sadorsky, 1996), but as a corporate profit return. Success depends on the real interests shown by corporates and their adherance to strict water conservationmeasures. Rebuilding process and putting methods in place for getting best points, open new dimensions of enhanced 'Blue Money' – the proposed 'Water Money'.

UN Development Programme (2006) sees through its human development report 2006 that 'Global water crisis' is sole reason for scarcity! Among the other factors being power and poverty! Water resources conservation and industrial water management demand very good entrepreneural skills with innovation, collaboration and technology. It is to help administrate and preserve water management business. Checking leakages till treating waste water need attitudes towards water in terms of money.Good business in water management needs components of designed solutions for Industrial preservation of water. It is in terms of reduced usage and virtual water values. Industries use water in every process of theirs. Water as a very important tool of production process has increased in importance to 16% as a globaly demanded commodity (UN Water 2013). Besides selling drinking water or water as a beverage, today's world sees water as a successful business commodity. More the chances of water pollution, greater are the business opportunities by working on strategies to reduce contamination and preserve water standards.

5.2 Futuristic Scopes

By 2030, Global demand of efficient industrial water management shall amount to an increase of 40%. Preserving water in large quantities need lot of energy and technology advantages. Reducing chemical contents in effluent water is another promising field of business scope.

Contemporary water cleansing process mechanisms amount to lot of revenue generation, as many governments across world are lavishing their expenditure on water conservation management. They see their expenditure will be returned in terms of 'Water' as a most valued currency, through preservation methods.

Dry cooling systems in food preservation industries, dry washing and dying in textiles, agriculture with very limited water supply, working genetically on newer breeds of plants to sustain droughts and to grow chemical processes to deal irrigation with contaminated water but no compromise on consumer health, pharmaceuticals adopting to dry testing techniques, technological advancements in reducing mining-water wastage are scopes for newer businesses. Market for these businesses shall grow dramatically in years to come as depeletion of fresh water and raising price over water consumption are drastically increasing (Shah, 1993) with very less updates on conservation practices globally.

Figure: 4 Illustration on Industrial Wastes dumped untreated into waters

Source: Global Environment Outlook: environment for development (GEO-4) - http://www.unwater.org/statistics_pollu.html#sthash.nUtq52fX.dpuf

Various possible channels are working on measuring water as 'money' through which natural resources are made as profitable business. These are the best studies in industrial establishments. To make water as a serious business, governments encourage water conservation as a factor of money building and institutions are in search of identifing course curriculums to suit engineering water management. Natural resources are always a blessing! To understand nature with love is to understand it as a factor of life and bliss. Nature gives its resources free of cost. It takes care of the balances and ensures proper continuity of life in earth.

There are two major things observed from the behaviour of nature versus humans. Primary one being the importance of nature as a factor driving 'existence possible', secondary being, the natural tendencies of humans to 'exploit nature and torule'. The exploitation behaviour in humans sounding in lines of pessimistic psychology, is tried by us to get converted into a drive of burning desires of making 'water as a positive business commodity'. It is in a proper sense as discussed through out the length of our paper, by which 'it is taken and used as a factor of 'least worth as a Natural gift' to most significant 'Profit Maximising Product'.

5.3 Operations Management Advantage

If viewed pessimistically, natural tendency of human exploitation is, creating unnecessary rivals across nations. Multi nationals try to bottle the 'free natural water' and to 'sell with fancies' to native people. People across the globe are kept out of their natural right over water, on which they hold a 'Natural Share'. We optimize the urge of human tendency to make a profitable business on 'Water' by implying techniques of Operations Management like Six Sigma, Lean and Kaizen (Newitt, 1996).

Why only Operations Management? And how exactly these techniques are used in Water Conservation? are questions arising! As told earlier, Operations in industrial terms concentrates on minimizing 'wastages' and maximizing 'profits'. Operations directly control production and supplies. Making 'Operations' as a monitoring authority of 'water-money' conceptualization, water being 'dirty or pure' (dirty as in the case of industrial Waste water; pure as in the case of it saved by managing the 'Virtual Water' – water associated with every product/process in an Industry), our goal is easily reachable (Appelgren and Klohn, 1999).

