ENVIRONMENTAL LAW AND PRESERVATION OF FRESH WATER

BY

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ENVIRONMENTAL LAW AND PRESERVATION OF FRESH WATER

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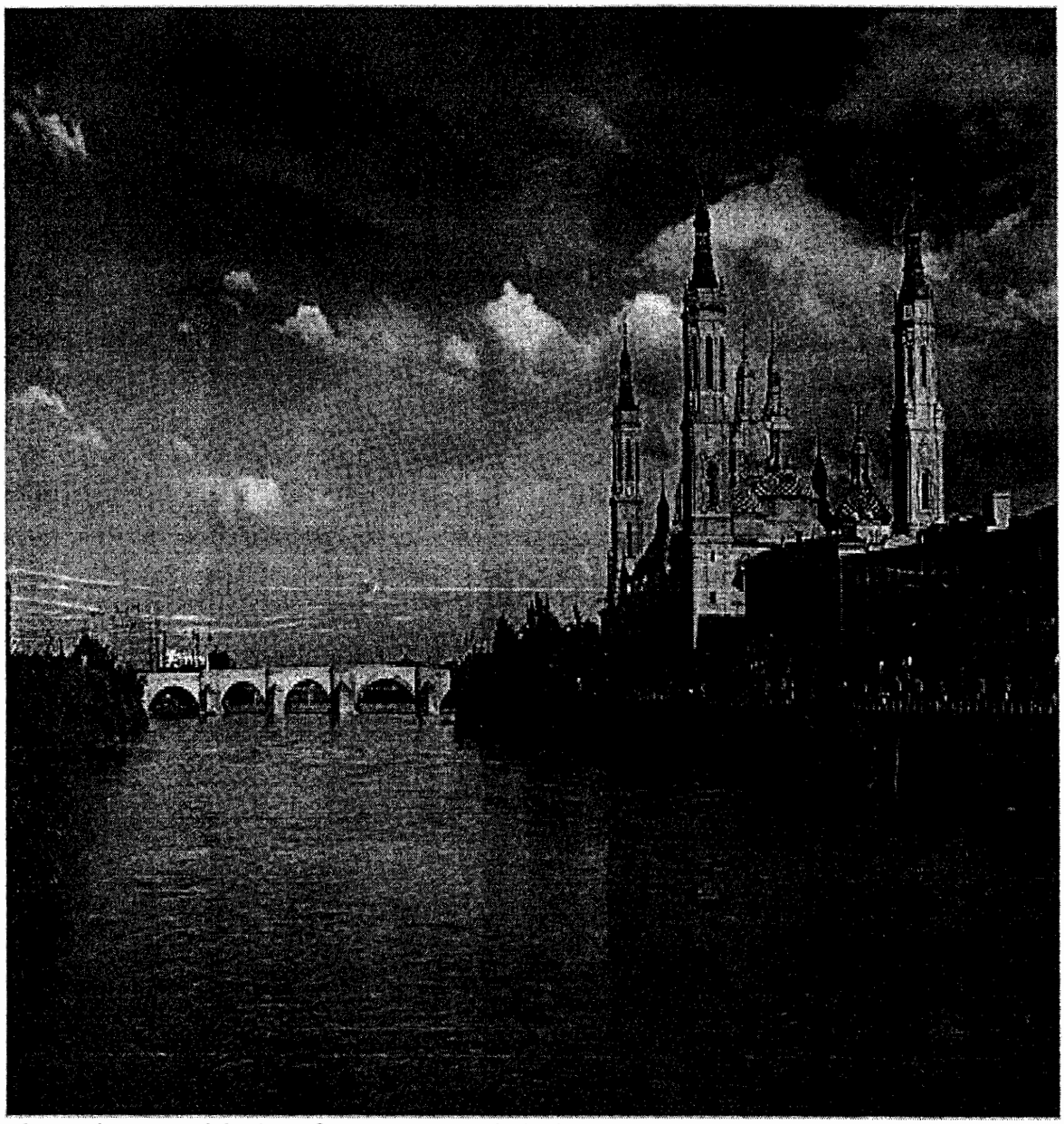

The ancient Spanish city of Zaragoza, Capital of Aragon

DEDICATION

TO MY WIFE WHO LOOKED AFTER ME AND THE CHILDREN TO AVIOD INCONVENIENCE IN PREPARATION OF THIS THESIS.

ACKNOWLEDGEMENT

The thesis in hand is the partial requirement of LLM international law from International Islamic University Islamabad. I must acknowledge the roll of UNEP by providing area-wise graphics on the web site.

I thank many who have in some way contributed to this thesis, Mr. Muhammad Aslam, Librarian, Supreme Court of Pakistan, Mr. Muhammad Ramzan Awan, both provided material. Mr.Iqbal Sohail Jami, Judicial Assistant, who has helped me in providing the reference on the issue. Ch. Munir Sadiq, Advocate Supreme Court of Pakistan recently graduated from this University has aided me in a variety of ways, and Mr. Muhammad Amin, LDC of the office for typing out the manuscript in proper form.

Finally, I express my immense sense of gratitude to my Research Supervisor Mr. Muhammad Munir, for his guidance and inspiration which I received during the preparation of this thesis.

ABSTRACT

"Environmental Laws and Preservation of Fresh water"

by

Hifz-ur Rehman

The thesis in hand is the partial requirement of LLM international law from International Islamic University Islamabad. I tried my best to produce a good thesis on the topic "**Environments Law and Preservation of Fresh Water**". Water has been considered a source of life in this world. Without water there can be no life. History bears testimony that due to famine and scarcity of water, civilization have vanished, green lands turned into deserts and arid zone completely destroying the life not any of human being, therefore fresh water if polluted, or contaminated will cause serious threat to human existence. Over the six chapters of this thesis I have tried to examine the major causes of pollution of fresh water, technical information and case studies wherever appropriate.

Water has covered 70% of the earth's surface, and its pollution is a global problem. There are many reasons of water pollution but the question arises that how can we resolve the problem with effective control and prevention.

The environmental legislation is common all over the world but comparatively it is new phenomena in the field of legislation. Limited laws are available in the world, the purpose of these laws; to protect and promote the aqua-life, but the enactment of law is not enough actually what we need is the proper machinery for comprehensive enforcement of the

existing laws. The world is also experiencing a steady decline in water quality. Human beings already use 55% of available fresh-water runoff. This level of consumption will be an increasing problem as the population arises. About 75% of the world rural population and 20% of the urban population have no ready access to uncontaminated water. The legislation and treaties made among the states are insufficient to cope with the problems. In Pakistan, Law relating to environment, neither the Environmental Protection Ordinance 1983 nor the Pakistan Environmental Protection Act 1997 meets the environmental issues of different nature it is necessary that the issue may be directly brought before the Court, claiming Fundamental Rights under Article 9 of the Constitution of Pakistan.

In recent past Supreme Court, on the report of news paper took *suo moto* action in the matter of Environmental hazard and pollution in Baluchistan. Justice Saleem Akhter gave his opinion reported in PLD1994 SC 102. the other case of Right of residents to have clean and unpolluted water was raised before the Supreme Court, decided the case in the light of Article 9 of the Constitution that "No person shall be deprived of life or liberty save in accordance with law" reported in SCMR 1994 on page No.2061 Some efforts have been made by the United Nation fresh water assessment to regulate the water shared system. UNEP is on the front line monitoring global water.

Pollution is a social problem of Pakistan because due to expansion of industry, urban population is seriously involved in the issue. Clear water is as necessary for health as clear air and pure food. Industrial cities are attracting people for the employments, studies and facilities of modern life. Slum has developed in dark and dingy streets where ill health and high crime rate has been found besides impurity. To reduce impurity from the society we can not

reduce industrial progress in man, we will have to adopt measures to neutralize the unwanted effect in common. But it needs collective efforts of the people. In rural areas agriculture itself became an industry. The use of chemical fertilizer and pesticides has converted the natural system into mechanized farming. The spray of pesticides on crops devastates the natural environment in to pollution; therefore social awareness is required to cope with the problem, because it is collective responsibilities of the Ummah, in wide sense/concept used for all nations. The role of NGO,WHO towards Pakistan is not satisfactory therefore the SAARC organization comprises Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka are required to accelerate the social behavior towards the solution of the water pollution issues among the member states, because we suffered a great loss. Not a single man is responsible for the destruction of ecosystem but the whole society is responsible for the same. International law focused only on the surface water that straddles a border now seems too narrow, and commentators began to discuss a broader scope for international law. UNEP has compiled a report in order to provide an easily accessible resource on the state of the world's waters, and further provided to produce a clear overview to the world regarding fresh and marine waters. It also illustrates the causes, effects, trends and threats facing to our water sources, with examples of areas of major concern and future scenarios for the use and management of fresh, coastal and marine waters. But practical approach towards the solution of the problem is required.

The thesis in hand consists upon six chapters starting from introduction and finally concluded with some recommendations and bibliography. The above idea discussed in detail, I will repeat my thesis statement that "if fresh water is not preserved then our next generation will suffer a lot".

CHAPTER–I

INTRODUCTION

It is said that water is a common heritage of humanity. Every one has an equal right to it. Even our future generations have the same right. However, in present day water is polluted and wasted as worthless item. In fact, it is the most valuable item in this world, as we cannot live without water. Even life on this planet depends upon water. It is high time to realize the importance of water in life on this planet. International Law deals with this topic but how these resources could be preserved is a question of fact. Whose job is it and how best can it be done? The United Nations Environment Programme (UNEP)[1] has been at the forefront of assessing and monitoring global water resources and presenting information on their use and management for 30 years. Global freshwater consumption raised six fold between 1900 and 1995 i.e. more than twice the rate of population growth. About one third of the world's population already lives in countries considered to be 'water stressed' that is, where consumption exceeds 10% of total supply. If present trends continue, two out of every three people on Earth will live in that condition by 2025. The assessment of global water resources and the provision of early warnings on water issues are enshrined in the mandate, vision and mission of the United Nations Environment Programme. UNEP, UN agencies, and collaborating centre and

[1]Url. http//:www.unep.org (last visited on 07.08.2008).

partners monitor and analyze water resources on a global scale. Highlights from assessment activities over the past two decades, which are used to establish present and future water trends, reveal that: Freshwater resources are unequally distributed, with much of the water located far from human populations. Many of the world's largest river basins run through thinly populated regions. There are an estimated 263 major international river basin in the world, covering ~ 059 898 km or 45.3% of the Earth's land surface area (excluding Antarctica). Groundwater represents about 90% of the world's readily available freshwater resources, and some 1.5 billion people depend upon groundwater for their drinking. Agricultural water use accounts for about 75% of total global consumption, mainly through crop irrigation, while industrial use accounts for about 20%, and the remaining 5% is used for domestic purposes. In Africa alone, it is estimated that 25 countries will be experiencing water stress (below 1,700 m^3 per capita per year) by 2025.[2] Today, 450 million people in 29 countries suffer from water shortages. Clean water supplies and sanitation remain major problems in many parts of the world, with 20% of the global population lacking access to safe drinking water. Water-borne diseases from faucal pollution of surface waters continue to be a major cause of illness in developing countries. Polluted water is estimated to affect the health of 1.2 billion people, and contributes to the death of 15 million children annually[3].

A wide variety of human activities also affects the coastal and marine environment. Population pressures, increasing demands for space and resources, and poor economic performances can all undermine the sustainable use of our oceans and coastal areas. Serious problems affecting the quality and use of these ecosystems include

[2] Url.http//:www.unep.org/vitalwater. (last visited on 07.08.2008).
[3] Ibid.supra.

Alteration and destruction of habitats and ecosystems. Estimates show that almost 50% of the world's coasts are threatened by development-related activities. Severe eutrophication has been discovered in several enclosed or semi-enclosed seas. It is estimated that about 80% of marine pollution originates from land-based sources and activities. In marine fisheries, most areas are producing significantly lower yields than in the past. Substantial increases are never again likely to be recorded for global fish catches. In contrast, inland and marine aquaculture production is increasing and now contributes 30% of the total global fish yield.

The world's limited reserves of clean, fresh water are shrinking fast; posing a serious threat to public health, political stability the United States has also realized the same. According to the report issued by the U.N predicts that as many as 7 billion people in 60 countries could face water scarcity by 2050. In just 20 years, the report predicts, the average supply of water per person worldwide will have dropped by one third, affecting almost every nation and specially those already on the economic edge. The report highlighted several consequences of current water use and trends.

i) Shortages of clean water have a direct effect on human health. Water contaminated with fecal bacteria, parasites and other microbes' causes about 6,000 deaths every day. Including1.4 million children under the age of 5 every year

ii) The United Nation has a goal to reduce by one half the proportions of people who lack reliable access to clean water by the year 2015.

iii) Fresh water is crucial for agriculture:- with about 70 percent of the fresh water used today earmarked for irrigation but with growing urbanization urban population are predicted to exceed rural ones for the first time in about 15 years the water crises is heading down High concentration urban setting, especially in poorer countries.

iv) Further added that globalization continues apace, many cities in less developed countries are working with toxic chemicals needed to make the product demanded by richer countries. And then are dumping those chemical into waterways. That's in addition to the 2 billion tons of human waste that that are spilled into fresh water courses every day.

v) Water is political time bomb also as well. More than 260 of the world river basins are shared by at least two countries. Those areas account for 40 percent of the world's population and pose difficult balancing issues when one country seeks to dam up, siphon off or pollute that shared resource.

vi) Global warming, which scientists say is causing droughts and more extreme storms, is blamed by the report for about 20 percent of the recent growth in water scarcity.

vii) Money is not the whole answer, but it would help, said Andras Szollosi-Nagy, secretary of UNESCO's international hydrological program. Global investment in access to fresh water need to be about $ 40 billion more than the current $ 60 billion, he said one of the big debates slated for Kyoto is how to balance the public and private aspects of the water economy.

viii) "Water is a public good", said Szollosi-Nagy. There is a role for private companies to help provide it, he said But its an important axiom that providers don't "own" the water, he said, and that "water pricing schemes must includes a mechanism to protect the poor."

ix) Peter Gleick of the pacific institute, a nonpartisan think tank in Oakland, Calif said that "American use 20 percent less water per capita than we did 29 years ago, yet we are much better off than we were before."[4]

[4] http://www.purewatergezette.net/threatsofwaterscarcity.htm

Fresh-Water Resources:-

Our primary source of fresh water is precipitation, but human needs can also be met from two other fresh-water sources: ground water and surface water. In the United States, 20 percent of all needed water comes from ground water and 80 percent from lakes, rivers, and streams. Ground water is the main water source of US towns.

Change in the chemical or physical condition or biological content of the water in a water supply that prevents or limits further use of the water or impair man's visual enjoyment of the water by looking at it or other uses that change the water's physical condition can be called pollutants. Pollutants are of two general classes: materials that change with time in water and materials that persist in water unchanged in form. The organic material such as soft tissue and paper waste, represent the first class. Most inorganic salts, such as sodium sulfate, used as a dye in the textile industry, and insert organic materials, such as pesticides, represent the second. Often water that is safe to drink contain barely measurable amount of pollutants that do not effect its clarity, or produce bad odour, unpleasant taste, films, or foams that make it unattractive for drinking or for recreational uses such as swimming, fishing, or boating.

From the time of the industrial revolution, the use of water multiplied in number as more goods were manufactured. Societies such as United States, which were expanding quickly and which had plentiful resources used water and other resources freely, with little thought for future supply. Water may be said to be a renewable resource, since it returned to the land as rain after it has been purified by evaporation from the sea. This resource is no longer always plentiful enough to meet the need of

growing population with technology that finds new uses for water. Therefore continually all possible sources of water must be used including surface water, ground water and treated wastewater. The waters of the earth in liquid, solid, and gaseous forms, and their distribution in river, lakes, and ocean, on the earth's surface; in the interior of the earth; in all plants and animals; and in structure like reservoir and canals built by human being for human purposes, water has been, and will always be very important to humanity. Plants and animals, including human beings, require water to carry out their life functions and, in fact consist mainly of water .the human adult, for example, is 65 to 70 percent water. The earth's water also regulate climate and help industry.

Water is the only substance on the earth that exists naturally in liquid, solid, and gaseous form. Liquid water is broadly categorized by its utility to humans and by its general location. Occurring at some place fresh-water is more useful than saline water (such as ocean water). More than 70 percent of the earth's water is found in ocean and inland seas. About 2 percent is fresh but is in ice caps and glaciers. Less than one percent of the world's water consists of fresh liquid water in lakes, rivers, and underground aquifers and water tables. Although water is abundant, water scarcities are always and some time water is not always available to animals and plants when, where in the amounts and quality they need.

Water, the most abundant compound on earth, has unique chemical and physical properties. Since it easily dissolves mineral salts, enabling organisms to absorb nutrients without being changed itself, it is vital for biological functions. With two atoms

of Hydrogen and one of Oxygen, water's molecular weight is only 18, but it has a surprising high boiling point (212 F or 100 C at 29.92 inches or 760 mm of atmospheric pressure). At high altitudes, where pressures are lower than at sea level, water boils at lower temperature. When water freezes, its volume increases by as much as 11 percent; the force of expanding ice can therefore crack water pipe and pavement and help in the natural process of breaking down rocks to form soil. As the freezing water expands, its density is lowered below than of liquid water. This explains why ice floats.[5]

Water also has unique thermal characteristics. As the temperature of each gram of water goes down to 0C, and the water freezes, 79 calories of heat, the heat of fusion, are released. On frosty nights, some farmers sprinkle their orchards with water so that the heat it releases on freezing will prevent the frost from injuring the young buds. When stream condenses in to water, each gram releases 540 calories of heat, which can be used in heating system. "A high heat capacity enables water to absorb a large amount of heat without changing temperature". This is why the temperature of large bodies of water does not fluctuate widely, thereby helping to moderate some local climates.[6]

1. **Salt Water & Fresh Water: -** Different estimates have been gathered as a result of different calculation methods to find out the proportions of salt-water and fresh-water as is shown below by a graphic illustration wherefrom we also get the idea as to how the earth's water resources with location make up an essential part of our existence.

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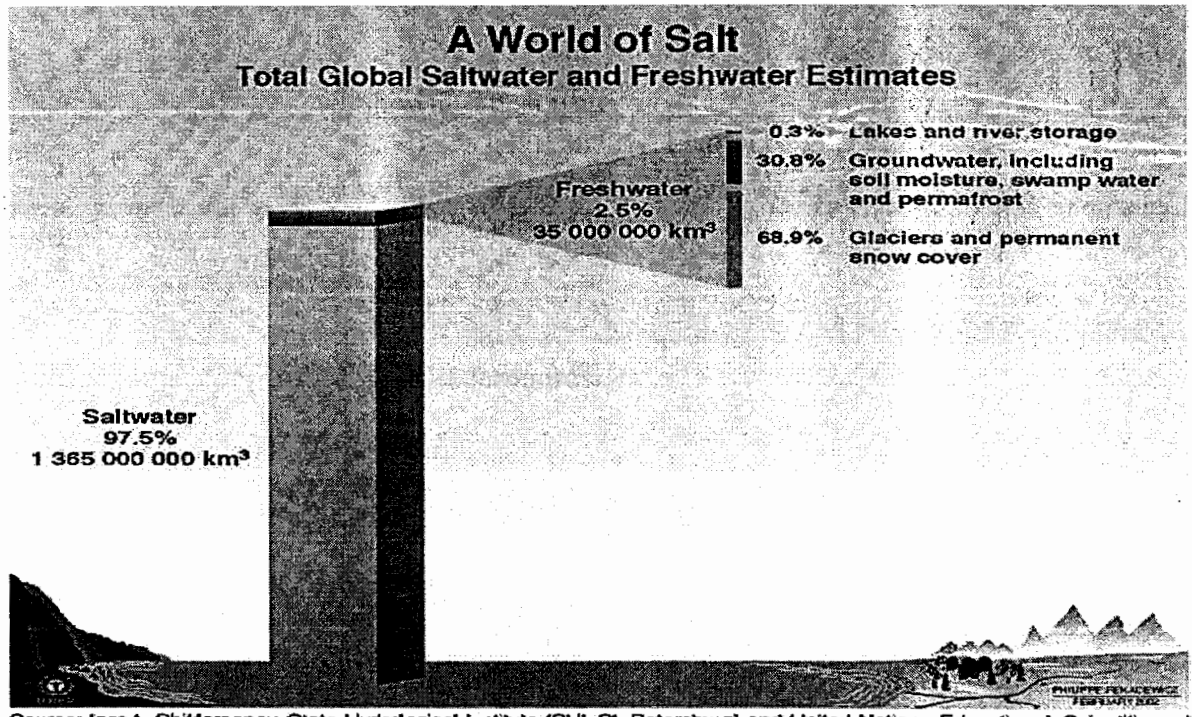
[5] William D. Halsey, Emanuel Friedman, *Collier's Encyclopedia*, (New York: Macmillan Education Company, 1998), 349.
[6] Ibid.

