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HOW TO STRENGTHEN TECHNICAL AND INSTITUTIONAL CAPACITY WATER RESOURCE MANAGEMENT IN YEMEN INCLUDING DATABASE CREATION AND RAISING PUBLIC AWARENESS

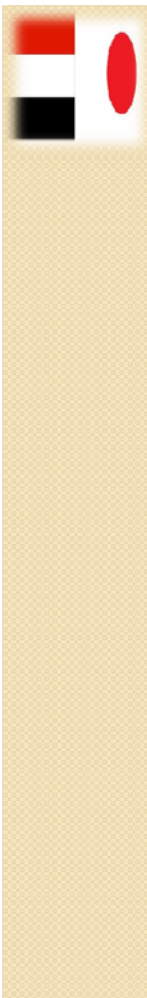


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Location:

Yemen is located in the southern west of the Arabian peninsula.

AREA :
528,000 km², 21 Governorate

POPULATION:
24 million.

Climate:

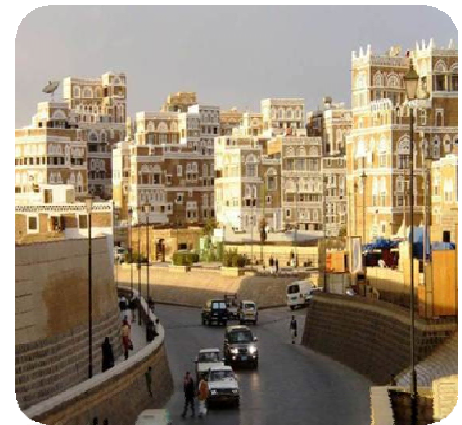
Temperate in the mountainous regions in the western part of the country, extremely hot with minimal rainfall in the remainder of the country. Humid on the coast



General Information

Topography

The country's topography of rugged Mountains , volcanic , Highlands, deserts and coastal plains

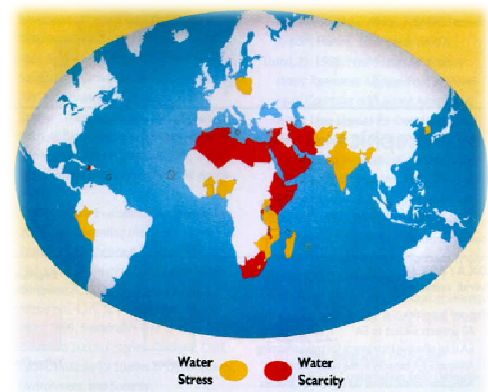
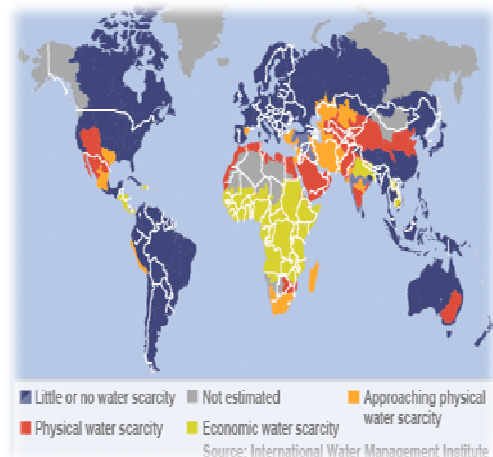


Overview of water problems in the world:

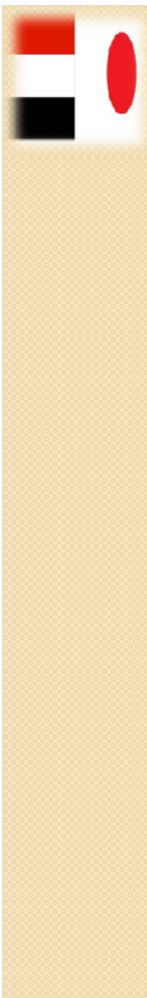
Water is definitely a security problem in the world.”.The main reason of the shortage of the waters over the world is the population growth and lack of justice in the distribution of water, citizen in North America consumes about 500 liters of water a day, and European consumes between 200 and 300 liters, while not available for African and Middle east only 10 to 20 liters of water a day. In addition to widespread poverty, if we didn't do anything to solve the shortage of the water so it will lead to the desertification of many areas & a lot of poor country. Also the climate change to raise temperatures, this one of the problem that affect shortage of water.

Pressures on water supply:

- Climate change
- Multinational use of water basins and aquifers
- Water supply infrastructure
- Intermittency
- Water quality and environmental assets
- Degradation of fossil groundwater supplies



water scarcity in the world



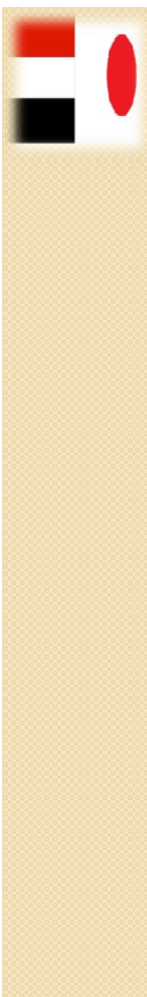
Water in Japan:

Japan is not a water abundant country. It has a narrow surface area, rapid run-off of precipitation, and high population density. The quantity of annual natural renewable water resources per capita in Japan (about 3,372 m³ per capita) is only one half of the world average. In addition, there are great fluctuations in rainfall—both seasonally and between the years. As a result of both of these factors—an absolute shortage of water and considerable variability over time—Japan has suffered severe water shortages several times in the recent past. For example, the Tokyo metropolitan area experienced water scarcity in the early 1960's when the city of Tokyo was forced to restrict water supply for 42 months, from October 1961 to March 1962. In order to solve the water scarcity problem, Japan has aggressively developed its water resources, mainly by constructing new water storage facilities (largely dams). At present, the amount of "newly developed" water sources accounts for 16.6 billion m³ of water per year, which amounts to 55% of total water consumption for domestic and industrial (urban) use.