Following bullets are to take us deep in the course of study,

- Every day, 2 million tons of human wastes are disposed off in water courses. Source: UN World Water Assessment Programme (WWAP) 2013
- In developing countries, 70 percent of industrial waste is dumped untreated into waters polluting usable water supply. Source: WWAP
- Half of world's wetlands have been lost since 1900. Source: WWAP
- Contribution of food sector to production of organic water pollutants with values: - High-income countries: 40 percent - Low-income countries: 54 percent
- Projected increase in fertilizer use for food production and in wastewater effluents over the next three decades suggest there will be a 10-20 percent global increase in river nitrogen flows to coastal ecosystems.
- Water use has been growing at more than twice the rate of population increase in the last century.
  Source:*Global Environment Outlook: environment for development (GEO-4)* - http://www.unwater.org/statistics_pollu.html#sthash.xegBgJT2.dpuf

6. How to make Water-money? Transformational Techniques of Operations Management

Operations Management is one of the most important fields of Engineering and Management. An operation is both engineering and application of concepts of engineering known as strategic designing. Strategic design, execution and action plans make mobilizing designs of any operations practically realizable (Mitroff, 2004). With the advantages of this field of applied engineering, we start enquiring strategy implementation on Water Conservation. Operations Management has many tools and techniques to control process and Quality. Assuming water as a product and applying operation concepts like Lean, Six Sigma, Kaizen over it, formulate industrial and virtual water management strategies into action.

6.1 Process Implementation

Implementation of any process is wrapped with operations management techniques.Process guided quality and flow makes disciplined strategic implementation. How are we going to start with Strategic Designing? Strategic design of water conservation is from the fronts of water resources conservation, water resources management, waste water wandling, industrial water treatment, rural and urban water conservation, water table management, IPR over water, effluent management and virtual water network administration (Fader and Gerten, 2011). Each of these disciplines is studied against techniques of Operations management making a 'Process Matrix' (Shook and Rother, 1999) giving raise to different fields of study (8 Strategy implementation techniques applied over Operations management techniques – Basic Lean, Kaizen, Six Sigma, Lean Sigma, Quality Control Excellence, Value Streaming). Six Sigma is comparative and comprehensive management planning. It is a scientific technical method used for tuning processes to match a goal. Six Sigma is a statistical performance target, which is used to evaluate success of production strategies. General measure of six-sigma is 3.4 defects per million (as in 'Water Management' a defect is a deviation from common objective). Moving from production to process management, Six Sigma is implemented for process streaming.

Measuring Strategies with Six Sigma defines deviations from expected results. Sustainable Water Management process is matched to statistically derived targets in line with Six Sigma. Goal of achieving maximum profit, in an improvised business process of identifying and marketing sustainable business process are evaluated in six sigma patterns. Measure of quality (Rothlauf, Jürgen 2004) as a process driver make successful business trends. In high end consultation, we propose six-sigma to be used for disciplined drive towards water management standards calculated with mean and nearest possible process maximization. In statistical procedures of applying six-sigma, flexibility, simplicity and clearance in defining strategic designing are well administered. Defining water management process as a business sourcing reinvents facts, data, needs and analysis. Water management's futuristic entrepreneurial initiatives achieve immense success having six-sigma as a measure of profitability.

7. **How to Implement Six Sigma at Policy Levels?**

Policy strategy and knowing sustainability with reference to profits are keys to six-sigma implementation in strategic water conservatio business. Six-sigma is a dynamic measurement stressing on engineering the change.Every new possibility in handling industrial water effluent and water resources conservation are handled with six-sigma for continuous improvement. Evaluation of strategies making flexibility in business system based on needs make common goals realisable. Check list for six sigma is lined with self-satisfaction index, as a measure to evaluate business profits and sustainable environmental services in single hand. Unless and until governmental and business interests go hand in hand in natural sectors, success is a far realistic dream.

Natural sector is a measure of humanity and consciousness which organisation has in reference to profitability and government, as a representation of society has in making any feasible policy to preserve highly depleting natural resources like 'water'.

7.1 Strategic Approach

Business strategies and deviations are measured in terms of process implementations and success ratios. Success are both monetary and non-monetary benefits. Service mentality should not slow process but should grab great deal in handling sludge, sewage in Industrial discipline. Steps accomplished are departmentalized and service functionsanalyse water as a business process adding values to service.