Showing fresh water 2.5%:-

- 0.3% lakes and river storage
- 68.9% glacier and permanent snow cover.
- 30.8% ground water including, soil moisture, swamp water, and permafrost.
- Salt water 97.5%:-

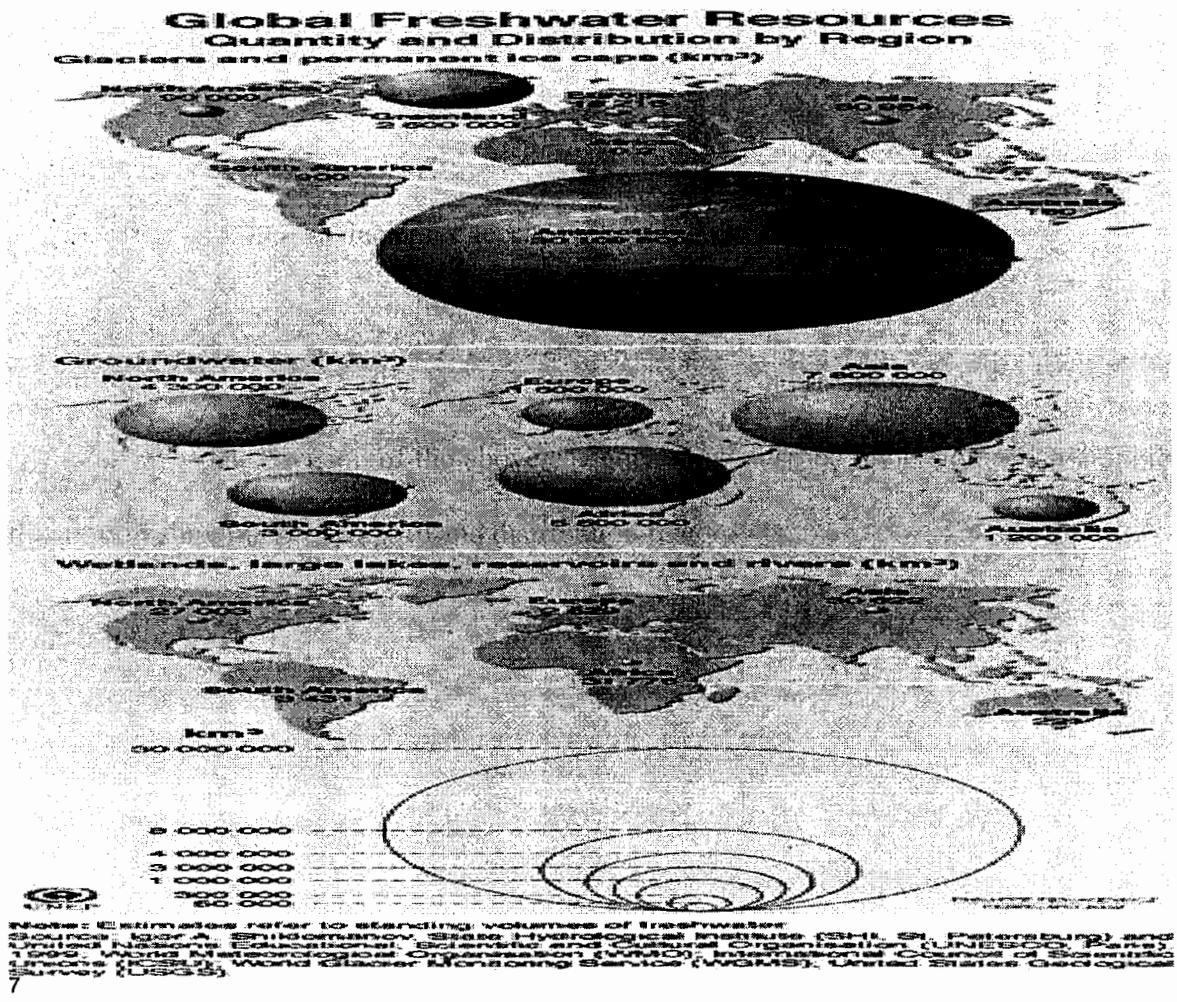


Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

2. Global Freshwater Resources: - According to a study, 70% of world's Fresh water resources are based on regional Glaciers and icecaps whereas under/ground water is a readily available source of fresh water in abundance. World's freshwater resources may be divided in the following three categories;

- Glaciers & icecaps
- Groundwater and
- Wetlands, large lakes, reservoirs and rivers.

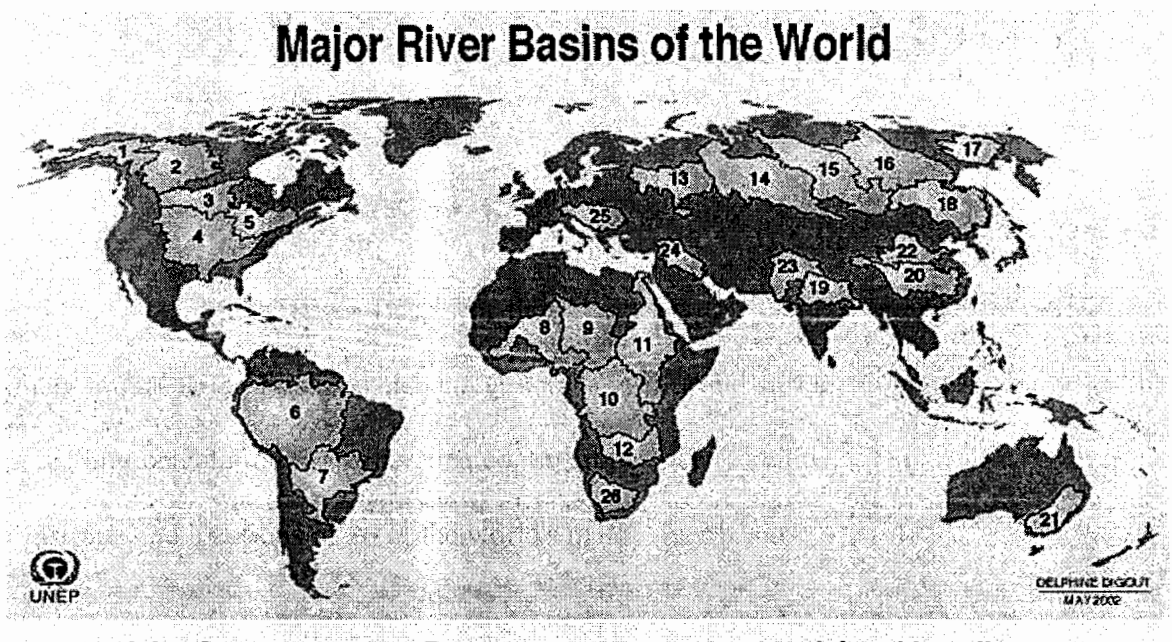
The division of the above categories may also be understood by a graphic illustration showing the quantity and distribution region-wise.



Note: Estimates refer to standing volumes of freshwater.
Source: Igor A. Shildomanov, State Hydrological Institute (Sh.St.Petersburg) and United Nations Educational, Scientific and Cultural Organization (UNESCO, Paris). 1999, World Meteorological Organization (WMO), International Council of Scientific Unions (ICSU), World Glacier Monitoring Service (WGMS), United States Geological Survey (USGS).
[7]

[7] Note: Estimate refers to standing volume of freshwater.
Sources: Igor A. Shildomanov, State Hydrological Institute (Sh.St.Peterburg) and United Nations Educational, Scientific and Cultural Organization (UNESCO,Pans).1999,World Metrological Organization(WMO),international council of scientific Unions (ICSU), World Glacier MonitoringServices(WGMS),United State Geological Survey (USGS)

3. Major River Basins of the World Rivers: - There has been reported 263 international River Basins which cover 45.3% of the land surface area of the earth. In the preceding calculation the Antarctica continent has been excluded. This following graphic illustrates the locations of 26 of the world's major river basins.



North America
1 Yukon
2 Mackenzie
3 Nelson
4 Mississippi
5 St Lawrence

South America
6 Amazon
7 Paraná

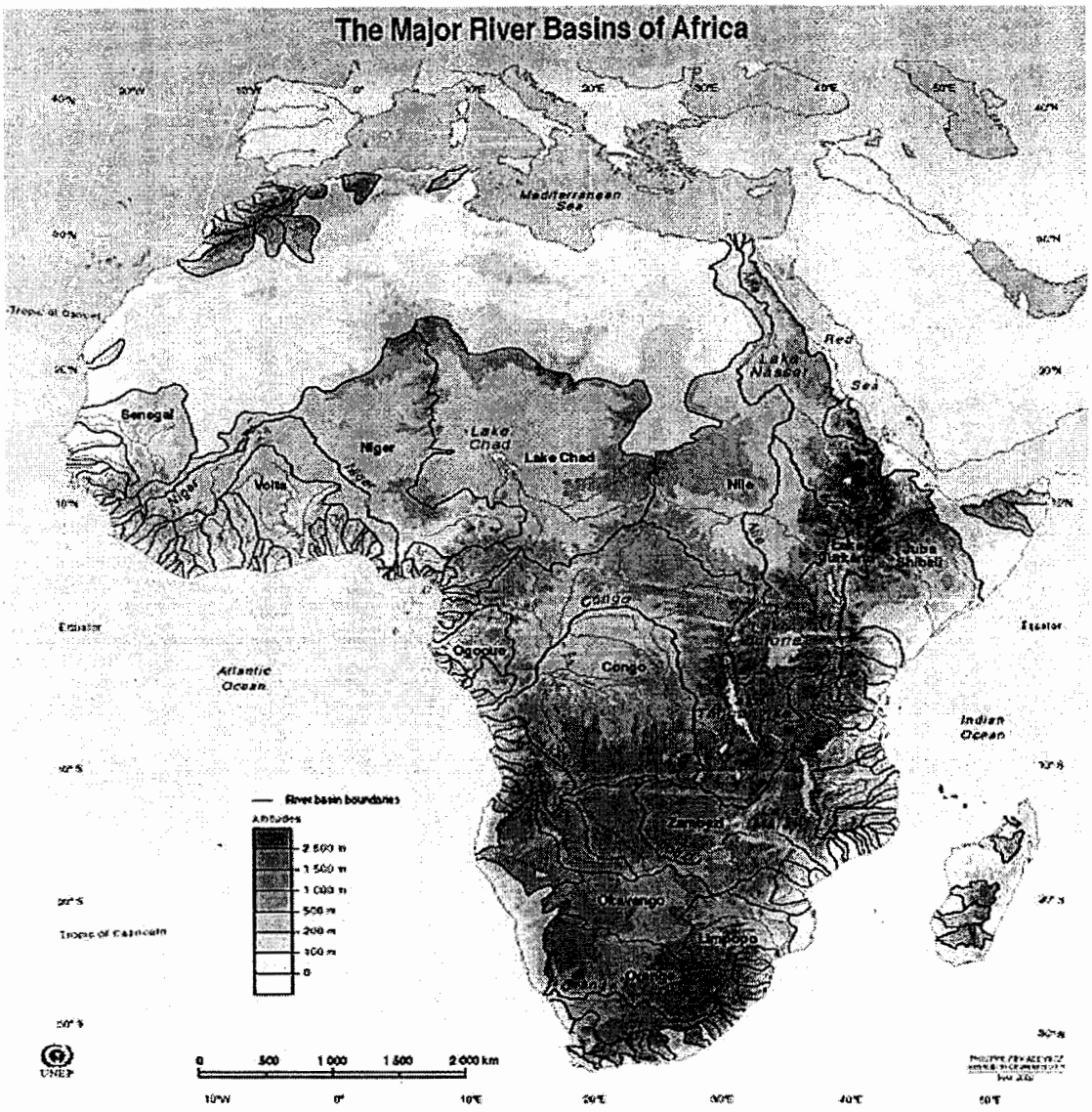
Europe
25 Danube

Africa and West Asia
8 Niger
9 Lake Chad Basin
10 Congo
11 Nile
12 Zambezi
26 Orange
24 Euphrates and Tigris

Asia and Australia
13 Volga
14 Ob
15 Yenisey
16 Lena
17 Kolyma
18 Amur
19 Ganges and Brahmaputra
20 Yangtze
21 Murray Darling
22 Huang He
23 Indus

Source: United Nations Environment Programme (UNEP); World Conservation Monitoring Centre (WCMC); World Resources Institute (WRI); American Association for the Advancement of Science (AAAS); *Atlas of Population and Environment*, 2001.

4 Major River Basins of Africa: - The following graphic shows the locations of 13 major river basins wherefrom we get the idea that all these locations surround the whole continent naturally apart from the states located at the North Africa.



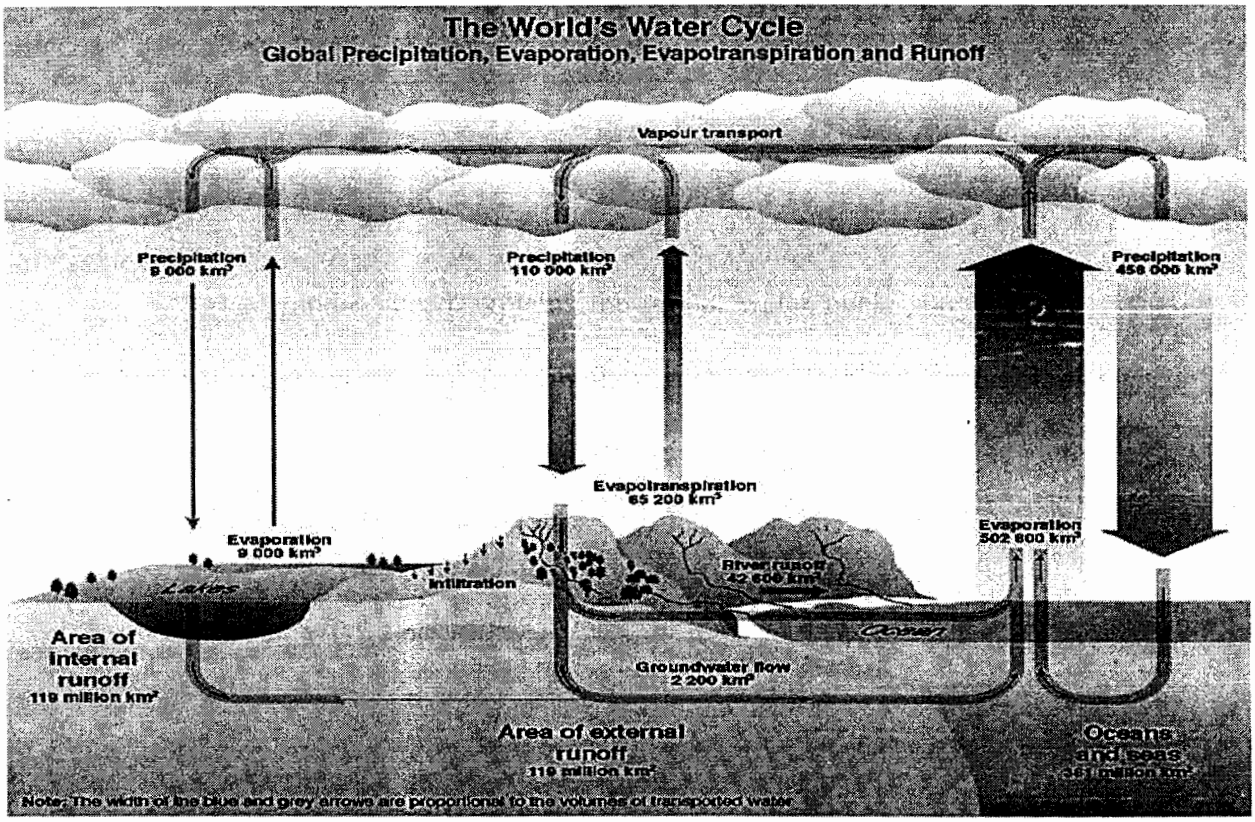
Source: Aaron T. Wolf et al., 1999; Revenge et al., *Watersheds of the World*, World Resources Institute (WRI), Washington DC, 1998; Philippe Rekacewicz, *Atlas de poche*, Livre de poche, Librairie générale française, Paris, 1996 (revised in 2001). [8]

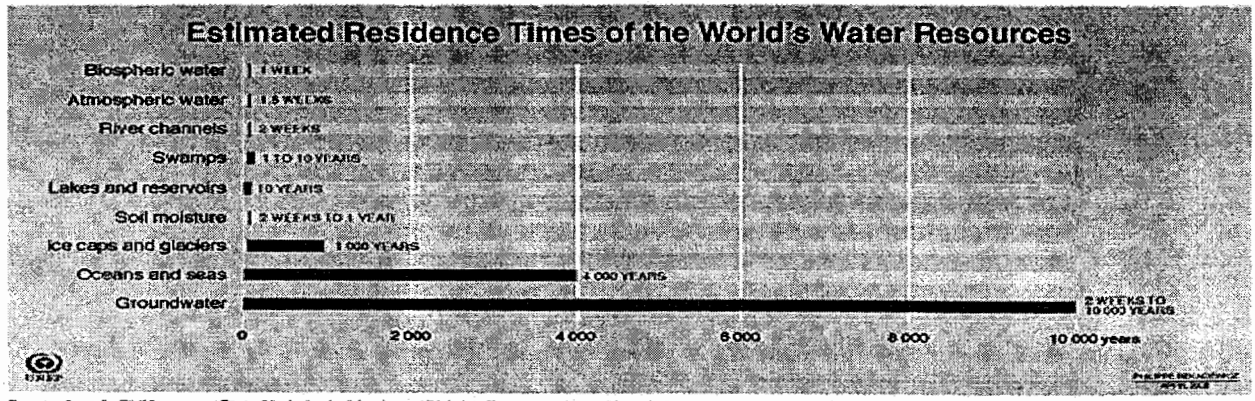
5. The World's Water Cycle and Estimated Residence Times of the World's Water Resources: - The water cycle basically consists of the following;

- ❖ Evaporation and evapotranspiration
- ❖ Precipitation,
- ❖ River runoff (Internal & External).

[8] Source: Aaron T.Wolt et al,1999, Revenge et al, watersheds of the worlds, world resources Institute (WRI), Washington DC,1998,Philppe Rekacewiez. Atla Livre De poche, Librairie generate tranqaise, Paris,1996 (revised in 2001)

The graphic ahead explains the global water cycle showing how nearly 577000 km3 of water circulates through the cycle each year. A table of estimated residence times of the world's water shows the estimated times that water resources exist as biosphere water, atmospheric water…etc.

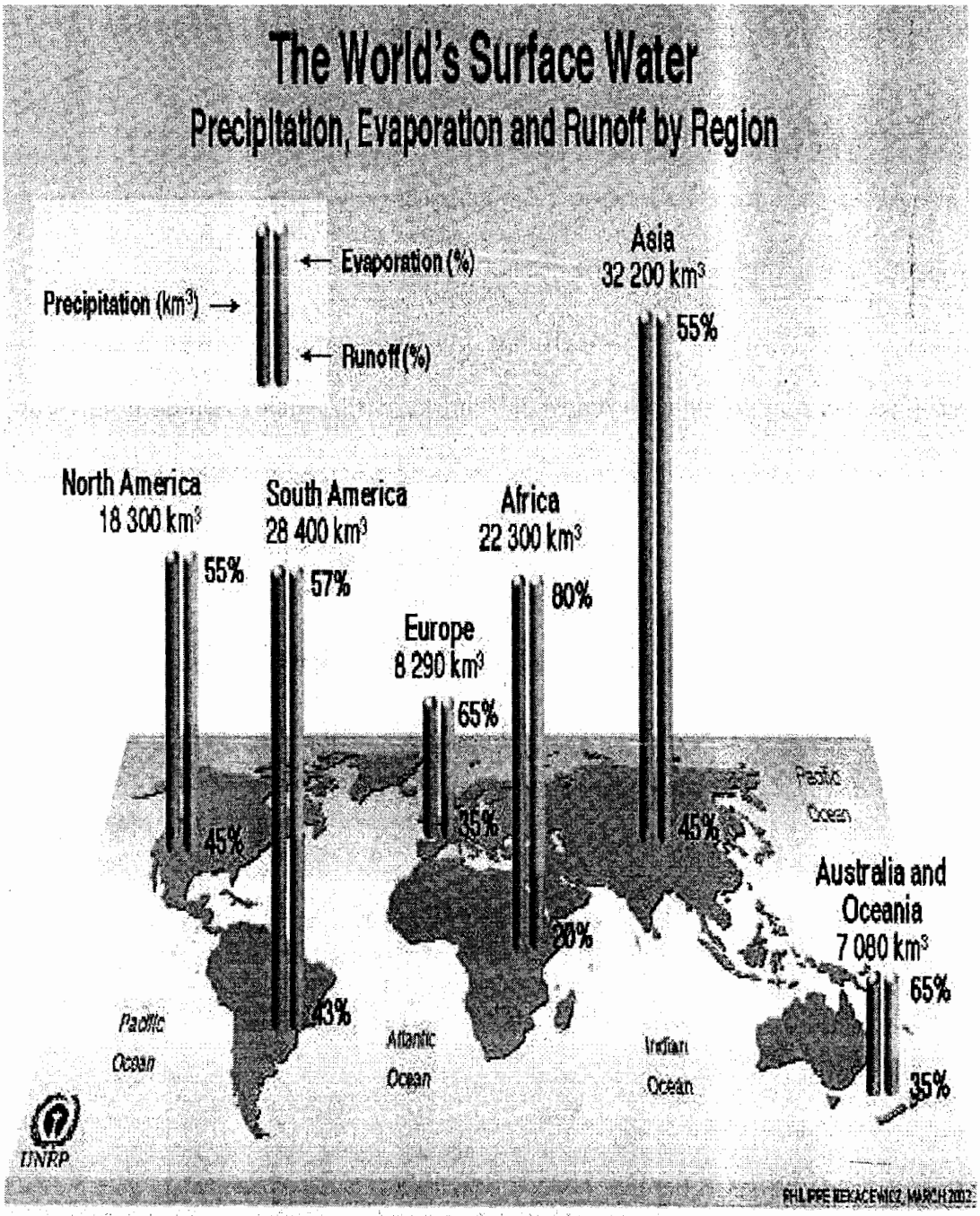




Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organization (UNESCO, Paris), 1999; Max Planck, Institute for Meteorology, Hamburg, 1994; Freeze, Allen, John, Cherry, Groundwater, Prentice-Hall: Englewood Cliffs NJ, 1979.
9

