



Water

A VITAL SOURCE
OF LIFE

THE UNITED NATIONS
SYSTEM IN PAKISTAN



Water

A VITAL SOURCE
OF LIFE

INTERNATIONAL YEAR OF FRESHWATER 2003

THE UNITED NATIONS
SYSTEM IN PAKISTAN

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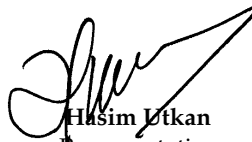
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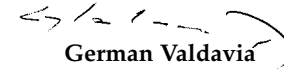
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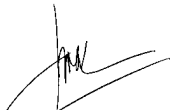
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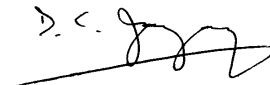
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PREFACE

Seventy per cent of the Earth's surface is covered with water, and yet there is an acute water shortage. This is because 97.5 per cent of it is salt water, and almost three quarters of the freshwater is frozen in ice caps. Consequently, more than one third of the world's population, that is 2.4 billion people, has no access to clean water.

Indeed, the availability of clean, fresh water is one of the most pressing issues facing humanity today. Water is essential for health, agriculture, security, power generation, transportation as well as ecosystems. Furthermore, access to water is a human right as it is the most basic element of life.

Without safe drinking water, human beings cannot survive. Water-related diseases are among the most common causes of illness and death, and more than three million people die every year from disease caused by unsafe water. The majority of people affected by contaminated and unhealthy water live in developing countries.

Health depends on the availability of nutrition, and poor productivity of food triggers malnutrition. Food production can be affected hugely by the existence of adequate water resources and efficient irrigation systems. In other words, water is vital for the provision of nutrition.

Inadequate access to water forms a central core of people's

poverty. It has an effect on their basic needs, health, food security and basic livelihoods of the poor. Improving access of poor people to water will potentially make a major contribution towards poverty reduction.

There is an interface between water and culture where local tradition and customs regulate access to water and its use. For example, in most societies, it is the responsibility of women to ensure the provision of water for their families. But most decisions pertinent to the management of communities are taken traditionally by men. If women can take part in the decision-making process of the provision of water, it will contribute to reducing gender disparity.

In September 2000, the heads of state and government who met in New York for the United Nations Millennium Summit unanimously adopted the Millennium Declaration. The goals, now called Millennium Development Goals (MDG), are to be achieved by 2015. These goals are to: 1) eradicate extreme poverty and hunger; 2) achieve universal primary education; 3) promote gender equality and empower women; 4) reduce child mortality; 5) improve maternal health; 6) combat HIV/AIDS, malaria and other diseases; 7) ensure environmental sustainability and 8) develop a global partnership for development. Although only one of the MDGs refers directly to water, that is to "reduce by half the proportion of people without sustainable access to safe drinking water", other goals include elements related to water in a number of ways. Following the Millennium Summit, the World Summit on Sustainable Development which took place in

Johannesburg, South Africa, in August 2002 equally agreed to halve the proportion of people lacking adequate sanitation by 2015.

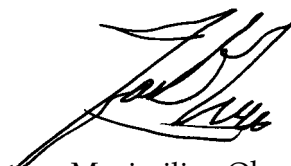
To meet these goals, coordinated actions not only by governments but also by people who use water are required. Efforts are needed equally by civic groups and educators of children and women whose opportunities tend to be limited due to water-carrying tasks. Interactions between freshwater and ecology should also be highlighted. It is a known fact that pollution is attributable to global warming, which causes ecological changes. This adds to already chronic water shortage in such regions of the world as South Asia, the Middle East and North Africa.

Against this background, the United Nations General Assembly proclaimed 2003 as the International Year of Freshwater by resolution 55/196. The main objectives of the year concern raising awareness of the essential importance of freshwater resources for satisfying basic human needs, for health and food production, and the promotion of ecosystems as well as for overall economic and social development.

Water management is an important issue in Pakistan. Federal and provincial governments alike are making relentless efforts to improve access to safe water sources and to provide sanitation facilities to the people. Five journalists who contributed articles to this book offer illustrations of issues the country faces. Each of them describes water-related problems in Balochistan, Sindh, Punjab, and North West Frontier Province (NWFP). Contribution is also made by school children in the form of drawings, poems

and short essays on their images of freshwater. These works present unbiased impressions of children about freshwater. In conclusion, the book offers recommendations of the United Nations agencies operating in Pakistan for better water management and sanitation.

Finally, I should like to thank United Nations Resident Coordinator Onder Yucer who supported this project right from the beginning. Deepest gratitude goes also to all the heads of agencies whose names and titles with their signatures appear on a separate page. Without their kind cooperation, this project could not have materialised. I am equally grateful to all members of the Pakistan Network for Information Sharing (PANIS), namely, Ms Faiza Effendi of the Resident Coordinator's Office, Mr Syed Muhammad Ali of FAO, Ms Saadya Hamdani of ILO, Mr Farrukh Ansari of UNAIDS, Ms Bushra Almas-Jaswal of UN Common Library, Mr Khurram Masood of UNDP, Ms Farhat Gul of UNESCO, Ms Shahida Fazil of UNFPA, Mr Asif Shahzad of UNHCR, Mr Mohammad Ali Fahim of UNICEF, Ms Khadijja Aslam of UNIDO, Ms Rizwana Asad of UNODC, Mr Reza Sultan of WFP, Mr Shahzad Alam Khan of WHO and Ms Ishrat Rizvi of UNIC. They played a pivotal role in coordinating the publication of this book.



Tetsuo Maximilien Ohno
Officer-in-Charge/Editor
United Nations Information Centre

FOREWORD

The issue of water — its quality, its quantity, and its guaranteed availability to all people regardless of income or social status is one of the most pressing challenges facing the world community today. Every year, some 3.4 million people, mostly children, die from diseases associated with inadequate water supply, sanitation and hygiene. Over half of hospital beds in the world are filled with people suffering from water-borne diseases.

Currently 1.3 billion people lack a safe water supply and nearly twice that number adequate basic sanitation. And the gulf between water use between rich and poor countries is stark: developed nations use an average of 400-500 litres a day per person, in developing countries the volume is just around 20 litre.

It is a problem that in many parts of the world is getting worse even as we strive towards meeting the Millennium Development Goals, which include the targets of halving, by 2015, the proportion of people without access to safe drinking water and proper sanitation.

Simply meeting the first of those requires us to connect around 275,000 people a day to clean water over the next 12 years. And we need to do so while meeting the broader challenge of reversing growing pollution and depletion of fresh water while alleviating growing competition over scarce resources in many parts of the world.

That is the scale of the challenge we face - and that is why water and its sustainable use has become so vital for all nations. Addressing the water issues by the development agencies and governments reiterate the broader commitment to meeting all the Millennium Development Goals and fulfilling the Johannesburg Plan of Action agreed at the World Summit on Sustainable Development less than a year ago.

It is needless to state that Pakistan with 60% of its geographical area being part of the great Indus Valley and the Indus Plain has freshwater resource, which is a source of economic well being for the country. The challenge, however, remains for better management of water resources so that the quality of water is maintained on one hand and requirements of different users are also met.



Onder Yucer
UN Resident Coordinator/
UNDP Resident Representative



I am extremely pleased to learn that the UN System in Pakistan is developing a publication on fresh water regarding availability and management. It is needless to emphasize the importance of fresh water and its role in the everyday life of the individual. The availability of fresh water is a basic right of all human beings and the duty of state to provide clean drinking water to each and everyone.

1. The non-availability of water and also the deaths caused due to the use of polluted water in the world is a major concern of the developing countries. The proportion of water born diseases is on the increase and is threatening the global environment and its ecological balance.
2. The intention of United Nations is to increase the awareness of the people and of a better way for doing so could be through education.
3. The Ministry of Education in Pakistan has already integrated the concepts of basic health and nutrition in its curriculum and textbooks. Information about the water cycle and the effects on human life has also been included in the curriculum as well as in the teach education/training programmes.
4. There is, however, a need that the basic issue of safe drinking water be included, not only in the curriculum but also should form an important theme of co-curricula and extra curricula activities. The importance of safe drinking water would be brought to the notice of all concerned and Ministry of Education will play an important role in this connection.
5. I extend all my cooperation to the U.N. System in this regard and congratulate them on this important initiative.



Zobaida Jalal
Federal Minister for Education



I am pleased to know that the United Nations System in Pakistan has prepared this book on Freshwater in Pakistan to mark the International Year of Freshwater 2003.

Realizing the crucial role of freshwater in security, prosperity and very survival of the country, the Government of Pakistan has included clean water as a priority area in the National Environmental Action Plan (NEAP). We are making all out efforts to achieve the objectives of NEAP, Millennium Development Goals and targets set at the World Summit on Sustainable Development and framework on WEHAB in order to effectively address the freshwater related challenges.

This book supplements these efforts of Government of Pakistan and those of international community to protect, conserve and enhance the freshwater resources.

I would like to congratulate the United Nations System in Pakistan for their commendable endeavour in this area and I hope that this book will go a long way in promoting sustainable use and management of freshwater in the country.



Maj. (Retd) Tahir Iqbal
Minister of State for Environment



Freshwater is a basic requirement for social and economic development of human societies. This is basic requirement of healthy life, and as right of the human being to live quality life. Many countries of the region including Pakistan are already facing water stress and likely to face water scarcity. Climate variability and changes, especially the global warming trend, shifting of the monsoons and intensity of rainfall in the region is further aggravating the already constrained water availability situation. The higher growth of population in the country would demand additional freshwater resources to meet the domestic, agricultural and industrial requirements. The quality of freshwater resources is also declining due to the entry of sewage and industrial effluents into the freshwater streams. Agriculture is the largest user of water, as this sector consumes over 90% of the total freshwater resources available in the country. The other users of water include: domestic water use, industrial water use and water for nature.

Pakistan has already faced shortage of freshwater resources due to the prolonged drought in the last five years. The experts are of the opinion that the extreme events like droughts and floods could be severe in the future. The available freshwater resources are not being used optimally. Agriculture sector being the largest user of water is in efficient in water use. The overall irrigation efficiency of the Indus Basin Irrigation system is less than 50%. The new resources of freshwater in the country are limited and would require considerable investment for future development. Thus in future the new water resources would come through the saving of existing losses. The efficient use of freshwater is necessary to reduce the mining of groundwater resources. Furthermore, the aspect of intergenerational water availability is going to be of crucial in the near future.

There is an urgent need to launch a movement in the country to create awareness about the importance of freshwater resources and to generate support from all the stakeholders for building consensus on water development and management. This would require efforts at all the levels. The subject of water has to be introduced in the curricula of schools and universities so that the young generation has awareness to conserve water resources and to have the feel in their education. The government is also taking serious steps to improve the management of freshwater in the country especially in the agriculture sector, where programmes are being strengthened for management of water at the farm level and at the canal command levels. Efforts are also underway to create awareness to block the sources of pollution not entering into the freshwater streams.

The MINFAL (Ministry of Food, Agriculture and Livestock) requests the people of Pakistan to consider water as a finite resource and start actions for conserving this important resource. This would include efforts in all the areas covering the drinking water, water for lawns and car wash and of course, for agriculture.



Sardar Yar Mohammad Rind

Federal Minister for Food, Agriculture and Livestock



It is gratifying to know that the United Nations System in Pakistan has prepared a book on freshwater to commemorate the year 2003 as the International Year of Freshwater. I have no doubt that this book will increase awareness among stakeholders about the importance of use of freshwater for prevention of diseases, protection of environment and promotion of agriculture. Water is also a precious gift from Heaven for humanity. However we have to protect and preserve his blessing. It will also provide insights to the government on improving water management in the country.

I am deeply impressed with the wealth of information contained in this book and the high quality of its publication. I commend the UN system in Pakistan for completing this very important work which will have a long lasting impact. It will give a new urgency to all of us in moving towards the Millennium Development Goals related to safe water.



Muhammad Naseer Khan
Federal Minister for Health



Water is one of the most precious natural resources and the lifeblood for sustained economic development in any country. It supports agricultural, industrial, commercial, domestic, municipal and environmental needs. Pakistan is a developing country situated in a semi-arid region with an agrarian economy whereby water assumes an added importance for our country.

Pakistan has limited water resources. The needs of food and fiber for the rising population, massive urbanization, rapid industrialization and environmental improvement are putting serious pressures on our water resources. The challenge for us is to plan, develop and manage our water resources to meet the above-said goals in a cost-effective and sustainable manner on an integrated management basis.

Government of Pakistan has recently launched a Vision 2025 Programme, which aims to meet the immediate water requirements of the country. Besides, the Government has also formulated a National Water Policy and a Water Sector Strategy to provide guidance for future water resources development and management in the country.



Aftab Ahmed Khan Sherpao
Federal Minister for Water & Power





ACCESS TO SAFE DRINKING WATER IN NORTH WEST FRONTIER PROVINCE (NWFP)

By Intikhab Amir

Clad in pink Shalwar-Qameez suit and her head covered with a long printed chaddar, Maryam, a student of class eight of the Government High School Chukara, Karak district, is busy filling the specially designed container placed on the back of a donkey. Standing atop the concrete water tank under the warm sunshine at around 2:30 p.m. in May, she has to stretch both arms high above her head to pull out the tin-



canister tied with a long blue rope. The young Maryam fetches water six times a day to enable her family of 15, including grandparents, to meet their daily water requirements.

It took about half an hour to fill the container made out of an inner-tube of a used tyre. Her nine month-old sister, Pashmina, kept looking at her while sitting on the top of the water tank. She covers a distance of about two kilometres each time she visits the water tank constructed by an affluent of the village Chukara to store the precious resource, for the water scarcity hit inhabitants of the area.

Karak, like other southern districts of the North West Frontier Province (NWFP), is an area known for scarce drinking water. Ground water in most parts of the region is saline and safe water located in small pockets is limited, said Ilyas Khan, a credit officer of the Sarhad Rural Support Programme (SRSP), a non-governmental organisation assisting local communities in more than 12 districts of NWFP, to design, execute and maintain small projects in the social sector including water supply schemes.

Apart from the local traditions, norms and cultural values of the far more conservative southern districts of the province, gender inequality is more serious in NWFP than in other provinces of the country. "My brothers and father can't fetch water because only children and women are allowed at the community water tank," said Maryam, daughter of the poverty-ridden Shireen Gul, who runs a small shop to help her large family meet both ends.

Like Maryam, the nine-year old Waqar, too, is hardly left



with much energy and time to study school books at home after fetching water for their families. However, in pursuit of a brighter future Waqar and his elder brother, Nadeem, who, too, fetches water three times a day, regularly attends the school, though they find it difficult to

prepare for their mid-term and annual examinations due to their responsibility of bringing water.

Those who don't want to make their children and female members fetch water from wells located far away rely on other arrangements to acquire water for daily consumption, chiefly for drinking purposes. Rickshaws loaded with large-size plastic cans containing water are becoming popular among the inhabitants of the Karak town. The motorbike-driven, newly designed rickshaws are one such growing means of transporting water to households from community water tanks and dug wells in Karak district.

Mubarak Shah, in his 40s, supplies potable water to those who can afford to pay the transportation cost. He charges Rs 10 to every household for transporting single water-container. His business is thriving, he claims. However, there are not many families who can afford to pay the

transportation charges.

"This is one of the most under-developed regions of the country where people have limited options to earn a living, hence the majority has a simple choice to make. Their children and women transport water from the distant water sources," said Ilyas Khan of SRSP.

Housing a population of over 34,000, Karak town has experienced water scarcity for a long time. Only half the population receives piped water from the tube-wells installed by the Public Health Engineering Department, NWFP, said Mr Ghulam Mujtaba, Deputy District Officer, Water Supply and Sanitation, Karak district. Only four of the total 19 tube-wells installed by the government to meet water consumption requirements of Karak town are functioning. "A majority of the tube-wells have been rendered non-operational. Some of them have dried, and others have started churning out brackish water due to excessive pumping, said Mr Mujtaba.

Though the people of Karak are experiencing severe water constraints, the provincial government wants local communities to take over about 60 tube-wells installed between 1993-94 and 1997-98 through the Social Action Programme (SAP) assisted by international donor agencies.