Service functions mended with six-sigma benefit organization to know cash cows and to analyse them in a Lean focus on speed and accuracy (Mingers and Rosenhead, 2004).

Redundancy, non-value added steps, threats are suitably crossed with dynamic rebuilding capabilities arrived with the help of six-sigma for continuous methodological improvements. This paper of ours becomes one of those critical studies opening dimensions of process monitored water business management,sociallyenterprising with regulated private participation. Activities implemented with operations, work in complete reference with all stake holders. It has all the processes departmentalized and evaluated on a whole. Operations professionals identify non functioning strategies and implement corrective measures in such cases. Making internal and external audits, performance management, corrective measures are three fundamental building blocks for guaranteed success.

Format of applying Kaizen in water management is both individualistic and systems focusing on suggestions and implementations of re-engineering (Mike Rother and John Shook, 2003). Restructuring production process based on 'water money' management techniques drive business strategy. Kaizen being 'putting back in a better way' encourages direct participation on a daily basis. The purpose is to shape improvements in making money through water management. Software tools to eliminate human repetitions in adopting kaizen and to formulate proper training to eliminate 'waste' slugging in industrial water are business aspects.

7.2 Business Process Recommendations based on Operations Management Techniques

- Daily Improvements governed by Kaizen monitored by self/external professionals
- Process oriented thinking for water conservation involving everyone to keep on reshuffling interests
- Hierarchical responsibilities framed and corporate bench marks set
- Process mapping defined for system level approaches interlined
- Water practices empowerment and scopes of expansions framed with Kaizen
- Time and work spent over making money-profit maximization

Lean occurs as a subset of Kaizen in water treatment. It improvises system level performances and monitors improvements with expansion of scopes. Lean impacts bottom line functions by removing wastages. Lean is a best fit for improvising waste water handling in a process oriented scenario. Understanding scopes of minimized wastage, in Industrial Water outputs (Tracey Schelmetic, April 2013)better handle process/product velocities. It is an interest of manufacturing to match cost-cuts and cost-conservation over 'articles of major expenditures'. Fabricating 'Value-addition' with their suitable impacts on water levels is needed in an industry discipline. It avoids 'wastages' in Water processing demanding 'heavy water quantities'.

8.Value Driven Service Tasks: Kaizen and Lean Necessities

A frame work guided by Kaizen and Lean, necessitates value driven service tasks (Musztyfaga, and Skoáud, 2007), streamlined for efficient water conservation and converting conservation into 'profits'. Six Sigma is employed in determining drive of operations as a sustainable measure to serve the purpose of loving thenature business. Six-sigma manages system comprehensions. It fine tunes water-money management loops and integrates them as an overall system. Targeted sustainable operations activities are monitored for deviations/million for virtual water, where both finished products and wastages along with their process of manufacturing are viewed for enriched water conservation keeping six-sigma as a frame of study (Lunau and Stephan, 2007). Six Sigma monitors opportunity costs on choosing options of enhanced water utilizations governed by 'water-money' guides.

Measuring Quality stands of Water-Money as an initiative is possible by applying six-sigma. Process streamlining is for reaching near perfection and attaining maximum profits by eliminating water-wastage. Standard deviations of reducing chemical compositions in water as effluents are measured with Six Sigma (Gygi and Craig, 2005). Statistically deriving loop holes and trying to match with potential correlation factors fine-tunes our business motives.

Table: 1 U.S. Water Industry Revenues in Millions with futuristic rates of growth

Water Treatment	$10,719	6% - 8%
Delivery Equipment	$13,090	5% - 6%
Chemicals	$4,760	2% - 3%
Contract Operations	$4,760	5% - 6%
Consulting/Engineering	$8,330	5% - 6%
Instruments and Testing	$1,785	5% - 7%
Wastewater Utilities	$39,270	4% - 5%
Drinking Water Utilities	$38,080	3% - 5%

(Source: The Environmental Business Journal, 2008, TechKNOWLEDGEy Strategic Group)

9. Designing a 'Water Business'

Water Business starts from source of the water. Measuring water quality levels right from the source, calculating accurate predictions on yearly water flow and being prepared with estimates of excess or low downpour are good start to begin with. Preparing reservoirs and anticipating chemical contents to make water fit for drinking is primary of water business strategy at water-source levels.Productivity control is gauged with quality and cost parameters. They lie with techniques on industrial waste water management as a top priority. Water is very depleting and getting scarce in many parts of the globe. Drought avoidance and proper usage of water resources entirely lie within managing water industry brilliantly. Virtual water management is needed to manage demand for water matched with outstripping supply. Climate changes are one of the most impacting terminologies in water study. Managing water under all these conditions force industrial disciplines and business mindedness to solve the issue.