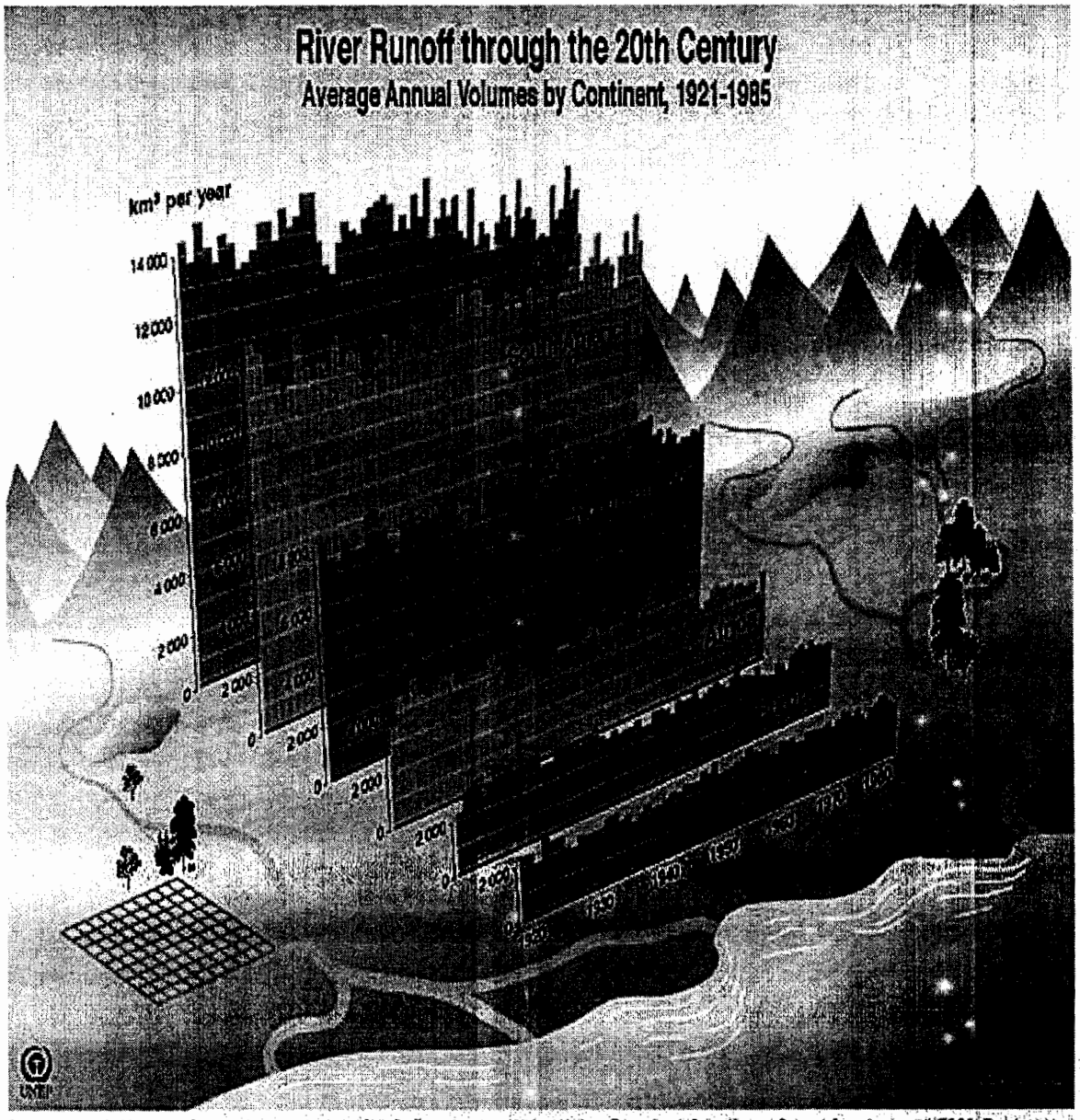
[9] Sources: Igor A. Shiklomanov, State Hydrological Institute (Sh.St.Peterburg) and United Nations Educational, Scientific and Cultural Organization (UNESCO,Pans).1999 Max Plank,Institute for metrology,Hamburg,1994,Freez,Alna,John,Cherry,Ground Water Prentic-Hall:Engle WoodCrafts NU,1979

6. The world's Surface Water: The world's surface water varies region-wise on earth due to precipitation, evaporation and runoff level in different regions. The following graphic explains different rates at which the above-cited causes affect the major regions of the world resulting in uneven distribution of freshwater.



Source: Peter H. Gleick, *Water in Crisis*, New York Oxford University Press, 1993.

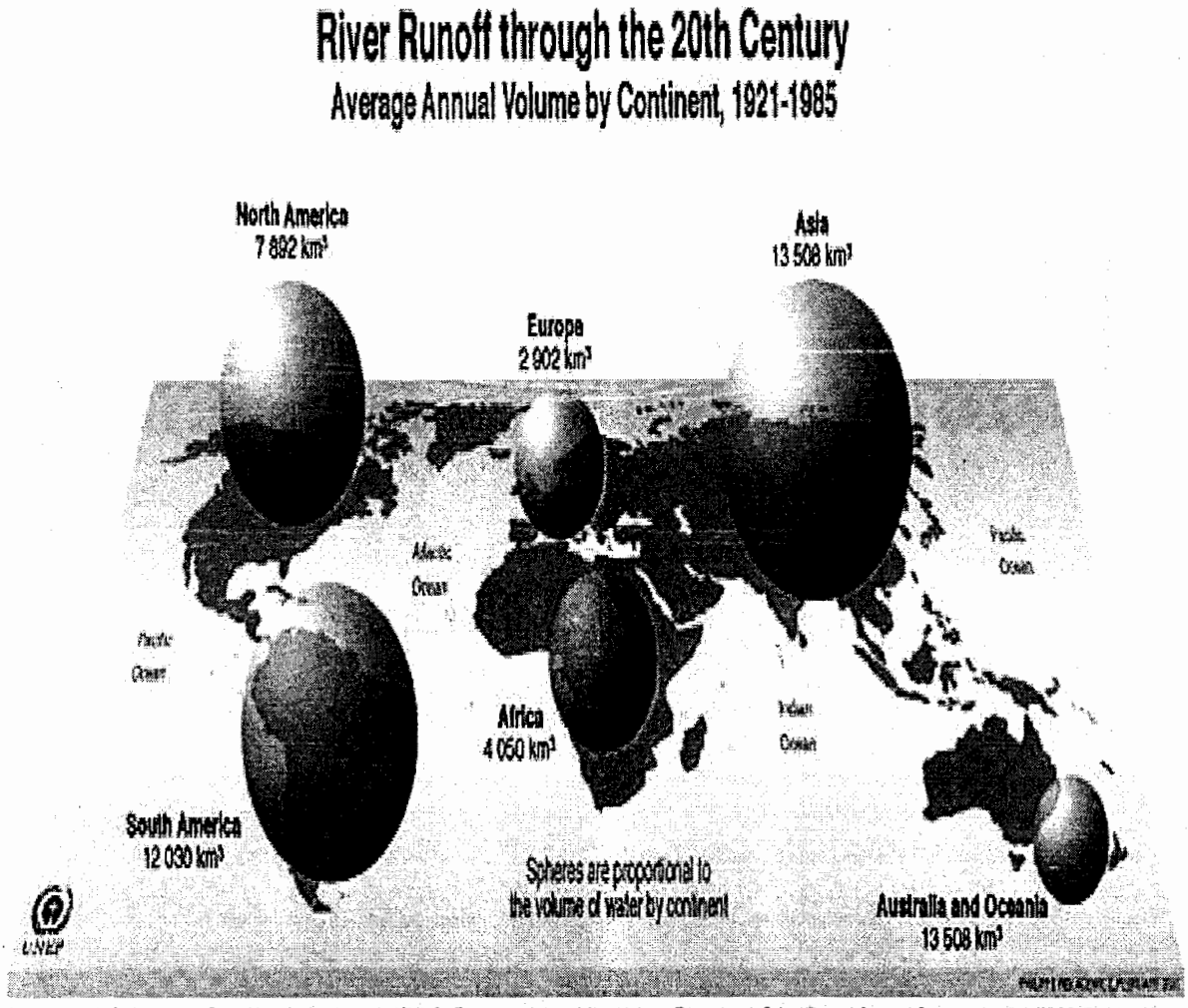
7. River Runoff through the 20th Century: - River runoff is cyclical in nature accompanied with alternative wet and dry year's cycle. From the following illustration it is quite clear that as compared to other continents, Asia had been the most affected continent by River Runoff in the 20th Century, besides South & North America.



Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

8 River Runoff through the 20th Century

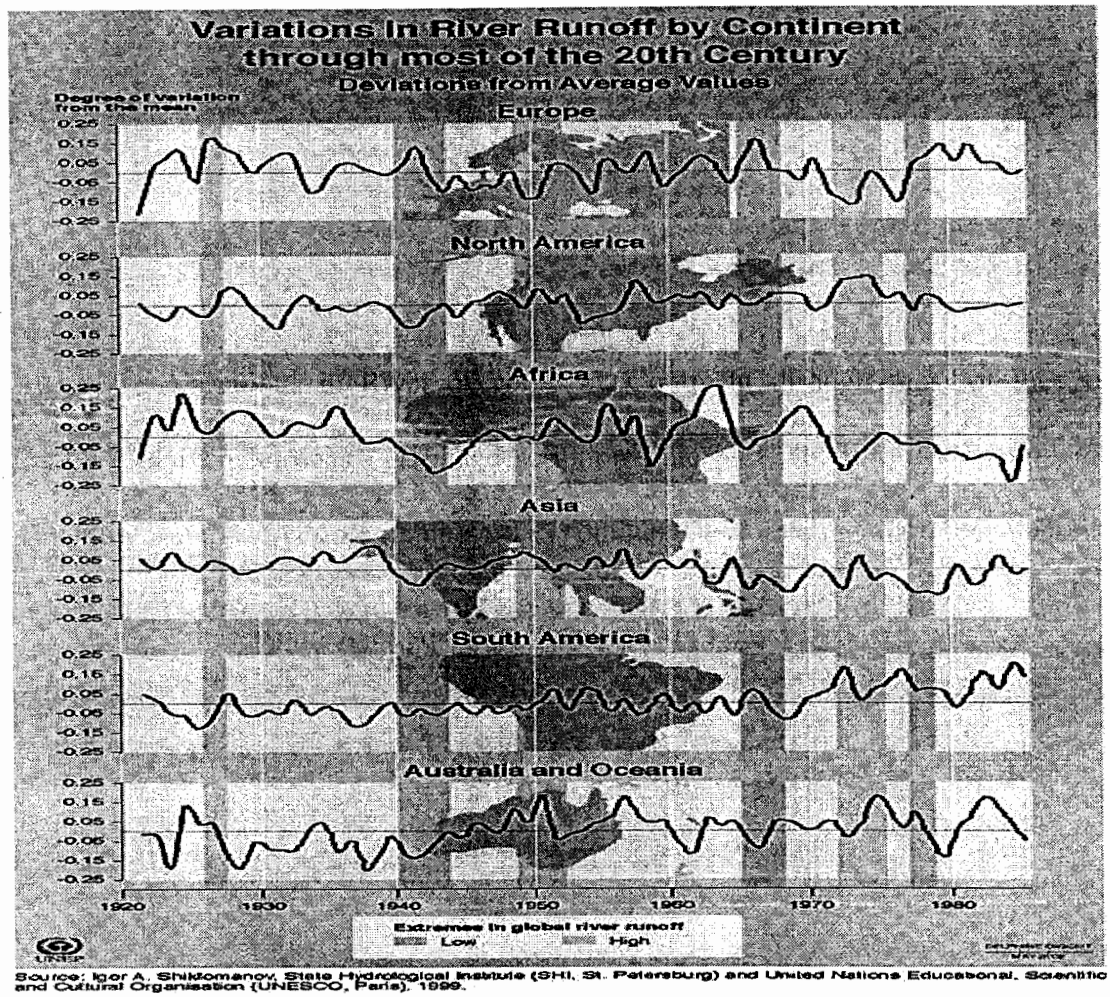
River run-off is the main cause considered to be controlled if we are determined to stop wastage of water sources.



Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

Given above is the graphic picture of run-off concept of water sources in the continents to understand the idea more comprehensively.

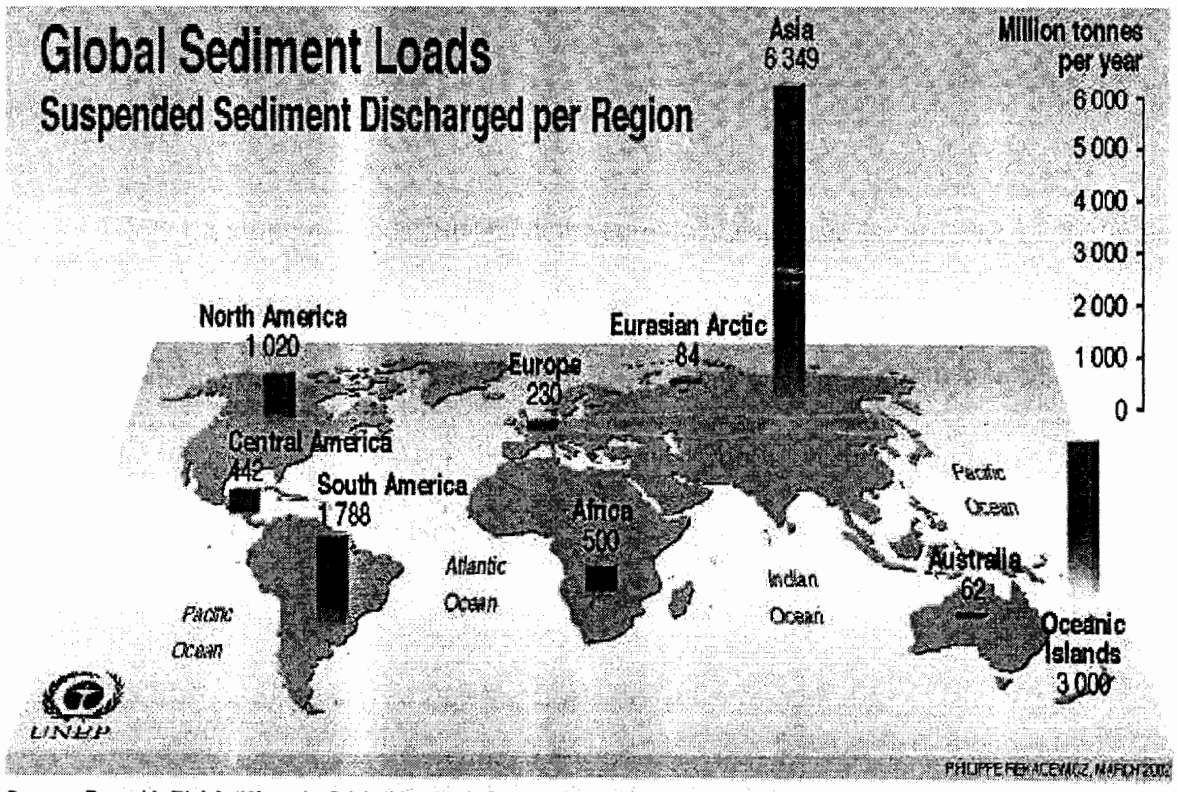
10. Variations in River overflow by Continent through most of the 20th Century: - Given below is a graphic description scale-wise wherefrom we get the idea as to how water sources are running off in continents and creating alarming situation



Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

for states on national and international level to adopt adequate measures to stop this wastage of water sources by extra and utilize the same in more effective manner for the civic public welfare mainly in agriculture sector development..

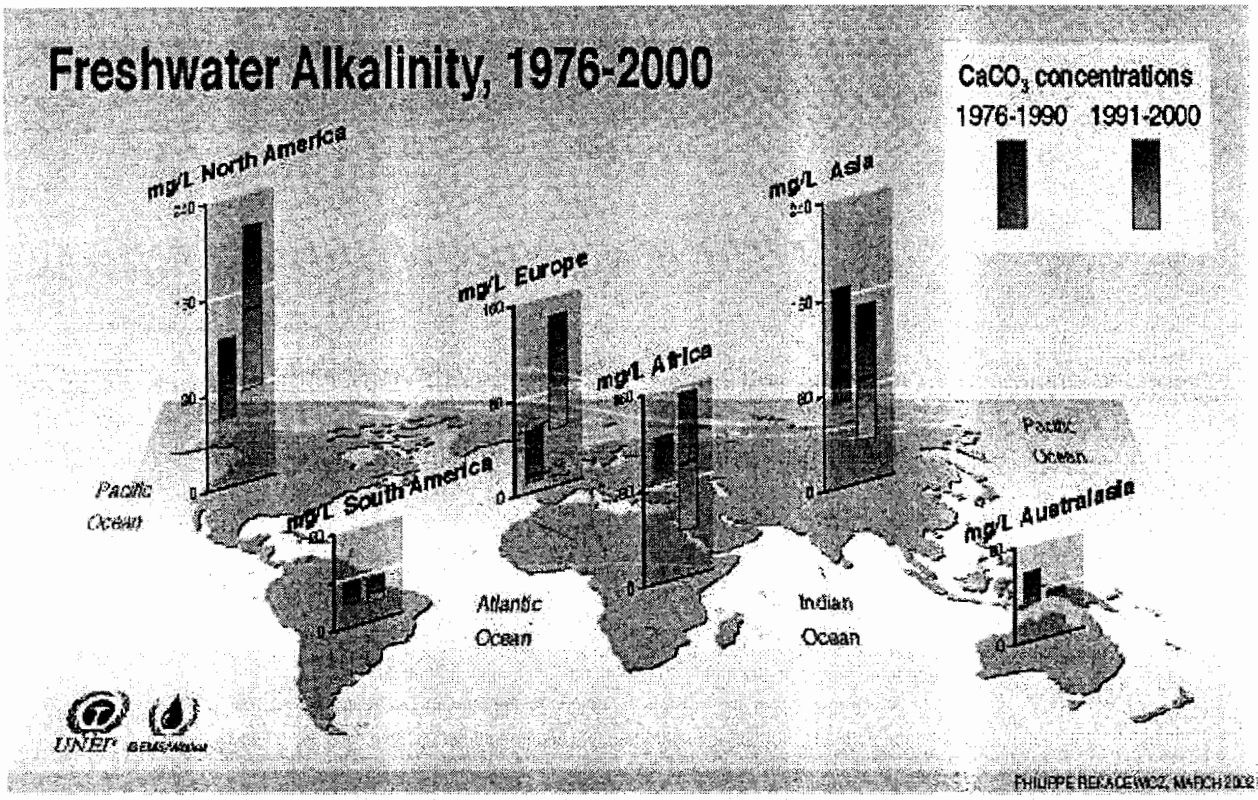
11. Global Sediment Loads: Suspended Sediment Discharge is also one of the main causes of wastage of water sources and causing hurdles in included water resources development and organization Given below is a Region-wise graphic display wherefrom we get the idea that Region Asia shows the largest runoff volumes and, therefore, the highest levels of sediment discharge.



Source: Peter H. Gleick, *Water in Crisis*, New York Oxford University Press, 1993.

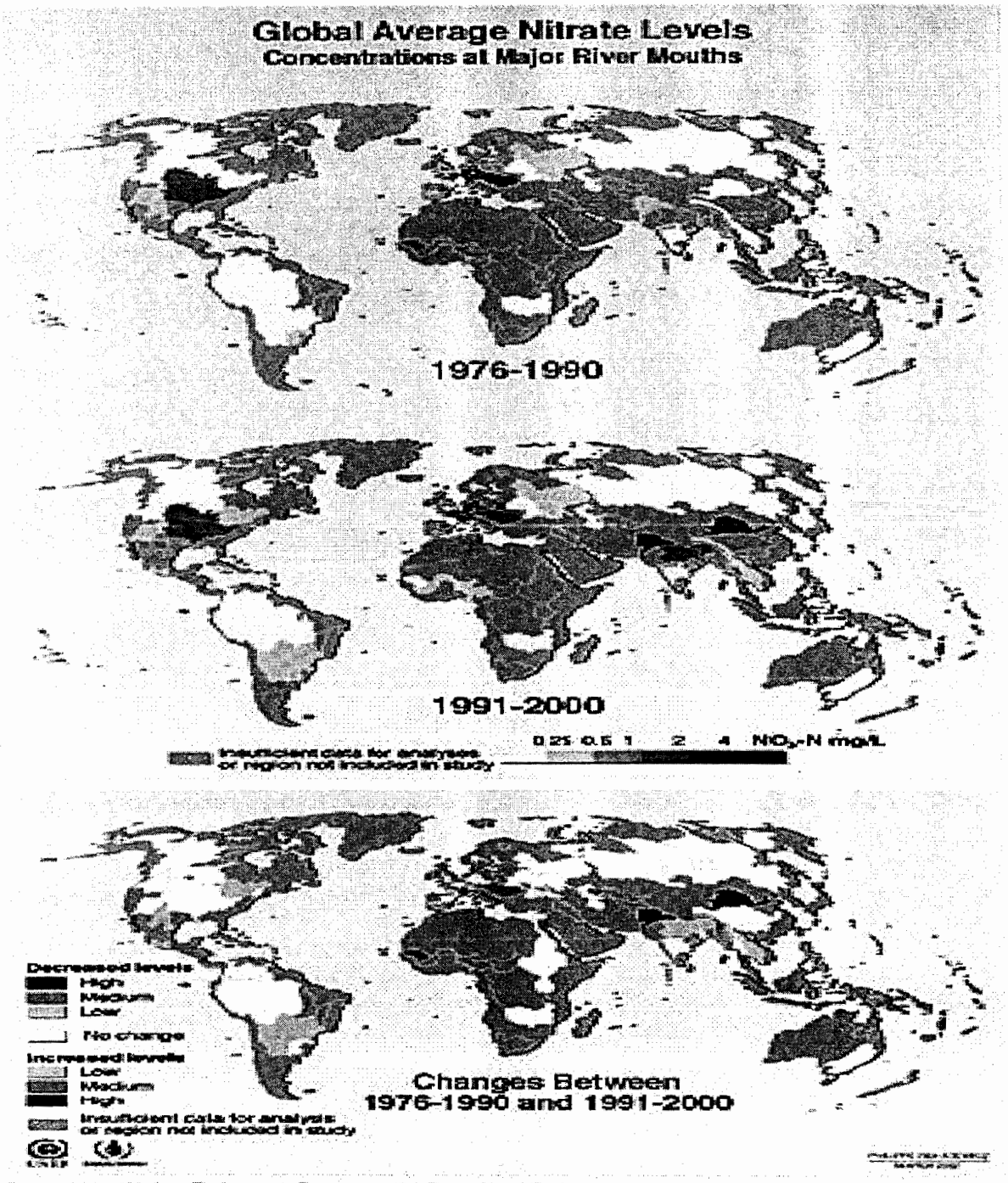
12 Biological Oxygen Demand (BOD), 1976-2000 and Freshwater Alkalinity, 1976-2000: - Biological Oxygen Demand (BOD) is an indicator of the **Organic Pollution of Freshwater** whereas Alkalinity is an indicator of **Freshwater Quality**. The above given graphic schedule provides us the Freshwater Alkalinity in different continents wherefrom we get the idea that as compared to the 14 years time i.e. 1976-1990, the Freshwater Alkalinity in almost all parts of the world has been increasing

during the recent past ten years time i.e.1991-2000 and this is a sign of responsibility for protection of water sources, quality, ecosystems, drinking water-supply, sustainable urban/rural development and food production.