Water resources in Japan:

Japan's water resources are characteristically plentiful mainly during the tsuyu, typhoon, and spring thaw seasons. Although annual precipitation far exceeds the world average, this does not mean abundance of water resources. Due to Japan's dense population the per capita precipitation in Japan is only about one-sixth of the world average. Furthermore, since the rivers have small basins and steep channels, rivers flow erratically and relatively little of their water is actually available for use. Compared with cities in other countries, Japan's major cities store surprisingly little water reserves, and every year there are water shortage problems somewhere in the country. The annual volume of water for municipal and agricultural use taken from rivers is estimated at about 78.21 billion cubic meters, and that from groundwater about 13.15 billion cubic meters. It is apparent from these figures that river water is the important water resource in Japan and that its efficient use is essential. It is expected that the severity of droughts will increase because of climate change which will reduce the amount of water stored in the form of snow, increase evaporation from reservoirs and reduce rainfall. Most of the water for domestic use comes from surface water. About 45% of the total comes from reservoirs regulated by dams, while 27% comes directly from rivers, 1% from lakes and 4% from river beds, totaling 77% from surface water. 23% of domestic water supply comes from groundwater, which is over-exploited in parts of the country.



Water storage:

There are more than 2,500 dams in Japan, their total storage is low because rivers are short and steep. Total active storage of all dams is only 20 km³, corresponding to less than the storage capacity of Hoover dam. In addition, lakes have an important storage function and their water levels are regulated through weirs. The largest lake is Lake Biwa that provides drinking water to more than 15 million people in the keihanshin (Kyoto-Osaka-Kobe) metropolitan region.



The Highest Dam of Japan



Yodo River, Osaka

Japanese Government Organization

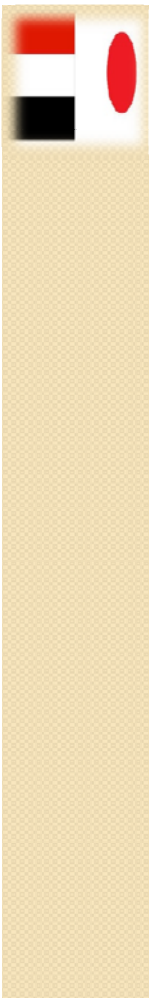
Water Supply for Domestic Use • Water Supply Law • Law to Promote the Implementation of Programs to Preserve the Quality of Source Water for Public Water-Supply, etc.	Ministry of Health, Labour and Welfare
Water Supply for Agricultural Use, and Development of Forest for Water Headwaters Conservation • Land Improvement Law • Forest Law, etc.	Ministry of Agriculture, Forestry and Fisheries
Water Supply for Industrial Use, and Hydroelectric Power Generation • Industrial Water Law • Industrial Water Supply Business Law, etc.	Ministry of Economy, Trade and Industry
Water Quality and Environmental Preservation • Water Pollution Control Law • Law to Take Special Measures for the Preservation of Water Quality in Head Waters Areas for the Purpose of Preventing Specific Trouble in the Drinking Water Supply, etc.	Ministry of Environment
Sewerage and Water Waste Management Department • Sewerage Law, etc.	Ministry of Land, Infrastructure, Transport and Tourism
Flood control, River Water Utilization, and Dam Construction, etc. • River Law • Specified Multipurpose Dam Law, etc.	River Bureau
Overall Coordination, Water Supply and Demand Planning, and Reservoir Area Development • Water Resources Development Promotion Law • Japan Water Agency Law • Law Concerning Special Measures for Reservoir Areas	Water Resources Department

Organization of the Water Resources Department

• Water Resources Policy Division : basic policy, Japan Water Agency, groundwater, waste water reusing, etc.
 • Water Resources Planning Division : long-term planning, establishment of sound hydrological cycles, issues of international water resources, etc.
 • Reservoir Area Development Division : reservoir area development, 100 Selected Water Spots, etc.



water resources development facilitates under control of JWA



Water Resources Management Policies and Actions:

In Japan, the national government is responsible for formulating and implementing water resources policies at the national level. It formulates an overall plan of water resources development and environmental conservation. The Comprehensive National Water Resources Plan is the national basic plan for water resources development under which dams and water systems are developed. The Basic Environment Plan clarifies long-term and comprehensive environmental policies related to water quality and quantity.

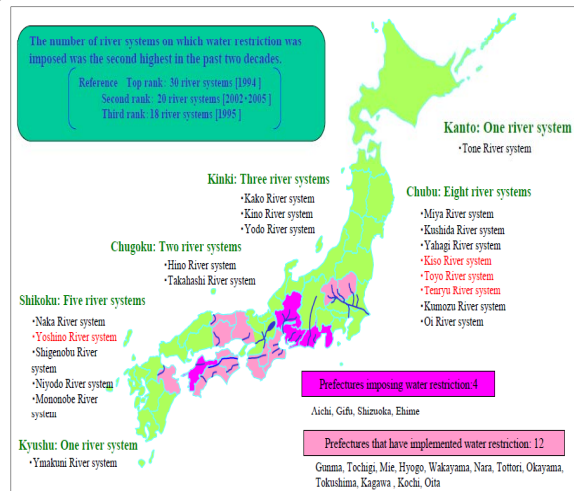
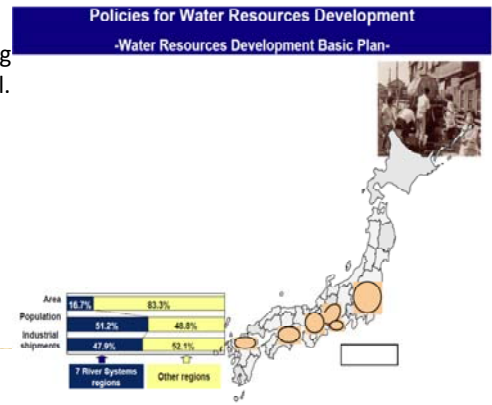
River management in Japan:

The River Law was enacted in 1896, and the Sabo Law and the Forest Law in 1897. These laws were the inception of modern flood and erosion control in Japan. The original River Law remained the basis for river administration until it was completely revised in 1964.