High maintenance cost and erratic monthly billing by the Water and Power Development Authority are the two main reasons from stopping the communities to take over the tube-wells in line with the provincial government's agreement with the lending agencies of SAP. So far, only three

tube-wells have been taken over by local communities, said Mr Mujtaba.

Water crisis in the rest of the district is as severe as is the case of the Karak town. With a total population of over 460,000, the Karak district, a semi-arid area receiving only 200 mm rainfall on average in a year, is one of several districts of NWFP where the scarcity of drinking water has attained serious proportions. The problem is becoming more serious with the increase in population and poverty, said Ghazi, information officer, district Karak.

Out of the total of 19 million inhabitants of NWFP, some 59 per cent has access to safe drinking water from a variety of sources including pipelines, closed wells, open wells, springs, ponds, canals and rivers, according to the multi-indicator cluster survey (MICS), conducted in 2001 by the Planning and Development Department, NWFP, with financial assistance from UNICEF. Of the 59 per cent having access to safe drinking water, about 38 per cent is getting piped water, 16 per cent from springs, 10 per cent from hand pumps, 6 per cent through motor pumps, 5 per cent from closed wells, 15 per cent from open wells, 8 per cent from ponds/canals/rivers. The remaining 2 per cent gets its drinking water from sources categorised as 'others' under the MICS 2001.

Like Karak, other southern districts of the province including Tank, Lakki Marwat, Dera Ismail Khan and Bannu have also experienced acute water crisis with women and children taking the responsibility to arrange drinking water for their families. "Water scarcity is the most serious problem facing

the people of the southern parts of the province," said Nawab Khan, a bearded old man. Only five to ten houses out of a total of 50 in his village Gandi Siraj Khel gets water piped from a nearby tube-well. The rest depends on their children, female family members and donkeys to fetch water to meet their daily consumption.

Mr Mujtaba, deputy district officer, said that apart from the scarce water resources in the southern parts of NWFP, the misuse of the facility on the part of the inhabitants of district Karak has aggravated the crisis. Water scarcity has become too big a problem to be resolved. A large number of households have taken illegal connections from the transmission lines passing from one village to another, which leaves no water to reach the consumers at the tail end of the pipeline making the crisis much more serious, said Mr Mujtaba.



Several households have installed dug-wells on their own to overcome drinking water crisis after persistently failing to get water from the main transmission lines. In some instances, community organisations have installed dug-wells to meet the drinking water requirements of the community. "After finding no way to get the problem resolved, we formed a village-based organisation and pooled certain amount of funds to install a hand pump," said Saed Khan, chief organiser of the Adam Welfare and Development Council, Karak. Six hand pumps installed with the active involvement of local communities in different villages benefited 400 people, as women and children in those villages are not required to fetch water from a distant community water tank, said Mr Khan.

Engineer Mohammed Faheem, currently associated with SRSP as its field officer at Karak, said that active community participation had started showing positive results as far as access to safe drinking water in certain areas of the district was concerned. The community covers 20 per cent of the total cost of installing a hand pump in its area, whereas the remaining 80 per cent of funds is provided by SRSP for the installation of equipment and machinery. Presently, SRSP is assisting in the execution of seven drinking water schemes in the Karak district.



Apart from the southern districts of NWFP, access to safe water is also an issue to be dealt with effectively in almost all other districts of the province. Even in the provincial capital, Peshawar, 77 per cent of the slightly over 1.9 million inhabitants have access to drinking water. The ratio is as low as 11.9 per cent in the Kohistan district.

Mufti Kamran, a research officer at the Planning and Development Department, NWFP, said that the provincial government had already undertaken several schemes to mitigate the effects of drought and shortage of drinking water in the districts of Bannu, Dera Ismail Khan, Tank, Kohat, Lakki Marwat, Karak, Buner, Dir (lower), Dir (upper), Chitral Kohistan and Haripur. The province has so far released a sum of Rs 1.5 billion from the federal government for executing several water-related schemes under the Drought Emergency Relief Assistance (DERA) project.

The province had also planned to spend Rs 30.442 million to execute six on-going schemes and one new development project to improve water supply in different parts of the province. But the execution of the project was blocked due to procedural requirements, said Mr Mujtaba, Deputy District Officer, Karak.

Mr Intikhab Amir is a holder of a Master of Arts degree in Journalism from the Journalism Department of the University of Peshawar. He has been reporting on economic, political, environment and social development issues for the DAWN for more than ten years from the daily's Peshawar Bureau.

PROTECTION OF WATER RESOURCES IN NORTHERN PUNJAB

By Shafqat Munir

Water is crucial to development, nature, bio-diversity, environment, food security, agriculture and all life forms. Water has become a human rights issue with ever depleting surface and underground resources of freshwater causing scarcity and reducing access to fresh/potable water. The human rights to water is indispensable for leading a healthy life in human dignity. It is a prerequisite to the realisation of all other human rights. But this right seems to be at risk owing



to the lack of access to freshwater and the commercialisation of water resources by a newly emerging water industry supplying bottled water and with eyes on the privatisation of water for agricultural purposes mostly in developing countries.

Water scarcity is becoming a widespread issue in Pakistan as the growing population largely depends on ground water pumping for agriculture and living. Deep water table, low rainfall and rising needs in hot weather create an acute short supply of water. Particularly in North Punjab, which comprises of four districts in arid zone, namely Rawalpindi, Chakwal, Jhelum and Attock, people depend on rainwater sources and groundwater pumping through tube-wells and water pumps.

North Punjab, the Potohar upland, commonly called the Potohar Plateau, lies to the south of the northern mountains and is flanked to the west by the Indus River and to the east by the Jhelum River. This 1,000-2,000 feet (305-610 m) upland is a typical arid landscape with denuded and broken terrain characterised by undulations and irregularities. Two seasonal streams – the Haro and Soan Rivers - flow from east to west and after crossing the region in the north and in the middle respectively, fall in the Indus. The Kanshi River traverses the eastern part of the plateau from north to south and drains into the Jhelum River. These rivers and other hill torrents have cut deep valleys, but they are of little use for irrigation. Agriculture and potable needs are thus almost entirely dependent on the rainfall of 15-20 inches and on the small dams built in the catchment areas of the streams. Water development and management in North Punjab is

somewhat different from the rest of the Punjab province where more than 80 per cent of irrigation is done through a wide network of canals and tube-wells.

Sources of freshwater (river/nullahs/lakes/rainfall)

Mountains, hills and spurs with the potential of catching rainwater coming down to plains through various streams originating from Murree and Kahuta and Kotli Sattian hills surround the Rawalpindi district. The most important among them is the Soan River. Rainfall in both summer (July-September) and winter (January-March) normally remains sufficient for maturing crops for both Rabi and Khareef harvests. Annual rainfall in the Murree hills is about 1,142 millimetres, while in the plains, it is 913 millimetres.

Four rivers pass through the Rawalpindi district. The Jhelum River skirts the district from the north near Dewal to its southern boundary, a distance of 88 kilometres. The Soan River flows close to Rawalpindi city and finally joins the Indus near Makhad. The Haro River cuts across a small portion of Rawalpindi tehsil and then enters Attock tehsil. The Korang River cuts through the Rawal Dam, and joins the Soan near Sihala.

No river passes through Chakwal district except the Soan that falls into the Indus on the border of the Mianwali-Kohat district. In summer and rainy season, there is heavy flow of water, while in winter it is a rivulet.

As compared to other arid districts in North Punjab, Attock generally has somewhat scanty and very uncertain rainfall

varying from year to year. The Indus River passes through the Attock district but surprisingly contributes nothing to the irrigation of the district. Due to inadequate water, agriculture is badly hit resulting in very low income. Two rivers, Jhelum and Kaushi, pass through the Jhelum district. Some streams and mountain torrents also run through the area. The streams of the district comprise sandy or rocky torrents, which descend from the hills or issue from the ravines. They are called Trimkar or Dhan.

Dams/small dams/mini dams

Currently four dams are located near Rawalpindi. The Simli dam, Khanpur dam and the Tanaza dam, with the Rawal dam located in the federal capital. The Simli dam, located about 30 kilometres away from Islamabad, is fed by melting snow and natural springs of Murree hills. The water stored in



the lake is supplied to Islamabad for drinking purposes. Water emanating from the Khanpur dam, 48 kilometres from Islamabad on Taxila-Haripur Road, also serves as drinking water in Islamabad and Rawalpindi.

The government has initiated a scheme of constructing mini dams and small dams in the district. So far 26 mini dams with the irrigation capacity of 1,675 acres and 10 small dams with irrigation capacity of 16,268 acres have been completed. The Shahpur dam has recently been completed. There are 4,922 wells and lift pumps and 106 tube wells in the district to provide water to the people in the district.

Irrigation

There are no proper sources of irrigation in the Rawalpindi district. Most of the land is irrigated by rain water. No canal system is available. Rawal dam in Islamabad provides water through two canals to irrigate 8,250 acres in the Rawalpindi area. Out of 25,000 acres in the district, 16,000 acres are irrigated by wells. In Chakwal, there is no proper irrigation and canal system like in other parts of the Punjab as it is an arid (barani) zone. However, a number of small dams have been constructed in the district to irrigate small acres of cultivated land through water channels. In Jhelum, tube-wells are the main source of irrigation followed by wells and canals. Out of 24,000 acres of land irrigated through various sources, 20,000 acres are irrigated by tube-wells.

Water management in North Punjab

Water is a federal as well as provincial subject in Pakistan. In

North Punjab, better water management is needed to cope with water development and demand, as compared to other parts of Punjab. Some experts say that water crisis is not about having enough water, but about the bad management of water.

Water management is necessary for ensuring the long-term availability of clean water for people living in North Punjab, particularly because these areas are excluded from the



purview of any water treaties between the central government and the provinces. The departments in the government of Punjab which deal with water, sanitation, irrigation and agriculture manage the water in North Punjab under rules and procedures set in this regard.

Security of water resources

Amid reports of an ever-increasing water scarcity, security of water gains importance in terms of the people's access to freshwater for food and agriculture, livestock and other needs. In this regard, North Punjab faces the two-fold crisis of the scarcity of water and poor water quality. In Rawalpindi and Islamabad, for example, bacteriological contamination and an increase in nitrate content was observed in drinking water.

According to a survey conducted on 47 water samples in North Punjab in July 2001 by The Network, an NGO, with support of the National Institute of Health (NIH), 94 per cent of samples proved to be unsuitable for drinking due to bacteriological contamination.

The Draft Safe Drinking Water Act states that the most common water-borne diseases in Pakistan are Typhoid, Cholera, Hepatitis, Giardiasis, Dysentery and other intestinal disturbances. Globally 80 per cent of the child deaths are attributed to water-borne diseases.

Nitrate is an upcoming pollutant in drinking water. Main contributors of this ion are the use of fertiliser, domestic effluents, decayed vegetable and animal matter, industrial discharges and atmospheric wash out.

On the quantity security option of water, the government under Vision 2025 of the Water and Power Development Authority (WAPDA) has planned to construct three dams namely Sanjwal (3.60 million acre feet - MAF), Akkori (3.06 MAF) and Buhtar (0.8 MAF) on the off channels from Ghazi Barotha dam near Attock. The addition of these dams would be good enough to store sufficient water, provided it is available through rainfalls and glaciers melting. Security of water resources with both quantity and quality perspectives is directly linked to security of food, land, environment and the people.

Hydel power generation

Due to its geographic location, North Punjab has a vast

potential for the protection of water resources and has ample scope for hydroelectric power generation. So far, the only existing facility is the Ghazi Barotha project. The site of the Hydro Power Station



of Ghazi-Barotha is situated at the confluence of the Indus and Haro rivers near Attock. Its estimated power production capacity is 1,450 mega watts. This project would soon be commissioned. In addition to this, five more big dams to be built over the next 20 years under Vision 2025 of WAPDA would have more opportunities of hydel power generation. The power generation potential of North Punjab could also be explored by exploiting mini turbine options on lakes, streams and big Nullahs. These small hydel projects could meet the electricity requirement of North Punjab and add power to the national grid.

Based in Islamabad, Mr Shafqat Munir contributes mainly to The News International, where he had also served as News Editor. He is the President of Journalists for Democracy and Human Rights (JDHR), and is currently working as Editor Research Publications with the Sustainable Development Policy Institute (SDPI). Mr Munir is a holder of a Master's Degree in Political Science and a Post-Graduate Diploma in Journalism, and he also taught "Press Ethics and Human Rights" to students of M.Sc Mass Communication at the University of Arid Agriculture, Rawalpindi

EFFICIENT IRRIGATION IN SOUTHERN PUNJAB

By Nadeem Iqbal

The Indus Water Treaty was signed in 1960. Commenting on the Treaty in his book entitled "The Emergence of Pakistan", Chaudhry Muhammad Ali, who was Pakistan's fourth prime minister in the early 1950s, wrote that the Treaty was designed in principle to maintain existing irrigation in Pakistan. It also held out hope, he said, of development to meet the need for a higher standard of living by a growing population. At the same time, he warned that dams on silt-laden rivers did not have a long life, and that the cost of maintaining the huge link canals and servicing the loans incurred by Pakistan would be beyond the productive capacity of the irrigation system."



An estimated 37.6 per cent of the irrigated area in the country is waterlogged and 14 per cent surface is saline. Water logging and salinity are caused by unnecessarily repeated irrigation of fields. Seepage from canals raising the water table around them makes the fertile lands redundant.

In addition, the irrigation system is not supplemented by an effective drainage system. The Indus basin – the largest irrigation system in the world - has flat topography, porous soils and semi arid climate with high evaporation. In such an environment, irrigation without drainage leads inevitably to rising water tables and eventual salinity. But this is happening when the availability of water is normal. When there is drought due to lesser rainfall, the situation becomes much worse. Solutions to these problems, such as the construction of drainage lines, have been devised, but their implementation was either sporadic or skewed.

In Punjab province during 2001 the canal water availability decreased in Kharif (summer season) between April-September from 31.49 million acre feet to 27.24. While in Rabi (winter) season during the period October - March, it plummeted from 11.36 to 9.81. The water shortage has resulted in the decline of 1 to 19 per cent in the production of cash crops like cotton, sugar, wheat, rice. The World Bank's Pakistan Poverty Assessment - 2002 notes that there is considerable seasonal variation in canal water availability. For example, between Kharif 1999 and 2000, good availability of canal water fell from 68 per cent of plots to 52 per cent. In Rabi 2000, only 27 per cent reported good quality as compared to 52 per cent in 1998.

The proposed remedy for the deterioration in irrigation facilities is the improvement in physical infrastructure such as the rehabilitation of canals, the lining of water channels and land levelling also called laser levelling, sprinkle irrigation, and so on.



The Indus Waters Treaty was also aimed at resolving the water disputes between Pakistan and India that emerged soon after the Partition. The head works of the Pakistani canals emanating from rivers Ravi, Beas and Sutlej were located in India and this led to a serious water dispute between the two countries from 1948 onwards. The dispute was resolved in 1960 through the World Bank, and both countries signed the Indus Waters Treaty, giving exclusive water rights of the three eastern rivers - Ravi, Beas and Sutlej - to India and those of the three western rivers - Indus, Jehlum and Chenab - to Pakistan. By 1970, Pakistan constructed storage reservoirs at Chashma on the Indus and Mangla on the Jehlum, and six new head works and seven large inter-river link channels. The largest Tarbela dam on the Indus was completed in 1975-76. Now the eastern rivers in Punjab are fed by western rivers. In fact, it is the Indus

river that is considered to be a lifeline of the country's economy as it forms the axis and with its tributaries, irrigates the whole of the country except sparsely populated Balochistan.

It is difficult to exactly define southern Punjab but generally with reference to irrigation, the region below Lahore city is considered the southern part. Of the total eight administrative divisions of the province, over half of them – Bahawalpur, Multan, D.G.Khan, Sargodha - fall into the southern part. In addition, a couple of districts of Lahore and Faisalabad divisions are also considered to be part of the region. The southern region enjoys the highest irrigated area i.e. 90 per cent in the country.

According to the census estimates of 1998, roughly over half of the Punjab's total 73.6 million population live there. Similarly, over 60 per cent of the total 205,345 square-kilometre area of the province lies in the south.