Source: Global Environment Monitoring System (GEMS), Freshwater Quality Programme, United Nations Environment Programme (UNEP), 2001.

13 Global Average Nitrate Levels and Global Dissolved Phosphate Levels:- As compared to the average change of nitrate at Major River mouths in the world between 1976-1990 and 1991-2000, Phosphate change has been noticed to a considerable increase as shown in the above graphic schedule wherefrom we also get an idea that these Phosphate changes are at considerable level increasing during 1991-2000 in Pakistan as compared to 1976-1990. It may affect the agricultural production if appropriate measures are not adopted by the Government of Pakistan as it may cause ruin to agricultural land with less sustainable for agricultural production.



Source: United Nations Environment Programme (UNEP) - Global Environment Monitoring System (GEMS) Water Programme, 2001; National Water Research Institute Environment Canada, Ontario, 2001.

14 The Global International Waters Assessment (GIWA): - GIWA is an example of a comprehensive strategic assessment designed to identify priorities for remedial and mediatory actions required to be taken on international waters.

The following graphic shows GIWA's case studies for the Black Sea, the Amazon, the Great Barrier Reef and the Agulhas Current[10] wherefrom we get an idea that how much the states of the world are adopting serious measures for remedial and mediatory actions regarding preservation of freshwater sources. There are five GIWA's assessment Tools (mentioned in DPSIR heading) for monitoring the world's water resources and major environmental concerns with application of the DPSIR framework, are now beginning to yield results of practical use for management decisions[11]

[10] Ibid., supra note 2, Url.http//:www.unep.org/vitalwater. (last visited on 07.08.2008)
[11] Ibid.,

Global International Water Assessment (GIWA) Case Studies

http://www.giwa.net/

Black Sea

- Introduction: The catchment area is ~ 2.5 million km² with a population of ~ 162 million, of which the urban population accounts for 60%.
- Freshwater shortages are a problem, although not yet catastrophic. Industry accounts for 50% of freshwater use, irrigation for 12-40%, and domestic use for ~ 29%. Increasing pollution in river basins and rising salinity are also exacerbating water shortages.
- Pollution from industries, municipal waste and oil spills is affecting groundwater, the seas and rivers through eutrophication.
- Unsustainable exploitation of fisheries: In the past 30 years, pollution has devastated the fishing industry. Total catches fell from ~ 750 000 tons in 1986 to ~ 281 000 tons in 1992.
- Habitat and community modification and loss: Ecosystems have drastically changed as a result of the increasing eutrophication of water bodies.
- Socio-economic impacts include the decreasing amenity value of coastal areas for tourism and recreation, losses in agriculture, and rising unemployment.

Amazon

- Introduction: The sub region 40b measures 6 869 km² and is shared by six countries.
- Freshwater Shortage: The high rate of deforestation in south-eastern Brazil is altering the water cycle and increasing problems of freshwater availability.
- Pollution caused by chemical and suspended solids – emanating from agricultural wastes and mercury contamination respectively – is of growing concern.
- Habitat and community modification is the priority concern, with management desperately required to address large-scale extension impacts.
- Over-exploitation of fisheries: The region's fisheries have a potential catch of 300 000 - 1 million tonnes/year with > 200 exploitable species. However, consumption is based on only a few dozen species and these are already threatened by over-exploitation.
- Socio-economic impacts include minor water shortages, growing pollution in urban centres, and increasing social and health problems in the suburbs of Amazon cities.

Great Barrier Reef

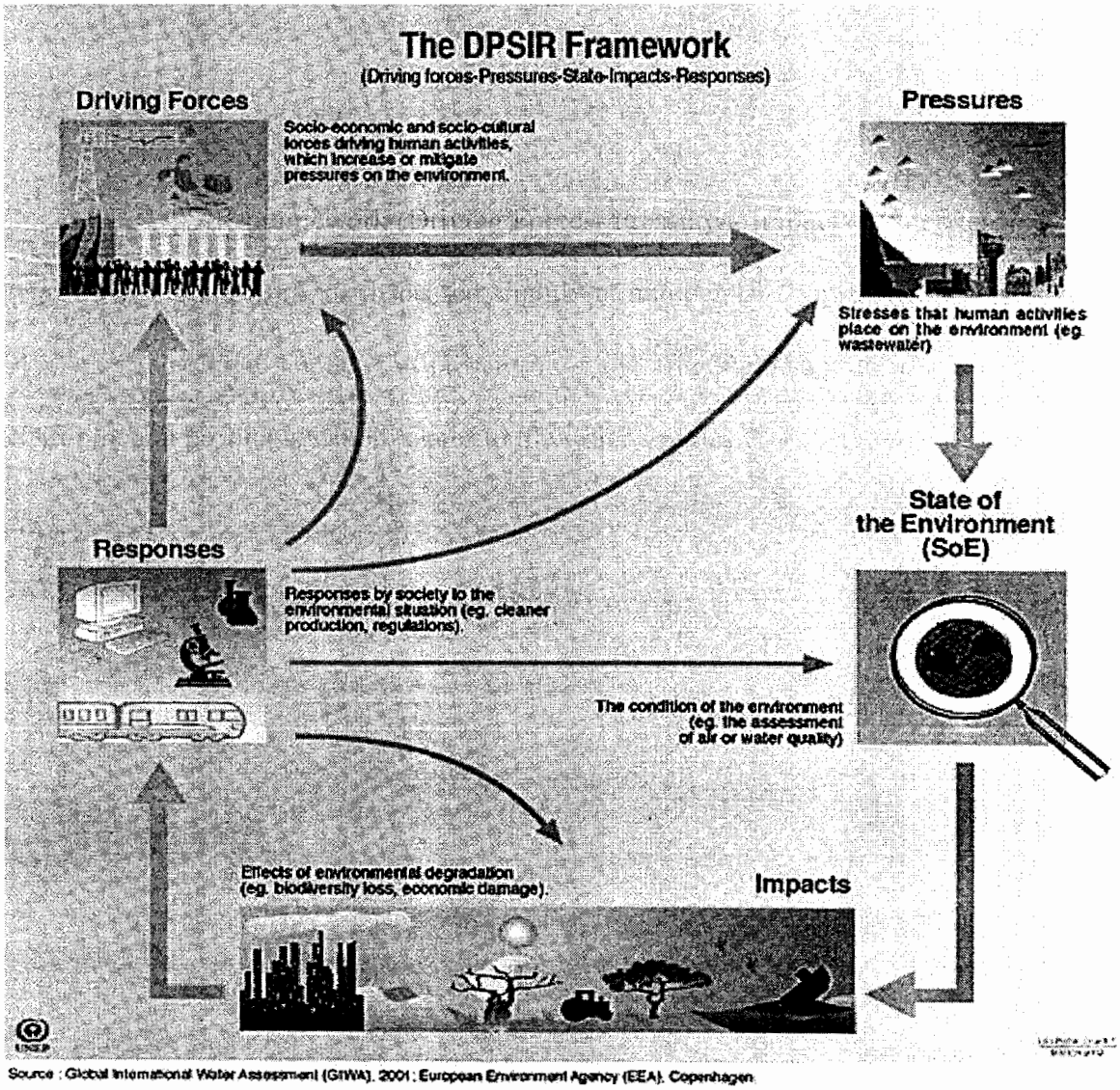
- Introduction: Bordered on the east by the GBR Marine Park World Heritage Area, the sub-region extends north across the Torres Strait to Bramble Cay and the Australia-Papua New Guinea territorial border, west to the PNG-Indonesia border, and south to the tip of Cape York, Australia.
- Pollution: Eutrophication, chemical pollution and suspended solids from the catchments, rivers, wetlands and estuaries are causing moderate impacts in the region. In some areas, the impacts are considered severe.
- Habitat and community modification: Loss or modification of ecosystems is a severe problem locally, notably in mangroves and riparian belts. Overall, the impacts are considered moderate.
- Unsustainable exploitation of fisheries and other living resources: Over-exploitation, excessive by-catches, discards and destructive fishing techniques (benthic trawling) are severe problems, particularly when targeting sharks, mackerel, lobster and shrimps/prawns.
- Global climate change is a major threat, particularly the impact of ocean sea surface temperature increases on coral reefs.

Agulhas Current

- Introduction: There are eight river basins in the sub region, forming a network of transboundary water systems, including a 5,000 km coastline off the Mozambique and South African continental shelves. The Zambezi's catchment area covers ~ 1 434 880 km² and supports 38.4 million people – about 70% of the region's population.
- Freshwater shortages are the primary concern due to excessive water abstraction and increasing pollution of supplies. Irrigation accounts for 60% of local freshwater use. Streamflow in the Zambezi River has declined by over 30% in the last three decades, due to the construction of three large dams.
- Unsustainable exploitation of fisheries, particularly tuna and shrimps in marine waters, is severe and likely to escalate to critical levels by the year 2020.
- Pollution is not a critical concern at the present, although some hotspots have been reported in the mining and industrial zones of major cities.
- Socio-economic impacts include escalating poverty, food insecurity and mortality due to waterborne diseases and rural-rural/rural-urban migration. The major root causes are declining agricultural productivity and fishery harvests, and habitat losses and modification.

15 The DPSIR Framework (Driving Forces- Pressures- Impacts- State-Responses)

The DPSIR framework, as discussed slightly at number 14 supra under the Heading of GIWA's Assessment Tools, is at present the most effective usage to assess and manage environmental problems which relates to the water sources. [12]



Source : Global International Water Assessment (GIWA), 2001; European Environment Agency (EEA), Copenhagen

[12] Ibid., supra note 2,Url.http//:www.unep.org/vitalwater. (last visited on 07.08.2008).

CHAPTER-II

SOURCES OF WATER POLLUTION

Introduction

Water (H_2O) is the second most common molecule in the Universe and is also the simplest compound of the two most common reactive elements in the universe. It covers about 70% of the earth's surface and is unique because it is the only substance that naturally occurs in all three states-solid, liquid, and gas. Water is most atypical as a liquid. Every living organism on the planet, from the simplest virus to the largest whale, vitally depends on water. All the plants, all the animals, all the bacteria contain water. It is the bloods of life and it connects all of us in one common threat. Pollution of water is a global problem. Heavy industrialization, population explosion and increasing urbanization, apart for multifold increase in automobiles have resulted in the problem assuming staggering proportions. This chapter consists upon the sources of pollution, and its hazards have been examined from several angles. Even industry-wise the problem of pollution and its effect on the society, water pollution and its preservation from the toxic and chemical hazards and nuclear activities have been discussed.

I Hazardous wastes.

The generation of hazardous waste around the globe has increased more then sixty-fold since world war-II until recently; the disposal of some of this waste in developing countries to avoid the high fees of local disposal was common practice. Every population must manage the disposal of its waste. This is as true for a culture of bacteria in a Petri dish.

In modern industrial society, this basic ecological fact becomes more challenging as our generation of waste grows in volumes and toxicity. The environmental and human health risks posed by the global movement of hazardous wastes, particularly to countries or facilities that may not be capable of managing wastes in an environmentally sound manner has led the international community to develop a comprehensive legal regime governing the tranboundary movement of hazardous and other wastes[13].

The universe of wastes that is legally considered hazardous waste varies from country to Country. Accordingly statistics about that volume of waste generated and transported across international boarders are not readily comparable. Nonetheless, the volume of waste generated in both developing and less developing countries has increased significantly in the record world wide generations of hazardous waste is estimated to have increased from approximately 5 million metric tone in 1945 to 300

[13] David Hunter, James Salzaman, Dogwood Zaelkep, *International Environmental Law and Policy,* (New York: Foundation Press, 1998), 856.

million in 1988, an increase of sixty-fold since the end of world war-II. Today UNEP estimates that more than 400 million tons hazardous waste is generated annually worldwide.

II Industrial Chemicals.

Industrial chemicals are another means of pollution of water. The UNEP adopted the London Guidelines for the exchanges of information on chemicals in international Trade. The guideline apply to hazardous chemicals including pesticides and call on states of export & import to the work with UNEP in creating mechanism of importance's exchange as chemical involved in international trade.

Environmental Protection Agency (EPA) has listed over 650 chemicals that facilities with ten or more employees (and generating in excess of certain threshold amounts) must report annually. In 1993 manufactories reported release of 2.8 billion pound of listed chemicals. Almost half of the release came from the chemical industry. Right to know legislation is important to protect the health of people and the environment is the most basic legal right to know. Access provides communities with information that is essential for disaster planning.[14] The above results show that the water around the industrial area is somewhat polluted due to the seepage of industrial waste. This water is absorbed by root. The root epidermis is in control with soil water. Some epidermal cell have long outgrowth. Root hairs, which increase surface area absorption. Water flows through the hallow lumen of vessels and tracheids. Mineral ions along with the polluted

[14] Ibid., David Hunter, IEP Supra note 10 , 896.

dissolved in water are transported two.[15]

III Persistent Organic Pollutions (POP)

i. The dirty Dozen

A serious look has begun on a synthetic organic chemical that persist in the environment know as persistent organic pollution it includes a wide rang of chemical pesticides pharmaceutically plastic, industrial chemicals and by product, of industrial process. In fact all POPs are persistent in the nature environment some lasting more than 100 years. POPs are fat soluble; it is found in the animals at the top of the food chain. Over 170 different POPs have been found in human tissue even more in animals. The toxicity of some POPs is relatively well known. Less well know but still reasonably well understood are the link by some of the POPs and cancers. By definition all POPs are persistent in the natural environment. Similarly the Inuit people in the Canadian Arctic carry higher concentration of PCBs in their body than any other human populations. Levels of PCBs in the breast milk of intuit women are at least five time higher then women in urban Canada. The milk also contains high level of chlordane and toxic. It has been reported that some young mother resort for feeding their babies non dairy coffee creamer mixed with water avoid passing on the POPs in their breast milk As PCB work their way up the food chain their concentration in animals tissue can be magnified up to twenty five million time. Microscopic organisms pick up persistent chemical from

[15] Gulrez Fatima,Musa Kaleem Baloach, Shaoib Ahmad, Effect of water pollution on photosynthesis, The Environ Monitor Vol.VI,(march 2006) , 24-26.

sediments, a continuing source of contamination, and water and are consumed in large numbers by filters feeding animals called Zooplankton. Larger species like my aside then consume zooplankton; fish eat the sides, and so on up the food web to herring gull[16].

ii) Pesticides

Pesticides use has been greatest in the industrialized countries of the Europe. Japan and US WHO discovered it as a threat to health. Though agriculture rely it for better production in killing plant eating insect and molds. But applying pesticides to crop poses danger to non-targeted plant and animals' species ground water and worker. In 1972 the WHO estimated that 50,000 people poisoned by pesticides and 9,000 were killed. Many pesticides that use is banned in the industrialization world were legally exported to developing countries. The process can lead to what has been labeled "the circle of poison" The phrase refer to pattern where hazardous pesticides are manufactured within a country where there use is either banned are severely restricted. As a result a chemical is exported back in to the country of manufacturer and in turn end in the dinning table and in school lunches. Hence the pesticides can "full circle" complete[17]

iii) Pesticides and alternative

The use of pesticides, herbicides, insecticides, fungicides, and fumigants like methyl bromides, mostly applied by spraying, increase by some 10 per cent annually. Pesticides seeping into ground water, river, and ocean may appear dispersed, but become concentrated in organic tissue in food chains endangering aquatic life and human health.

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[16] Ibid., David Hunter, IEP Supra note 10, 888.
[17] Ibid., David Hunter, IEP Supra note 10, 888

Biological controls are some time effective. Screwworm-fly populations (cattle press) have been reduced by introducing irradiated sterile male flies. Insect parasites may be used in some cases. In many topical countries where pests multiply rapidly there is less control over pesticide use or guidance over suitably application have killed predators as well as pests and so increased infestation[18].

iv) Chemical Pollution of International waters.

Access to clean water plays a major role in achieving Human development However, chemical pollution of water resources is one of the major threat to the achievement of sustainable water recourses and management of chemical pollution can be caused by poorly treated or untreated municipal and industrial wastewater, pesticides and fertilizer runoff from agriculture; spills and others ships related released; mining 'and other resources. It is one of the contributing factors to the current global crises in which nearly a billion people lack aces to safe drinking water.

[18] David Money, *Environmental Issues, the Global Consequences,* (London: Hodder & Stoughton,1994), p.54.

UNDP's response to this water crisis has been to emphasis an integrated approach to water resources management through effective water governance referring to the range of political, social, economic and administrative system. UNDP administer international water which shares international water bodies' including agriculture, industry, mining oil and gas exploitation and water waste management. That place biological stress on marine and fresh water systems and reduce them often affecting their use by another country or community that shares the recourses. Project implementing stress reduction measures in major trans-boundary water bodies that result in considerable reductions in pollution loads but all these measures required coordinated legislation and improved environment monitoring. Therefore such like project are playing Project leading roll to reduce the release of mercury in to the environment from artisanal gold mining and practices and to create artificially engineered wetlands treating municipal waste water for national and regional replication.[19]

[19] http:/www.undp.org/chemicals/wehmicalpollution.htm

CHAPTER -III

LEGISLATION ON THE SUBJECT MATTER

Introduction

Water pollution, the nation's major water resources conservation and development problem, continues to engage the important consideration of legislatures concerned with providing for its effective prevention and control, the law available in the country is insufficient to cope with the requirement of the society. The reason is that the Environmental Legislation is common all over the world presently but it is comparatively new phenomena in the legislative field. Public are not aware of their rights provided in the existing laws. Therefore, the responsibilities lay upon the local admintration to arrange public awareness programme about the law available. Limited laws are available for example **Clean Water Act 1977 (USA)** is the primary law in the United States governing water pollution commonly abbreviated as the CWA. In Pakistan some provisions of PPC, The Canal and Drainage Act 1873, the West Pakistan Fisheries ordinance,1961, the Baluchistan Sea-fisheries ordinance, 1971, and The Baluchistan Sea-fisheries rules, 1971 are similar in nature to the Fisheries ordinance with some exception while the NWFP Fisheries Rules, 1976 are formulated under the fisheries ordinance, 1961. The purpose of all these laws is to protect and promote the aqua-life and atmosphere in Pakistan. PEPA 1997 is considered to be a major law on the subject, there is required further improvement in the legislation to face all the problems which are not addressed so for.

Many fresh water resources in the world are shared by to or more nations. .some of the oldest international treaties and organizations were created to regulate the use of shared water bodies, including the Rhine and the great Lakes. Water pollution agreements grew out of general agreement on water use. In both the Rhine and the Great Lakes, they have met with only limited success,

Tranboundary management of the Rhine began in 1869, when the central Commission for Rhine shipping was established to create an intentional forum for shipoping problem However before it the pollution became an international issue. In 1950, the international Rhine commission began studying waste-water and water quality problems. In 1953, Switzerland, France, Luxembourg, Germany and the Netherlands formed the international Commission for the protection of the Rhine against pollution. Its purpose was to monitor the level of contamination in the river.

When the issue salt emissions raised by the Dutch Government in 1932. The commission named as IKSR passed on convention in 1976 on the protection of the Rhine against chloride pollution. Unfortunately, the chloride treaty led only small reduction in salt discharges by France. In the 1960, the IKSR turned to the problems of cooling-water, eutrophication and heavy metals, and in 1976 again a convention was passed on the protection of the Rhine against Chemical pollution. In 1986 it came with four objectives long-term

- Safeguarding of drinking water higher
- Decontamination of sediments
- Re-establishment of higher species of fish
- And protection of North Sea.

However, it was recommendatory body to the national Government but even then the result was positive. In 1995, the rates of discharge for all 30 different hazardous substances have been reduced by more than 50 percent.

Unlike the Rhine action programme, the Grate Lake agreements largely are strict enough to protect the environment. Problem lies in implementation and enforcement. Because the agreements do not have the force of law, they have relied on public pressure and political will among the member jurisdiction to achieve their goals. According to citizens review of the GLWQA 1987, Federal, provincial and state government have failed to implement the GLWQA and in some instance have not even enforced their own existing laws and regulations. Furthermore, the current climate of decrease to research, education and enforcement programme in Ontario and several US states threatens to undo much of the progress that has been made in the past two decades.[20]

[20] Http://book.google.com/books.
The water crises constructing: constructing solution to fresh water pollution by Julie Stuffer.