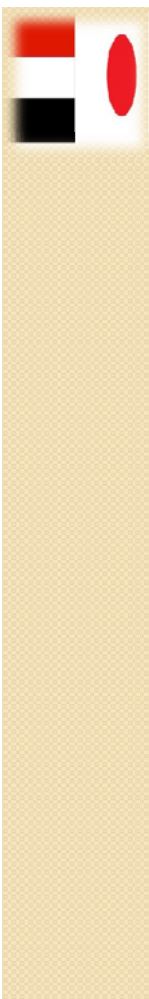
Drought in Japan:

In the past Japan face drought because the change climate all the countries around the world have problem with water especially for drought in Japan they have in 1939 drought on the markets for rice and electricity in Japan. The authorities were ill-prepared for such a disaster but willing to use it for the purpose of covering for other problems. climate fluctuations as crises.

- 1- Fluctuation of Precipitation in Japan due to Climate Change:
- 2- Declines in Water Supply Stability
- 3- Water resources affected by climate changes



The river systems and rivers affected by droughts

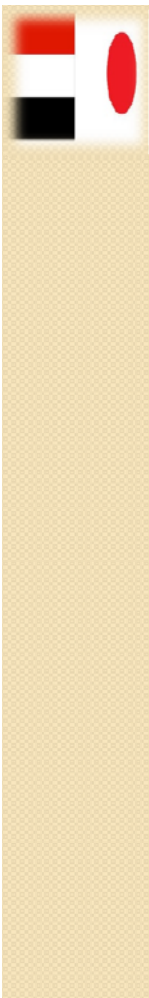


Tone River System and Ara River System

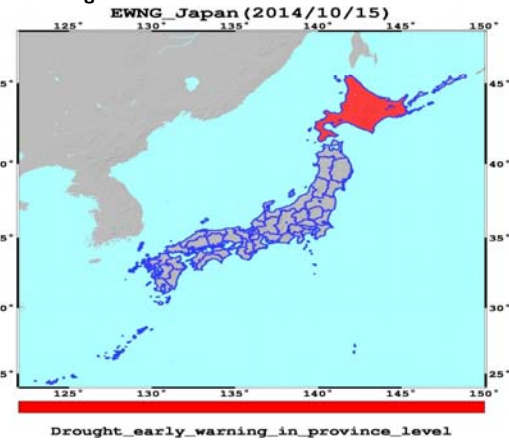
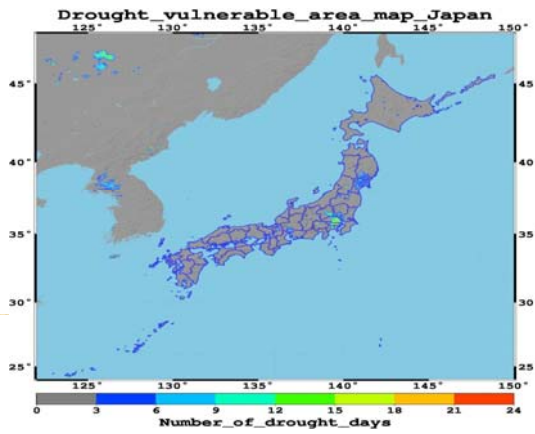
control by Japan water agency (JWA)

Kiso River System and Toyo River System





drought early warning and the number of drought



Revival and Fostering of Water-Related Culture

- Water Day and Water Week
- United Nations' World Water Day



Genba River improved in the Creek Improvement Project



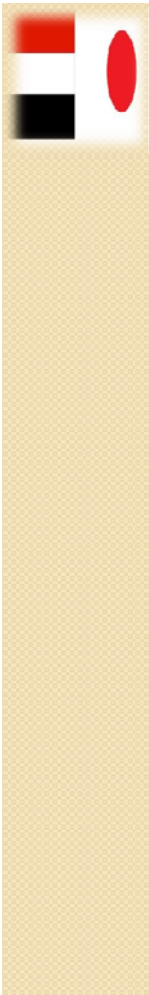
Preservation of water springs through Small Forest Dam Development



Water Week event: Water-related Exhibition



Water Week event: Regatta in Sumida River



Sewerage and Wastewater in Japan:

Sanitation coverage in Japan is over 70%. And there are about 2100 wastewater treatment plants in Japan.

- Most plants adopt aerobic treatment methods such as conventional activated sludge process or oxidation ditch process. Most of sewage sludge is used for cement material and so on, but the rate for use of biogas and sludge fuel is small.
 - There are digester tanks in about 300 treatment plants. About 70% of the biogas generated by digestion (218 million m³) is utilized, for example, about 20% of biogas (66 million m³) is used for the power generation, but the rest (86 million m³) is incinerated.
- Accelerate the government-led development of new technology and its practical application by promoting technical validation through installation of actual size plants and by formulating guidelines. Achieving cost reduction in the sewerage projects and generation of renewable energy

The roles of sewerage system

- water quality control of public waters
- improvement of living environment
- flood prevention (disaster - resistance)
- effective use of resources

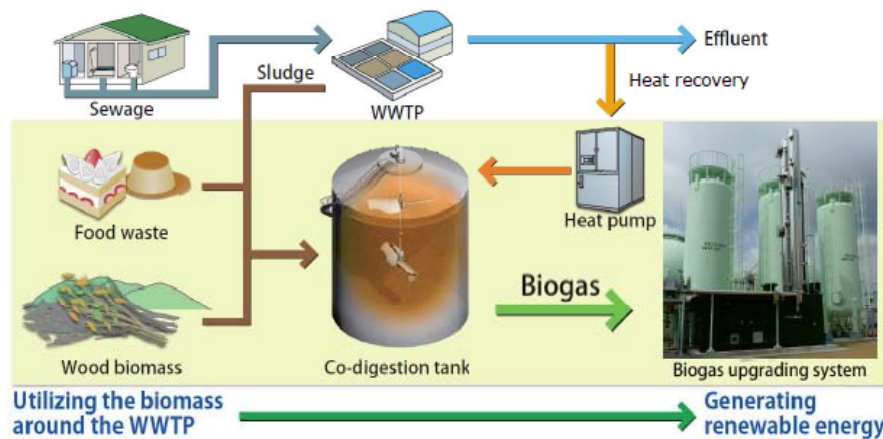


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Flow diagram



Feature

- Biogas production can be significantly increased by co-digesting sewage sludge with suitable biomass
- Biogas produced can be fully utilized by using heat pump to heat digester.