The southern region is also the heart of the Punjab Irrigation network comprising of irrigation canals, drains, tube-wells, small dams and flood protection infrastructure.

A total of fourteen major barrages on the five rivers are flowing in the province, with a total off-take canal capacity of 102,000 cusecs (one cubic foot per second) of irrigation supplies, and another, about 101,000 cusec capacity of inter river links. The colossal network of over 23,000 miles of irrigation canals provide irrigation facilities to fertile lands in the Punjab. Most of this infrastructure is in the south. Interestingly, the region itself does not have catchment areas

for rain and is totally dependent on the irrigation system, whose water sources are outside the region.

Not only is southern Punjab home to the cash crops of the country like wheat, cotton, sugar cane, but it is also famous for mangoes, and is sometimes referred to as granary of the country. Furthermore, this area has the highest density of the 7.3 million buffalo population in the country. The country's dairy industry is dependent on buffalo milk. Buffalo is called an animal of water. It is bred all along the river and canal areas. In spite of such precious assets, the region is stuck with growing poverty.

In Pakistan, poverty is largely a rural phenomenon as 32 per cent of the population live below the poverty line as against 19 per cent urban population, according to the figures of 1998-99.

In rural Punjab, the incidence of food poverty increased from 24.5 per cent in 1993-94 to 35.8 per cent in 1998-99, as compared to urban areas that have been 19.8 per cent and 27.3 per cent respectively.

The southern rural belt is believed to be hard hit by the paucity of means to better livelihood severely endangering their food security.



Irrigation water mismanagement has been considered as one of the factors contributing to a high rate of poverty.

Water experts say that in some parts of the southern Punjab, the soil is naturally saline and ground water tends to be brackish. However, canal irrigation and tube-well installation have substantially worsened the problem in recent years. Due to its flat topography and the lack of natural

drainage in the Indus plain, repeated irrigation has led to the rise in the water table. This is compounded by seepage from the canal system during the delivery. In areas where ground water aquifers are fresh, water lost can be re-used by pumping, since it simply recharges the aquifer. But, the pumping or sucking out of water through tube-wells must be managed efficiently. In the 1950s, there were only 1,000 private tube-wells in the Punjab. The number is said to have gone up to 500,000 in 2000, causing stress to aquifer. There is a projection that the number of wells will rise to 680,000 in



2010, worsening the situation further. There is therefore a need to maintain the balance.

Another related issue felt seriously by water rights activists is of water quality. In Punjab, the discharge of hazardous saline effluent into rivers is mainly taking place in the upper Indus region. The water there is fully recycled into irrigation system.

Realising the gravity, soon after inception in February this year, the Punjab Irrigation Minister, Mr Amir Sultan Cheema, announced the government's massive plan to rehabilitate the provincial irrigation system. Mr Cheema said the Irrigation Rehabilitation Project, which would cost about Rs 21 billion, would play an important role in restoring all the canals in the province to their original condition. Besides feasibility



studies are on to remodel existing barrages. He said that the construction of drainages and around 8,900-kilometre water courses would be lined to check wastage of water. He informed that work on the Greater Thal Canal, costing Rs30.4 billion, was ongoing. On completion after seven years, the canal would irrigate 100,000 acres in districts Khushab, Bhakkar, Layyah and Jhang in southern Punjab.

In the past, people have been sceptical of the success of government plans.

Mr Khalid Hussain of Development Visions, a Multan based NGO, viewed it differently. He said: "policy issues in water have generated local urgency and global importance. As downstream impacts of upstream water developments are shaping political conflicts at the global, state and local levels." Macro management, he adds, often conflicts with micro desirability. "But the situation in Pakistan is not helped by the fact that Pakistan has no water policy," he concludes.

Mr Nadeem Iqbal is a correspondent for the Sunday edition of The News in Islamabad. He also works for the leading monthly the Newline and the Inter Press Service. He holds a master's degree in English literature from Punjab University and has been extensively writing on environment, water, politics, nuclear and other socio-economic issues regarding public safety. He is also the winner of Green Journalist Award of the Federal Ministry of Environment for two consecutive years, 2001-02 and 2002-03.

WATER PURIFICATION AND POLLUTION - BALOCHISTAN

By Siddiq Baluch

Water is the most precious material in this semi-desert and completely arid human settlement of Balochistan. It is inseparably linked with life and its sustainability. The concept of conserving water resources remained an illusion for decades for planners and officials in Balochistan. The reason was that local authorities were entrusted with power for maintenance of law and order while finance and planning were the monopoly of Central Government in Islamabad who for decades ignored the development of water resources. They gave little or no importance to it till recently. This can be seen from the official approach about the Mirani Dam, an earthen dam conserving water, both for drinking and irrigation purposes, in the Mekran region. Already approved at all levels in the mid-1980s, it was kept in cold storage for fourteen years.

Initially, the British colonial rulers planned this dam for augmenting water resources and was later taken up under the Marshal Plan in the post-war reconstruction. Now WAPDA is building the dam some 64 kilometres from Turbat. Earlier, WAPDA built the Hub dam in Lasbela district of Balochistan only to cater to the needs of the ever-growing population of the city of Karachi and not Balochistan. It also provided a few hundred cusecs of water to the adjoining townships of Hub and Gadani for drinking purposes or for industrial uses.



The change in Government policy to conserve water resources was due to public pressure and the prolonged drought that devastated Balochistan, completely destroying livestock and flocks in rural areas for lack of sustainable water resources. In the early 1980s, the Government had created the Public Health Engineering (PHE) Department ensuring supply of drinking water to hundreds of communities and settlements. The PHE received massive assistance, both technical and financial, from UN agencies and the World Bank for its water supply schemes. Except for the provincial capital, Quetta, there were a few fresh drinking water supply schemes throughout Balochistan functioning prior to the creation of PHE.

A very large part of Balochistan is under the threat of man-made desertification. Over 90 per cent rangeland is degraded. The soil is losing its productivity and nutrient content by continuous cutting and the indiscriminate and unabated grazing of green pastures. Runoffs and floods

cause damage to fields and property and to the basic infrastructure of the irrigation system in Balochistan. Subsoil water is scanty and is relentlessly exploited beyond natural sustainable limits. The depletion rate is alarming, threatening the ecosystem in this part of the world.

In regard to the industrialisation of water purification plants, such a system or plan does not exist in Balochistan. There is no water purification plant in any settlement of Balochistan. Even Quetta has no such facility. Water sucked through tube-wells is directly supplied to the consumers, a city with a population of around one million.

In case of Hub, there is a water desertification. Silt is separated and the sedimentation level is reduced before the

water is pumped to consumers. There are frequent reports in the newspapers that the open surface water reservoir contained bodies of dead animals, including dogs and rats. The process of desilting the water is undertaken to supply water for industrial units. Otherwise, the water is believed to be unfit for human consumption.



In Quetta, the Water and Sanitation Authority

(WASA) provides tap water directly sucked from subsoil sources and pumped to the consumers. It is generally believed that the fresh water is fit for human consumption as it is filtered naturally. No human efforts are involved in filtering the water. On complaint, the water supply is suspended if found contaminated. One complaint is the mixing up of the fresh water pipeline with the sewerage system. The distribution system is obsolete and underground pipes laid during British colonial rule, now rusted and extensively damaged, have never been replaced. For this reason, frequent breakdown of water supply system is reported through burst pipes. The Federal Government allocated over Rs 6.5 billions (around 110 million US dollars) to improve water supply and sanitation in the Provincial Capital. An open surface dam will also be built under the scheme augmenting fresh water supply using floodwater.

Interestingly, the Federal Government initiated a scheme to reclaim waterlogged and saline land in Naseerabad. Planners used the simple technique of pumping out the saline water from the waterlogged land. But there were no proper disposal of the saline water. The planners thought it fit to pump the highly contaminated saline water into the Kirthar Canal, an irrigation canal built by the British colonial rulers in 1930s. Its discharge capacity was around 800 cusecs (flow of water equal to one cubic foot per second) at that time and the planners pumped around 300 cusecs of saline water into the canal contaminating the only source of fresh water. The process continued for decades. The entire population residing in the Kirthar Canal command area was forced to use the highly contaminated water for drinking and farming.

The situation is no different in the rural areas of Balochistan. There are hundreds of communities using the common ponds as a source of drinking water both for human beings and the animals. The only safe source of water is the tube-wells or Karez, the underground water channel linking up wells at the bottom for receiving an increased discharge of water. The water used from the open surface well is less harmful compared with ponds and open surface stagnated water on hilly tracks.

According to a recent survey conducted by the Sanitation and Water Environmental Education Technologies (SWEET), twenty-one water-related diseases are rampant in the villages of Pishin in Northern Balochistan and Khuzdar in Central Balochistan. Out of these diseases, 19 are



preventable. Out of the 4,527 households surveyed only 447 houses have separate residential arrangements for human beings and animals. Animals are the biggest source of water contamination. In other cases, people have common residential accommodation with animals. According to one survey, a single community in Khuzdar is spending Rs 154,259 on medicine per month.

The main causes of disease are the improper disposal of human waste, domestic and municipal filth, and garbage finding its way into the source of drinking water. The common diseases are gastroenteritis, malaria, typhoid, diarrhoea, dysentery and occasionally cholera. Ninety per cent of patients received by most of the Government hospitals and private clinics are suffering from water-related diseases. In recent years, hepatitis has become rampant among the local people across Balochistan, including Quetta.

The local population in those human settlements gets a mere 4.5 litres of water instead of the standard 10 gallons per person per day. In most cases, the water is highly contaminated and unfit for human consumption.

In order to check the rampant diseases, SWEET launched a campaign to inform people about safe water and introduced low cost water purification techniques to over 10,000 local residents.

Water pollution is playing havoc with the ecosystem in Balochistan. Municipal authorities have no resources to clean up the dirt and filth. There is no proper system of garbage removal in most of the human settlements in all the five ecological regions of Balochistan. More than 95 per cent of funds to the municipalities are spent on salaries to the staff leaving no funds or resources for garbage disposal.

There is no water treatment plant in Balochistan. Waste and untreated water drains into rivers contaminating the fresh sources of water. The increasing use of insecticides, pesticides, herbicides and chemical fertiliser in farms is also causing pollution to subsoil water resources damaging the ecosystem of Balochistan.

The Government has planned the first water treatment plant for Quetta and will be set up under the water supply and sanitation scheme of WASA in next five years. Damaged pipelines are being replaced and an improved water distribution system is being built for the Provincial Capital improving the quality of water for human consumption in near future. Most of the water pumps used to supply fresh

water to communities are being operated by solar energy. For this the Government of Balochistan has earmarked 34 million US dollars for the installation of solar pumps for fresh water supply.



Mr Siddiq Baluch is presently Editor of the English daily Balochistan Express, Quetta, and the Urdu daily Azadi, Quetta, and contributes columns regularly in the DAWN.

Born in Karachi, Mr Baluch worked for the DAWN in different capacities for 28 years. He acted as President of the Karachi Union of Journalists for two terms, Vice-President of Karachi Press Club, and also as President of the Balochistan Newspapers Editors Council for two terms. Between 1972 – 73, he served as Press Secretary to the Governor of Balochistan

WATER AND HEALTH ISSUES IN SINDH

By Sheher Bano

The provision of safe, clean drinking water, adequate sanitation facilities along with health and education is considered to be the basic ingredients for human development. Unfortunately, water and sanitation - two important factors for sustainable development - remain a very low priority of governments in many developing countries, and Pakistan is no exception. According to a World Health Organisation (WHO) report, Pakistan is included in those countries where freshwater sources are fast dwindling.

The availability of safe drinking water in Sindh is affected by the injudicious exploitation of fresh water, absence of the concept of conservation of both quality and quantity,



unabated pollution of water sources coupled with poor maintenance of sewerage and water distribution system. All these factors together turn good quality freshwater into contaminated water unsafe for human consumption. This is in addition to a lack of public awareness towards hygiene resulting in serious health damages.

With an annual average rainfall of below 100 mm, the province of Sindh depends on three main sources for its water supply-- rainfall, ground water and river water. Unfortunately, the provision of safe drinking water to the residents of Sindh is still a far-fetched dream.

The Indus river is the source of drinking water for Karachi and the majority of cities of the province. Badin Hala, Jacobabad, Kotri, Mithi, Khipro, Nawabshah, Shahdadpur, Sanghar, Thatta, Khairpur, Tando Adam, Tando Allahyar, Mirpur Khas, Sukkur, Hyderabad and Karachi possess an organised water supply and distribution system, with quality standard yet to be achieved. Places like Dadu, Shikarpur and Larkana have access to sweet groundwater in aquifer.

Karachi, the largest megalopolis of Pakistan, with no perennial source of water supply, depends mainly on canal water. According to statistics provided by the Karachi Water and Sewage Board (KWSB), Karachi receives 470 million gallons daily (MGD) of water against its demand of around 600 MGD. A study of the Orangi Pilot Project reveals that about 25-30 per cent of water is lost due to leakage in the distribution system not to mention the intermittent power failures, which affect water supply in both rural and urban

areas. The study observes that water supply can be increased by repairing leakages, regulating the water tanker supply and rationalising distribution.

Some urban areas of Karachi, Hyderabad and Sukkur do not fall under the regular water distribution network. These areas are either located at the tail end of the system, or are Katchi Abadis and are served officially through water tankers. Apart from this, the informal sector of water supply depends on the operators of donkey carts, mashkis, the traditional water carriers, pushcarts, etc. They cater to the needs of many urban centres as well as towns in Sindh. The private tankers draw their water either from tube-wells or through suction pumps from a pond of water created by leakages in the distribution system. The water thus acquired is highly contaminated with bacteria and pathogenic organisms making it totally unfit for human consumption.

Sewage system in Sindh

According to a study conducted by Dr Mirza Arshad Ali Beg, former Director General of the Pakistan Council of Scientific and Industrial Research (PCSIR), the core areas of almost all towns and cities have open channels converging into drains that carry sewage from cities and towns to discharge into open land, into nearby irrigation drainage canal or else into a canal or river. This is a major source of ground water contamination. Almost 90 per cent of all samples from ground water (wells, tube-wells, boreholes or from the pools and ponds formed by seepage from main distributaries) collected by the University of Karachi, PCSIR and other independent sources were contaminated by sewage

organisms.

Karachi generates an estimated 280 million gallons daily (MGD) of sewage from a water supply of 450 MGD, but it has the facility to treat only 85 MGD and disposes of another 65 MGD by pumping it into channels, which flow into either the Malir or Lyari river. This leaves approximately 130 MGD that finds its way into storm water drains or flows into the above rivers

or the sea as raw sewage, incurring irreparable loss to the ecosystem. In addition, effluent from main industries causes extensive water pollution. In Karachi, the central sewage collection and disposal service is available to 28 per cent of the population, an ineffective service is available to 25 per cent. Three per cent of the population benefit from local collection and disposal services including one through septic tanks, while the rest (44 %) remain unserved.

Quality of water in Sindh

According to WHO standards, freshwater is potable when it



has less than 500 milligramme/litre of total dissolved solids (TDS) with no sewage-related bacteria, particularly e-coli present. However, the quality of drinking water across Sindh is variable with TDS ranging from 150 to 350 mg/litre besides containing sewage-related bacteria. Water drawn from wells and boreholes is no better since it comprises over 600 mg/litre of TDS. In coastal areas, the TDS limit exceeds 1,500 mg/litre. A report entitled "Status of Safe Drinking Water Availability in Sindh" released this year by the Sindh Ombudsman's office, says that some 25 to 80 per cent of tap water supplies in major urban centres in Sindh is not treated with chlorine and is therefore liable to pose serious health risks. About 75 per cent of water supplied to Karachi and Hyderabad, about 66 per cent in Sukkur, 60 per cent in Badin, 50 per cent or less in Jacobabad and Nawabshah and about 20 per cent in Thatta is treated with chlorine, whereas no chlorine is added in Mirpurkhas, Larkana, Shikarpur, Dadu and Kotri and other towns of the province.