I Clean Water Act 1977 (USA)

The Clean water Act is the Primary Federal Law in the United States governing water pollution commonly abbreviated as the CWA, the Act established the goal of eliminating releases to water of amounts of toxic substances and eliminating additional water pollution by 1985.The principal body of law currently in effect is based on the Federal Water Pollution Control Amendments of 1972, which introduced a permit for regulating point sources of pollution. These point sources includes industrial facilities (including manufacturing, mining, oil and gas execration , and service industries) point sources may not discharge pollution to surface waters without a permit from the National Pollutant Discharge Elimination System (NPDES) This System is managed by the united States Environment Protection Agency (EPA) EPA has authorized 46 states to issue permits directly to the discharging facilities. Representative of Frank Pallone introduced H.R.1310, the clean water protection Act, on March 4, 2009. The bill would amend the CWA by redefining the term, "fill material "to exclude "any pollutant discharged in to the water primarily to dispose of waste." The amendment is intended to restrict the practice of mountaintop removal mining. Senator Russell Feingold introduced S.787, the clean water restoration Act, "on April 2, 2009, to amend the CWA and clarify the jurisdiction of "waters of the United States." The intent of the bill is to restore protections for rivers, streams and wetland that may be subject to question due to recent Supreme Court ruling in SWANCC.

II Pakistan Penal Code 1860

There exist general laws in the country that impose penalties on its violation. Therefore, Section 277, of the Pakistan penal code provides punishment for water pollution.

> "Whoever voluntarily corrupts or fouls the water of any public spring or reservoir, so as to render it less fit for the purpose for which it is ordinary used, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine which may extend to five hundred rupees, or with both".[21] Similar provision in the section 426 of the PPC that :-Whosever commits mischief shall be punishable with imprisonment of either description for a term which may extend to three months, or with fine, or with both.[22]

Wrongfully diverting of water or other mischief with water may effect badly the vegetation and thus cause pollution. It is evident that any such act may cause fouling of water; the law is there to check such mischievous act by making them punishable under section 227 and 426 of the Pakistan penal code 1860. The Object of the section is to prevent a diminution in supply of water for agriculture or drinking purpose of human being and animals. it is important to note that section 277 of the Pakistan penal code applies if the water is fouled so as to render it unfit for human consumption, and this section is equally apply to irrigation sources. Therefore, whoever fouls water of irrigation channels, pond, tanks, etc is guilty under this section too.[23]

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[21] The Pakistan Penal Code, 1860.S. 277,
[22] Ibid, S. 426,
[23] Fahim Ahmed Siddique, *The Scope of Environmental laws in Pakistan,* (Karachi: Asia Law House, 2000), 167

III. The Punjab Local Government Ordinance, 1979 repealed in 2001

There are some provisions to deal with environment matter in the Punjab Local Government ordinance 1979 which is repealed in 2001. It is the duty of Zila council to beautify the public places, like roadside ways and public buildings by plantation and preservation of tree, it is also defined in the ordinance that the Zila council may or by the direction of the government shall perform the function relating to the matter of environmental of pollution and it is further provided that the zila council shall prepare and implement the scheme relating to water pollution the same duty is also imposed on the urban Local Councils. The public health and sanitation is a very primitive concept of the environmental law, and it is also given sufficient weight in the Punjab local government ordinance, 2001.

According to the ordinance, it is the basic and the most fundamental responsibility of the Zila council, to make arrangement and to provide facilities of public drain and to maintain the existing and future facilities of drain to keep them in good working condition, and to make regulation for industrial waste. Comparatively vast and comprehensive responsibilities for providing and maintenance of public drains are imposed on an Urban Local Council.[24]

[24] The Punjab Local Government Ordinance 2001,S 40(E) edition 2005

IV. West Pakistan Fisheries ordinance, 1961

The West Pakistan Fisheries ordinance, 1961 was enacted to regularize the method of fishing. Either traditional or modern should be used with some limitations, and not other means of catching of fish should be used, which is noxious to the aqua-life specially fish, and destructive to atmosphere. The ordinance says that no person shall use any dynamite or other explosive substance in any water with intent thereby to catch or destroy any fish that may be therein. It is illegal to catch fishes by using poison, lime or noxious material into any water with intention to catch or destroy fishes that may be therein. [25].

There is also provision to check the excessive and harmful commercial fishing during the breeding periods. Commercial fishing during breeding period may cause a sharp depletion of fish stock in the waters. Especially Trout, Mahashair, Rahu, Mori, and Thaila species are badly affected. The breeding period of Trout ranges from the first week of October to the second week of March. While it ranges from the beginning of June to the end of August. The ordinance provides a conditional ban on any kind of fishing activities during this period. In this regard Government is required to issue circular notification informing the all concerned. It is further stated that any law drive its force of implementation from sanction behind it, and penalties are necessary for a violator. The fisheries ordinance also imposes penalties on a person who contravenes any provision of it. According to section 17 of the ordinance whoever violates the provision

[25] The West Pakistan Fisheries ordinance 1961. S. 17.

of section 6, 7 or 11 shall be punished with punishment of either description which may extend to three months or with fine which may extend to five hundred rupees or with both. The ordinance also empower the government to make rules for the purpose of carrying effect the provision of this ordinance, to prohibit to regulate the dimension and kind of nets, cages, traps, or other contrivances for taking fish to be used etc. [26]

The Baluchistan Sea-fisheries Ordinance, 1971. and The Baluchistan Sea-fisheries rules, 1971 are similar in nature to the Fisheries ordinance with some exception while the NWFP Fisheries Rules, 1976 are formulated under the fisheries ordinance, 1961.

V. The Territorial Water and Maritime Zone Act, 1976.

The territorial water and maritime Zone Act 1976 was enforced on 31 December, 1976. The purpose of this act is to provide for the declaration of the territorial water and maritime zone of Pakistan. [27] According to the Act there are three type of zone of water of Pakistan.

1. Territorial waters
2. Contiguous zone
3. Exclusive Economic Zone.

The territorial water zone is extended to 12 nautical miles from the base line according to section 2(1) of the territorial water and maritime zone Act 1976.

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[26] The West Pakistan Fisheries Ordinance,1961, Section 17 of
[27] The Territorial Water and Maritime Zone Act 1976, Section 2(1).

The Contiguous Zone of Pakistan is an area adjacent to and beyond the territorial waters and extending seaward to a line of 24 nautical miles measured from the baseline. Exclusive Economic Zone is extended up to 200 nautical miles seaward from the base line. It is exclusive jurisdiction of the Federal Government to preserve and protect the marine environment and to control the marine pollution. But there is one thing more that is called the "Continental Shelf" which called the seabed also in term of the law or sub side of the submarine area it is up to the 200 nautical miles distance of the outer edge of the continental margin, as provided in section of the Act. The purpose there is that no foreign government can engage in any activities in the continental shelf of Pakistan without the prior permission in shape of license, letter of authority, of the Federal Government. The Federal Government may by notification in the official Gazette make rules for the preservation and protection of the marine environment and control of marine pollution. And those who violate the rules may be penalized.

VI The Pakistan Environmental Protection Ordinance 1983 (repealed)

The Pakistan environmental protection ordinance 1983 was promulgated on 31 December 1983 and came into force on 6th day of February 1984 it is a mile stone in term of environmental legislation in the country. It can be said that this ordinance has provided a base for legal control on environmental pollution, and it has declared the way for the Pakistan environmental Protection Act 1997. In fact this ordinance has initiated a series of legislative and administrative activities for formulation of different bodies and drafting of rules as required by the ordinance. On the whole the function of this ordinance

was limited to advisory and assurance capacity. Although the ordinance is no more exist in the Books of statutes, as it has already been repealed by the section 34 of the environmental protection Act 1997[28] but it will be remembered as a law that has crystallized the legislative activities in the field of environmental protection. [29]

VII. The Pakistan Environmental Protection Act, 1997.

The Pakistan environmental protection Act 1997 was passed by the national Assembly of Pakistan on 3rd September, 1997 and by senate of Pakistan on the 7th November1997 and relieved the assent of the president on the 3rd December,1997 and now it is the law of the land. Although, the close observers have some reservation regarding some parts of the law and about the functions of the bodies to be formed but still it is a great achievement in all respect. The Pakistan environment protection Act, 1997 extends to whole of Pakistan the act proposed two bodies named as "The Pakistan environment protection council" and the other is "the Pakistan environmental protection Agency". Mere framing of law does not provide good result unless the law is strictly implemented with letter and spirit and active participation of the public. Duty and obligation of the media to provide sufficient material with regard to the awareness of environment programme initiated by the Government and non-government organization.

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[29] The Pakistan Environmental Protection Ordinance 1983

As I have discussed in Chapter-1 that hazardous waste is the source of water pollution so section 13 of the PEPA 1997[30] provides that "No person shall import hazardous waste in to Pakistan and its territorial waters", exclusive economic zone and historic waters. Exclusive economic zone shall have the same meaning as in the territorial water and maritime zone Act 1976.and section 17 imposed penalties on law-breakers that whoever contravenes or fails to comply with the provisions of section 11,12,13,or section 16 or any order issued there under shall be punished with fine which may extend to one million rupees, and in the case of continuing contravention of failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues.

Section 20 of the PEPA lay responsibilities on the Federal Government to established environmental tribunals as it considered necessary and it will be consist upon the chairperson who is or has been or is qualified for appointment as Judge of the high court to be appointed after consultation with the chief justice of the high Court and two member to be appointed by the Federal Government with suitable and technical expert in the relevant profession and environmental field. Like other courts the opinion of the majority will be prevail. The Baluchistan Sea-fisheries ordinance, 1971, and Sea-fisheries rules, 1971 are similar in nature to the Fisheries ordinance with some exception while the NWFP Fisheries Rules, 1976 are formulated under the fisheries ordinance, 1961. The purpose of all these laws is to protect and promote the aqua-life and atmosphere.

[30] The Pakistan Environmental Protection Act, 1997.

VIII The Canal and Drainage Act 1873

Let me compare the different laws applicable to each integrating province of Pakistan viz Punjab ,NWFP Balochistan and Sindh will show that where NWFP and Balochistan provinces have adopted the Punjab Canal and Drainage Act of 1873 for application in their province the Sindh irrigation Act fairly meet with the requirement of the said Punjab Act . The government of Balochistan have through an independent law namely "The Balochistan Canal and Drainage Ordinance 1980 adopted the Act Punjab as amended in 1975 where as the NWFP have not incorporated any change enacted since after 1975 except certain changes in section 68-70 of the NWFP as it suited the legislature. Similarly Sindh Government has also not made any considerable change in the original text of the year 1879 except minor modification here and there. [31]

There is hardly any case law applied in NWFP, Balochistan and Sindh and therefore attention has been concentrated on laws applicable to the Punjab Province. The Punjab government prescribes a sentence comprising of a fine of Rs. 200 (maximum) or to imprisonment not exceeding 3 months or both for offence or offences detailed in section 70, of the canal and drainage Act that of NWFP sentences the offender to fine of Rs.50 or imprisonment of one year or both, that of Balochistan fixes Rs.5000/- (five thousand) maximum fine or an imprisonment of 3 month or both and that of Sindh describes an imprisonment of 3 months (maximum) or a fine of Rs.1000/- or both as the case may be for a similar culpable offence. Section 70 is a penal Section added by the

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[31] Sardar A.D. Nasir, *The Canal & Drainage Laws in Pakistan*, (Lahore: Mansoor Book Hous, 1993), Section 71.

Government with a view to enable the Divisional Canal Officer to control and harness water supplies to the best use and to the entire benefit of the water user. All the offences given hereunder are punishable under the special law which however does not bar a trial of an offence cognizable under any law. The exception being that where an accused person is once convicted under the provisions of one law for an offence, he cannot be convicted a second time for the same offence under another law as is specifically provided in section 71of the Canal and Drainage Act. The trial court has powered to order the accused to restore watercourse-demolished damage by him.[32]

IX. Pollution of Ground Water and liability for damages

It is clear that potential water pollution arising from a proposed development is a material consideration in any planning decision, and receiving any application for gaining permission having great importance regarding ground water protection, and any interference with the natural quantity or quality of the water is an actionable nuisance. There are number of offences committed in relation to water pollution. The dumping of waste, which often involve the pollution of water, and many by-Laws of local or specific nature and liability may also arise against the culprit. this was first established in **Ballard VS Tomlinson (1885) 29 ChD 115,** where a brewery successfully sued for the contamination of its well caused by a neighbour who used his own well for the disposal of sewage. However, the extent of this liability was clarified in ***Cambridge water Co Vs. Eastern Counties Leather plc (1994) 2 Ac 264,*** a case

[32] *Ibid.*, Supra note 26.

discussed in detail the house of Lord took the opportunity to move the law of nuisance and the law under the rule in **Rylands Vs Fletcher** toward negligence, by requiring the defendant to show that the type of damage that occurred was foreseeable. This decision satisfied those whose primary concern was with avoiding the prospect of retrospective civil liability, but disappointed those commentators who argue for the primacy of strict liability in the civil law as a reflection of the polluter pays principle[33].

There is another relevant case decided by the Supreme Court of India in 1988.The abstract of the case briefly as follow.

In Common Law the Municipal Corporation can be restrained by an injunction in an action brought by a riparian owner who has suffered because of the pollution of the water in a river caused by the Corporation by discharging into the river insufficiently treated sewage from discharging such sewage into the river.

In the instant case, the petitioner had filed writ petition for prevention of nuisance caused by the pollution of the river Ganga. No doubt, the petitioner is not a riparian owner. He is a person interested in protecting the lives of the people who make use of the water flowing in the river Ganga and his right to maintain the petition cannot be disputed. The nuisance caused by the pollution of the range and indiscriminate in its effect and it would not be reasonable to expect any particular person to take proceedings to stop it as distinct from the community at large. The petition was therefore, entertained

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[33] Stuart Bell, Donald McGilliveray, *Environmental Law,* (New Delhi: Universal Law Publishing Co.PVT, 2001), 608.

as a Public Interest Litigation. The petitioner was entitled to move the Supreme Court in order to enforce the statutory provisions which impose duties on the municipal authorities and the boards constituted under the Water Act.

It was observed that although Parliament and the State Legislature have enacted many laws imposing duties on the Central and State Boards and the Municipalities for prevention and control of pollution of water, many of those provisions have just remained on papers without any adequate action being taken pursuant thereto. On account of failure of authorities to obey the statutory duties for several years the water in the river Ganga at Kanpur has become so much polluted that it can no longer be used by the people either for drinking or for bathing. The Nagar Mahapalika of Kanpur has to bear the major responsibility for the pollution of the river near Kanpur city. In order to control and prevent the pollution of water in the river Ganga at Kanpur the Supreme Court issued certain directions for compliance by the Kanpur Municipal Corporation and concerned authorities.

1. It is seen to that Kanpur Mpl. Corporation is taking certain steps but not with sufficient speed. It is noticed that the Mpl. Corporation has not submitted its proposals for sewage treatment works to the State board constituted under the Water Act. The Mpl Corporation should submit its proposals to the State Board within six months from 12.1.1988.

2. Appropriate steps be taken to prevent pollution of water on account of waste accumulated at the dairies.

3. Wherever sewerage line is not yet constructed steps should be taken to lay it and it should be increase the size of the sewers in colonies so that the sewage may be carried out smoothly through the sewerage system.

4. Immediate action should also be taken by the Knapur Nagar Mahapalika to construct sufficient number of public latrines and urinals free use of the poor people in order to prevent defecation by them on open land.

5. Since the problem of pollution of the water in the river Ganga has become very acute the High Courts should not ordinarily grant orders of stay of criminal proceedings in case under S.482, Cr. P.C., and even if such an order of stay. is made in any extraordinary case the High Court should dispose of the case within a sort period, say about two months, from the date of the institution of such case.

5. Steps shall be taken by the Knapur Nagar Mahapalika and the Police authorities to ensure that dead bodies or half burnt bodies are not thrown into the river Ganga.

6. Licenses should not be issued to establish new industries unless adequate provision has been made for the treatment of trade effluents flowing out of the factories. Immediate action should be taken against the existing industries if they are found responsible for pollution of water.

7. Central Government should direct all educational institutions to include the subject of national environment in taxt-books. To make people aware of the importance of cleanliness and hazards of pollution, "Keep city/village clean" weeks should be observed.

8. The directions given to the Knapur Mpl. Corporation applies mutatis mutandis to other Mpl. Corporations and Municipalities. [34]

The discussion in this division concerns certain matters of a general or common nature or application pertaining to the liability for injury to property by water. Various particular instances of injuries to property by water, and questions as to who may be held responsible for such injuries, are considered in other portions of the present article, and also under other titles in this work. The flooding of land as a taking within the law of eminent domain is also considered elsewhere.

So long as one takes no active steps to change the natural flow of water over or from his premises, whether from springs, streams, or on the surface of the land, he is not chargeable with liability for any injury or damage which may result to an adjoining or lower proprietor form such flow

X. Water Pollution Regulations in the United States

The Federal Government has taken a more significant lead in the problem of water pollution than it has in the problem of air pollution. The first comprehensive Act in 1956 set forth certain general regulations on water pollution and has urged the States to follow suit. Most States have more specific water pollution control laws than air pollution control laws. However, there is a wide variation here also in the degree of enforcement and interpretation.

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[34] *Compendium of Judicial Decisions on matter Related to environment*, National Decisions volume-1,(UNEP/UNDP/Dutch Government Joint Project on Environmental Law and Institution in Africa 1998),421.

New or strengthening legislation has been adopted in most States in recent years. In 1956 Congress enacted the first permanent Federal comprehensive water pollution control law, replacing a temporary Act passed in 1948. Subsequently strengthened by amendments in 1961, the Federal Water Pollution Control Act (33 U.S.C.466) provides the basis for co-operative federal State programmers and efforts for resolving the national water pollution problem. The suggested Act, revised, is made available in implementation of Sec. 3 of the Federal Water Pollution Control Act. This section of Federal Act directs that enactment be encouraged or improved, and so far as practicable, uniform State laws relation to the prevention and control of water pollution, it is not expected that the State will repeal their existing legislation and adopt this suggested law. The process of uniformity is one of evolution. It is suggested that the States take a realistic look at their basic statutes in the field of water pollution control, compare them with the suggested law, and evaluate and significance of any departures in relation to improve their own effectiveness to cope with pollution.[35]

[35] Gyanandra Kumara, K.B. Asthana,S.K.Gadi and Board Of Editors, *Lal,s Commentaries on Water Air Pollution and Environment(protection Law)*, (Delhi: R.G.Sagar Law Publisher, (Indian) PVt.LTD1999), 3rd edition), 837.

XI. Fundamental Right and Un-polluted water

Right of residents to have clean and unpolluted water was raised before the Supreme Court of Pakistan in General Secretary, West Pakistan Salt Miners Labour Union (CBA) Khewra, Jehlum Versus the Director, Industries and Mineral Development, Punjab Lahore decided by Justice Saleem Akhter reported in 1994 SCMR 2061.

The Supreme Court of Pakistan ordered not to grant fresh lease/ permission/ license to carry out mining mentioned in the Judgment and also not to renew or extend the existing lease/license.

This report gives a clear picture of geological, geographical and historical background of the present controversy. The claim of the petitioner though formed in general term seeks enforcement of the right of the resident to have clean and un-polluted water. Their apprehension is that in case the miners are allowed to continue activities, which are extended in the water catchments areas, the water source, reservoir and the pipelines will be contaminated.

However, irony of the situation is that with passage of time, population has grown and number of mining leases in the catchment areas has increased, but the water source remains the same and water catchment area has been reduced. The mining operation in this area pose serious danger of crack, puncture and leakage in the rocks and ravines which may lead to contamination or drying up of the springs, these are well-

known and acknowledge danger to water sources the same also been acknowledge by the committee in the report submitted by him to the court. In such a situation when water catchment area seems to have been reduced to its minimum, the mining activities have completely surrounded the water catchment area and are extending nearer to the source spring, it seems necessary to immediately take measures to protect the water sources and spring, it is fortunate that so far no major mishap has occurred, but the more mining activities increased and the catchment area is reduced, the danger of bursting, leaking and contamination also increases. In this situation, if the petitioners complain, are they not justified to seek protection of their right to have clean and fresh-water free from contamination and pollution. **Article 9** of the Constitution provides that "No person shall be deprived of life or liberty save in accordance with law"[36]

Judgment

Saleem Akhtar, J.---This petition under Article 184(3) of the Constitution was filed complaining against the pollution of water supply source to the residents and mine workers of Khewra. They claim to be settled there for generations and the water supply was arranged by Pakistan Mineral Development Corporation (PMDC) through a pipeline connecting the spring and taking water to the reservoir. It has been alleged that

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[36] i) The Constitution of Pakistan, Article 9 of Selected Cases 1956--2006 published in eve of Supreme Court Golden Jubilee by Pakistan college of Law

ii) *PLD 1994 S C M R 2061 Part II*, decided in Human Right Case No.120 of 1993, on 12th July, 1994.

whom leases were granted, also filed their replies. In the present case the main contestant seems to be PCC.

2. The history of these coal mines particularly in the water catchment area goes back to the early part of the century when during British days the water catchment area was reserved and grant of mining lease was prohibited. PMDC has filed a copy of the letter No. 78 C& I dated 31.1.1911 from Mr. R.A.Munt, ICS, Financial Secretary to the Government of the Punjab addressed to the Commissioner, N.I. Salt Revenur, which reads as follows:--

"In reply to your Letter No. 2576 dated the 22nd October, regarding the coal mining operations in the Salt Range in the Jhelum District, I am directed to say that the Lieutenant Governor agrees to the proposals contained in paragraph 4 of our letter under reply. I am to add, however, that His Honour understands that the preservation of the Khewra Water Supply is real ground for the reservation of this area which lies to the north of the Mayo Salt Mine."