Introduction about the water situation in Yemen

Yemen is a water – scarce country , situated , in an arid region with no permanent rivers. Historically, the population depended on rainfall, springs. Hand-dug wells and water harvesting in ponds, and dikes and dams of various sizes. Maximum well depth didn't exceed few tens of meters and their water was lifted ,in small quantities, by animal or human effort . No mechanical drilling rigs or pumps were used until 1960s.

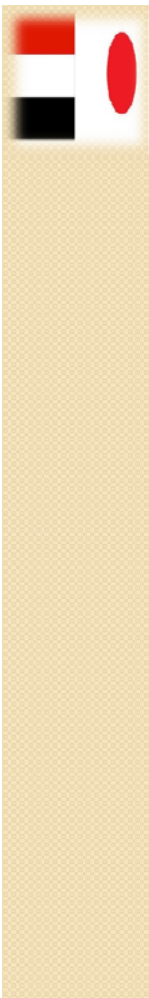
Because Yemen is situated in an arid region the annual per capita share of renewable water resource does not exceed 125m³ (the international figure is 7500m³), the yearly amount of rainfall in Yemen is estimated at 72 billion m³, the other renewable water resources which are available to be used are estimated at 2,5 billion m³ out of this 1.5 billion m³ comes from flooding in the raining beds and 1 billion m³ for the recharge of the ground water . Water usage for different needs is estimated at 3.4 billion m³ the deficit is amounted at 900 million m³ and the water availability per capita is estimated at 125m³ per year which is the lowest rate all over the world .

The main problem is the bad management for water resources which lead to the following

-The overuse of groundwater resources for the agricultural sector.

-The expansion of well-drilling and groundwater use in Yemen since the 1970's demonstrated that in water abundant conditions, demand management is not seen as a priority, qat, vegetables and fruits, resulting in high water consumption. It also gave rise to increase in drinking water demands, especially in urban areas where population increased faster as result of migration from rural to urban areas.





Water Resources in Yemen

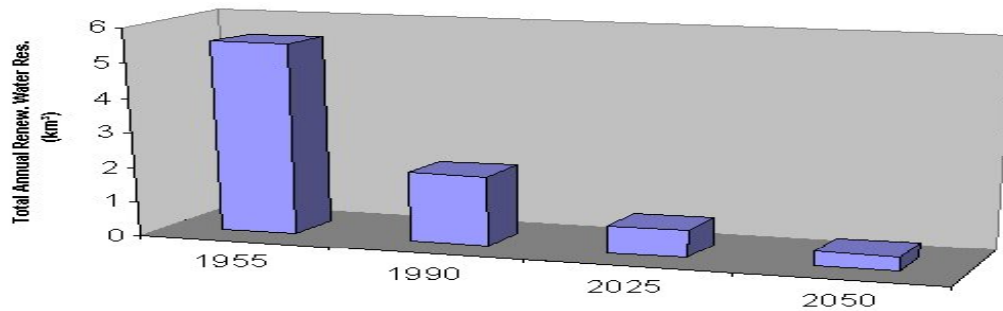
- Rain fall
- surface water
- Springs
- Ground water

- Harvest rain water

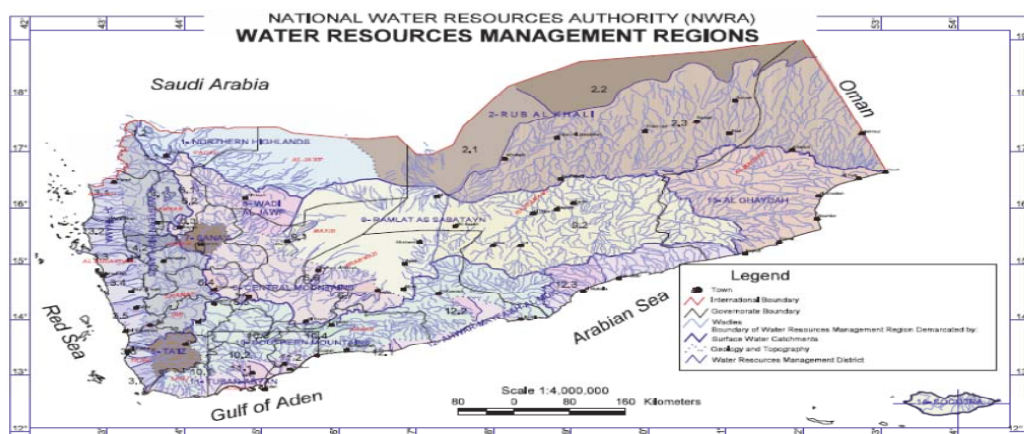
Yemen is a country suffering water shortage. Therefore rainwater harvesting is a common practice since the antique. Ruins of dams and reservoirs as well as the unique, spectacular mountain terraces, cistern (rocky tanks), water pools, dams



Water Resources Available in Yemen



Map of Water Resources Management Regions in Yemen





Wastewater treatment in Yemen:

According to a 2002 report by staff from the Yemeni Environment Protection Agency, there were 10 wastewater treatment plants in Yemen at the time in Sana'a, Taiz, Ibb, Hajaa, Aden, Amran, Al Hodaida, Dammar, Yarem, and Radaa. Most of the plants use the stabilization pond technology, a low-cost technology particularly suitable for a hot climate. Some use imhoff tanks or the activates sludge procedure commonly used in many developed countries. While data on the quality of treated effluent are limited, those data that are available show that the effluent of at least two plants complies with the relatively lenient national standard of 150 mg/l of Biological oxygen demand, a measure of organic pollution. However, none of the four analyzed plants complied with the standard for fecal coli form , a measure of biological contamination. Reuse of treated and untreated wastewater in agriculture is common in Yemen. Wastewater from hospitals and medical laboratories is discharged into the sewer system, but cannot be adequately treated in the existing municipal wastewater treatment plants. The largest wastewater treatment plant in the country, located in Sana'a, was completed in 2000, but it had to be upgraded between 2003 and 2005 due to "deficiencies in its operation, unacceptable odor emissions, and inadequate management of the generated sludge.