The decline in the flow of the Indus river over the past decades has played havoc on Sindh's underground water reserves and wells too. Scientists found that with zero discharge down the Kotri Barrage, non-replenishment of aquifer, and over-exploitation of ground water, have caused an alarming rise in total dissolved solids in Indus water and reached the limit of 3,200 ppm at the Sujawal bridge. They termed a TDS of above 2,000 ppm as not fit for irrigation purposes. The water from almost 95 per cent of wells in Karachi, Hyderabad, Sukkur and over 90 per cent in their suburbs is said to be contaminated with sewage bacteria and contains totally dissolved solids beyond permissible limits. Some toxic materials like inorganic and organic chemicals,

dyes and pesticides discharged by large scale consumers also add to contamination.

An adequate use of chemical agents including chlorine can disinfect pipe water. The use of solar radiation treatment system in addition to chlorine tablets and iodine for water disinfection in rural areas, will improve the situation. Karachi, however, has very limited water treatment facilities to make water potable. KWSB's seven filter plants, are not working at their full capacity firstly due to the paucity of funds, and secondly, and more importantly, due to the mismanagement of the plants with no, or very little, regular cleaning. The total treatment capacity of all the plants is 340 MGD against a supply of 490 MGD, with a shortfall of 150 MGD.





Water-borne diseases

Ordinary polluted water, which is free from human and industrial contamination, causes more than 100 diseases, while the water supplied to most parts of Karachi contains sewage and industrial contamination and coliform organisms. According to a press report published in July 2002, samples of drinking water collected from different places in Karachi contained 23 kinds of dissolvable contaminants including Lead, Arsenic, Sodium, Sulfur, Cadmium, Phosphorus, Magnesium, Chlorine, Alkali, Chloroform, Bacilli, Virus, Pesticides, Herbicides, Dioxin, Radioactive material and others. These sorts of contaminants can cause various ailments including kidney and liver diseases, skin ailments, hypertension, heart

diseases, ailments of digestive system, bone problems, cancer, acidity, bacterial infection, viral infections, hepatitis, teeth ailments, arthritis, blood pressure and so on. The contaminated water, especially during monsoon season results in a sharp rise of intestinal problems, specially acute diarrhoea, cholera and dehydration among children. A study conducted by the Jang Development Reporting Cell (September 2002) shows that in Karachi alone more than 10,000 people die of kidney infections annually due to the use of polluted water.

Bottled water and quality standards

In such circumstances, one solution is to use bottled water sold under many local and foreign brands in the city. However, the purity of this water is also doubtful. According to the report of the Consumer Protection Council (CPC) of the Helpline Trust, only ten out of seventy brands of bottled water sold in the city are registered with municipal or health authorities. It is therefore no surprise that 58 per cent of the mineral water samples were found contaminated with faecal coliform. Dr. Rumina Hasan, Associate Professor of Aga Khan University says, "When the water samples were tested at the Aga Khan University Hospital (AKUH) clinical laboratory (January-September, 2001), 45.5 per cent bottled water and 59 per cent of water from the tap and well were found unfit for drinking purposes." A study conducted jointly by the Pakistan Council for Research on Water Resources (PCRWR) and the Consumer Rights Commission of Pakistan (CRCP) concludes that out of 21 brands of bottled water only 10 are fit for human consumption.



Quality standards have been formulated by the Pakistan Standard and Quality Control Authority (PSQCA) for natural mineral water and bottled drinking water which have been declared mandatory for the manufacturers. Sale and manufacture of bottled water unfit for human consumption is also not permissible under the Sindh Local Government Ordinance, promulgated on 8 August 2001, but sales go on unabated.

For those who cannot afford to spend money on bottled water, boiling and filtration can be considered the most practical and safest method of purification. Water boiled for ten minutes will be adequate for inactivating all faecal pathogens, even Hepatitis-A virus, which can be destroyed by boiling for five minutes. In Karachi, an estimated 0.5 per cent of the population drinks boiled water.

Scientists believe that the more the water is disinfected, the more are the chances of freeing human health from water-borne chemical toxicity and microbial problems. Dr Badar Siddiqui, who is running an NGO in interior Sindh, says: "Thirty to forty per cent of ailments in the province can be avoided if the water quality is improved." All this needs is proper planning and forceful implementation of policies.

Table – Water and sanitary condition in Sindh

S No	Parameters	Rural Population	Urban Population
1.	Pipe water (in house)	14%	68%
2.	Laterine (in house)	24%	50%
3	No latrine in house	56%	6%

Source: Arif Hassan, Orangi Pilot Project

Holder of an MSc in Anthropology from Quaid-i-Azam University and being a professional Anthropologist, Ms Sheher Bano conducted a lot of research on various issues with NGOs both in Pakistan and abroad. For the past thirteen years, she has been working with The News in Karachi and is currently its Supplements Editor. Her major areas of interest are environment, health, women, entertainment and socio-cultural issues.



International Year of Freshwater

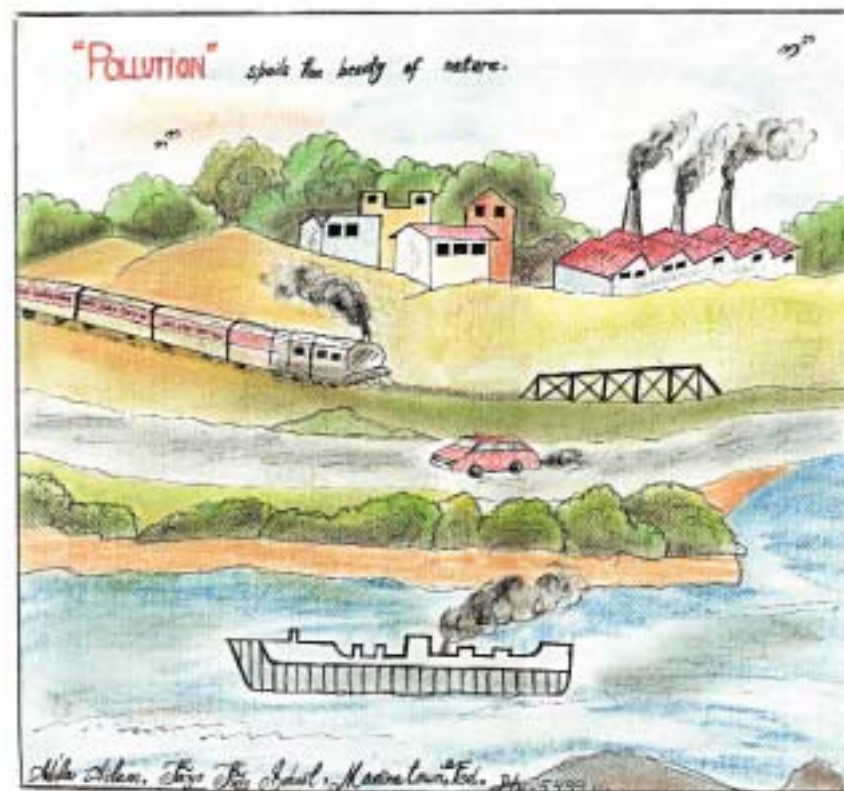
Muneeza Farouqi

Class 10th,

City Model School, Karachi

Water is our basic need and about 3/4 of the earth crust is covered with water, but the quantity of pure water in this large amount of water is very less because of which so many diseases occur, like typhoid, cholera, hepatitis, which are very harmful for human beings, that is why many exhibitions are held all over the world to tell the people how important is pure fresh water in our daily life. More over we are celebrating international year for fresh water which is good thing for the life of human being. We must take care of water, which is a precious gift of God. Many water while passing throughout the pipe goes waste because many pipe lines burst. This is so disgusting to see water pipe lines passing with pipelines of wastage. That is why sometimes so smelly and dirty water comes in our taps at home. This is so bad to see people drinking such water. In the end my message is that we must drink pure and fresh water. It is not the proper way to make water fresh and pure by boiling, it does not becomes pure but it becomes useless because it's all minerals escapes from it. So, please don't drink dirty water try to drink fresh water and take care of your health. This world is due to us. So we must be healthy for progress of our country. I hope that you will look careful at my advice.

◀ Arsalan Khalid, Class 10th, Rainbow Foundation, Adyala Road, Rawalpindi



Abida Aslam, Kays Kids School, Madina Town, Faisalabad

Story of an intelligent boy

Hashir Amhed

Class 7th B

Habib Public School, Karachi

Usama was a intelligent boy. He usually tried to do something that would be good for his village. The people of village liked him because he helped them. One day Usama went to his friend Ahmad home who was his same age

fellow. But he got severe disappointment there. Ahmad was lying ill in bed. His mother told Usama: "the doctor said that he had drunk some water with bacteria and he have to stay in bed for two weeks". Usama was terribly upset, as his friend was ill. He went to his favorite tree, which was located in the centre of the village and sat there. He thought about the water that was pure for everyone. He remembered that Ahmed told him that the UNITED NATIONS is giving fresh waters in bottles and these bottles are coming to Pakistan, in Karachi, the place, where he lives. He tried to remember that date, which Ahmed told him, 21st October. It was 20th October already and that means that the water will arrive the next day. The next day, the water arrived in the morning, it was four o'clock but Usama was awake, he couldn't sleep by

happiness and excitement. He went to the mosque to offer the prayer and then went to the well. He saw that the wagon driver was sleeping and he waited for the rest of village to wake up. He went to the well at 8 o'clock, but to his surprise the wagon was not there. He went back to his home. His mother told him that some people had come and gave them two bottles of water. At hearing this, he laughed with joy. Usama gave some of the fresh water to poor people who couldn't have bought it because it was too costly. Usama recover from illness and enjoy the purity of life with pure and fresh water on fresh water day.

Hiba Batool

Class 6th

City Model School, Karachi

*"Fresh water" the source of life and birth,
The precious gift of Allah on earth,*

*We need to save, we need to care
Its careless use would give us nightmare,*

*Women or man, child or old
Let's reach everybody and message is told,*

*The time is now to think and learn
Before lakes dry up and rivers stop run,*

*Please save it now and do it right
Lest drought's come and we're caught in plight.*



Khurram Ijaz, Class 10th. Govt. High Secondary School No. 3, Peshawar



Ayla Usmani, O.P.F, II Scarlet, Islamabad

Tuba Inayat
Class 9th Cambridge
St.Patrick's Girls High School, Karachi

Water is a natural resource, vital for the existence of life on earth. While some organisms live in it other need it to carry out the functions of their systems. Plants use it to make their food, and animals use it to dissolve substances so that they can be easily digested. All kinds of water are not

suitable for the consumption. Living creatures can utilize only fresh water. Fresh water resources include rivers, streams, lakes etc. 75% of the earth surface is covered with water, but only 3% are fresh water resources.

The world now faces a critical situation regarding the sources of water. Statistical reports show that a fifth of the world's population does not have access to drinking water. Experts say that the world is going to face a severe problem regarding water in the next 20 years. Some say that the cause of the third world war could be shortage of water. This problem already prevails in some countries.

The main reason for fresh water shortage is excessive water consumption. Water is a renewable resource, but it is in a limited supply. While we may have water gushing out, in the tenth of second from our water taps, some countries do not have sufficient water supplies.

By consuming water excessively we are depriving the future generation from a resource which is essential for life. Water pollution is another major cause of non-availability of drinking water. In order to conserve water, we need to spread awareness about the importance of fresh water. Once the world knows the dire situation it is in, it will try to conserve water.

The governments of the countries of our world should join hands together and work for the conservation of water, it is necessary because "WATER IS THE EYE OF A LANDSCAPE".

Sameen Khalid
Class 3 - Aster, Primary Girls Section
O.P.F. Girls College, Islamabad

FRESH WATER FRESH WATER.
FRESH WATER IS BEST WATER.

FRESH WATER GIVES US LIFE.
FRESH WATER SAVES OUR LIFE.

FRESH WATER GIVES US HEALTH.
FRESH WATER GIVES US WEALTH.

FRESH WATER FOR ME.
FRESH WATER FOR US

FRESH WATER FROM THE RAIN.
FRESH WATER FOR THE BRAIN.

Saleha Ashraf
Class 10th
Govt.M.C. Girls High School,
Peoples Colony No.1, Faisalabad

Water covers some 70% of earth surface and is also component of soil and air. It is also a major source of survival of living organism (animals and plants) comprising 70-90% of their body weight. Calculation by various scientists estimates that 97% of total water of planet is in oceans, 2% in

the form frozen ice caps and glaciers, and only 1% as available fresh water in lakes, streams and rivers (and sea). It is a fact that water, an almost universal solvent, even in its natural state contains dissolved materials, carries particles, and is the home of living organs, when water is used for domestic and industrial purposes even more materials, of a wide range are added on it.



No caption given



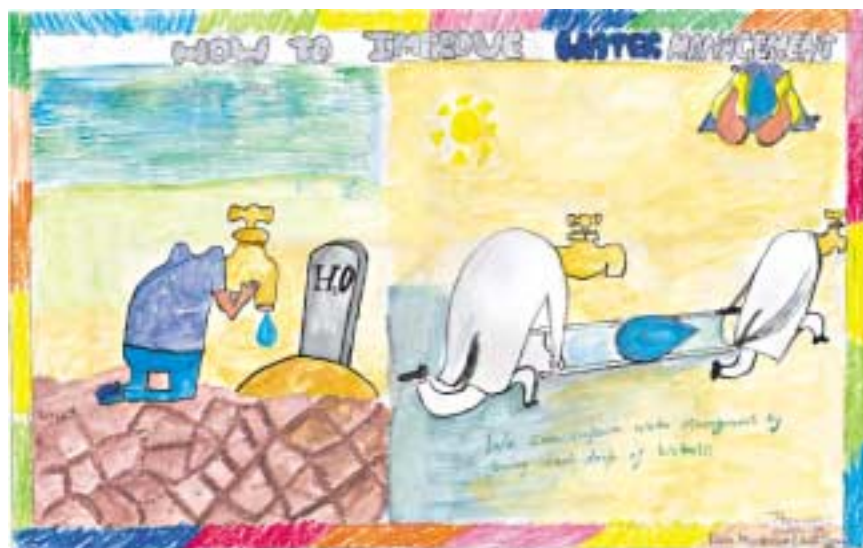
Sania Masood, Saeedabad Baldia Town. Karachi

Water pollution also speeds eutrophication, with resultant aging and clogging of lakes. In these ways, water pollution degrades the multiple uses of water for human supply, recreation, aquatic life, and other wild life, agriculture, and industry. Fish kills often result from pollution. In 1969 in the United States, it is estimated that 70% of the kills were caused by industrial wastes the complex mixtures in the waters of rivers and lakes include many unknown chemicals. For practical purpose they may be divided into degradable and non degradable wastes. Degradable wastes in water are those that are reduced in quantity by natural resources. Non degradable wastes are salt-soluble in water-soluble gases, or

particulate matter. Municipal wastes come from homes, commercial establishment and industries.

In the usual combined sewer systems, the wastewater cannot be separated from the large volume of rainwater. Therefore, when total flow exceeds the capacity of the system, most of the waste included in the by-pass flow that is discharged directly into the outlet river or streams water using industrial plants add pollutants that have a variety of effects. Four major world industries account for a large portion of wastewater discharge: paper, chemical, petroleum and steel. In addition, great amounts of waste heat are discharged into water by power generation. The oceans, which cover more than 70% of the earth and are a critical element in maintaining the world's environment, are the final receptacle for many wastes. In early 1972, Britain, the Scandinavian countries, and eight other European governments signed the first major agreement to prevent pollution of the seas by dumping from aircraft and ships. Covering the northwest Atlantic, this agreement bans dumping of many poisonous substances, including pesticides, mercury, cadmium, and persistent plastic waste.

While agriculture waste contributed considerably to water pollution through the runoff from pesticides, herbicides, and fertilizers, they are generally less concentrated and have less aggravating effects than industrial and municipal sewage wastes originating in or near cities. Another serious non-urban water pollutant is the drainage of acids from mines, mostly abandoned coal diggings, into neighboring streams. The best method of control is at the source by sealing the mine to prevent air and water from entering to react with the



Poonam, Class VI, Roots Montessori & High School, Islamabad

substances from the acids.