Energy is associated with Water. An estimate says that, to treat 1 M litres of water, 586 kWh are needed (Environmental KTN Publications 2008). Reported leakages in Industry are around 3,650 M litres per day (US). Corresponding energy wasted amounts to 21 million KW per day. Water management with operational techniques tends better solutions to water saving and leaking problems. Water metering at domestic and industrial levels to monitor water inflow and outflow is one among those best suggested ways of managing water problems.

Regulated capital flows in water industry are wide scope of research area in relating water with perfect financial advantage. Areas of direct foreign investments, channelling money through well-defined IPR and measuring water with globalization impacts on environment are process chains treated in a Lean management scale.

FDI in water industry is not so desirable when water is treated as a market commodity, as it might disturb internal stability of a country. Not only drinking and bottled water business, but also Virtual water foot prints consitute lot of technology, integration, economic measurability, market penetration and trade deficit in most practicable and realizable frontiers. Water auditing is best recommended as a financial measure for water to be treated as a raw material and measured from supply to retailing in terms of money.

9.1 Virtual Water Trade and Business Effects

Potential water regulators like capital flows, rate of return, cross national borders flow, shared public interests, and conflict avoidance are managed in Six Sigma and the deviations are identified and treated accordingly. Virtual water has become a factor determining internal economic stability of a country, so open market and liberalizing policies dealing with virtual water foot print are carefully monitored and advantages are exploited. Water capital flows are driven by business opportunities in making commercial returns. Water flows in and out of countries in terms of virtual water trade (Hoekstra, 2003). They are rising steadily assuming a greater market orientation. State enterprises dealing capital flows in water market motivated by opportunities are prioritized. They are concentrated on a whole in emerging economies to avoid exploitations and high risks because of poor water management infrastructure. Water Capital flow and return guided by sustainability considerations are volatile and sensitive over trade issues.

In Virtual water foot print, if Virtual water parity exceeds characteristics of imports, taxes (Adams 1997) are allowed relating products and virtual water parity, treated in same way as other standard parities are dealt. Unprotected Virtual water trade and extracted methods affecting principle and treatment of industrial water are prohibited with fresh governmental regulations. Virtual water parity over products is adjusted for extra costs incurred by product transfers operating under strict industrial water management governance (Lyne, 1990).

Water seen as major environmental asset, to constitute a country's economic growth. They compensate rebates in context of domestic and multinational agreements.

Potential for using water as traded commodity in combination with taxes and standards are candidate for harmonization. They are with better production solutions to local and globalized environmental conditions. Water life-cycle perspectives, over consumer durables are mapped with overall environmental factors of products measured in terms of buying against non-conventional notions of virtual water parity making virtual water as a perfect industry to operate with.

Table: 2 Our proposed Key Business interests in Virtual Water Policies

Designing Water Business		
Business Drivers	Water Quality Critical Regulation Policies and Approaches Developments Rearrangements	Public Education Enforcement Capital Investments Business Consolidations Controversial Privatization
Niche Areas	Policy Oversights Key Trends Efficient usage Wastewater Utilities Resolving Paradoxes	Infrastructure Cries Conservation Regulation Asset Ownership (IPR) Better Monitoring Metering Surge

9.2 Virtual Water Trade Autonomy

Virtual water export processing zones are most vitals of measuring virtual water trade. Industrial precision of water usage and reuse techniques are supported with firms in virtual water export processing zones.

They favour treatment of water strategically and duty charges concessions for industries with best certified Virtual water treatment encouraged. Virtual water taxing on corporate, property and trade income are sheltered from regulations, virtual water export processing formed with superior infrastructure and monitoring for routing trade process.