- the treated wastewater from the STPs is around 125,000m³ per day, or around 45.5 Mm³/year
- The quality of the outflow is highly variable, while it is very good quality in Hajah, it is very bad in Taiz, depending on :
- The method of treatment
- The capacity of the station



Causes of the Water Crisis in Yemen

- 1-Population Growth
- 2- Misguided Agricultural Development and Policies
- 3- Qat and Its Effect on the Crisis
- 4- Lack of Law Enforcement
- 5- Climate Vulnerability

Water Use	1990	2000	2005 (estimated)	2010 (estimated)
Agriculture/Irrigation	2,600	3,145	3,235	3,328
Domestic/Urban/Rural	168	210	265	552
Industrial & Mining	31	45	65	90
Total	2,799	3,400	3,565	3,970

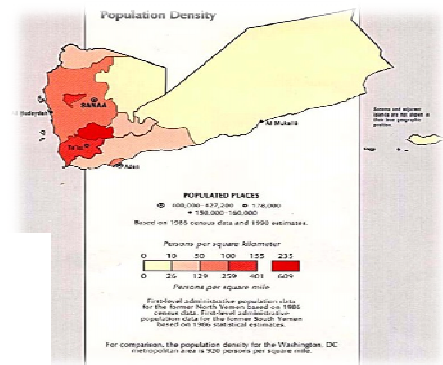
Use of Water for a Period of 30 Years (1990-2010) In Different Water Use Sectors (million cubic meters per year)

Drought:

Yemen is set to be the first country in the world to run out of water, providing a taste of the conflict and mass movement of populations that may spread across the world if population growth outstrips natural resources. Government and experts agree that the capital, Sana'a, has about ten years at current rates before its wells run dry but the city of two million continues to grow as people are forced to leave other areas because of water shortages Drought has caused the displacement of thousands of people s from mountainous villages in 2009, the first time in Yemen; the Investment Authority in Yemen has called on the private sector to compete for projects to desalinate seawater in order to face the current issue of water scarcity in Yemen as well as the future fear of drought



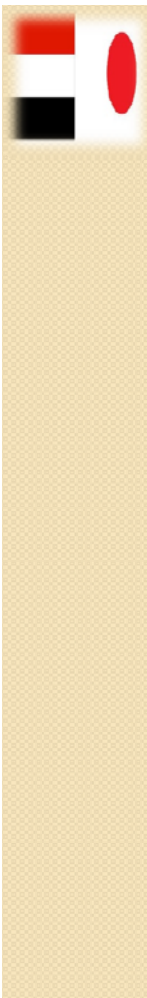
land drought in Yemen



Population Density in Yemen



Qat tree



The Institutional Framework of the Water Sector

The Ministry of Water and Environment (MWE) which was established in May 2003 is highest authority in charge of water affairs in Yemen, the mandate of the ministry to reorganize the water sector, with the aim of creating an institutional structure for integrated water management and to prepare the necessary institutional and investment conditions to face the exacerbating water problem in Yemen. The MWE was charged with one of the most complex development problems in Yemen and its most challenging tasks, namely: the water scarcity problem and the challenges of providing drinking water to the urban and rural population, treating wastewater, managing water resources and planning its use in light of the water law.

The ministry's mandate includes a number of implementing institutions

the National Water Resources Authority (NWRA) , in charge of water resources management and development

The General Environment Protection Authority (EPA) in charge of environment protection and natural resources conservation.

The General Authority for Rural Water Supply Projects (GARWSP) in charge of water supply services in rural areas.

The National Water and Sanitation Authority (NWSA) in charge of water and sanitation services in the branches.

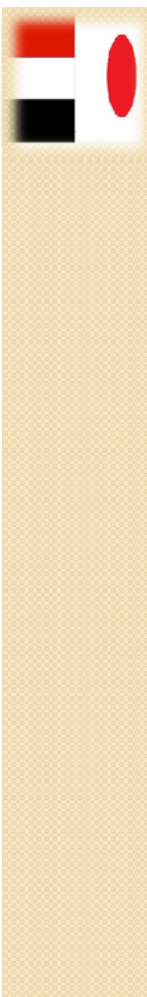
The Local Water and Sanitation corporations.

The Technical Secretariat for Water and Sanitation Reform.

The Urban Water and Sanitation Project.