Other related letters referred and subsequent correspondence in this regard has not been filed, but none of the official respondents appearing have disputed this letter. From this

letter it seems that even at the time for the preservation of the Khewra water supply an area was separately reserved while granting lease for mining purposes. Initially the area of the water catchment was alleged to be 4161 acres which was declared as restricted area. PMDC has filed plan in which the original water catchment area has been shown. It also mentions the present water catchment area which was much larger then it exists now. It would have been at least six to seven times more than the present area. The location of PCC (No. 27A) is also shown whereas the area of M/s. A. Majeed & Co has also been mentioned. It seems that after the year 1950 the mining lease were granted in the original catchments area, which has been reduced to about 1/8th of its original measurement as claimed by the petitioner and PMDC. It was in the year 1981 that a small area now measuring 545.09 acres was absolutely forbidden for allotment for mining purposes. In this regard reference has been made to the report of high-powered committee constituted in the year 1981 to dispose of the application of M/s. Rasco & Co. for grant of prospecting licence for coal near 'Nali', District Jhelum[37].

[37] SCMR 1994 page No.2061 part-II

There is another case decided by the Supreme Court of Pakistan under article 9 of the constitution of Pakistan.

The Supreme Court of Pakistan, having noticed a news item in a daily newspaper that nuclear or industrial waste was to be dumped in Balochistan which was violation of Art.9 of the Constitution, ordered the office to enquire from Chief Secretary of Balochistan whether coasted land of Balochistan or any area within the territorial waters of Pakistan had been or was being allotted to any person and if any allotment had been made or applicants had applied for allotment, their full particulars be supplied--- Plots having been allotted by Balochistan Development Authority, Supreme Court ordered that no one will apply for allotment of plot for dumping, nuclear or industrial waste---Supreme Court further gave the guidelines for allotment of plots in the area. Order of the case is reproduced as under:-

Order passed by the Court

In compliance with the notice issued on 9th July 1992, the Chief Secretary had made inquiries from various Departments, namely, from the Commissioner of Makran, Commissioner of Kalat Division and also from the Board of Revenue who had submitted their reports which were forwarded to this Court. from the reports submitted, it seems that besides the land allotted to the Pakistan Navy and Maritime Agency for defense purposes, 112 ship-braking plots measuring 336 acres in Gadani Beach, **Lasbella District** have been allotted to ship breakers for ship-breaking purposes by the

Balochistan Development Authority. Furthermore, land measuring 29.2.2. Acres have been allotted to one **Muhammad Anwar son of Qadir Bukhsh** for agriculture purposes. **The Chief Secretary** while giving details has stated that the allotment of land for ship-breaking was made by the Balochistan Development Authority while the plot measuring 29.2.2 acres was allotted by the Chief Minister on the recommendation of Balochistan Development Authority.

The officials present have reported that no plot has been allotted to any party for dumping nuclear waste. The Commissioner, **Makran Division** has pointed out that the law enforcing agencies on the high seas are always on the alert and can locate any vessel from a distance of more than 500 miles.

It may be noted that no one will apply for allotment of land for dumping nuclear or industrial waste. This would be a clandestine act in the garb of a legal and proper business activity. The authorities are therefore not only to be vigilant in checking the vessels but regularly check that the allottees are not engaged in dumping industrial or nuclear waste of any nature of the land or in the sea or destroying it by any device.

It seems that the plots have been allotted by Balochistan Development Authority and all the relevant terms and conditions will be available with them. In these circumstances, **the following interim order has passed by the Court:**

(1) "The Balochistan Development Authority should submit to the Assistant Registrar, Supreme Court, Karachi a list of persons to whom land on the coastal area of Balochistan have been allotted giving, their name and full address alongwith copies of the letters of allotment, lease or licence which may have been issued in their favour.

(2) The Government of Balochistan and the Balochistan Development Authority are directed that if any application for allotment of coastal land is pending or in future any party applies for allotment of such land then full particulars of such applicants shall be supplied to the Assistant Registrar, Supreme Court of Pakistan, Karachi before making any allotment to any such party.

(3) The Government functionaries, particularly the Authorities which are charged with the duty to allot the land on coastal area should insert a condition in the allotment letter/licence/lease that the allottee/tenant shall not use the land for dumping, treating, buying or destroying by any device waste of any nature including industrial or nuclear waste in any form. The Balochistan Development Authority should also obtain similar undertaking from all the allottees to whom the allotment has been made for ship-braking, agriculture or any other purpose whatsoever.

Before parting with the order I record my appreciation for the officials present who have shown their interest and keenness in tackling the problem. Such eagerness coupled with public awareness can eliminate much of the problems creating health hazard to the citizens[38].

[38] PLD 1994 Supreme Court Page No. 102 part-II in the public interest Litigation Environmental hazard and pollution in Balochistan, decided in Human Rights Case No. 31-K/92(Q), on 27th September, 1992.

CHAPTER-IV

THE LAW OF INTERNATIONAL WATER COURSES

Introduction

"A water course" is a living stream of water, within well-defined banks and 'channel. Although the law of waters has always been regarded as vital and important area of the jurisprudence of the country, it is now, in certain respects-especially in view of its scarcity in certain parts of the country, and in view of the wide-spread pollution of waters that now exists more important than ever before[39].

As a general proposition, property in water, and its use and enjoyment, is as sacred as the right to the soil over which it flows, and controversies concerning water rights have been litigated in a many of cases, not only as between private persons and corporations, but also as between states and the federal government.

Naturally, water is ordinarily regarded as constituting a part of the land in or upon which it is found, and therefore as being in the nature of real rather than personal property. Water may be converted into personal property, however, by segregation from the natural stream or body. Water which is reduced to actual physical possession by being taken into vessels or storage receptacles, or by confinement in pipes or other artificial

[39] Formerly pollution of water was considered the price of progress, and people in the United States have acted, united recently, as though their streams, rivers, and lakes had an infinite capacity to absorb wastes. We have for years been heading for a water crisis, which I many localities is already there. Water quality problems caused by pollution are prevalent in every region of the country. 61 Am Jur 2d, Pollution Control 53 et seq.

Channel may be the subject of larceny[40].

Right to purity of water

a. In general

b. Nature of right

a. In General

It is the right of every riparian owner to have the stream continue to flow through or by his premises in its natural condition of purity, and free from any contamination or pollution, such as would render it unfit for domestic proposes, or for manufacturing purposes, or for agricultural purposes such as irrigation or the watering of stock, or for swimming and bathing purposes, or which would be destructive to the fish therein, or cause it to give off toxic and unhealthful Odors. Thus, an upper riparian proprietor ordinarily has no right to pollute a stream. If he does so it is wrongful, under he has some prior or special right to some exclusive or particular enjoyment which permits such pollution. A statute prohibiting the pollution of watercourses occasioned by the inflow of salt water, of oil, and of other substances is a proper exercise of legislative power[41] .

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[40] See 50 Am Jur 2d, Larceny 75.

[41] The American Law Book Co and West Publishing Co vol. 94, *Corpus Juris Secundum,* (New York:The American Law Book 1956),18-19.

b. Nature of Right.

The right of a riparian owner to have the water flow pure and undefiled is termed as natural easement: it is annexed to the soil and is parcel of the land itself and inheres in the estate entitled ex-jure nature independent of grant or prescription. Such right is not conditioned on the beneficial user of it, nor may it owner be deprived of it by legislation. An injury to the purity or quality of the water, to the detriment of other riparian owners, constitutes, in legal effect, a wrong and an invasion of private right.

i) Definition and Scope of international Water Courses.

Determining exactly what should be considered the scope of the law on international water-courses has been more difficult than one might at first expect. Traditionally, international watercourses were considered only those parts of rivers or lakes that straddled or crossed borders. This seemed appropriate when the primary concern for international law was to ensure free navigation and transportation along international rivers and lakes.

More recently, environmental concerns have grown and the hydrologic relationships between groundwater and Surface Rivers and lakes have become better understood. Similarly, the importance of riparian zones to the quality and quantity of water flows is now recognized. This growing understanding of ecology has broadened

our view of what should be protected or addressed in international laws and policies to one that encompasses connected groundwater systems, tributaries, headwaters, riparian zones and other parts of a particular water basin.[42]

International law focused only on the surface water that straddles a border now seems too narrow, and commentators began to discuss a broader scope for international law. In this regard, the **1966 ILA Helsinki Rules** perhaps represent the '**high water mark**" for the scope of international law. Those rules applied to international drainage basins, defined broadly to cover "a geographical area extending over two or more states determined by the watershed limits of the system of water, including surface and underground waters, flowing into a common terminus.

II. The 1997 UN convention on Non-navigational uses of international watercourses.

The 1997 UN Convention provides the frame work from the major issues arising with respect to the international law of watercourses. The convention is divided into six parts. Part-IV addresses the protection, preservation and management of watercourses ecosystem. International water courses considers only those part of rivers or lakes that are across borders this seemed appropriate when the primary concern of international law was to ensure free navigation and transportation along international rivers and lakes.

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[42] *Ibid., "Environmental Policy" supra note* 10, at.853

The central focus of most early efforts to address the international law of watercourses was on the issues of how to allocate the waters among competing riparian states and uses. To what extend did downstream states have a right to a certain amount or quality of water left in the river for their use. What basis or standard should be used in resolving disputes between downstream and upstream states? Four competing theories have dominated discussion over how to allocate water between riparian states, as well as the concept of equitable use territorial sovereignty territorial integrity equitable utilization and common management. Both territorial sovereignty and territorial integrity have been largely abandoned as rules decision, although both remain important for shaping international negotiations with respect to specific disputes. The Concept of equitable use is the concept adopted by most efforts at codification, including the 1997 U.N. Convention. The movement toward common or joint management although encourage in the1997 U.N. Convention is not so much a legal requirement at this time as it is a trend in which Tran-boundary water management is moving.

The Territorial Sovereignty under the doctrine of territorial sovereignty states retain total control over all water in or flowing through their territory thus upstream states are free to use the water anyway they want without regard to the interests of downstream states.

The doctrine is also known as the Harmon doctrine named after the US. Attorney general who issued the following opinion in a dispute with Mexico over diversions of the Rio Grande River the Rio Grande flows from the San Juan Mountains in

border between the united lands in the country, and even though it is not by many measures a large river.

The fundamental principle of international law is the absolute sovereignty of every nation, as against all others, within it own territory. The nature and scope of sovereignty with respect to Judicial Jurisdiction is one of it.

The state in which the pollution originates will, in addition to certain disadvantages, be victim of pollution within its territory, also receive certain perhaps considerable benefit from the activities which produce the pollution, while the downstream state is confronted with only disadvantages. Thus, whatever may be its value in non-intergovernmental proceeding it is understandable that the principle of public international law governing tranfrontier pollution at the intergovernmental level. State may, of course, accept it by treaty and this has in fact been done in the1974 Nordic Convention on the protection of the environment.

Restrictions on the use of water courses, and not in the last place use involving pollution, have often been based on the principle *sic utere tuo ut alienum nonnlaedas* which has been translated as:" one must so use his own as not to injury to another" or" use your property in such a manner as not to injure that of another" [43]

[43] http//.www. internationalwaterlaw.org/bibliography/watercourse.html.

III Protection of Resources

Environmental concerned and the needs to protect the ecological integrity of water system raise relatively new issues for the law of international watercourses. It is still unclear how obligations not to harm the environment of a shared watercourse are different from the general rules of equitable utilization.

The 1997 UN Convention addresses the environmental protection separately, but the relationship between these provisions and the doctrine of equitable utilization remains somewhat unclear[44].

Article of the 1997 UN convention addresses the protection and preservation of the ecosystem Watercourses States shall, individually and where appropriate jointly protect and preserve the ecosystem of international watercourses.

Watercourse States shall, individually and where appropriate jointly prevent, reduce and control the pollution of an international watercourse that may cause significant harm to other watercourse States or to their environment, including harm to human health or safety to the use of the waters for any beneficial purpose or to the living resources of the Watercourse. Watercourse States shall take steps to harmonize their policies in this connection.

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[44] Ibid., David Hunter, IEP,supra note 39,at 830.

Watercourse States shall , at the request of any of them consult with a view to arriving at mutually agreeable measures and methods to prevent, reduce and control pollution of an international watercourse such as sitting joint water quality objective and criteria secondly establishing technique and practices to address pollution from point and non point resources and thirdly establishing lists of substances the introduction of which into the waters of an international watercourse is to be prohibited, limited investigation or monitored.

IV Duties of the National River Authority (UK)

The task of controlling pollution in inland today primarily falls to the National River Authority. The NRA has powers to prosecute for wide range of water offences and it is to the NRA that the public should report instances of water pollution. The burdens placed on the NRA are heavy ones and even an organization with much greater funding and resources would find it difficult to undertake effectively all its responsibilities.

The NRA is under a number of duties which may be open to judicial review in the event that the NRA ever fails to exercise its power correctly. Under section 16 of the Water Resources Act 1991 the NRA must (rather whimsically):

(a) Further the conservation and enhancement of natural beauty and the conservation of flora, fauna, geological and physiographical features of special interest; and

(b) Take into account any effect which the proposals would have on the beauty or amenity of any urban or rural area, of any such flora, fauna, features, buildings, sites or objects.

Thus everything from fish to features in Constable's paintings must be considered by the NRA in the exercise of its functions.

Section 17 of the NRA specific duties in relation to sites of special scientific interest. Section 39 makes provision that the grant of a license does not derogate from the rights of existing license holders. In addition, the NRA also enjoys certain bye-law making powers under section 210 of the Water Resources Act 1991.

The Act designates certain water as 'controlled waters' which it is an offence for any person to pollute. Controlled waters are defined in section 104 as follow:

(a) Relevant territorial waters, i.e. waters which extend three miles seaward from the coast of England and Wales;
(b) Coastal waters, that is to say any waters which are within the area which extends landward from those baselines as far as the limit of high tide or, in the case of the waters of any relevant river or water course, together with waters of any enclosed dock;
(c) Inland waters-any relevant lake, pond or any relevant river or water course as is above the fresh-water limit;
(d) Ground waters-contained in strata including walls and boreholes.

Proceedings for offences in magistrates' Courts should be brought in the court having jurisdiction over the controlled water into which an illegal discharge takes place. The same principle should apply for civil actions for damages of up to £50,000 brought through the relevant country court. [45]

[45] Alan Murdie, *Environmental law and citizen action,* (London: Earthscan Publication Ltd, 1993), 165.

V The Great lakes and the International Joint Commission (IJC) (US)

One of the most widely respected efforts at joint management is the U.S. Canada efforts to manage the Great Lakes, and the other boundary waters between the two countries. The great Lakes alone constitute one fifth of the world's fresh water under the 1909 Boundary water treaty ,Canada and the United States created the international Joint Commission (IJC),an independent bilateral agency to manage their shared water resources (later the IJC would also address tranboundary air pollution .) [46]

The IJC is composed of six members, three from each country. Its main mission is to provide for thee equitable use of the water, but it also address navigation, power generation issue. The IJC also serve as conciliatory body, which makes non-binding recommendations to the parities in case of conflict. The commission has its own scientific and quality advisory board in order to conduct its research, collect data and make recommendation. The parties often consult the commission before engaging in negotiations. The commission has administrative, judicial, and consultative and arbitral functions. The commission began addressing environmental issues in1945, but water quality became a central focus with adoption of the 1972 Great Lakes water Quality Agreement. These agreements address the ecosystem as a whole.

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[46] Ibid,, David Hunter, IEP , Supra note 39,at 845.

The IJC is advised by a water quality Board and a science Advisory Board. The former is comprised of high-level manger from federal state and provincial agencies selected equally from both countries. It is supposed to help coordinate policies among the different jurisdiction having responsibility for pollution in to the great Lakes. The science Advisory Board consists primarily of government and academic expert charged with providing scientific advice and knowledge to the IJC. In 1912, water pollution was one of the first problems referred to the IJC for study. In 1919, after several years of study, the IJC concluded that serious Water quality problems required a new treaty to control pollution. However no agreement was reached. Additional study in the 1940s led to new concerns by the IJC. Public and scientific concern about pollution of the lakes grew as accelerate it eutrophication became more obvious through the 1950s. The IJC has three responsibilities for the great lakes under the original treaty. The first is the limited authority to approve applications for the use obstruction or diversion of boundary water on either side of the border that would affect the natural level or flow on either side. The second responsibility is to conduct study of scientific problems under references or request from the governments. The third responsibility is to arbitrate specific disputes that may arise between the two governments in relation to boundary water. The government may refer any matter of difference to the commission for a final decision.[47]

[47] Ibid,, David Hunter, IEP , Supra note 39,at 845

VI The Great Lake Water quality agreement 1972

The great lake water quality agreement established common water quality objectives is to be achieved in both countries and three process that would be killed out by nationally. The first is control of pollution, which each country agreed to accomplish under its own laws. The chief objective was reduction of phosphorus level to no more than 1 ppm in discharges from large sewage treatment plants and to lakes Erie and Ontario together with new limits on industry. Other objective included elimination of oil, visible solid ways and other nuisance condition. The agreement provided for a review of the objective after 5 Years and negotiation of a new agreement with different objective if necessary. In 1975, discovery of high level of PCBs in lake were received toxic chemicals. By long-range Atmospheric transport. These development and the results of studies that were carried out after the 1972 Agreement set the stage for the next major step in Great Lakes management.[48]

VII Great Lakes water Quality Agreement-1987 (revision)

In 1987, the agreement was revised to strengthen management provision, call for development of ecosystem objective and indicators, and address non-point sources of pollution, contaminated sediment airborne toxic substances and pollution from contaminated ground water new management approaches included development of Remedial Action plans for critical pollutants.

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[48] Ibid,, David Hunter, IEP , Supra note 39,at 845

The ecosystem approaches was strengthen by calling for development of ecosystem objective and indicators, and by focusing RAP and LAMPs on elimination of impairments of beneficial uses. The uses include various aspect of human and aquatic community health and specially include habitat. By clearly focusing management activities on endpoint in the living system , the agreement to prepare reductions in loads of critical pollution entering the lakes in order to meet water quality objective and restore beneficial uses.[49]

VIII. The Environmental Security and Access to Fresh water

In recent years, the importance of environmental issues to the overall security of a state given rise to the concept of environmental security. Water scarcity is among the issues most commonly cited as threatening national security. Access to water is an integral component of maintaining food production and a nation's food security.

Water scarcity can also be sources of direct hostility between the countries. As water becomes scare, conflict increase. In some instances, most notably in the Gulf war, cutting off access to water has been discussed as a potential weapon of war. It is in fact in the Middle East where the scarcity of water seems most likely to disrupt

[49] Ibid., David Hunter, IEP , Supra note 42,at 851.

regional security. The Middle East already rife with conflict encompasses a range of shared watercourses, any one of which could ignite the region.[50]

Existing tension in the Middle East add an extra dimension to the difficult problem of sharing limited water resources. Populations are increasing, and water is becoming scare throughout the region. In 1988 study by the centre for strategic and international studies concluded that the situation is likely to become so acute that, in near future, **water __not oil___ will** be the dominant resources of the Middle East. Water scarcity severely curtails agriculture and economic development, and increasing shortage will bring desperate competition for water, heighten existing tension between countries and increase the potential for armed conflict in the region. In 1965, a dispute arose about Israel's use of water originating in Arab states. Israel wanted to divert water for its own use, and the failure to reach an agreement with neighboring countries on the detail of the plan led to Israel carrying out the diversion unilaterally. In response, the Arab states, thus depriving Israel of some of its water supply. Regarding this as a series threat to its security, Israel launched a preemptive strike on Syrian construction site with military aircraft. Israel has recently made a water-transfer agreement with Egypt, which originally, under **President Sadat**, offered Israel 400 million cubic meters per year of fresh water in excluding for a Palestinian solution. Up to a quarter of Israel water resources is available in the aquifer shared with the West Bank, and any action in this region is likely to increase the division and tensions that already exist.

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[50] *Ibid.*, supra.

Even without the problem arising from the long standing Arab-Isreal differences, many other countries of the Middle East are in dispute over water. Many upstream countries have plans to use the waters of shared rivers and aquifers to fill reservoir and irrigation system in order to increase agricultural production. Syria is panning to divert water from the Yarmuk River, Turkey from the upper Euphrates and Tigris, Libya from its shared aquifer and Ethiopian from the Blue Nile.[51]

Jordan's water supply is under threat from Syria, which plans to divert 40 per cent of the flow of the Yarmuk River into its irrigation system. This would seriously reduce Jordan's water supply used largely for irrigation and lead to an increase in the salinity of water in the Lower Yarmuk and Lower Jordan. Jordan has therefore signed an agreement with Iraq to transfer water from the Euphrates over the mountain into Jordan. In turn both Syria and Iraq are annoyed by the action of upstream Turkey, with whom they share the Euphrates-Tigris basin. Turkey reduced the flow of this river system in January 1990 to allow a huge reservoir behind the newly constructed Ataturk Dam.

The Euphrates is the biggest single sources of water for Syria and Iraq, and their supplies are likely to interrupt for five to eight years. Competition for the water of the Nile is severing, as all countries sharing the Basin are experiencing water scarcity. The Nile basin covers one-tenth of the African continent, and from part of nine African countries including downstream countries such as Egypt and Sudan, and upstream countries such as Tanzania, Kenya and Ethiopia. Egypt's increasing water

[51] *Ibid.*, David Hunter, IEP, Supra note 44, 852.

supply problems because the country's almost dependence on the Nile for water. As water increased in line with its growing population, Egypt negotiated an agreement under which the Sudan agreed to provide Egypt with its excess water from the Nile. Because the population of the Sudan is now increasing and the country is developing. Large scale of irrigation project demanding for food to reach the limit of its available water supply. Both countries are therefore turning to upstream countries such as Ethiopia to answer their water need. However, Ethiopia is not bound by any agreement with Egypt on the over water supply, and claimed during the 1977 UN water Conference in Argentina it is "the sovereign right of any riparian state" in the absence of an international agreement.