In addition to using water for flushing and carrying off wastes, industry also uses huge amounts for cooling. The largest such user is the electric-power industry. Steam-generating plants, which draw water from a natural source to cool their condenser discharge it back at an average of about 13°F (70°C) higher temperature. Nuclear plants require almost 50% more water than equivalent fossil-fuel plants. With the growth of the electric-power industry certain to continue, the cooling of power generation plants is clearly becoming a major pollution problem.

Moreover, most of the water pollution problems can be overcome by monitoring of fresh water and preventing the discharge of toxic materials in the water bodies. It is true that

pollution is dangerous to call our natural resources like air, soil, and water. It is also true that all the benefits to a mankind are at the expenses of our: “mother earth”.

We should in fact create public awareness towards the safe use of our natural resources. I would like to add that saving the environment doesn't mean that man must give up the modern technology but man must learn to live within nature's cycle.

Iman Shoaib

Class 6th

Roots Montessori & High School, Islamabad

*There goes a bell ringing quite aloud!
People jump with joy hopping all around!*

*What is there makes them sing!
Oh! a water van, which they did bring!*

*So many people children, old and young!
Shouting, screaming as a bee had stung!*

*Line up! line up! Screamed the driver!
Wait a while and waste no water!*

*More precious than silver, gems and gold!
This was all that they were told!*

*They paid no heed to what was briefed!
Alas! The show did end with all the grief!*

*Wasted all and left no drop!
Many problems, sorrows, all did crop!*

*Learn to live in decent way!
This is all what I want to convey!*

Praynaa Rawlani
Class 7th Cambridge
St.Patrick's Girls High School, Karachi

The world is another name of beauty. It is a treasure which is mainly divided into three parts—land, air and the most significant of all, water. Water is the one, which adds 70% of the beauty to our mother earth. But this water is not only used for the elegance of earth, but also for us, the human beings.

There are some ways in which the water provides us with a lot of benefits, and the most crucial of all is the drinking water. The drinking water has commenced since billions of years. The natives of Peru were the first people who discovered this great importance of life. From that time, till now the people are accustomed to drinking water. Drinking water is suitable for health only if it is purified. We have often heard this saying:

“Bullocks have horns and roses have thorns”

The phrase indicates some peculiar things, which make our nature somehow ugly. Not only nature but also human

beings have themselves provided some drawbacks for them. The human beings are the ones who have polluted the water, and so it has become vital to boil, filter or sediminate the drinking water, otherwise we would be involved in the world of disease. As I believe,



M. Imran Sohail, Bahawalpur road, Hasilpur

“Pollution causes disease,
The life circle seems to cease”

Drinking water has myriad advantages. Scientifically, it is proved that drinking water is essential for living. “It is the best medicine ever found in the world”. This statement becomes crystal clear when we will come to know that drinking water has fluorine, which cures our tooth decays. Besides this, our body contains protoplasm, which is made up of 70% of water. Drinking water also secures us in constipation. Not only that but it is also a good solvent. So, we can see that drinking water has a principal role in drama of life. Our whole body is dependent on water, and so we should drink as much as possible. But the question arises that from where should we get the drinking water. Although many people have tried to make the drinking water filter, but on the other hand there is still some meritorious and decorous personalities that rendered services to safeguard the drinking water. Taking the example of our country, Pakistan, river Indus is the main source of drinking water to millions of people.



No caption given

Thus, it is evident that drinking water is the essence of our life. Our life is like a fragrant flower, and it will dry out if we would not drink a lot of water regularly. Do not take water a luxury thing, but, instead of this, try to always remember this short and sweet poem:

Nature consists of various things
Due to which the birds as well as the human beings sing,
Water is a part of our life,
Without it, in suffering, we would die,
The whole world is dependent on it,
It is one of the things, which keeps us fit.

S. M Ahsan Imdad
Class 10th
City Model School, Karachi

Water Water Water
International year for freshwater

It is important to drink water
Without it life is out of order

Plants are there due to water
Humans are living because of water

It's our hope to take freshwater
Nothing is fresh without freshwater

Water Water Water
International year for freshwater

Story of a courageous Boy

Rehan Tariq

Class 8th

Army Public School

7-Stream, Quetta Cantt.

Ali is student of 10th class. He is living with his family in Quetta cantt. He reads newspaper regularly. One day reading two different statements regarding water in newspaper confused him. One source mentioned that water is life. Other source mentioned that four children died by drinking poisonous water of well in nearby village of Quetta.



Fatima Gardezi, O.P.F Girls College, Islamabad.

This news is enough to make one sensitive, child more worrisome. He usually astonished by reading news that talk about water shortage or problem in Balochistan. He found that in his area water is available in abundance and people use it openly for washing homes, cars and watering the garden. But he was stunned to find out that in his own province children of his age died by drinking dirty water. Ali also watches that women of different villages travel 5 to 6 miles for getting two or three pitchers of water. This situation is awesome, for him getting water from tap is easy source but for them getting water is most difficult thing in life. He discussed this thing with his parents, friends and teachers and found that water deficiency is main hurdle in their life. He decided to do something for them and to start it from his home. He asked his mother and maid not to waste more water in cleaning or cooking food. He also requested his father not to wash his car and cleaning of porch daily. He thinks if all people make one more water tank in their homes, which is equipped, and able to clean the water, which is already, use for washing clothes and in sewerage pipelines. This water can then be used to watering the garden or for washing homes. This thing not only save the plenty of water but also making it available to all those who are depriving from this blessing. He also shared his thinking with his class fellows in his school that if we took bath only once a day so to keep water save for those who are unable to take bath once a month. He made efforts to raise funds through donor organizations for the installation of water pipes that provide clean water to every village of his province. His team also makes efforts to convince the villagers that they should not allow their animals to drink water from same places from where you are getting water for your families. He suggested

making separate places available for animals to drink water and that water should also be clean because if animals are in good health then different diseases, which are caused by these animals, can be prevented. He realizes that blaming government is not solution for the problem. Every one should realize his/her responsibility for making environment clean and make it worthwhile for future generations. And save our future generation from dying miserably by drinking dirty water. If every one plan or work like Ali, one day whole country will have access over fresh and clean water.



Asima Bukhari, Class 9th, Govt. Girls High School, Ahsanpur

Usman Muzaffar
Class 10th
Islamabad Model College for Boys
F-10/3, Islamabad

*Oh drop of water !
 You are life
 for a dying person in desert*

*Oh drop of water!
 You are hope
 In summer time*

*Oh drop of water!
 You help in
 Flowers to bloom*

*Oh drop of water!
 No seed is able
 To bear the food*

*Oh drop of water!
 No human life
 Reproduce without you*

*Oh drop of water!
 You are blessing of God*

*Your taste is sweet
 Your Color is unique*

Oh drop of water!

Abdul Malik
Class 9th
Government High School No. 3, Peshawar

The world was covered with darkness and water before the creation of the Earth, sky, the sun, the moon and stars. Then God separated land from water, and the Earth was thus created at the ratio of 1:3 for land and water. It means that three quarters of the Earth is covered with water and only one quarter is dry land. That is why it is true if we say: "water is life". Every human life entirely depends upon water. The basic organ of human body is the cell, seventy per cent of which is made up of water. And if water finishes inside the cell, it dries and ultimately the life ends. Philosopher Alama Abdulallah Yousaf Ali compares water to protoplasm, as protoplasm is a basis of human life and water is necessary for it. So we come to the point that water is life, and the lack of it is death. Now a question arises which type of water is required. It is a big question for all human beings. If we look around, we see that the whole world is suffering from a shortage of clean and fresh water. It is quite painful and alarming a situation.

UN Secretary-General Kofi Annan mentioned in his Millenium Development Report: "Developing countries can safeguard their lives against the pollution and diseases with only freshwater". In countries that are lacking freshwater, their people are forced to use water of dirty ponds and rain. They catch untreatable diseases and die. Six thousand people are dying every day by drinking polluted water. Polluted water is the cause of 80 per cent of diseases in developing countries. Our population is growing rapidly and people are

not educated enough to realise the importance of clean water. We all - students, teachers, organisations and Governments - should make sincere efforts to create an awareness in our society, especially among the poor people. How can we do it? We can start it from our home by telling family members how to purify the water at the domestic level, and how to stop the wastage of water. What I have done: I discussed it with my friends and family members and convinced them that water resources are very limited and that we should be careful in using the water at home when washing cloths, pots and taking a bath. We should do so also at the community level. I think it is the responsibility of all of us. I am doing it at my home, are you?



Hina Parveen, Rawalpindi



LEAD AGENCIES FOR THE INTERNATIONAL YEAR OF FRESHWATER

United Nations Department of Economic and Social Affairs (UN/DESA)

Through its Water Management Branch, DESA provides project execution and policy advisory services at national and regional levels in integrated water resource management. While providing policy advice to Member States, DESA stresses the importance of water as a key resource to achieve the goals of sustainable development.

UN/DESA serves as secretariat for the UN Commission on Sustainable Development, where freshwater issues are sometimes dealt with in conjunction with other issues, such as international conflicts or economic deliberations; serves as secretariat for the System-wide Subcommittee on Water Resources; houses the UN Secretariat's main freshwater expertise; manages a large programme of technical cooperation in integrated water resources management and ground-water development, including management of international waters; helps governments and local entities design development strategies and build national capacities in freshwater resources planning and management; conducts needs assessments and develops water resources management programmes; plays a key role in promoting inter-agency cooperation around water issues; and launches advocacy campaigns for partnership-building.

Areas of expertise: Sustainable development, economic and

social development

Key publications and resources: Agenda 21 (Ch. 18), Report of the Expert Group Meeting on Strategic Approaches to Freshwater Management

Website: www.un.org/esa/sustdev/water.htm

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Water is a major priority for UNESCO, which has taken a multidisciplinary approach to help provide the scientific knowledge, technological training, sociological studies, policy advice and ethical guidelines required to manage the resource efficiently, fairly and environmentally.

Key water programmes include:

- The International Hydrological Programme (IHP) (<http://www.unesco.org/water/ihp.html>), which has diverse projects concerning the hydrological sciences and water management, including: transboundary aquifers, international river basin monitoring and management, groundwater studies particularly in arid zones, urban water management, water governance especially concerning the role of women, studies concerning water history and civilization, the ethics of nonrenewable water mining, in addition to the prevention and resolution of water conflicts between and within countries. IHP has also developed training and research institutes around the world, including the UNESCO-IHP Institute for Water Education in Delft (The Netherlands), Centre for Water in the Humid Tropics of Latin America and the Caribbean (Panama), the Regional Centre for Urban Water Management, based in Tehran (Iran), and

the International Research and Training Centre on Erosion and Sedimentation in China;

- The International Groundwater Resources Assessment Centre, which operates under the auspices of UNESCO jointly with WMO;

- The World Water Assessment Programme (<http://www.unesco.org/water/wwap>), which brings together the work of 23 UN agencies to better assess the world's water resources. These findings will be released periodically in the World Water Development Report, the first edition of which was launched at the Third World Water Forum in Kyoto in March 2003.

Areas of expertise: UNESCO's activities in the natural sciences cover diverse fields, such as oceanography, freshwater, environmental education, biodiversity, coastal zones and geology.

Key publications and resources: World Water Development Report (released in March 2003), a series of technical reports on water management, reports on the state of the world's freshwater resources, a major analytical report on the prevention and resolution of water conflicts between and within states.

Website: www.unesco.org/water

LEAD AGENCY FOR WORLD WATER DAY 2003

United Nations Environment Programme (UNEP)

Freshwater is one of UNEP's priority areas of concern. Through its work on water policy and strategy, UNEP

addresses the issues of inadequate quantity, declining quality and insufficient access, while also promoting a better understanding of the linkages between freshwater, coastal areas and the marine environment. Working with other UN partners, and through the newly established UNEP Collaborating Centre on Water for the Environment, UNEP assists countries to integrate environmental considerations into efforts to achieve the Millennium Development Goals and in attaining the environmentally related water and sanitation targets agreed to at WSSD and other recent international forums.

Key water-related activities include: the Global International Waters Assessment; the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities; the Global Environmental Monitoring System's freshwater quality programme, GEMS/WATER; and the Dams and Development Project.

Areas of expertise: Environmental monitoring, assessment, early-warning systems, policy development, law, water, marine pollution, biodiversity, chemicals, hazardous waste, energy, atmosphere, economic instruments, trade, sustainable consumption, cleaner production, urbanization.

Key publications and resources: Global Environment Outlook, Regional Environment Outlooks, UNEP Annual Reports, Our Planet magazine, Earth Report (TV series on BBC), Vital Water Graphics (in 2003), Atlas of International Freshwater Agreements (in 2003), Global Groundwater Assessment (in 2003), Children in the New Millennium: Environmental Impact on Health.

Website: www.unep.org

Other UN System

Food and Agriculture Organization (FAO)

FAO has been active in water development ever since its inception in 1945. The three basic concerns shaping FAO's water programme are: to produce more food with less water; to protect water quality and the environment, including human health; and to close the food consumption and production gap, particularly in Africa. The organisation has a focus on "more crop for the drop" – irrigation methods for higher water productivity – and related technology transfer.

FAO's specific water activities include: water resources inventories and evaluation; development of a global GIS-based water information system; a programme for water policy formulation and river basin planning; improved water use technologies and management tools; a programme on water development and irrigation expansion; and water quality control, conservation and environmental effects projects.

Areas of expertise: Nutrition, agricultural productivity, water development, animal and plant production for agriculture, forestry, fisheries, nutrition, food standards and commodities, economic and social policy, investment and trade

Key publications and resources: The State of Food and Agriculture, World Agriculture: Towards 2015/2030 - Summary Report, Land-water Linkages in Rural Watersheds

Website: www.fao.org

International Atomic Energy Agency (IAEA)

IAEA is mandated to assist its Member States in using nuclear science and technology for various peaceful purposes, including food and agriculture, human health, marine and terrestrial environments, and water resources.

The water resource programme of IAEA

(<http://www.iaea.org/programmes/ripc/IH>) aims to increase the global hydrological knowledge base, including a better understanding of the water cycle, and scientific capacity of developing countries to assess water resources. A cooperative project with UNESCO and others has been launched recently to prepare a global assessment of fossil groundwater resources based upon isotope data on the origin and age of groundwater.

IAEA has invested about US\$ 30 million in 150 projects in 60 countries to improve water management using isotope hydrology. These projects have helped provide hydrological information on surface and ground-water resources and strengthened human capacity as well as infrastructure for water quality and water resource assessment and management.

Areas of expertise: Nuclear science and technology as it relates to food and agriculture, human health, marine and terrestrial environments, and water resources

Key publications and resources: IAEA Bulletin, factsheets

Website: www.iaea.org

United Nations Children's Fund (UNICEF)

The overall objective of UNICEF's Water, Environment and Sanitation (WES) Programme is to contribute to child

survival, protection and development by supporting efforts to achieve universal access to safe water supply and environmental sanitation services as a basic right and by promoting the behavioural changes essential to realizing the full benefits from such services – in short, to improve the hygiene conditions in children's and families' environments.

UNICEF presently supports WES projects in nearly 80 countries with 200 professional staff, both international and national. UNICEF's support for water supply and sanitation started in the late 1960s as a response to drought emergencies. Since then, UNICEF has supported government programmes for the provision of a minimum level of water supply and sanitation for those most in need.

Areas of expertise: Children's protection, water, environment and sanitation, education, health, nutrition, humanitarian emergency response.

Key publications and resources: State of the World's Children, UNICEF Annual Report, "We the Children": the Secretary-General's report

Website: www.unicef.org/programme/wes/

United Nations Development Fund for Women (UNIFEM)

UNIFEM promotes gender equality and women's social, economic and political empowerment. It works to ensure the participation of women in all levels of development planning and practice and acts as a catalyst within the UN system, supporting efforts that link the needs and concerns of women to critical issues on the national, regional and global agendas, such as water. UNIFEM's work focuses on

strengthening women's economic capacity as entrepreneurs and producers, increasing women's participation in the decision-making processes that shape their lives and promoting women's human rights.