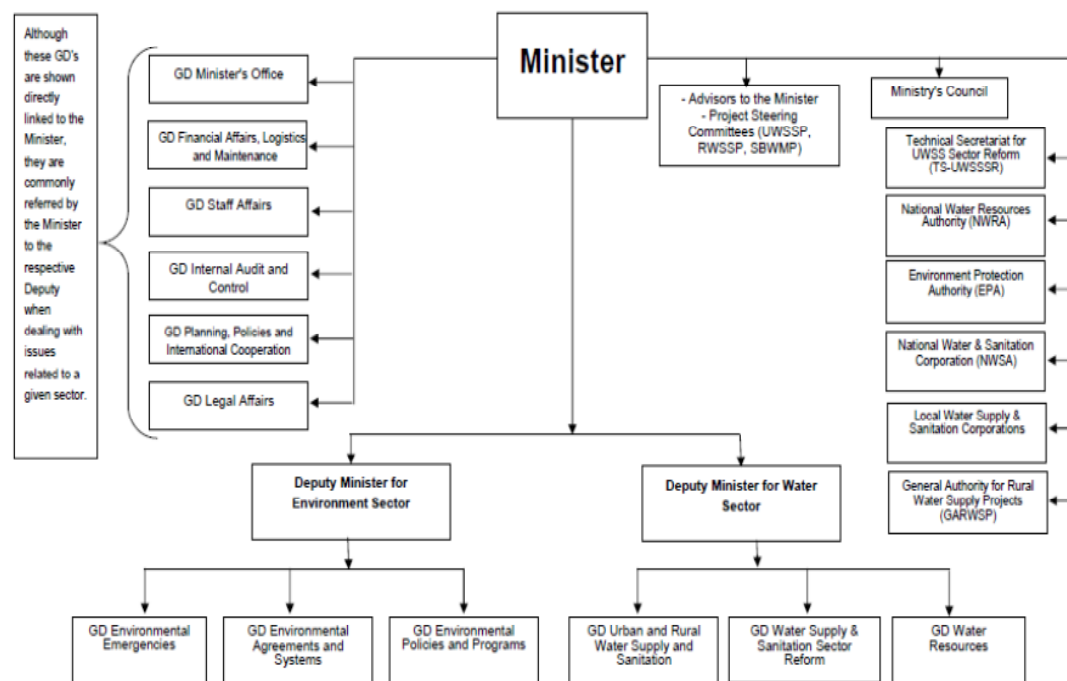
The Rural Water and Sanitation Project

The Development Project of Socotra Archipelago



Organization structure

Figure 3.1: Organogram of the Ministry of Water and Environment (MWE)



* UWSSP= Urban Water Supply and Sanitation Project, RWSSP= Water Supply and Sanitation Project for Rural Areas, SBWMP= Sana'a Basin Water Management Project



Institutional background of water resources management

In 1996 a national water resources authority (MWRA) was established.

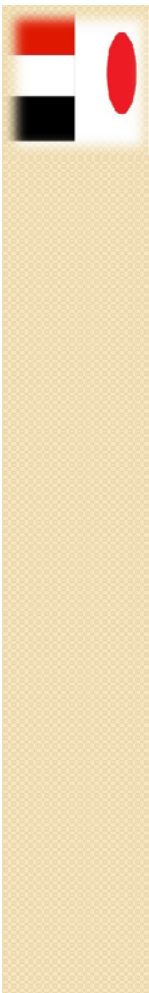
New Ministry for Water & Environment was established in May 2003

Water Law was ratified and issued in August 2002

Irrigation & Dams department still with Ministry of Agriculture & Irrigation and did not yet merged with the new established ministry

Water resources strategies & policies and legislations

- Water Resources Policy and strategy(99-2000)
- Irrigation Water policy, (2001)
- Watershed Policy, (2000)
- Agricultural sector reform policy, (2000)
- Urban Water Supply and Sanitation Sector reform Policy, (1997)
- wastewater reuse strategy, (under developing)



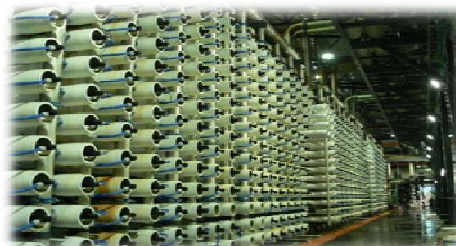
To strengthen technical and institutional capacity water resource management in Yemen

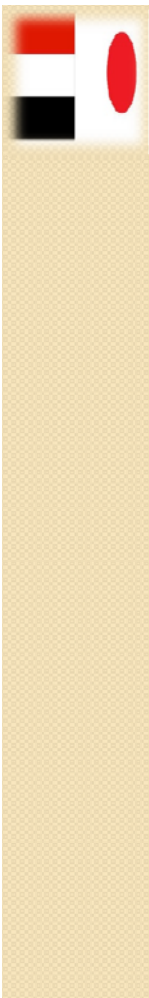
Strengthening the institutional framework by: institutional strengthening and sector coordination strengthening community-based organizations; water resources management planning (especially basin planning); and human resource development including:

- 1- Managing water quality
- 2-Recovering control over groundwater
- 3-Creating an enabling institutional framework
- 4-Information provision, awareness raising and creation of water management vision
- 5- Protection of water rights, implementation of the water law, and creation of an enabling environment at the macro-economic level
- 6- Building capacity and improving performance
- 7-Enhancing community participation
- 8-Desalination formulating a policy for sea water or brackish groundwater desalination.



The National Water Sector Strategy and Investment Programme (NWSSIP)





Strengthen the technical and institutional capabilities :

The NWSSIP I action plan provided for thirteen actions grouped under eight strategic

- Sustainability through water resources protection and allocation through: reducing groundwater mining, securing farmers' water rights, and getting incentives right.
- Increasing farmer incomes through increased water use efficiency by: refocusing agricultural research and extension, cost recovery on public irrigation schemes, developing water user associations (WUAs) as principal partners, and treating qat as a crop.
- Enhancing resource sustainability and quality through watershed management by: reviving watershed/water basin management with an integrated approach, and reviewing and revising the dams program.

- Improving targeting and sustainability by: adopting bottom-up approaches throughout and mainstreaming gender issues; promoting sustainability through broadening the range of partners so as to include, for instance, more NGOs and community institutions; and directing available finance to the greatest need (targeting).

- improving technology choice by: broadening available technology choices; and integrating sanitation and hygiene in rural water schemes Sourcing the water by: ensuring and protecting water resources and their quality

- Continuing the reform process by: evaluating and deepening the reform program; developing regulatory, monitoring, support and policy functions; working towards financial sustainability of water utilities; and promoting private investment and public private partnerships

- Improving water allocation, while mindful of equity, social norms, meeting the domestic needs and maximizing economic benefits

- Improving sector governance through information and awareness by: strengthening the water resources information base; strengthening the water resources monitoring system; and national and regional information, education and awareness campaigns.