It is practicable for countries to have government agencies charged to attract newer policies in virtual water balances. Subsidiesoffered associating services on water conservation and are well protected. In light of virtual water trade, encouraging discussions are on the multinational attentions of policy and recognition in emerging economieson life and death questions of water conservation.Recognition of policy autonomy and rules balancing virtual water trade routes are mounting up. Attempting multilateral disciplinary studies on national competencies and drawing investment policies in water businessmake superior model of trade regardless to levels of developments. Water management needs proper sign-on to trade policies. Emerging Economies need a push for policies in futuristic virtual water trade. Return for greater market assets in water conservation are at a good bargain (Oki and Kanae 2004).

10. Modelling Innovations in 'Water' Welfare

Business leaders (Kraszewski, 2005) developing newer skills of understanding with a good capability of selling and shaping water management policies are needed. Water being financially managed and outcomes are 'profit-wise' counted. Most of the international beverage brands make money simply by colouring and filling water with gas and added preservatives. Water is money to them! Such an intensive crave for water in terms of conservation is needed for running a successful business.Every drop amounts to a dollar; let it be fresh or sewage. Water management tools providing opportunities to encourage stakeholders and to attract positive business scape are in great demand. Understanding utility levels, extents of scope in water preservation and management is the first step towards water as a positive business factor in industrial sectors. Till today water conservation is viewed as an issue, but it should change to viewing water as 'money'.

Table: 3 Value produced from a unit of water for various commodities

Value produced from a unit of water for selected commodities

Product	Water productivity			
	Kilograms per cubic metre	Dollars per cubic metre	Protein grams per cubic metre	Kilocalories per cubic metre
Cereal				
Wheat ($0.2 per kilogram)	0.2-1.2	0.04-0.24	50-150	660-4,000
Rice ($0.31 per kilogram)	0.15-1.6	0.05-0.18	12-50	500-2,000
Maize ($0.11 per kilogram)	0.30-2.00	0.03-0.22	30-200	1,000-7,000
Legumes				
Lentils ($0.3 per kilogram)	0.3-1.0	0.09-0.30	90-150	1,060-3,500
Fava beans ($0.3 per kilogram)	0.3-0.8	0.09-0.24	100-150	1,260-3,360
Groundnut ($0.8 per kilogram)	0.1-0.4	0.08-0.32	30-120	800-3,200
Vegetables				
Potatoes ($0.1 per kilogram)	3-7	0.3-0.7	50-120	3,000-7,000
Tomatoes ($0.15 per kilogram)	5-20	0.75-3.0	50-200	1,000-4,000
Onions ($0.1 per kilogram)	3-10	0.3-1.0	20-67	1,200-4,000
Fruits				
Apples ($0.8 per kilogram)	1.0-5.0	0.8-4.0	Negligible	520-2,600
Olives ($1.0 per kilogram)	1.0-3.0	1.0-3.0	10-30	1,150-3,450
Dates ($2.0 per kilogram)	0.4-0.8	0.8-1.6	8-16	1,120-2,240
Others				
Beef ($3.0 per kilogram)	0.03-0.1	0.09-0.3	10-30	60-210
Fish (aquaculture[a])	0.05-1.0	0.07-1.35	17-340	85-1,750

a. Includes extensive systems without additional nutritional inputs to superintensive systems.

World Water Assessment Programme. 2009. *The United Nations World Water Development Report 3: Water in a Changing World*. Paris: UNESCO, and London: Earthscan. Box 7.4, page 107.

Based on data from: Comprehensive Assessment of Water Management in Agriculture. 2007. *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. London: Earthscan, and Colombo: International Water Management Institute.