The Middle East is not the only region where water dispute can turn into potential political disputes. As Norman Myer has observed "tensions and violence over water-user rights and river-diversion project have already erupted in the river basin of the Mekong, which is shared by Laos, Thailand, Cambodia and Vietnam; the Parana, which is shared by Brazil and Argentina; the Lauca, which is shared by Bolivia and Chile; and the Medjerda, which is shared by Tunisia and Libya.[52]

The Euphrates and Tigris rivers are not international waters but international tranboundary water-courses, not only due to provisions of the 1997 Convention, but also according to international legal documents, such as the 1992 Convention on the protection and use of Tranboundary Watercourses and Lakes. In

[52]Ibid., supra at 853.Norman Myers, *Environment and Security, Foreign Policy*, (1989) 23, 29.

addition, this is also according to international documents in force among Turkey, Syria and Iraq, and according to documents in force among the three riparian states.

Since the Euphrates and Tigris are international watercourse, their use and utilization can only be determined by the riparian states of those river.[53]

[53] Url. http//:www. international law of watercourse.com (last visited on 11.08.2008)

CHAPTER- V

STEP NECESSARY FOR REDUCTION IN POLLUTION AND WASTAGE OF WATER.

Introduction

Fresh water ecosystems are in serious trouble. At time when the natural world is under stress, our rivers, lakes, wetlands and streams may be the most at risk. Fresh water ecosystem have lost a greater proportion of their species and habitant than those on land or in the oceans, and they face increasing threats ranging from land management to dams.

The nature conservancy is working to protect and restore this essential resource for now generation we are facing these threats with thoughtful, science-guided solutions that demonstrate that the needs of people and nature are not in conflict bur rather interdependent.

These threats rarely operate in isolation of one another and might be simplified into the following primary threats.

- Dame and water withdrawals alter a river's natural course and block the pathways used by migrating fish, red and rearrange the patterns of flowing water that have choreographed aquatic life cycle for millennial cha water quality.

- Water pollution resulting from agriculture runoff and industry poising fish and wild life in rivers and lakes bef being carried down streams through estuaries and impacting our ocean.

- Invasive exotic species disrupting vital natural process and un raveling the natural biodiversity.

- Direct habitat destruction caused by agricultural or urbanization can completely wipe out of fresh water ecosystem.

- Over harvesting of plants and animals for the purpose of substance, commercial sales, collecting, or recreating purposes.

- Global climate change is already altering the temperature and flow of waters, putting pressure on human set

The nature conservancy is addressing these threats and our global strategies are being applied locally and on the ground to save these fresh waters for future generations.[54]

Pollution problem is not limited to the by-products of our commercial activities; we dump our wastes in to atmosphere and hydrosphere, and human population is so dense that it is difficult to see how we can maintain a clear environment. In the past three decades, we have forced the environment to cope with synthetics, pesticides, plastics, anti-biotic, radioisotopes and detergents. Only fractions of these have been tested for toxicity to river water and to marine diatoms that produce 70% of the earth's annual supply of oxygen. Nor they have been tested for toxicity to equally vital forms involved

[54] http://www.nature.org/initiative/freshwater/about/threats.html

in the cycle of nitrogen and other essential element. Although water pollution comes from many sources, the major sources ones are industrial, municipal, and agricultural. The more than 3000,000 water-using factories in the United States discharging three to four times as much oxygen-demanding waste as all the population of the United States, Moreover, many of the wastes discharged by the industry are toxic. The water availability situation is becoming increasing alarming with the passage of time. The annual per capita availability came down to 1200 cu.m. in 1999 to 5300 threshold of water scarcity is considered to be 1000 cu.m per capita in the international standard. In order to carry out the purpose of this chapter any water quality standard applicable to the society the government is required to take positive steps to remove the deficiency in the present facilities provided and remove the draw back of the current situation of sanitation. There is lack of consistency in the government policy to word the purification of water and other related means of pollutions. A comprehensive effort is required to be done towards the alarming situation of the issue in hand.

I. Preservation of water resources.

Water is essential for life of Earth, within organism; water provides the medium within which the complex metabolic process necessary for life takes place. Organism simply cannot function without water and if deprived will rapidly die. In addition, the water must be clean. Human beings, the most complex of organisms are affected by the most subtle. According to the World Health Organization (WHO), an estimate people lack of satisfactory or safe water supply. There is clear disparity between domestic and municipal, and industrial water consumption in the developing world and

compared with the developed industrialized world and there is also greatest amount of waste water occurs in the developed and industrialized nations, for example Europe and North American.

People do not take enough care of this essential resource, however, and often appear not to value it. "**The Holly Prophet (Peace be upon Him) says that don't waste a drop of water even if you are sitting at the bank of water.**" Water is polluted directly or indirectly by introducing substances that are a hazard to human health, which lead to a reduction in amenities and prevent water activities, such as swimming and fishing. Figure shows the world consumption of water expressed as the world average annual consumption per person.

Water supply is a problem not just for the developing world. In California, for example there is serious looming water supply crisis. The Sacramento River index that measures the water flow feed the states largest reservoir is at one of its lowest levels in history. The water-parched city of Santa Barbara on the Pacific coastline is leading the way after being afflicted by a five-year drought by turning to the ocean. In May 1991, the city council approved the immediate construction of a US $ 37.4 million **desalination plant** intended to provide 9.1 liters of water per year for Santa Barbara and two neighboring Communities when complete this will be the largest Municipal desalination plant. Until this scheme was approved, some of the Californian communities, such as the agriculture community of Goleta, considered importing fresh water using ocean going tankers from Canada. Other communities in California, such as San Luis Obispo, are also now on the verge of approving a desalination plant.

Protection of water resources in Norway. Although most fresh water is of satisfactory quality, the Govt: has during the last 15 years been encourages water work to increase. In developed countries droughts are usually manifest in the issuing of drought orders and the imposition of temporary bans on the excessive use of water, for example on the use of hose-pipes. In some countries, water meters are being introduced in large scale to influence the demand already the case in most of the European countries. It appears that maturations of water can reduce demand by between 7 and 55 percent but typically between 10 to 15% in regions they have similar climate and consumption patterns to Britain. In a detailed report POST (the UK Parliamentary Office of science and technology has indicated that leakage control programs appear to give higher saving than a universal metering programme, even where external meters with an ensuing reduction in supply pipe leakage are used. In England and Wales, about 22% of the water input to the supply system is lost from the water companies distribution systems, with a further 8% lost from customers supply pipes.[55]

More disturbing is the fact that the less-developed countries may have even greater problems than the developed countries, since government legislation and implementation ground in drinking supply for environmental reasons to reduce cost and to reduce the risk to public health from contamination, special restriction on land are used are used to protect drinking water sources from pollution. Financial compensation is provides where such instruction are enforced. Norway has built several waste water

[55]Kevin T. Pickering and Lewis A. Owen, *An introduction to Global environmental Issues,* Pickering and Lewis A. Owen (new York: Rutledge,11 New Fetter Lane,London EC4P 4EE1994),133.

treatment plant with secondary treatment (b chemical purification) over the last few years, and secondary phase is planned for all treatment plants with hydraulic capacity for more 2000 population equations that discharge treated water to fresh water recusant. Aquatics echo system are protected under the wild life Act and the act relating to the solemnizes and fresh water fish, which apply to terrestrial mammals, birds, reptiles, amphibians, fish, and other fresh water organism.

Drinking water supply and sanitation:- water supply and sanitation coverage is universal in Norway. A national programme to improve water supply was lounged in 1995 with the goal of insuring that all water works that supply more than 50 persons.

The nitrogen pollution is not a major problem in fresh water bodies in Norway. The capacity for waste water treatment is about 5.4 millions. 80 % pollution of Norway is connected to municipal wastewater water treatment plant with a capacity of more than 50% pe. The remaining 20% are connected to smaller individual plant to satisfy the drinking water regulation to 60 water work plants have to be upgraded to include a disinfection stage and about 500 to meet colour requirement. At present 65% of water is treated before used and drinking water the target to increase to 100%.[56]

More disturbing is the fact that the less-developed countries may have even greeter problem than the developed countries, since government legislation and implementation is crude due to poor resources. There are still areas, such as the

[56] Htt://www.nature.org/initiaves/freshwater/work/art

Indian subcontinent and Latin America, where stream are using for household / Cloth washing.

Plate 5.3

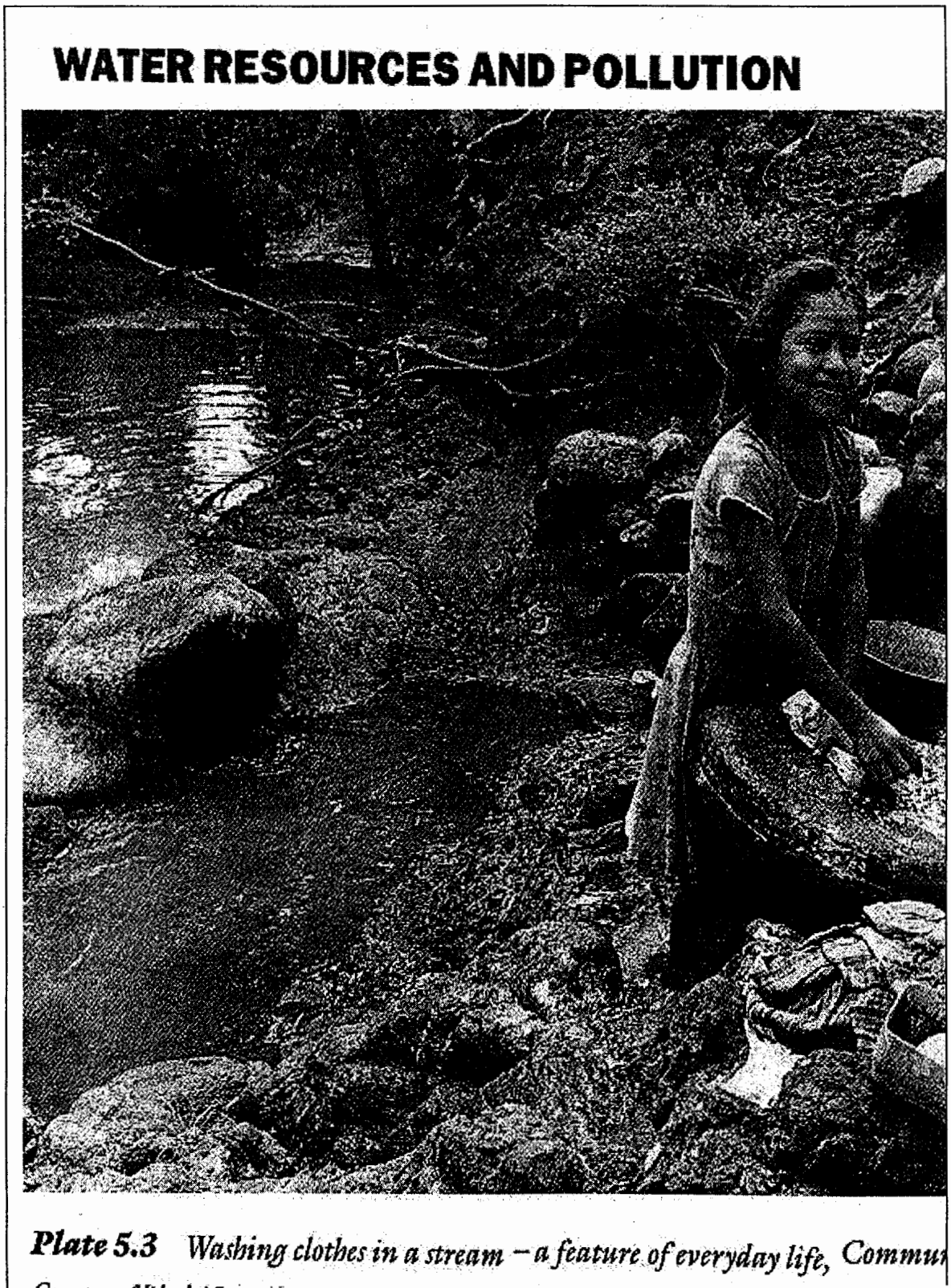

Plate 5.3 *Washing clothes in a stream – a feature of everyday life, Commu*

II Freshwater Resource Bases

The water existing to maintain human use in inhabited section of the earth is much less than the total water in the hydrosphere. The future global availability of freshwater is likely to be very close to the possible human need for water, depends on the historical usage figures, this mean that any spare in the worldwide freshwater supply is gradually on its last legs

The oceans have 97 percent of international water. The remaining 3 percent of the water is Fresh-water, but more than half of that is out of stock for human uses because it is locked in glaciers or permanent snowfields. Therefore exterior water and groundwater aquifers are the main resources we have for freshwater access. However, these freshwater resources make up less than 1.5 percent of the total global water supply. Population development quickly industrial development and continuing development of irrigated agriculture the demand of limited freshwater resources will radically enhance

According to a recent report by the **Central Intelligence Agency** (CIA), by 2015 nearly half the world population more than 3 billion people will live in countries that are water-stressed have a lesser amount of than 1,700 cubic meters of water per person per year. There will also be challenge for the future of U.S freshwater accessibility although this will not be as severe as in many part of the less-

developed world; the United State also faces severe water quantity shortages on a regional source mainly in parts of the West and Southwest.

It is ordinary for people of United State and other nations to use more water than they actually need. Water-useless landscaping and plumbing are creative despite the fact that other options exist. Many cities waste much of their water through invisible pipeline leaks in aging water-allocation system. It is further proposed the immediate solutions, such as water rationing to such water crises as drought. And long terms solution include water efficient toilets, improved irrigation tools and landscaping customized to the natural ecology Another important long-term solution is water-pricing motivation that encourages management and the use of improved technology. That is sometimes a difficult plan to implement because it usually requires rising water rates-in no way a popular option.

Water industry professionals use a theory known as "safe yield" to describe the sustainability of a source of water. A water system is working "within safe yield" if the demand for water is less that the amount a water system can always deliver, even in the driest years. Safe yield is what all water supply systems strive for, but increasing demand makes this less and less possible, nation wide and around the globe.

At the start of the twenty-first century, development and renovation projects are not as aggressively pursued as they once were. Daniel Beard, former head of the U.S Bureau of Reclamation, proclaimed in 1994, "The dam-building period in

the United States is now over". He offers several reasons for this. First, the best sites have already been used, and the most economical projects have already been undertaken. Also, public funds for construction are limited, and the regulatory command is increasingly challenging. Finally, there is greater competition for water.

According to the Daniel if the dam-building era is over, something must replace it. He suggests several ways to improve water policy directions, including pricing water at its real value, considering the environmental impact and major water projects and giving serious considering improving efficiency. These are "soft solution that stress non structural policy approaches to balance the need of competing users.[57]

III The Water Cycle.

In order to understand what happens to pollutant in water, it is necessary to examine the universal water cycle, or what is known as the hydrological cycle. Water is present on planet Earth as oceans and seas 97.41% of the total water on land as river, lakes, within soil, animals and plants, and in the atmosphere as water is stored as ice within the ice caps and glaciers, and in the ground as ground water.

Water is precipitating from the atmosphere as rain or snow, falling on the land and the oceans. Some of this water will penetrate into the soil and rock layer and flow as **ground water**, often toward the sea, and some of the water will flow by means of

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[57] http://books.google.com/books
Zachary A. Smith, The Environmental Policy Paradox, 2nd ed. (Englewood Cliffs, NJ: Prentice Hall, 1995).

rivers is counterbalance by desertion of water from the lakes and soil by direct evaporation or drawn up by plants and then released during **transpiration.** Once the water has been evaporated, it is transported in the atmosphere as vapour, until it condenses and returns to the Earth in the form of rainfall. This is the hydrological cycle.

In addition to understand the pathway of impurity in the hydrological cycle, it is important to consider the chance of contamination when human being eat, drink or inhale polluted water and animal from part of a hierarchical system known as **food chain.** Put simply organisms at the bottom of this chain obtained their food from plants, while greedy creatures further up the chain eat those below. Humans represent the top of many of these chains. For example, plants may be eaten by small fish, which in turn are preyed on by larger fish, and fish are then consumed by humans. In reality, the different chains interconnect in a composite way to form food web.

Another case is the use of Led in old piping for water supply can cause serious health problem. In March 1989, the EC published a report showing led level in drinking water exceeded those said by the EC in the 1985 in every **Scottish region.** The principal culprit was led piping. The maximum acceptable led level said by the EC is 50 micro gram of led per letter. The British Government has set its own standard at double this figure, which is 100 micro grams per letter. Excessive led levels even at low dosages are known to cause hectic activity in children and affect their performance in achievement and capability test. Some experts believe that there is no safe level of lead in drinking water and that government should provide grounds to all house holders to

remove any existence lead fitting in their water system.

There is a famous case decided by the King Bench Division in the title **BARNES AND ANOTHER VS. IRWELLY WATER BOARD.** The Water Work Clauses Act 1847 Sec 35 provides that the undertaker shall provide and keep in the pipes to laid down by them a supply of pure and healthy water, adequate for the domestic use of all the inhabitants of the town or districts within the limits of the special Act, who, as hereinafter, provided shall be entitled to demand a supply, and shall be willing to pay water rate for the same.

The defendant was a constituted under special Act incorporating Act. The Act of 1847, as the water Board for a Borough. The plaintiff were the occupant of the premises in the region which were supplied with water by lead service pipe, not belonging to the dependant, but connect it a stop cock with the main pipes of the defendant. The water provided by the defendants was pure and healthy in their main pipe and at the stop cock, but it was of such a nature that when it remained for a time in contact with lead, it dissolved and observed lead and became piousness. The plaintiff having continuous lead poisoning through per taking of the water in their premises in ignorance of its piousness quality brought in action against the defendant claiming damages for breach of statutory duty, and for negligence. The defendant were aware that the water was sound solvent, that it might become piousness if it pass through a lead pipe, and that it would pass through a lead pipe on the promises occupied by the plaintiff, and that had taken steps to install an apparatus to provide the water harmless but they had

unjustly delayed installing the tools, and they had fail to give the plaintiff notice to take the precaution of drawing of certain amount of water before using the water for drinking or cooking:-

Held, that the only statutory duty of the defendant in regard to the quality of the water to be supplied by them was that impose upon them by S-35 of the Act of **1847**- namely, to provide and keep in the pipes laid down by them a supply of pure and healthy water and that the defendant, having complied with that requirement, were not liable for any breach of statutory duty.

Held, further, whoever that the defendant were under a duty at common law to use logical care that the water should be pure and wholesome at the point at which it was received by the plaintiff in their premises, that the defendant had carelessly failed to perform their duty and that the plaintiff having to damages; and that the statutory duty of the defendants did not derogate from their obligation at common law.[58]

IV An over view of public water supply in Pakistan

The public water supply in term of quantity and quality in Pakistan is much lower than the international standards. Efforts are being made to improve the situation in urban and rural areas of the country. Target to supply clean drinking to whole the country is seems difficult. Let me overview of the existing supply situation Vs demand for selected urban area and semi urban centre and its deficiencies are presented

[58] *Law Reporters King's Bench Division 1939 Vll-I* (London: the council at the office 13, serjeants,INN),page 21.

and some recommendation made for and required for improvement in the water management. Therefore, the following Key words are required to be explained.

The water supply sector in Pakistan is characterized by a low of coverage particularly in rural areas. Presently only 80% of the urban population has access to the piped water supply whereas only 11% of rural population is benefiting from this facility. The water supply system in the urban population is benefiting from this facility. The water supply system in the urban centers of Pakistan based on either the utilization of surface water or the ground water abstraction through the tube well or combination of both sources. The rural area depends on ground water for domestic water supply where , but in irrigated areas under lain by salty water; canal water is used to meet the domestic requirements. Out side the canal area, where ground water cannot be depended upon. Rural water supply is based on the available stream flows in the uplands or rainfall collected in natural depressions. In barren locations, the local populace is constrained to travel long distances to acquire drinking water.

The quality of water in most of water supply system does not conform to international standards for drinking water. Recently Government of Pakistan has taken up the huge task of providing safe drinking water through installation of Filtration plants. Government of Pakistan has also initiated work on framing of National policies for drinking water and sanitation.

V Water demand and supply

According to 1998 Census Report, existing population of Pakistan was 131.51 million with urban and rural population distribution of 30 to 70 percent of the total population respectively. With the shift of population from rural to urban areas, it has anticipated that over the next 25 years the urban population would increase by 130 percent while the rural population would still be 11 percent higher. However the urban population is expected to continue to increase although efforts have been made to reduce growth rate from 2.69% to 1.82% (1998 to 2004)

Table-1[59]

Sr. No	Year	Population (Milion)			Water Demand (mgd)				Total Demand (mgd)
					Urban		Rural		
		Urban	Rural	Total	Rate (gpcd)	Demand	Rate (gpcd)	Demand	
1.	1998	42.91	88.60	131.51	50	2146	10	886	3032
2.	2000	45.91	91.60	137.51	50	2296	10	916	3212
3.	2005	54.27	97.80	152.07	50	2714	10	978	3692
4.	2010	64.34	102.13	166.71	50	3217	12	1228	4445
5.	2015	76.60	105.13	181.73	50	3830	15	1577	5407
6.	2020	90.81	104.76	195.57	50	4541	18	1886	6426
7.	2025	105.96	102.10	208.06	50	5298	20	2042	7340

Abbreviation: gpcd-gallon per capita

Mgd –million gallons per day

[59] *Pakistan water partnership, supplement to the Framework for action* (FFA) for achieving the Pakistan water vision 2025,

Show population and water requirements for urban and rural population under a planning horizon up to 2025.total water requirement are estimated to be 7340 mgd.(million gallon per day)

Table -2 shows existing water supply sources and additional expected sources for various urban centres in the country.