Areas of expertise: Financial and technical assistance, women's human rights, economic security, gender mainstreaming, women's empowerment

Key publications and resources: Annual Report, Picturing a Life Free of Violence, Progress of the World's Women

Website: www.unifem.org

United Nations Development Programme (UNDP)

Water plays a pivotal role for sustainable development, including poverty reduction. UNDP focuses on supporting activities at the country level that aim to increase access to safe water and sanitation by 2015 and to halt the unsustainable exploitation of water resources.

In the past decade, UNDP has maintained a marked presence in water issues in 90 countries through its water programmes. As one of the Global Environment Facility (GEF) implementing agencies, it works to sustainably manage international water resources, including lakes and river basins. UNDP's GEF-funded Small Grants Programme has already provided grants for over 3,900 community-level projects.

UNDP and partners have established the Water and Sanitation Programme (www.wsp.org); Water Supply and Sanitation Collaborative Council (www.wsscc.org) and Global Water Partnership (www.gwpforum.org), as well as capacity building for integrated management of water

resources and service delivery (www.cap-net.org).

Areas of expertise: UNDP works in 166 countries, helping to find solutions to unsustainable water management practices including water supply and sanitation.

Key publications and resources: UNDP-GEF Biological Diversity Projects; Ecological Sanitation for Food Security; Water Governance Strategy; Water and Sustainable Development

Website: www.undp.org/water/index.htm

United Nations Fund for International Partnerships (UNFIP)

UNFIP, which was established by the UN Secretary-General in March 1998, serves as the operational arm of the Secretary-General in the partnership between the UN system and the UN Foundation (UNF) – the public charity responsible for administering Ted Turner’s \$1 billion contribution in support of UN causes. The UNF/UNFIP partnership focuses on four priority areas: women and population; children’s health; peace, security and human rights; and the environment.

UNFIP also promotes new UN partnerships and alliances with a variety of sources, including companies and foundations, in furtherance of the Millennium Development Goals. This includes facilitating dialogues between key civil society actors and the UN system with a view to developing innovative collaborations.

In the area of water, in June 2002, UNFIP facilitated a roundtable discussion on partnerships for global water alliances conducted by UNDP and PriceWaterhouseCoopers.

The aim of this meeting was to explore creative solutions to the global water crisis and the achievement of the millennium goals related to water and sanitation through partnerships that engage a broad range of participants, including the UN, other multi-lateral organizations, governments, the private sector, foundations, NGOs and water associations. This meeting was unique in that it was the first such discussion to bring interested stakeholders together to address water and sanitation challenges in the context of the millennium goals.

Areas of expertise: Partnerships between UN and civil society, including private sector and foundations.

Key publications and resources: Final Report of Roundtable on Partnerships for Global Water Alliances; Towards Global Partnerships (General Assembly report – A/56/323, Oct. 2001).

Website: www.unfip.org

United Nations Human Settlements Programme (UN-HABITAT)

A central focus of UN-HABITAT’s work is sanitation and access to adequate water, especially for suburban agriculture and for municipal drinking water.

Among the organization’s key water initiatives are the following:

- The Urban Management Programme, which is active in 120 cities in 57 developing countries. This is a long-term technical cooperation programme to strengthen the contribution that cities and towns make towards human development, including economic growth, social

development, reduction of poverty and improvement of environmental quality.

Partners include the World Bank, UNDP and others;

- Managing Water for Africa, which addresses different aspects of water for Africa's largest cities in collaboration with UNEP. It is directed towards promoting a demand-side perspective of water management and water pollution control methods, gender mainstreaming, and improvement of water access for urban poor and periurban areas;
- A new regional programme, Water for Asian Cities, will promote pro-poor investments in water and sanitation to support the Millennium Development Goals. It was launched in May 2002 (www.un-urbanwater.net).

Areas of expertise: Human settlements, urbanization, social services, urban poverty management, environment, infrastructure

Key publications and resources: The State of the World's Cities, Global Report on Human Settlements, UN HABITAT in Action, HABITAT Debate newsletter

Website: www.unhabitat.org

United Nations Industrial Development Organization (UNIDO)

UNIDO helps developing countries and economies in transition in their fight against marginalization in today's globalized world. It mobilizes knowledge, skills, information and technology to promote productive employment, a competitive economy and a sound environment. UNIDO's water strategy focuses on promoting sound management of

water resources and environmental conservation, maintaining environmental quality and preserving the productivity of river basins, coastal areas and large marine ecosystems, as well as the health and well-being of those populations dependent on and living in them.

UNIDO water-related projects currently include a cleaner production programme for the fishing industry in Chile, the transfer of environmentally sound technology in the Danube River Basin – involving five Central and Eastern European countries – and a mercury pollution reduction programme in Tanzania.

Areas of expertise: Industrial water pollution control, integrated coastal zone planning and management; control of water pollution by toxic accumulative metals (e.g. mercury, arsenic), cleaner production technologies and biodiversity conservation

Key publications: Industrial Development Report 2002/2003; The Gulf of Guinea Large Marine Ecosystems – Environmental Forcing and Sustainable Development of Marine Resources; World Water Development Report – Chapters on Water and Industry, Water and Energy (published in March 2003)

Website: www.unido.org

United Nations University (UNU)

UNU's International Network on Water, Environment and Health (INWEH) is a research and capacity-development centre contributing to the resolution of global water problems, particularly in the developing world. INWEH was established in late 1996, with financial support from the

Government of Canada, and is headquartered at McMaster University, in Hamilton, Canada. INWEH advocates the need for integrated capacity development as an essential prerequisite for integrated water resource management. It establishes training centres and undertakes collaborative, demand-driven projects on river basins, urban water systems and marine coastal waters in support of initiatives in Africa, the Middle East and Latin America.

Projects to date have included the development of a Lake Malawi water-shed decision-support model; establishment of a water quality monitoring programme for Lake Victoria; groundwater pollution assessments in Jordan and the Gaza Strip; a nitrate pollution (blue-baby syndrome) study in Syria; design and implementation of a sustainable wastewater biosolids programme in northern Mexico; and development of a global curriculum for the UN Water Virtual Learning Centre.

Areas of expertise: Water management capacity

Key publications and resources: Capacity Building at UNU/INWEH: The Four Pillars Approach, Metadata Report

Website: www.inweh.unu.edu/unuinweh/default.htm

Water Supply and Sanitation Collaborative Council (WSSCC)

The WSSCC was set up in 1990 by virtue of a United Nations General Assembly resolution to maintain the momentum of the International Decade for Water Supply and Sanitation in the 1980s and to enhance collaboration among developing and developed countries. In 2001, the WSSCC launched the 'WASH' campaign (Water, Sanitation and Hygiene) – a global

advocacy effort involving all partners and supporters of the Council.

Areas of expertise: Water supply, sanitation, hygiene awareness, poverty alleviation, gender issues

Key publications and resources: WASH: Water, Sanitation and Hygiene for All, Global Water and Sanitation Assessment Report (with WHO/UNICEF), Vision 21– Water for People

Website: www.wsscc.org

World Bank

The World Bank water programmes and its water unit reflect the Bank's long-term water resources management policy, focusing on freshwater, coastal and marine resource management, integrating an ecological dimension into water resources management from the upper watershed to the coastal zone. Water resources management projects include investments for: urban, rural, industrial and agricultural water supplies; sewerage treatment; flood control; irrigation and drainage; hydropower; and navigation projects. Activities in catchment areas can include forestry, mining and construction, and industrial discharge and agricultural runoff.

The projects fall into 10 main areas: coastal and marine management; dams and reservoirs; groundwater; irrigation and drainage; river basin management; transboundary water management; water and environment; water economics and institutions; water supply and sanitation; and watershed management.

Areas of expertise: Development assistance, economic growth, poverty eradication

Key publications and resources: World Development Report, World Development Indicators, Global Development Finance, Global Economic Prospects

Website: www.worldbank.org

World Health Organization (WHO)

WHO is mandated to maintain health as a central focus of water and sanitation development, which is reflected in its water programme (<http://www.who.int/peh>). In water, WHO's objectives include to emphasize the provision of health-related guidance in support of sustainable development in Member States and to target its water and sanitation activities on specific health goals.

WHO collaborates with other UN organizations such as UNDP, UNICEF, the World Bank and UNEP, as well as with the Water Supply and Sanitation Collaborative Council (<http://www.wsscc.org>). The Joint Water Supply and Sanitation Monitoring Programme – a WHO/UNICEF programme – supports individual countries in strengthening their water supply and sanitation monitoring capability.

Areas of expertise: Developing health systems, health care management, mortality, morbidity, disability, poverty eradication, disease control, risk education

Key publications and resources: World Health Risk Report 2002 – Reducing Risks, Promoting Healthy Life, Water Resource Management Series, Environmental Effects of Chemicals

Website: www.who.org

World Meteorological Organization (WMO)

WMO's Hydrology and Water Resources Programme concentrates on promoting worldwide cooperation in the assessment of water resources and the development of hydrological networks and services, including data collection and processing, hydrological forecasting and warnings, and the supply of meteorological and hydrological data for design purposes.

WMO's education and training programmes as well as its technical cooperation activities include hydrological components which aim to bridge the gap between the national services of developing and developed countries.

WMO supports capacity building at the regional level through activities such as the World Hydrological Cycle Observing System (WHYCOS) – a system for acquiring hydrological and related data on a regional basis and making them available to decision-makers, engineers and resource managers.

Areas of expertise: Atmosphere, weather, climate, assessment of water resources, operational hydrology, early warning against natural disasters, and related geophysical sciences

Key publications and resources: WMO Bulletin, Annual Statement on the Status of the Global Climate, World Climate News

Website: www.wmo.ch/index-en.html

Regional Economic Commissions

The Regional Commissions support a wide range of water

activities: technical cooperation, policy advice, research, analysis, data/statistics, exchange of best practices, meetings, regional integration and coordination, publications, networking and training. See links below for specific areas of involvement.

Economic Commission for Africa (ECA)

Areas of expertise: Fostering sustainable development

Key publications and resources: Economic Report on Africa; Transboundary River/Lake Basin Water Development in Africa: Prospects, Problems and Achievements; Population, Agriculture and Environment in Africa, Some Key Indicators; Harnessing Technologies for Sustainable Development

Website: www.uneca.org/programmes_home.htm

Economic Commission for Europe (ECE)

Areas of expertise: Environment, human settlements, transport, environment and health

Key publications and resources: Convention on the Protection and Use of Transboundary Watercourses and International Lakes; The Protocol on Water and Health: What It Is, Why It Matters; Protection of Transboundary Waters: Guidance for Policy- and Decision-making; Protection and Sustainable Use of Waters

Website: www.unece.org/env/welcome.html or www.ece.org/poja/

Economic Commission for Latin America and the Caribbean (ECLAC)

Areas of expertise: Environment, human settlements and natural resources

Key publications and resources: Globalization and Development; CEPAL Review; Economic Survey of Latin America and the Caribbean

Website: www.eclac.org/dmaah – or www.eclac.org/drni

Economic and Social Commission for Asia and the Pacific (ESCAP)

Areas of expertise: Environment, natural resources, population, rural and urban development

Key publications and resources: Guidebook to Water Resources Use and Management in Asia and the Pacific; Integrated Water Resource Management in Asia and the Pacific; Guidelines in Water and Sustainable Development, Principles and Policy Options; ESCAP News Bulletins, UN Focus Newsletter, UN Asia-Pacific News

Website: www.escap.org/enrd or www.escap.org/pop/division.htm

Economic and Social Commission for Western Asia (ESCWA)

Areas of expertise: Agriculture, environment coordination and natural resources

Key publications and resources: Water Management: From Conflict to Cooperation; ESCWA Update (newsletter)

Website: www.escwa.org.lb/divisions/sectoral/agriculture.htm, www.escwa.org.lb/divisions/environment/ecu.html, or www.escwa.org.lb/divisions/environment/nrs.html



FRESHWATER FOR AGRICULTURE - FAO

Water for crops:

The water needs of humans and animals are relatively small - the average human being drinks about four litres a day. Producing the same person's daily food can take up to 5,000 litres of water. That is why the production of food and fibre crops claims the biggest share of freshwater from natural sources for human use, or some 70% of global withdrawals.

The recent FAO's report "World agriculture: towards 2015/30" projects that global food production will need to increase by 60% to close nutrition gaps, cope with population growth and accommodate changes in diet over the next three decades. Water withdrawals for agriculture are expected to increase by some 14% in that period, representing an annual growth rate of 0.6%, down from 1.9% in the period 1963-1999. Much of the increase will take place on arable irrigated land, forecast to expand globally from some 2 million sq. km to 2.42 million sq. km. In a group of 93 developing countries, water use efficiency in irrigation - i.e. the ratio between water consumption by crops and the total amount of water withdrawn - is expected to grow from an average of 38% to 42%.

If gains in water management achieved over the past 50 years are maintained, pressure on resources will be reduced, while the scope for transfer of water for other, non-agricultural uses will be increased. It points out, however, that past increases in productivity have been the result of strategic investment not only in water control infrastructure, but also in agricultural research and extension. Current trends in those key areas of the production chain show a sharp decline. To meet future challenges, therefore, agricultural investment must be revived and used to support a strategic package that combines research, improved agricultural practices, capacity building for water users, and promotion of global agricultural trade.

Progress will also depend on a shift from what FAO calls "a culture of supply management" to one of "demand management". The supply-driven model underpinned most water development during the past half-century, as large national or state agencies placed extensive farming areas under irrigation. However, they proved less successful in managing those systems after construction. Decision-making was typically



top-down and bureaucratic, leaving little flexibility to downstream users in choosing cropping patterns, calendars, and water delivery schedules. Often, unreliable water deliveries forced users to overexploit groundwater. It became evident in the 1980s that many irrigation schemes had become a burden on national budgets and a source of environmental degradation.

FAO views positively the far-reaching irrigation reforms, beginning in the 1990s, that led to the massive transfer of responsibility to local water user associations and a shift to demand-driven management strategies. Today, farmers are increasingly involved in decision making and in bearing the cost of operation and maintenance of irrigation systems. "One of the first priorities of modernization is to assess the physical conditions of the irrigation system and identify the practical options for moving towards more reliable and flexible water delivery service and accommodate a variable demand for water services," FAO says. Ultimately, it is the users who must decide on the level of service they require and what they are willing to pay for.

Policy interventions and recommendation for Pakistan.

FAO sees broad scope for policy intervention to help "re-invent" agricultural water management. It recommends a strategic approach to development of available land and water resources in order to meet demand for food products and agriculture commodities, and a broader awareness of the productivity gains that can be achieved through wise water use.

Individual farmers and households need to be assured

"stable engagement" with land and water resources, meaning land tenure and water use rights that are flexible enough to promote comparative advantage in food staples and cash crops. Those rights must be matched by access to rural credit and finance and dissemination of technology and good practices in water use. There also needs to be a re-adjustment in management strategies away from formal irrigation systems and towards pro-poor, affordable technologies, such as small-scale water harvesting.

At irrigation scheme level, modernisation programmes will help extract the full value out of sunk costs and reduce pressure on public funds. Modernisation strategies should transform rigid command-and-control systems into much more flexible service-delivery systems. Agriculture should - and can - shoulder its environmental responsibilities much more effectively by minimizing the negative environmental impacts of irrigated production and seeking to restore the productivity of natural ecosystems.

Finally, government policy and investment must help local markets for agricultural produce to become more effective in meeting local demands. This means investment in key public goods, such as roads and storage, as well as institutional capacity, but will also demand a more progressive role for large-scale private investment

FAO recommends for action by the Government of Pakistan, Civil Society and other stakeholders the following to ensure the economic use of the available water resources for sustained agriculture productivity;

♦ **Modernization:**

- Introduction and promotion of improved irrigation methods/practices
- Improve the delivery system through lining water courses and effective on-farm water management
- Institutional reforms to improve the performance and re-orient the focus of the irrigation institutions
- Comprehensive planning of the water sector coupled with integrated development and management of irrigated agriculture
- Salinity control, land reclamation and introduction of saline agriculture
- Productivity and sustainability research to address issues of water scarcity and inequity

♦ **Participation:**

- Strengthening and financially empowering farmers organization/water user associations at the village level,
- Participation of users in planning and investment decisions and the full and open sharing of economic and environmental information
- Massive awareness campaign to educate farmers on efficient and economic use of water

♦ **Investment:**

- Augmentation of the water storage capacity through small Dams
- Development of Rod Kohi system in the Barani Areas
- Development of water and energy efficient pressurized irrigation system

- Incentives for individuals and user groups to invest in water control to increase productivity for servicing both local and export markets
- Pilot projects in all major canal commands to address issues of canal operational management, institutional reforms, productivity and sustainability
- Recycling and re-use of water including wastewater management and Research on low - cost and low O&M treatment plants for sewage and industrial effluents.