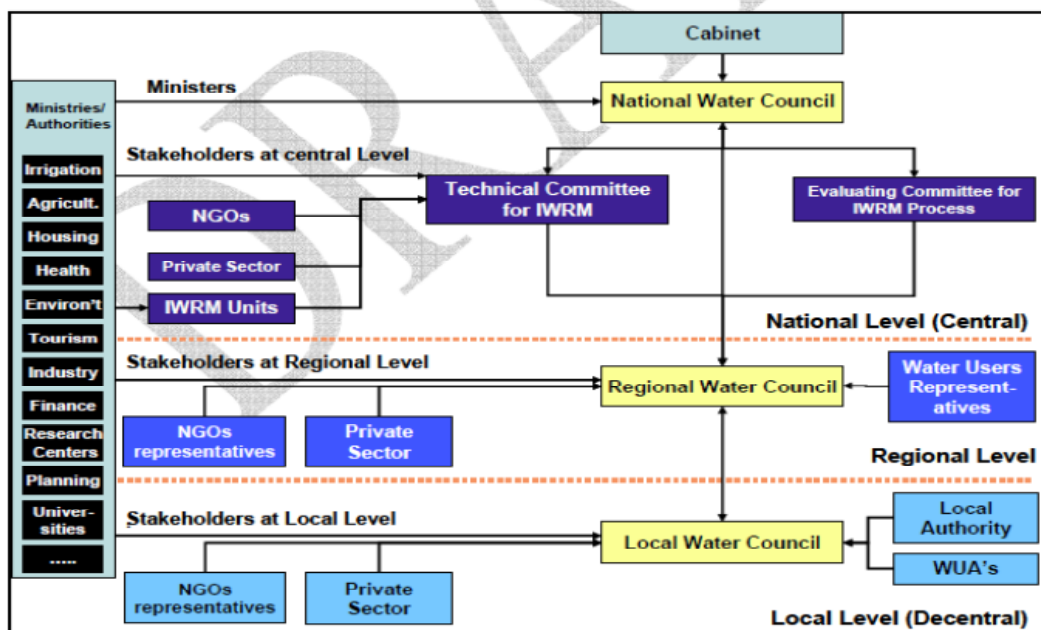
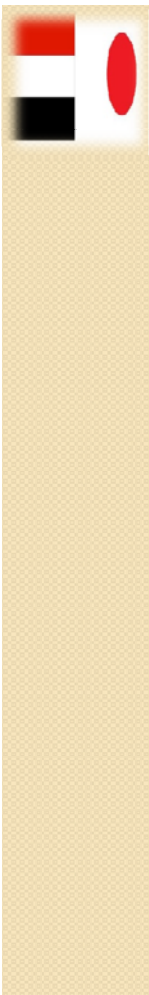


Figure (2) Proposed Institutional Structure for implementation of IWRM plans at the national level in the ESCWA countries

proposed institutional structure for implementation of IWRM plans at the national level in the ESCWA countries

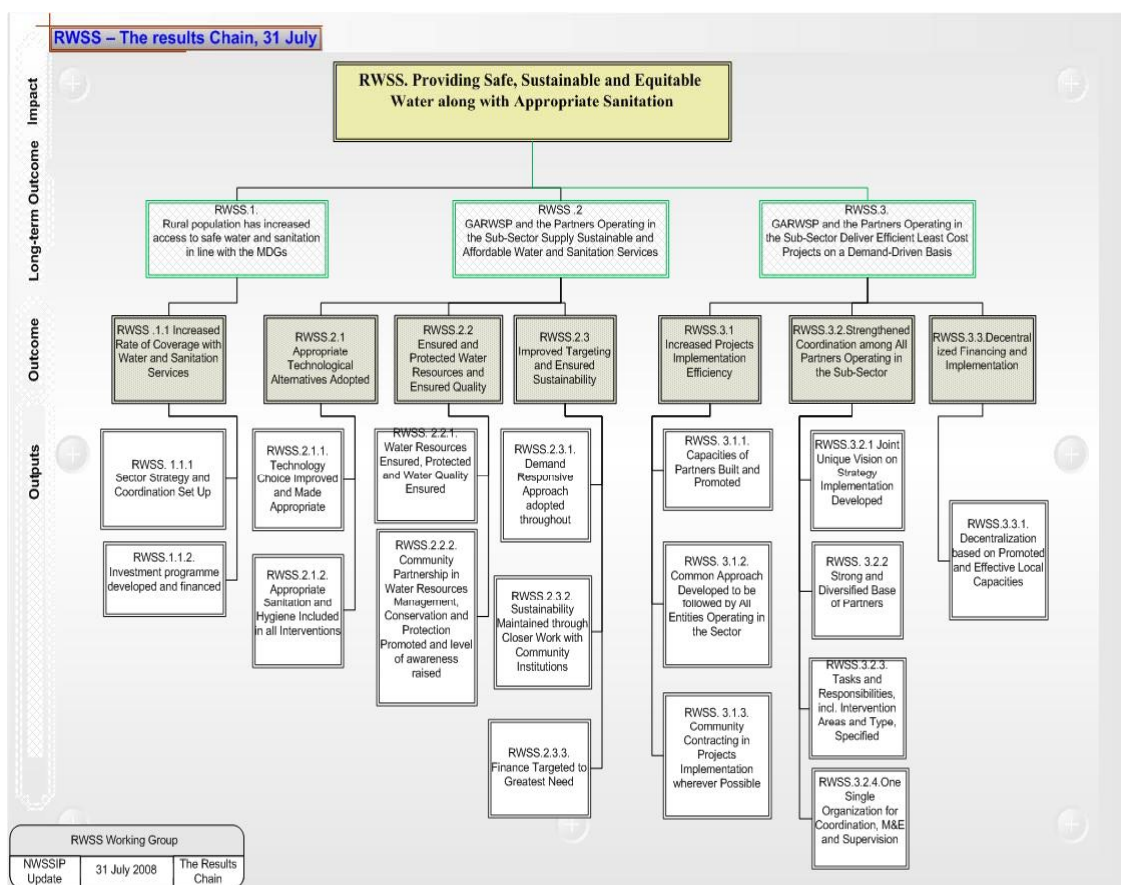
The NWSSIP Update Overall Goal and Key Objectives