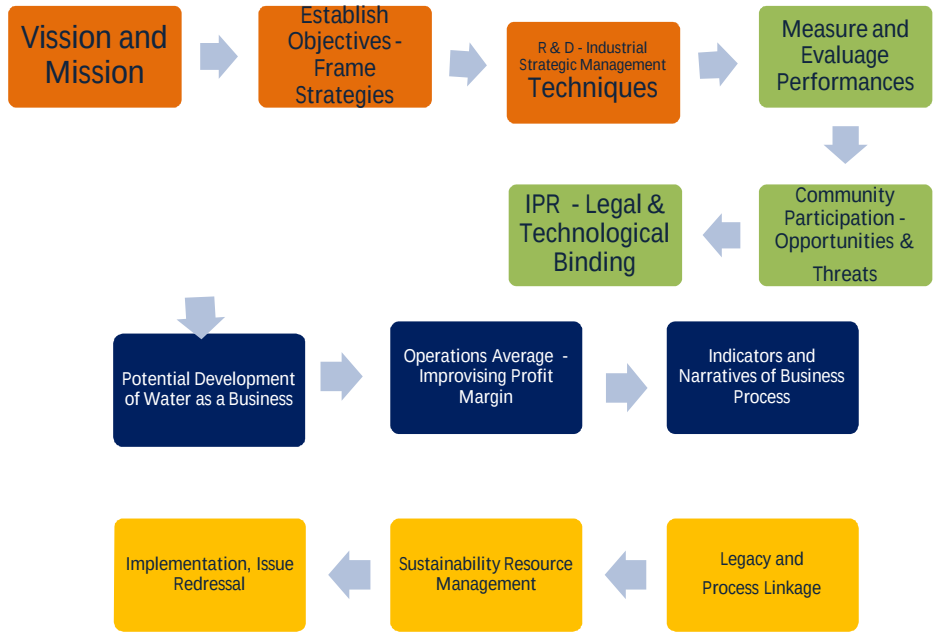
Source: Food and Agriculture Organization of the United Nations (FAO) and UN-Water

In a continuous scale industrial expert's consultation on deciding the direction of strategic decisions in water handling leads to profiting open opportunities at environmental sectors. Technology needs are designed and adopted in measuring quantifiable conversion of waste water into 'water money' making transformational changes. Heading technological advancements in finding solutions to handle 'virtual water' usage with respect to every production process is monitored and audited at regular intervals. Period of observation for this adoption are made similar to financial audit terms, to measure enormous water saved and profit made out of 'virtual water' administration. For sector to remain competitive, macro economic regulators are adviced for production houses to submit water audit reports on a quarterly basis. Entreprenueral ventures are needed in giving consultation to such initiatives.

Confidence levels in technologies, consultations and skills are inter-connected in making 'water money' a profitable business.

Incentive oriented business practices in maintaining water-network's scientific utilizations (Giulio Boccaletti, Merle Grobbel and Martin, 2009) are made and regularly audited for functional efficiency by an Expert Committee. Knowledge inputs on contamination levels, effect of water exploitation in every process associated with production steer the need of strategy and regular meetings with an expert advisory group. It efficiently formulates and addresses environmental solutions in terms of money.

Figure: 5 Flow of Comprehensive Water Business Strategic-Management Model



Key on handling Environmental impacts of running production/services is kept on maximizing profit by smart handling of 'non-renewable' resources (Van der Ploeg and Frederick, 2010). Priorities involving industry-led strong environmental business has strategic planning, change engineering, road mapping price-water-stress-shortage and financial returns. Current Capital spent over 'miss-management' turn as 'saving' and 'virtual-water' money becomes 'profit'.

Appraisal techniques on successfully measuring 'virtual water' behind industry of information technology and enabled services (ITES) turn big market opportunity to penetrate in emerging markets.

Monitoring water quality standards on the basis of possible adoption lies as the central question of 'How to plan a water management (Bill Clark (HKS) and John Briscoe (SEAS) 2011) solution just like an ERP'! Fore seeing future scope of dimensions in profitable business at environmental sectors, governments are to encourage investing on 'water-bonds' similar to 'infrastructure-bonds' to attract hefty capital investments. Saving is made through avoidance of additional expenditure on functional blockades in water administration.