WATER MANAGEMENT - UNDP

During the second half of 2002, UNDP prepared a detailed concept of a programme on mass awareness creation for water conservation and development. Based on this concept, a three-year programme for launching a mass awareness campaign has been prepared at a cost of US\$ 4 million. It would be partly funded by UNDP from its core resources and the remaining amount will be raised through third party cost sharing contributions. The review has highlighted the fact that the country has been experiencing water shortages of varying magnitudes over the last several years. Basically, the sources of water are surface and ground including rainfall. The rainfall pattern has been erratic. Since 1998, the average rainfall has been below the national average, approximately 289 mm. Main rivers have also been flowing around one third of the average flows, forcing users to resort to more and more of groundwater. Greater pressure on ground water to make up for the shortfalls in surface water exert negative trends with the result that not only water tables start going down but also the quality of ground water deteriorates. Changes in world weather patterns due to El Niño and La Niña severely affected several countries and Pakistan was no exception. The variations and reduced water availability in the case of Pakistan could rightly be attributed to this factor.

Pakistan's water resources are not enough to meet present and future demands. Greater increase in population over the last two decades which now stands around 145 million is definitely putting further strain on meager water resources for all three main users i.e. agriculture, industry and households including drinking water. All water users are affected but it is the poor who bear the brunt. The deficit in year 2001 was estimated to be about 8.1 billion cubic metres (BCM), which is expected to swell to 18.3 BCM in 2004.

One of the worrying aspects is that not only is there over exploitation of ground water resources but a great deal of it is wasted. Agriculture, which uses almost 93-95 % of water resources, loses about half of this amount before it even reaches the farmgate. Industry uses about 3% and here too, there is great wastage. Besides wastage, the industry releases effluents, which de facto reduces the fresh water quantities.

People generally consider water on infinite and inexhaustible natural resource and this attitude has not



helped. There is a need to change the perception about water in terms of valuing and conserving it. The study has highlighted the following areas of immediate concern:

The critical threshold of chronic water stress, generally perceived to be 1000 m³ per capita per annum is almost nearing that level for Pakistan. This is an alarming situation and the process must be brought to a halt and reversed.

Most hard-hit by water shortages are the poorer sections of the population. It has been observed that poor people and those living on lower incomes have serious difficulties in getting fresh water whether it is for drinking, enterprise or agriculture.

Reduced water availability, lower agricultural yields and livestock population have resulted in reduced incomes, which may push more people below the poverty line.

Water quality in various regions and towns is questionable and may pose serious health hazards for Pakistan's teeming millions.

While plenty of water is being wasted, there is no realisation that a significant part of it could be recycled and used for different purposes.

Recommendations / suggestions

The Mass Awareness Project on Water Conservation and Development is a significant initiative from UNDP to create general awareness among masses, especially for the main

users i.e. agriculture, industry and the households. The main recommendations and areas of focus of the project are as follows:

1. Create awareness to utilize water resources judiciously and to educate the general public that although water is a free gift of nature, the resource is finite and exhaustible. Water resources are not enough compared to current and future demands.
2. Pursue vigorously pro-poor policies and ensure that the poor and lower income groups have greater access to water. A great degree of advocacy has been built into the project. It is recommended that all those linked with policies will be systematically approached and briefed about the situation. The idea is to ensure consistent policies and increase budgetary allocations for water sector.
3. Increase water availability through conservation and recycling. Different methods and appropriate technologies most suitable to the users will be recommended and disseminated through mass media.
4. The present system of allocation and distribution of water has serious snags. There is a need to involve beneficiaries by forming communities, groups to make all out efforts in order for the whole water management system to be efficient and sustainable.
5. There is a need to reverse the process of chronic water stress levels back to safe limits and allow greater access to

safe drinking water by creating awareness in the general public about water conservation and development

6. The project will establish an integrated Hydrological Information System covering quality and quantity for the entire country. The information will be available on a regular basis for all the main users so that they can plan and use water in the light of its overall availability.
7. To meet the challenge of reduced water availability, a massive programme of water development needs to be launched which is forecast to be undertaken by the government under Vision 2025 for Water. Major focus needs to be given to watershed management and water harvesting by introducing new and innovative techniques and methods with community participation. UNDP already provides support in these areas through its community based Area Development Programmes currently being implemented all over the country.

UNDP's initiatives mentioned in this area will contribute towards achieving the Millennium Development Goals i.e., eradication of poverty and access to safe drinking water.



WATER FOR PEOPLE, WATER FOR LIFE - UNESCO

The Brundtland Report on Sustainable Development: "Our Common Future", was followed by a string of international conferences focusing on the great variety of water issues including ways to provide the basic water supply and sanitation services required in the years to come. It is, however, the World Water Development Report – "Water for People, Water for Life", presented on the occasion of World Water Day (22 March 2003) that delves into the scale of the problem and urges timely corrective actions. The report is the single most important intellectual contribution to the Forum and the International Year of Freshwater, which is being led by UNESCO and the UN Department of Economic and Social Affairs.

Many countries and territories are already in a state of crisis. The report ranks over 180 countries and territories in terms of the amount of renewable water resources available per capita, meaning all water circulating on the surface, in the soil or deep underground.

While much attention has been paid to international rivers and glaciers, groundwater supplies (aquifers) have been largely ignored, despite the massive volume of generally high-quality water involved (estimated at 23,400,000 km³ compared with the 42,800 km³ in rivers). Many decision-makers are not even aware that they share aquifers with other countries. The report presents the preliminary findings of a UN initiative to compile the first global map and inventory of these resources.

With climatic changes, a raising level of temperature worldwide and an accelerated population growth, notably in warmer countries, the scarcity of water resources might trigger deep and violent conflicts. Regions and countries urgently need to focus on developing more just and equitable water resource management schemes.

In the context of Pakistan, in many parts of Balochistan – an arid province of Pakistan - groundwater exploitation and urban water supply has increased tremendously in the past decade. Intensive groundwater extraction, particularly for irrigation of orchards as well as the provision of domestic supply for Quetta city, has caused a continuous decline in water levels in the order of two to four metres per year, in the main extraction areas. Accordingly, traditional water extraction schemes like karezes and dug wells have dried up and tube wells have to be deepened to secure adequate yield for irrigation purposes. The



adverse effects of over-exploitation of groundwater resources are particularly severe during periods of low rainfall, which have been experienced in wide parts of Balochistan since 1998. In addition to critical shortages of water for domestic supply, insufficient availability of irrigation water has led to the damage of perennial plantations such as orchards and to substantial economic losses.

Groundwater extraction at the present rate obviously exceeds the renewable volume of groundwater in many exploitation areas and is not sustainable long term. In addition, there is an imminent threat that new ground water developments will exceed renewable resources in further districts of Balochistan in the near future.

No integrated water management policy limiting excessive groundwater exploitation has been introduced in Balochistan so far. Existing groundwater monitoring systems are insufficient for establishing a reliable data base for assessment of exploitable resources and for the formulation of groundwater management strategies as required for long term safe groundwater use on local and sub-basin scale.

The problem of water scarcity was further exacerbated by the onslaught of a persistent dry spell in Balochistan, which led to drought in the region.

In response to a request from the Government of Pakistan, the Director-General of UNESCO approved special funds for fielding a technical mission to investigate the causes of drought in Balochistan and recommend strategies to

overcome the problem. UNESCO Division of Water Sciences, in consultation with UNDP, Islamabad and experts of FAO and WFP, fielded the two-member mission to Pakistan in September 2000, which held a series of consultative meetings with officials of the Federal and provincial Governments. The team visited the drought stricken areas, gathered and analyzed data relating to hydrology and meteorology and in its preliminary report, recommended a long-term strategy to overcome the problem of water scarcity. The proposal for a five-year pilot and demonstration developed by the mission envisaged undertaking indepth field investigations, evolving and installing institutional and technical setups for sustainable water management in Balochistan.

Recommendations / suggestions

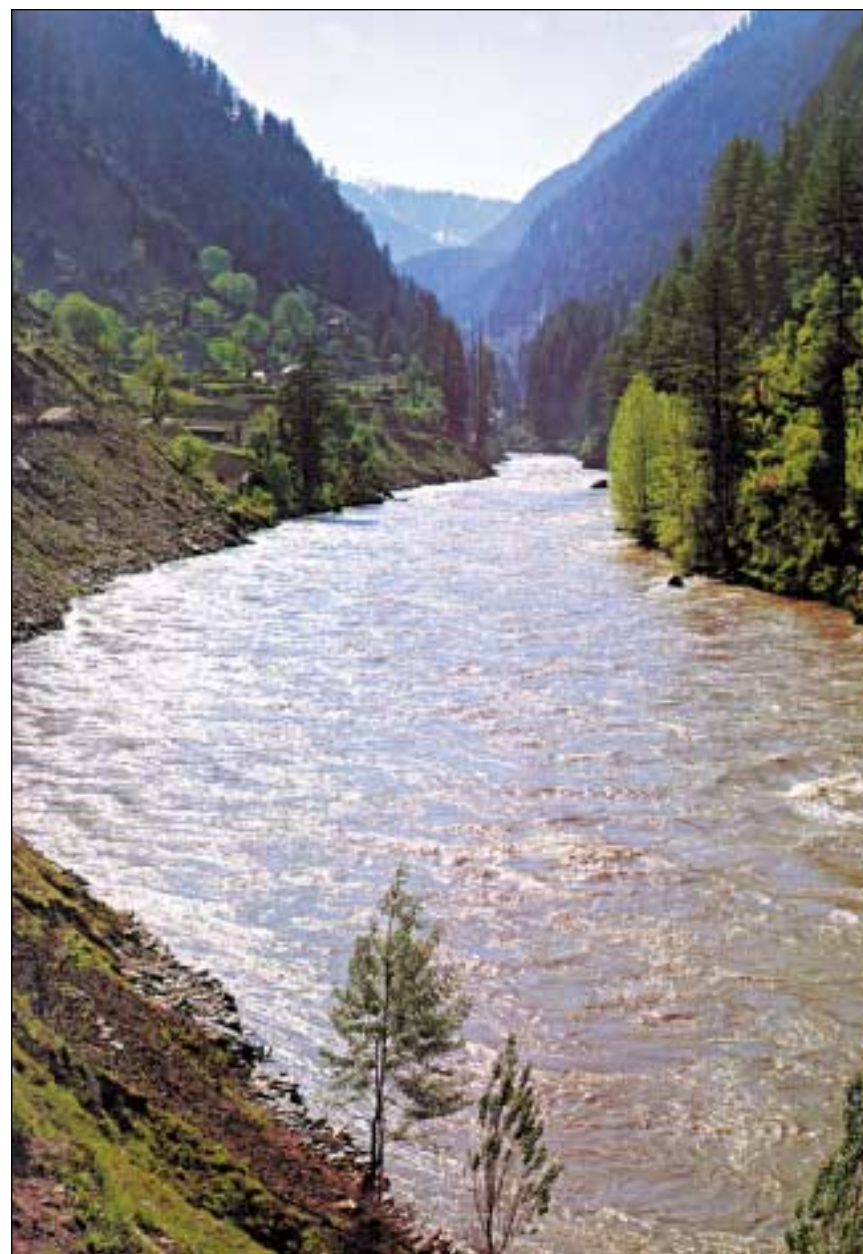
In the light of these investigations, the following measures may be adopted to address the problem:

1. Setting up a methodology for assessing groundwater resources available for sustainable use in specific sub-basins of Pishin Lora Basin, for groundwater extraction areas.
2. Introducing guidelines for water management planning on a sub-basin level.
3. Establishing a water resource management policy for the Pishin Lora basin.
4. Establishing an institutional framework for enacting and supervision of an action plan for water resource management on a provincial level.
5. Introducing appropriate scientific and technical methodologies for efficient water resource management.

6. Initiating the introduction of an action plan for water resource management for the upland and coastal parts of Balochistan province.
7. Introducing appropriate methodologies for water resource use and management for the particular conditions of Balochistan province.

UNESCO has been in touch with specialists involved in the strategy of communication with agriculturists, and received suggestions for the implementation of the project. The document incorporated applicable aspects of groundwater management in agricultural practices in consultation with the FAO and Water Department. It is also crucial to have a firm commitment from the Government of Pakistan, about the possibility of formulating rules and regulations to support the institutional framework for an adequate and sustainable groundwater management in the country, particularly in Balochistan. Such political commitment would facilitate the identification of external funding source. It might also be advantageous for Pakistan to strengthen the national committees of the two UNESCO based relevant intergovernmental programmes: The International Hydrological Programme (IHP) and Man and the Biosphere (MAB).

“Of all the social and natural crises we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet Earth.” UNESCO Director-General Koïchiro Matsuura.



DRINKING WATER AND SANITATION STATUS IN PAKISTAN - UNICEF

Poor access to safe drinking water and lack of adequate environmental sanitation including waste management has been one of the major causes of the high prevalence of water and sanitation related diseases in this country. It is estimated that over 200,000 children in Pakistan die every year due to diarrhoeal diseases alone. UNICEF supports Pakistan's commitment to increase safe water and sanitation through the provision of water supply systems (handpump, tube-well, and gravity flow supply systems), environmental sanitation promotion (including celebration of sanitation week), capacity building at various levels, school sanitation and hygiene education and water quality amongst others.

According to the Pakistan Integrated Household Survey (PIHS 2002) a significant proportion of population, i.e. 86 % (with 94 % in urban and 80% in rural areas), are using water from taps, hand pumps and motor pumps while the remaining population rely on other sources such as dug wells, rivers, canals, streams, etc. This figure does not take into account three factors concerning access (in terms of distance to the source and equitability); quantity of water available to users which may differ according to income levels, geographic location and the safety status of water including the deterioration in water quality from bacteriological and chemical contamination. In addition, it should be noted that data from other government sources (e.g. Poverty Reduction Strategy Paper) estimates the national drinking water coverage to be slightly over 60 % which is significantly less than that of PIHS. However, it is widely recognized that most drinking water available to consumers is grossly contaminated (PCRWR report) and the situation is getting worse each year. There are many factors contributing to deteriorating drinking water quality including contamination of drinking water sources, suction of sewage waste into the drinking water pipe network, lack of clear and obligatory policy/national standard on water quality, absence of water quality monitoring and surveillance mechanism at different levels and lack of affordable technologies for treatment etc.

Recommendations

In order to improve the water quality situation in Pakistan, the following major recommendations are made:



- ♦ Formulation/enforcement of policies/protocol on drinking water including national water quality standards at provincial and national level.
- ♦ Establishment of a coordinating mechanisms for drinking water and sanitation at provincial level.
- ♦ Establishment of water quality monitoring and surveillance mechanism at Tehsil level.
- ♦ Research & Development in the areas of low cost technology for monitoring water quality and treatment of contaminated water.
- ♦ Mass awareness on water quality issues affecting public health, and
- ♦ Incorporation of environmental issues into curriculum.
- ♦ Capacity building of partners in water quality monitoring and surveillance.

Working with scientific research organizations, UNICEF and UNDAF partners will cooperate with the government to establish policies, guidelines and standards for improving water quality and implementing appropriate and affordable technologies to ensure safe drinking water.

As far as coverage of household latrines is concerned, it is estimated that 57% of the population have household latrines (PIHS 2002). Of this, 94% are in urban areas and only 41% in rural areas. This simply means that almost 60% of rural population is without any sanitation facilities. The major causes for the low coverage was found to be the perception that latrines are costly and sophisticated to construct, lack of awareness on the importance of latrines (as primary barrier for disease transmission), unavailability of

construction materials, non-availability of water and lack of space. The rate of sanitation coverage has been extremely slow. Projecting the expected coverage at the current rate (based on best fit equation for the last 10 years), it will take about 24, 32, 41 and 49 years to increase sanitary latrine coverage to 70%, 80%, 90% and 100% respectively in rural areas. Therefore, in order to achieve Millennium Development Goals (MDG) on water and sanitation by 2015, there is an urgent need to concentrate efforts on provision of safe water and promotion of low cost sanitation technologies.