City/ Town	Source		
	Groundwater	**Surface Water**	**Remarks**
Islamabad	√	√(major)	Additional surface water sources such as River Indus/Jhelum/Ling/Soan required. [Red.1].
Rawalpindi	√	√	
Karachi	√ (0.3 %) [Ref.4]	√ (99.7%)* [Ref.4]	* Desalination of seawater would be required.
Lahore	√		Excessive groundwater withdrawal could caused undermining and intrusion of brackish water.
Multan	√		
Faisalabad	√	√ (major)	Local aquifer is brackish. Shallow wells near River Chenab & Canal provide fresh water.
Hyderabad		√ *	* River Indus
Quetta	√	√	• Additioanl surface water sources are under investigation. • Previous investigation indicate that Bore Nallah at Burj Aziz carries high TDS ranging from 6000-7000mg/L [Ref.3].
Peshawar	√	√ *	* Warsak Dam
Gwadar		√	• Additional desalinated supply from Arabian Sea is under execution • Additional supply may also be from Mirani Dam
Gujranwala	√		
Murree	√	√	Additional supply from River Jehlum under execution

Table-3 shows deficiencies of water supply sources for some urban and semi-urban centre of Pakistan in order to have an idea about the demand Vs supply situation.[60]

Urban/Semi-Urban Centre	Population Year		Demand (mgd)		Existing Supply (mgd)	Deficient Supply
	1998*	2000**	gpcd	Quantity		
Karachi	9269265	9919877	80	793.59	300.00	493.59
Lahore	5063499	5394838	80	431.59	240.00	191.59
Faisalabad	1977246	2117257	80	169.38	150.00	19.38
Rawalpindi	1406214	1503753	80	120.3	100.00	20.38
Multan	1182441	1251044	80	100.08	75.00	25.08
Hyderabad	1151274	1210501	80	96.84	50.00	46.84
Gujranwala	1124749	1210687	75	90.08	50.00	40.80
Peshawar	984113	1050136	75	78.76	50.00	28.76
Quetta	560307	606494	80	48.52	25.00	23.52
Islamabad	524500	585997	80	46.88	50.00	-3.12
Sargodha	455360	479907	80	38.39	40.00	-1.61
Sialkot	417597	433787	80	34.07	35.00	-0.30
Larkana	270366	269321	80	23.71	20.00	3.71
Pishin	20479	21959	60	1.32	0.50	0.82
Killa Abdulah	65477	71900	60	4.31	2.00	2.31
Loralai	132411	136279	60	8.18	5.00	3.18
Zhob	44248	45621	60	2.74	1.00	1.74
Total:-	24649546	26336358		2090.1	1193.5	896.6

VI Water quality

The physical and chemical quality of the surface and ground water sources have been reported to be good except in few cases. Various investigation and surveys have indicated that water pollution has increased manifold in Pakistan. The water sample

[60]Gulrez Fatima,Musa Kaleem Baloach, Shaoib Ahmad, *Effect of water pollution on photosynthesis , The Environ Monitor Vol.VI,(march 2006)* ,24-26.
ii) Ahmed Nawaz, *Management of water Resources in Pakistan*, proceeding of first international Conference,40th Annual Convention, The institution of Engineering of Pakistan, July 2000.

collected from urban distribution system have generally been found to be bacteriology contaminate [61]

VII Water Conservation and treatment of Polluted water.

Water supply system have unaccounted for water in the rang of 30-50% illegal connections, leakage due to poor O & M of water transmission and distribution of pipelines, excessive/wasteful use etc Immediate attention of operators is required to reduce unaccounted for water to the lowest possible level.

Untreated sewage and industrial wastewater are being indiscriminately disposed of into river, streams, drains and other water bodies. Downstream users are forced to use polluted water for drinking and other domestic purposes. The discharge of untreated sewage and industrial effluents is also a cause of ground water contamination. There is urgent need of treat such effluents for safe disposal into receiving water bodies and use again of treated waste matter in order to reduce stress on the existing sources. [62]

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[61] Gulrez Fatima,Musa Kaleem Baloach, Shaoib Ahmad, *Effect of water pollution on photosynthesis, The Environ Monitor Vol.VI,(march 2006)* ,24-26.
NESPAK, various Report on water Supplies to Urban and Rural Area in Pakistan

[62] Sewage. Means liquid wastes from sanitary conveniences, kitchens, wastes from sanitary conveniences, kitchens, laundries, washing and the like.

CHAPTER-VI

DEVELOPMENT OF CIVIC SENSE AND RESPONSIBILITY

Introduction

The health of an individual is influence by a variety of factors, both natural as well as anthropogenic. Important natural elements include the air we breathe, the water we drink, the radiation we are exposed to etc whereas man-made laws environmental modifications, which play a crucial role in the habitat place of work, transport, industry and other development activities. Chemical agents they are released into the environment from various anthropogenic activities impact human health seriously. The effects of water pollution on cognitive functioning have not been made the subject of scientific scrutiny, as have been other health effect. Microbiological techniques can be applied to a variety of surfaces including water, food, and human hand and working surfaces.

The requirement of water to better maintain people's livelihood clearly differs between rural and urban areas, therefore Government and local authorities are required to ensure policy targets and programme meet these entire end toward maximum development aim. Therefore, there is need of establishment of associations to protect their rights as well.

I Result Oriented Co-ordination between all Concerned Persons and institutions

The increasing awareness for the protection of natural environment has caused people to think for an organized movement for the assessment of environment consequences. In this respect environment impact assessment or EIA, formal process used to predict the environmental consequences of a proposal or decision to introduce legislation, to implement policies and plans or to undertake development project.

In 1969 an assessment was introduce in the United States as a requirement of the National Environmental policy. It is not clear that weather there is any proviso recommendation regarding preservation of fresh water was considered or not there is question mark because I think that there is no co-ordination between the organization and focal personality regarding the issue concerned.

Some international treaties regarding environment have been agreed upon since the **Stockholm Conference** along with some other issues, but the hot of preservation of water remained ignored. At the Dublin international Fresh water Conference in 1992, and at the numerous proceeding meeting, the principle of subsidiary has been advocated, where management of public water supply, irrigation and water resources should occur at lowest appropriate level. In 1992 the United Nations convened a global Conference on **Rio de Janeiro** two important international conventions were

agreed upon at the conference the **Framework Convention**[63], but we need specific law on the subject therefore there is harsh need of coordination among the sanctioning and Enforcing Authority.

The Ministerial Declaration of the Second World Water Forum in **Hague, Netherlands**, in March 2000 set water security as a principal for sustainable development in the twenty first century. Human demand and the misuses of water resources continued to grow. Intensive irrigation is placing steadily increasing pressures on aquifers and their ability to recharge, and reported incidences of ground water and surface water contamination continue to rise. Over the last ten years rural sanitation in Africa has decreased by 2% and the low levels of urban water supply and sanitation have hardly improved. Water is an element that is fundamental to so many aspects of life and of the surrounding natural environment. The fact that it cuts across so many areas relating to sustainable development poses considerable challenges. Institution and individual will need to look more collectively at these critical issues, through international, regional, national, and local water strategies, so that they come together at earth Summit 2002.[64]

The function of Federal Agency and the Federal Government may be strengthening and there is an ultimate limited of resources. Environmentalists believe that, as population and their demand increase, the attitude of humanity towards the idea of faster growth must be stopped. And more rational and practical approach for

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[63] Http://www.unfccc.de/
[64] http://www.earthsummit2002.org

sustainable exploitation of the environment or in economic term Sustainable Development should be adopted.

II Water user Association for Public Awareness.

To reduce environmental degradation and to save its habitant of mankind, it must be recognized that the environment is finite, and having limited resources. There is a need for establishing of an association of the water user to protect their right and implement the policy. NGOs have played positive roll in raising the public awareness from the hazards waste trade .but at the domestic level there is need of association of the water user and coordination to promote public awareness among the people.

Some international forums were agreed upon in Paris in WSS 1998 to improve knowledge and information exchange through transfer, education and training particularly to enable the involvement of poor community, local authorities and NGO,s is more essential to better health and sanitation[65]

As I have discussed in previous chapter that the public are unaware of their rights regarding purification of water and other related issue, injurious to health and little careless in the factory may cause a great damage to the worker and surrounding atmosphere, therefore the awareness among the factory worker is the sole consideration for the development of protection to health elements and preservation and purification of healthy surrounding.

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[65] GEO2000(UNEP1999)

Conclusion

Water is the only substance that occurs naturally in solid (ice), liquid (water), and vaporous (steam) forms. As the temperature changes, so also does the hydrogen bonding between water molecules, and this in turn changes in the state of water. Because liquid waters excellent abilities as a solvent, it is rarely pure, but contains dissolved minerals or suspensions of other materials. Only 2.8 percent of the earth's 359 billion gallons (1,360,000,000 cu km) of water is fresh. Most of this fresh water (about 2.2 percent) is in solid form in ice caps and glacier (mainly the Antarctic ice cap), and only 6 percent is liquid. About 98 percent of that liquid water is located underground. Salt (or saline) waters, in oceans and salty inland seas, which occupy more than 70 percent of the earth's surface, amount to 97.2 percent of the earth's water.

Many freshwater resources in the world are shared by two or more nations. Some of the oldest international treaties and organizations were created to regulate the use of shared water bodies, including the Rhine begin in 1869 and Great Lakes where the Boundary Water Treaty was created in 1909 to address issues concerning the Great Leaks and others waters that lay on the boundary between the US and Canada. One of these issued was pollution: according to the treaty, waters flowing across the boundary shall not be polluted on either side to the injury of health or property of the other (1909 Boundary Waters Treaty, cited in Cooper, 1986). The treaty established the International Joint Commission (IJC), a quasi-judicial body with the power to give or refuse approval for the use, obstruction or diversion of boundary waters.

UNEP is a body of the United Nations, which was established in 1972 by a resolution of the United Nation (UN) General Assembly. The specialized task of this body is to promote the co-operation amongst the members' states regarding environmental matters. Its tasks include constant surveillance of the environment through a program known as **Earth watch**. In this program, data of global environmental trend are collected and analyzed at different research centre of the world. This analysis of the collected information proved helpful in adoption of environmentally sound policies. It has ensured the compatibility of projects with the priorities of developing countries. The aim of the UNEP is to watch the problems of the depletion of ozone layer, climate changes, global warming, marine environment, water system, soil degradation, desertification, soil conservation, human settlements and population planning, deforestation and biodiversity, effect of environment on urbanization, the transportation and disposal of waste, energy conservation, public health and toxic chemicals. The issues of sustainable development, growth of international and municipal environmental laws and environmental education are also included in the aims and objects of the UNEP. This wide area of activities of the UNEP needs heavy financing which is done by the UN's general budget and by members' contributions. The find for these activities is allocated proportionally but a quota of 20 per cent is reserved for Africa, Asia, Latin America, Western Asia, Europe, and the Mediterranean while 80 per cent goes to global projects. Although the UNEP helps the member nations in dealing environmental issues but it is not a funding agency. Usually the resources of UNEP are used to start the programs for environmental betterment and their completion is done by other sources like governments and donor agencies. The most important aspect of UNEP is that it has established links

with more than 6,000 NGOs concerned with the environmental projects in developing countries without governmental interference. The headquarters of UNEP are situated in Nairobi, Kenya, and its Governing Council which comprises the representatives from 58 member states, meets every two year.

There is lack of legislation in Pakistan, the India is somehow trying to extend their legislation on the environmental issues, though, there is some law in acted in the country.

As I have observed in the previous Chapters, the legal system of Pakistan and India has the same origin. There are many identical laws available in the books of statute of both the countries, but all of these laws are first legislated during the British régime. The purely Pakistani environmental laws were first enacted during late 1950s and the first half of the 60s. The major activities of environmental legislations in Pakistan can be seen in three different periods.

i) The first period of environmental legislation runs from 1958 to 1965.

ii) The second period of environmental legislation runs from 1970 to 1976.

iii) The third period of environmental legislation runs from 1983 to 1997.

That during the first period of environmental legislation, about six or seven specific environmental laws has been promulgated, while during the second period comparatively lesser laws were enacted. In the third period of environmental legislation the first environmental protection ordinance 1983 was promulgated. This ordinance was

in fact the foundation stone of a environmental legal system for Pakistan, and a campaign of environmental legislation started which contemplated on enactment of environmental protection Act, 1997.

Although the environmental protection Act is not the last resort for environmental protection, but it is the best available law of the land for legal control of environmental pollution, but there is still required of improvement. The establishment of tribunal court and improvement in laws on the subject of water pollution is the demand of the time. What we need today is sufficient law but the enactment of law is also not enough actually what we need proper machinery for comprehensive enforcement of the existing law what ever the law is in the society.

The ancient Spanish city of Zaragoza, capital of Aragon, is playing host in 2008 under the theme and sustainable Development through Sept.14. The city has long been aware of the importance of water to its civic well-being. It has three museums that focus on water in the Roman era and a fairly advanced system of 2,000-year-old water pipe and sewers.

It is pertinent to refer here the presently on going Festival from July-September 2008 in Zaragoza (Capital of Spanish autonomous province Aragon in North West) at River Ebro (Rio Ebro) whereas the issue regarding provision of purified and healthier water supply to the public at large is under discussion and researchers from different parts of the world especially from Europe have been presenting their serious consideration on the future threats of the cited issue and emphasizing the importance of shortage of water. References are made about the import of water from France to Barcelona this year. The participants in the Festival urge the importance of state politicians to take appropriate Legislative measures at national and local level in respective states. It is pointed out that the off shore states like Portugal and Greek in

Europe have been confronting this problem since long. The experts say the Middle East and North Africa may face this problem in near future if appropriate measures are not adopted at international level. Spain has already been conformed the internationally adopted measures such as to purify seawater from sea salt through mechanical water treatment and enable it for public and irrigation use. Two Plants have been set up and more are expected to be constructed in the next few years further measures have been taken to recycle the wastewater to enable it for reuse for public welfare purposes of public and irrigation. The participants forecast that the possibility of wars on water issues can not be ruled out in future.[66]

[66] News clip published in the daily *Nawa-i-waqat Islamabad* dated 25TH July 2008.

Recommendations

✓ Pre-treatment to hazardous industrial waste water should be implemented to avoid damage to aquatic life before discharging in to rivers stream/drain etc. contaminated fish could be cited as one example which is **FOOD FOR PEOPLE.** This could also affect health of down stream users of rivers water if untreated waste water is directly discharged.

✓ The first step in any environment programme should be the elimination of those factors which are the most important agent in the transmission of disease.

✓ Ban on dumping of municipal/hospital/industrial solid wastes into water bodies must be strictly enforced.

✓ Institutional capacities should be reviewed for their jurisdiction, charter and performance for better management of water supply and sewerage systems.

✓ Restriction on the use of aquifer should be enforced especially in the area where undermining taking place.

✓ Stringent quality control should be properly enforced on manufacture of water pipes fitting, valves, etc. as per international standard.

✓ Selection of water supply pipes, equipments and appurtenant structure should conform to local conditions with special reference to recent earth quake requiring revised seismic zoning maps and building code/ bye-laws.

✓ Quality of public water supply and private vendors' bottles water should be regularly monitored by third party.

✓ Municipal sewage and industrial waste-water should meet National Environmental quality standard for safe disposal into receiving bodies of water or reuse of treated water for horticulture, recharge of aquifer, industrial use to reduce stress on existing source of potable water and cost of development additional sources

✓ Existing supply system should augment through careful planning's especially with regard to re-use of treated water for agriculture irrigation, recharge of aquifer, horticulture, etc.

✓ Incidence of water-borne diseases such as hepatitis, Typhoid, cholera, Dysentery, Gastroenteritis, etc must be reduce through adequate supply of safe drinking water as per WHO guideline.

✓ Mass awareness through festival like in Zaragoza in Spain may be arranged on government level fully exposure through media.

✓ A linkage with the donors and NGOs is required to be accelerated to solve the purpose of purifications of water.

✓ There is also need of long-term policies for the waste segregation and recovery of recycling system at the district level.

✓ Manufacturing of plastic material must be minimized and Recycling of the plastic bags should be discouraged.

✓ Political will at the Government level should be upheld and policy of zero waste generation should be enforced.

GLOSSARY OF TERMS

S.No.	Words	Definitions
1	Aquaculture	Breeding and rearing fish, shellfish or growing plants for food in special ponds.
2	Amphibian	An animal that can lives both in water and on land such as Frog.
3	Anthropogenic	Caused by or resulting from man's activities.
4	Barrier Reef	Long coral reef laying the shore and enclosing a lagoon low rock near the surface of the Sea.
5	Cyclical	Something that happens periodically i.e. on a regular basis.
6	Cyclical	Something that happens periodically i.e. on a regular basis.
7	CWA	Clean water Act (US)
8	CIA	Central Intelligence Agency
9	Chemical purification	Removing impurity from water through chemical process.
10	Drought	Long period without rain at a time when rain normally falls.
11	DPISR	Driving Force impact State Responses
12	Earth watch.	In this program data of global environmental trend are collected and analyzed at different research centre of the world
13	EPA	Environment Protection Agency
14	EIA	Environment Impact Assessment
15	Euphrates	Name of river
16	Ecosystem	It includes all the organisms of an area and the environment in which they live.
17	Eutrophication	Process by which water becomes full of phosphates and other nutrients which encourage the growth of algae and kill other organisms.
18	Evaporation	Changing liquid into vapours.
19	Earth watch.	In this program data of global environmental trend are collected and analyzed at different research centre of the world
20	Euphrates	Name of river
21	Fungicides	A substance which kills fungi.

22	Fumigant	Chemical compound which becomes volatile when heated and is used to kill insects.
23	Freshwater alkalinity	Alkali one of many substances which neutralize acid and form salt so alkalinity means amount of alkali in something such as soil or water
24	Food chain	Series of organism which pass energy from one to another as each provides food for the next. The first organism in the food chain is the producer and the rest are consumers. Animal from part of a hierarchical system known as food chain.
25	Global sediment	Sediment is a solid particle, usually insoluble, which fall to the bottom of a liquid; the other term is used as sedimentary cycle by which sediment become rock and the other term is called marine sediment which fall to the sea bed.
26	GIWA	The Global International Waters Assessment (GIWA):
27	GWLQA	Great water lake quality agreement
28	Hazardous wastes	Unsafe, harmful waste. Danger stagnant water poses a health hazard for example fire hazard it means risk of something catching fire. So Hazardous waste means rubbish which can pose a risk to people's health.
29	Herbicides	Chemical which kills plants, especially weeds.
30	Hydrological	Referring to Hydrology-Study of water, its composition and properties.
31	Hydrosphere	All the earth's water in the sea, the atmosphere and on land.
32	Industrial Chemical	It can be divided in to various type of solid waste, liquid wastes from various process including radioactive coolants from power stations and gas wastes, largely produced by the Chemical industry.
33	IJC	International Joint Commission (US)
34	Methyl bromides	One of the top five most widely used pesticides in the world.
35	Marine diatoms	Referring to the sea animal vegetation which lives in the Sea. So it is tiny algae with a skeleton formed of silica which makes up some basic organism such as plankton. It is microscopic animal and plants which live and drift in water and are eaten by many aquatic animals.
36	MPL	Municipal corporation
37	Microbiological	Referring to Microbiology-scientific study of microorganisms.

38	NRA	National River Authority UK statutory body responsible for water management and the regulation of water quality.
39	NPDES	National Pollutant Discharge Elimination System
40	Oakland	The eighth largest city in U.S.
41	Ozone Depletion	Removing ozone from the atmosphere
42	Peter Gleick	A scientist (born 1956) working on issues related to the Environment, with a focus on global freshwater challenges.
43	Precipitation	Action of forming solid particles in a solution.
44	Permafrost	Ground which is permanently frozen, as the arctic Regions, where the top lawyer of soil melts and softens n the summer, while the soil beneath remains frozen
45	Precipitation	It is used for rain fall
46	POP	Persistent organic Pollution (POP
47	PCB	Polychlorinated Biphenyl:- white or colourless crystalline substance used as a fungicide, in the production of dyes and as a preservative on the skin of citrus fruit.
48	Pesticide	A substance or mixture of substances used to kill a pest. And which is absorbed in to plant's sap system through its leaves and makes the plant poisonous to fungi or insect
49	PEPA	Pakistan Environmental Protection Act, 1997.
50	PMDC	Pakistan Mineral Development Corporation
51	River runoff	Removing of water from river in flood flow of rain water.
52	Regional replication	Process in the division of a cell where the DNA makes copies of itself.
53	Riparian	The Bank of a river.
54	RAP	Remedial Action Plans
55	Reptiles	The class of clod blooded animals which lay eggs and have scaly skins.
56	Swamp water	Area of permanently wet land and the plants which grow on it. it require to be away from main water course.
57	Slum	Area of a city where the buildings are in bad condition and often where a lot of poor people live very closely together

58	Sic utere tue ut aliemnum nonnlaedas	One must so use his own as not to injury another
59	Safe yield	Quantity of crop or a product produced from plant or from an area of land.
60	SAARC	Organization comprises Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka
61	Synthetics	Made artificially by chemical reaction, Man-made.
62	Tranboundary pollution	Waterborne pollution produced in one country which crosses to another.
63	UNDP	United Nations Development Programme.
64	Wet-land	Area of land which is often covered by water or which is very marshy.
65	Wastes	Wastes are substance or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provision of national law.
66	Water course	A natural or artificial channel through which water flows.
67	Water cycle	Cycle of event s when water in the sea evaporates in the heat of the Sun forms clouds which deposit rain as they pass over land, the rain then drain in to rivers which return the water to the sea.
68	Zaragoza	Capital of Spanish autonomous province Aragon in North West n

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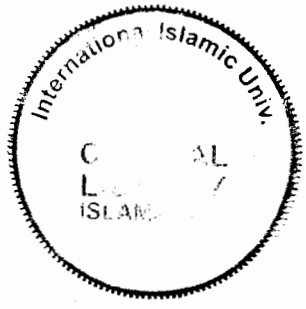

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