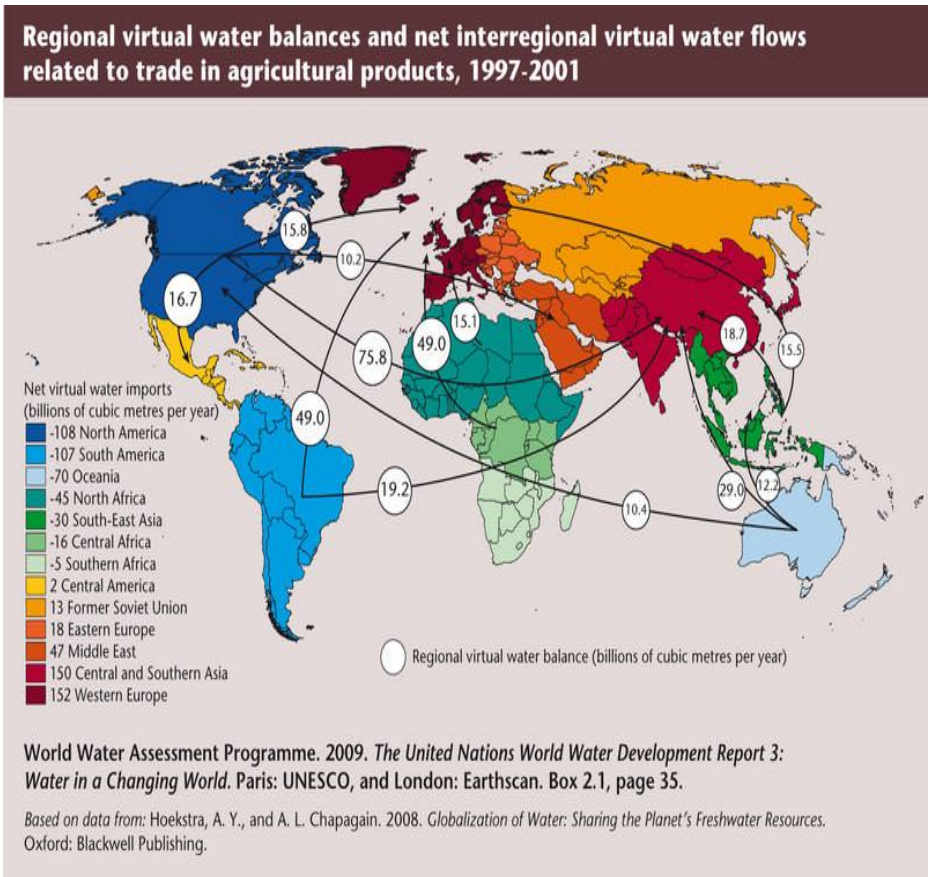


Figure: 6 Virtual Water Balances across regions

11. Water and Water Resources Management Control and Regulations Proposals

Broadly speaking, we are presenting following sets of concluding recommendations as regulatory proposals:

First --world production market consuming a major portion of water and contributing to pollution should adopt high alert strategies on 'production and manufacturing' systems by minimizing water consumptions to the maximum possible!

Second -- Natural resources should not be dead-end sectors! Global community's view on it should change urgently. It is to be believed in "Nature loving Industrialization" and "money generation" and to be counted in healthy revenues as an essence of sustainable economic development without exploitation attitudes.

Third -- *V*olatility of Exploitation by population in terms of artificializing agriculture, undue forestation, deforestations should be checked with an industrial discipline. Government spending, imposing unnecessary costs on 'Desalinations' disturbing oceanic flora fauna are avoided. Directly contributing to the 'eco system' balance by creating stable flow of the 'marine to fresh and fresh to marine' waters are encouraged .

Fourth -- countries where availability of water and fresh-water resources are in abundance should maintain conservative measures of preservations and should ban 'commercialization' of water as a market commodity. 'Water' should be made as national property and should be denominated under 'extinct' resources globally.

Fifth -- Natural resources depletion, because of automobiles and advancements in transportation should be checked. Increasing 'public transport' modes, limiting 'automotive' consumer vehicle markets, changing to 'CNG's and 'green vehicle' models leave globe with little or no environmental disturbances.

Sixth -- countries endowed with natural resources should avoid armed conflicts. Wars should be avoided in general, and 'multinational beverage' corporations should be limited to supply of water and should be prevented from substituting their drinks in places of natural water consumption, could serve aiding not only to water conservation but also to the economic growth, by blocking the 'outflow' of virtual water money.

Seventh-- Swings in climatic conditions especially monsoons should be regulated with good and healthy 'industrial practises' helping in excessive macroeconomic stability;

Eighth --Industrial effluents are prevented from polluting 'water resources' with optimistic specialized water treatments and governance encouraged.

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