Similarly over half the schools in Pakistan do not have access to water and sanitation facilities which not only contributes to an unhealthy environment at school but is also thought to have a negative influence on primary school enrolments and retention, particularly for girls. Learning about hygiene at school is one way children can motivate families back at home. UNICEF, under next country programme, plans to assist government in furnishing every school with safe water, latrines and hygiene education in selected districts. There is a strong need to develop and enforce policies to ensure water and sanitation facilities in schools are coupled with hygiene education so that facilities are properly used and maintained.

Due to drought and over-exploitation of water resources, the per capita water availability has reduced significantly. The water table has fallen drastically. In order to protect water resources and to ensure sustainable use, water resource management has become vital for Pakistan. Various dialogues at provincial level on water resource management have made the following recommendations:

- ♦ Establishment of Provincial Water Management Authority: Provincial Water Working Group for increased coordination, education and information sharing.
- ♦ Policy Development/Enforcement of Regulations.
- ♦ Awareness Raising, Education, and Advocacy.
- ♦ Promotion of Alternate Crops.
- ♦ Promotion of Efficient Irrigation Systems such as drip and sprinkler irrigations.
- ♦ Irrigation scheduling, and Land Use Management Plan.
- ♦ Prevention of seepage and loss of water including misuse of drinking water.
- ♦ Reuse of waste water.
- ♦ Soil and Water Conservation practices.

UNICEF collaborates with other UN agencies in Pakistan under a common development action framework (UNDAF). Within this framework a range of UN agencies and donors have agreed to work with the government to improve water resource management.



DRINKING WATER QUALITY IN PAKISTAN - UNIDO

According to national statistics, 56% of the total population of Pakistan enjoys safe drinking water and 24% have sanitation. The majority of the 130 million population of Pakistan similar to other developing countries has no access to safe and reliable drinking water supplies. Karachi with a population of around 15 million cannot cope with the growing population. This phenomenon has resulted in the formation of over 532 slums and squatter settlements where more than 40% of city's population reside. Though the majority of slums are connected to the pipe water supply system, the quality of water is not safe. This is confirmed by various microbiological tests performed by different organizations and NGO's.

For the rural population the figure is 45% and 10% respectively. However, factors such as accessibility, reliability, water quality and effective use of water and sanitation look less promising. For example in northern Pakistan, out of 502 existing water supply schemes only 86 can possibly be described as satisfactory. This number will be further reduced if continuity and quality of water supply is taken into account.

PROBLEMS OF DRINKING WATER IN PAKISTAN

Pakistan has been facing a lot of problems related to drinking water quality. In Pakistan ground and surface water is used for drinking purposes. Some major problems related to drinking water are as follows:

- **LESS IMPORTANT ISSUE:** The first problem is that we give less importance to the drinking water quality issue and consider it a minor issue.
- **TRANSPORTATION:** The second problem is transportation, which results in low drinking water quality in Pakistan. The ways used for the transportation are not good enough. There is continuously leakage of pipes and useful water is wasted or may be contaminated. So it is necessary that we give importance to the ways by which drinking water is transported.
- **MISMANAGEMENT OF DRINKING WATER:** Water that is used for drinking purpose is not properly managed. The ways we supply it and how we conserve that water for future. There are many reasons for mismanagement and we should try to manage water sources properly to overcome problems.



- **LACK OF TREATMENT FACILITIES:** Another major problem is lack of knowledge about treatment facilities, and if known, that knowledge is not properly applied for treating drinking water. It still contains contaminants that, are hazardous for human health. Especially in rural areas drinking water is used without any treatment.
- **LACK OF SAMPLING AND ANALYSIS:** The water that we use for drinking purposes is not properly checked, which is why it cannot be compared with WHO guidelines or National Environmental Quality Standards (NEQS) level, and why we do not know enough about the quality of drinking water. Except in some areas where drinking water is analyzed, there is lack of testing, and importance should be given to sampling and analysis.

HEALTH IMPACTS

According to WHO, more than 80% of diseases in the world are attributed to unsafe drinking water or to adequate sanitation practices. The population is forced to use polluted surface water from rivers, irrigation canals, ponds, lakes and ditches. This surface water is a carrier of many infectious and tropical diseases, which must be treated prior to consumption. Use of contaminated water in rural and urban areas of Pakistan, which results in large number of diseases and mass-mortality, invokes the need for quality assessment of drinking water. Both ground and surface water are used for drinking purposes in Pakistan.

TREATMENT OF DRINKING WATER

Water treatment originally focused on improving the aesthetic qualities of drinking water. The most common

drinking water treatment, considered by many to be one of the most important scientific advances of the 20th century, is disinfections. Most water suppliers add chlorine or another disinfectant to kill bacteria and other germs. Water suppliers use other treatments as needed, according to the quality of their source water. For example, systems whose water is contaminated with organic chemicals can treat their water with activated carbon, which adsorbs or attracts the chemicals dissolved in the water. Industrial and agricultural advances and creation of new man-made chemicals also have negative impacts on the environment and public health. Many of these new chemicals find their ways into water supplies through factory discharges, street and farm field run-off, and leaking under ground storage and disposal tanks. Following are some of the treatment techniques: screening, coagulation and flocculation, filtration, granular activated carbon absorption, reverse osmosis, recarbonation, ion exchange, and disinfectants.

RECOMMENDATIONS FOR SAFE DRINKING WATER

Many of the treatment techniques used today by drinking water plants in Pakistan, include methods that have been used for hundreds and even thousands of years. However, some modern drinking water plants are also employing newer treatment techniques such as reverse osmoses and granular activated carbon.

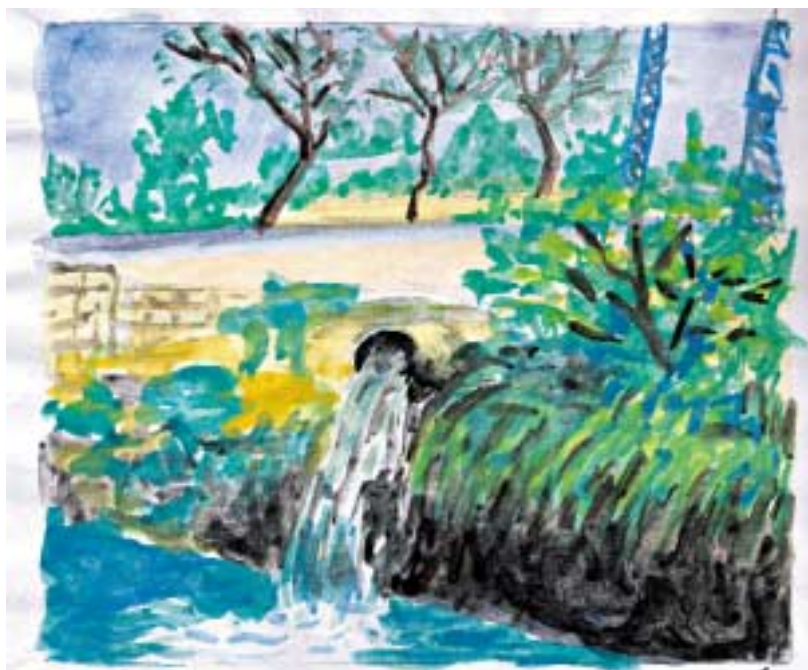
Filtration and chlorination remain effective treatment techniques for protecting water supplies from harmful microbes, although additional advances in disinfections have been made over the years in Pakistan. In the 1970s and 1980s,

improvements were made in membrane development of reverse osmosis filtration and other techniques such as ozonation.

1. Removal of Suspended Particles and Biological Oxygen Demand (BOD) through screening: Screening is the very common method for separation of very coarse suspended and floating material from the waste streams. Screening device requires comparatively small space for their installation and can achieve a substantial reduction in the solid contents of the waste flow. Some BOD removal may also be achieved with the fine mesh screens.
2. Removal of fine particles by coagulation and flocculation: The purpose of chemical coagulation and flocculation of wastewater is the removal of very finely divided suspended solids or colloids, which could not otherwise be settled out in sedimentation tank or screening. It is also aimed at removing soluble inorganic compounds (e.g.

phosphorus) through chemical precipitation or absorption on chemical flocks.

3. Disinfections: includes Chlorination, Ozonation and others.
 - a. In Chlorination process, chlorine is added as a disinfectant and kills the germs. Most of the natural drinking water is treated with chlorine to kill bacteria or viruses. From two to four parts of chlorine per million parts of water are used. Swimming pools are rendered safe by similar treatment. All pathogenic microorganisms can be destroyed by chlorine.
 - b. Ozonation is the process in which addition of ozone takes place and ozone acts as a strong disinfectant. This technique is developed to deal with chlorine resistant pathogens in drinking water that can cause illness like hepatitis, gastroenteritis, Legionnaire's disease, and cryptosporidiosis.



Recently, the Centers for Disease Control and Prevention and the National Academy of Engineering named water treatment as one of the most significant public health advancements of the 20th century. Moreover, the number of developed treatment techniques, and combinations of them, is expected to increase with time as more complex contaminants are discovered and regulated. It is also expected that number of systems employing these techniques will increase due to recent creation of a multi-billion dollar state revolving loan fund that will help water systems, especially those serving small and disadvantaged communities, upgrade or install new treatment facilities.

WATER RESOURCES IN PAKISTAN - WFP

- ♦ The provinces of Balochistan and Sindh need to be supported further to help people badly affected by half a decade of drought. Aid here needs to be concentrated on developing assets that provide or preserve water - such as underground water tanks, open water ponds, wells and hand pumps.
- ♦ Such developmental work should incorporate the labour of the people and pay them to build such assets for themselves and their communities. Many of the poor in these provinces are too busy trying to earn a livelihood to spare time for such work unless they are paid for it. The government should increase their investment in water conservation programmes with strong community participation. If possible, both the government and other donor agencies should gear their aid towards a self-help policy for the poor to solve their water problems with the aid of either cash or food for their work. Schemes like these would also help provide employment opportunities and should be carried out mostly outside the sowing or harvesting seasons, when unskilled and semi-skilled labourers are abundantly available.
- ♦ A diverse range of water resource development programmes need to be launched within the arid belt of Sindh and not just in Tharparkar. Other areas that need aid such as Dadu and the desert of Umerkot should be supported as well.
- ♦ Relations with both National and International partners should be cultivated to extend the ambit of development work in new areas. The performance of the current NGO's or other such implementing partners working in these areas should be evaluated in order to decide whether to use them for similar future collaboration or expanding the support extended to them for their work.
- ♦ Further partnerships should be developed with UN agencies such as ILO and WHO that work through communities in various development schemes.
- ♦ Monitoring and reporting mechanisms for water resource development and preservation initiatives need to be further strengthen and improved.
- ♦ Media campaigns should be launched in other areas of Pakistan to highlight the importance of water conservation. In many parts of the country, water resources are still not managed efficiently and the waste lies in stark contrast to the hugely pressing needs of the poor people in other places who have to walk for miles to get water every day.



WATER SUPPLY IN PAKISTAN - WHO

The provision of safe drinking water supply in Pakistan is one of the most important health determinants for maintaining the health status of the population. WHO is involved in strengthening the role of the health sector in ensuring the adequacy and safety of drinking water supplies. This includes support for establishment of national standards, provision of water supply through organized and mobilized community in Basic Development Needs (BDN) supported areas, extensive human resource development, provision of technical experts and advice to the Government of Pakistan, assessment, operational research and studies to support improvement of water quality and water supply with special focus on children and remote rural areas. Installation of tube wells in some of the drought hit areas of Balochistan was also supported by WHO.

WHO being the lead technical agency for health will be an active member of the international community to press its pivotal role in advocacy for provision of safe water supply. WHO plans to support the Government of Pakistan to establish federal, provincial and district environmental health units within the public health sector to improve access to safe drinking water. WHO based on its mandate will support national capacity building at all levels in development of national water quality standards and its enforcement.

Recommendations for improvement the water supply in Pakistan:

1. Assessment and systematic needs and identification at national level

- ♦ Well coordinated and systematic technical assessment and situational analysis at all levels (district, provincial and national) mapping the relationship between health and water supply
- ♦ Analysis, need identification and prioritization for advocacy, capacity building resources mobilization, etc
- ♦ Dissemination of information to elected officials/government officials, national decision makers and the public

2. Promotion and advocacy

- ♦ Developing mass awareness campaigns
- ♦ Sensitization of elected persons and decision makers



- ♦ Developing close relationship with the media
 - ♦ Promoting awareness in the use and conservation of water in terms of quality and quantity
 - ♦ Promoting community based initiatives through community organization, mobilization, partnership and ownership, using the available experiences of Basic Development Needs (BDN), Healthy Cities, Healthy Villages and Women in Health and Development
 - ♦ Promotion of affordable and improved water supply and safety at household level
 - ♦ Promoting the needs and reducing the hardship of women, related to water collection for daily use
- 3. Capacity building and Institutional Strengthening**
- ♦ Strengthening of local level institutions and capacities in line with the devolution plan of the Government (strengthening technical agencies and local government planning and monitoring capabilities)
 - ♦ Strengthening normative, regulatory and enforcement capabilities at all levels
 - ♦ Strengthening intersectoral coordination at all levels using the experiences of Community Based Initiatives (BDN, Healthy Cities, Healthy Villages and Women in Health and Development)
 - ♦ Strengthening linkages between water supply and health sector at all levels, especially at the peripheral level (involvement of Lady Health Workers)
 - ♦ Encouraging & facilitating privatization of water supply schemes
 - ♦ Strengthening technological capabilities for appropriate and required technologies
- ♦ Assessment and improving the capacity of human resources for the provision of technical, financial, and administrative support to water supply programmes
 - ♦ Encouraging and facilitating the participation of communities and close collaboration between people and water agencies and local government for need identification, priority settings, planning, financing, implementation and operational maintenance systems
 - ♦ Ensuring effective coordination and information sharing with international agencies, and organizations, donors, development banks and other partners
 - ♦ Creating forums to discuss water supply issues and facilitate consensus building
 - ♦ Reviewing and updating engineering, health care providers and vocational training (plumbers, fitters, mechanics etc) to ensure quality improvement in all aspects of construction, delivery and services
- 4. Mobilization of resources**
- ♦ Promoting the principal of user contribution/beneficiaries
 - ♦ Campaign to increase local, provincial and federal government investments in the water sector
 - ♦ Applying the principal of cost-recovery and sustainability
 - ♦ Massive campaign to attract external support agencies and soft loans
 - ♦ Recognition, documentation, and dissemination of cost effective success stories
 - ♦ Using innovative methods of fund raising and financing of water supply, e.g. Kushali Bank, Zakat Fund, etc

5. Strengthening of information system and networking
 - ♦ Undertaking evidence based on the environmental burden of disease studies and utilising the results for advocacy, planning, and management, especially for demonstrating comparative economic advantage of safe water for human development
 - ♦ Developing, as a priority, basic information collection tools and mechanisms at all levels
 - ♦ Collecting, developing and exchanging information and experiences on population coverage rate, costs, investments, needs, per capita water availability and water use
 - ♦ Development of water supply websites containing districts and provincial water supply profiles
 - ♦ Creation of water hotlines, bulletins, technical journals and newsletters

6. Provision of safe water and water quality monitoring
 - ♦ Development of national drinking water quality standards (based on WHO's guidelines)
 - ♦ Strengthening the capacity of water quality monitoring and sanitary inspection of water supply schemes
 - ♦ Enforcement and control of water quality standards based on monitoring results and on routine basis
 - ♦ Encouraging and facilitating safe drinking water at household level (boiling, use of chlorine tablets, solar radiation, etc)
 - ♦ Creation of a specific task force for the prevention of seasonal water-borne diseases like cholera, typhoid, hepatitis, etc
 - ♦ Enforcement of rules, regulations and standards for

protection of water sources used for drinking water supply systems.