Overall goal	Impacts	Impact indicators
To improve the Yemeni population's sustainable and economically efficient use of the nation's scarce water resources	Increased access to safe and affordable water and sanitation Rural incomes are sustained Rate of groundwater depletion slows in key basins	<ul style="list-style-type: none"> ▪ Percentage of MDGs attained ▪ Real rural GDP pc maintained ▪ Depletion rates reduced in Sana'a, Upper Wadi Rasyan, and Amran
Key objectives	Key outcomes	Key outcome indicators
Key objective 1: Strengthen institutions for sustainable water resources management	NWRA, basin committees, local authorities and other partners have the institutional capacity to develop and coordinate integrated water resource management	<ul style="list-style-type: none"> ▪ 8 NWRA branches decentralized and fully functioning ▪ 8 basin committees and plans operational and fully financed
Key objective 2: Improve community-based water resource management	Communities are empowered and enabled to manage their water resources at the local level	<ul style="list-style-type: none"> ▪ Number of farmers organized in WUAs and cooperating in water resources management ▪ Number of agricultural wells monitored and controlled by WUAs
Key objective 3: Increase access to water supply and sanitation services	The Yemeni people, both urban and rural, have increased affordable access to safe and regulated water supply and sanitation	<ul style="list-style-type: none"> ▪ 65% of urban residents have access to safe water ▪ 50% of urban residents have access to safe sanitation ▪ 62.5% of rural residents have access to safe water ▪ All water supply projects have provision for safe sanitation
Key objective 4: Increase returns to agricultural water use	Farmers are able to sustain their incomes whilst using less water	<ul style="list-style-type: none"> ▪ Area using water saving techniques
Key objective 5: Recover control over groundwater abstraction in critical water basins	Groundwater abstractions from critical basins have been stabilized or reduced	<ul style="list-style-type: none"> ▪ Abstractions in Sana'a, Upper Wadi Rasyan, and Amran basins have stabilized or reduced

Example of NWSSIP activities requiring inter-agency approaches

Cross cutting topic	Agencies	Joint actions	Reference
1. IWRM at the basin level	NWRA, basin committees, local authorities, MAI, users	<ul style="list-style-type: none"> ▪ studies of priorities at basin level ▪ preparation and implementation of basin plans ▪ support to basin committees ▪ establishment of protection zones ▪ water rights registration and water transfer 	IWRM 3.2.1 IWRM 1.1.4 IWRM 1.1.7 IWRM 1.3.3 IWRM 3.2.2
2. Developing WUAs as the building block for water management	NWRA, basin committees, local authorities, MAI, users	<ul style="list-style-type: none"> ▪ <i>National Conference on Community Water Management and Water Rights</i> ▪ development of water users associations as the lower level building blocks of water resources management 	IWRM 1.1.4 IWRM 1.1.7
	RWSS agencies, NWRA, MAI, NGOs, WUAs	<ul style="list-style-type: none"> ▪ capacity building of effective and sustainable user organizations for rural water 	RWSS 2.3.2
	NWRA, basin committees, local authorities, RWSS agencies, WUAs	<ul style="list-style-type: none"> ▪ development of water user organizations for irrigation, including a study and strategy for scaling up 	IRRIG 2.1.1
3. Sourcing water	MWE/utilities, NWRA, basin committees, WUAs, private sector	<ul style="list-style-type: none"> ▪ identify resources within basin plans ▪ develop equitable and sustainable models for resource transfer, recognizing water rights and "no uncompensated harm" 	UWSS 2.2.1 UWSS 2.2.1
	RWSS agencies, NWRA, basin committees, local authorities, WUAs	<ul style="list-style-type: none"> ▪ map, identify and monitor resources within basin plans ▪ sustainable management of RWSS sources 	RWSS 2.2.1 RWSS 2.2.2
4. Developing alternative water sources	NWRA, MAI, urban utilities, private sector, NGOs	<ul style="list-style-type: none"> ▪ developing desalination, rainwater harvesting and other options 	IWRM 1.2.5
	MWE/utilities, NWRA, private sector, NGOs	<ul style="list-style-type: none"> ▪ desalination study for coastal cities 	UWSS 2.2.1
	RWSS agencies, NWRA, SFD, private sector	<ul style="list-style-type: none"> ▪ development and distribution of low cost technologies for drinking water supply 	RWSS 2.1.1

Cross cutting topic	Agencies	Joint actions	Reference
5. Improving water use efficiency	NWRA, MAI, rural water agencies, urban utilities	<ul style="list-style-type: none"> technology and pilot programmes in water use efficiency irrigation water management irrigation technology 	IWRM 1.2.2 IWRM 3.1.1 IWRM 3.1.2
	MWF/utilities, NWRA, private sector	<ul style="list-style-type: none"> implementing a loss reduction programme improving network management and efficiency 	UWSS 2.1.1 UWSS 2.2.2
	MAI, NWRA	<ul style="list-style-type: none"> Research on water use efficiency, technology and pilot programmes in water use efficiency 	IRRIG 3.1.1
6. Water quality	NWRA, EPA, Water Quality Committee, urban utilities	<ul style="list-style-type: none"> updating water quality standards and finalizing water quality policy water pollution monitoring establishment and enforcement of protection zones 	IWRM 1.3.1 IWRM 1.3.2 IWRM 1.3.3
7. Water reuse	NWRA, MAI, urban utilities	<ul style="list-style-type: none"> cost effective and safe treatment/reuse of irrigation drainage water urban wastewater treatment and reuse 	IWRM 2.1.1 IWRM 2.1.1 UWSS 1.2.3
8. Policy environment	NWRA, MAI, MWE, other government agencies	<ul style="list-style-type: none"> the policy framework for groundwater management 	IWRM 1.2.3
9. Environmental Impact Assessment (EIA)	NWRA, EPA, MAI, all water agencies	<ul style="list-style-type: none"> updating and improving the EIA mechanism ensuring consistent application of EIAs to water programmes, including dams 	IWRM 2.1.3 IWRM 2.1.3



providing safe sustainable and equitable water along with appropriate sanitation



Awareness public in the field of water :-

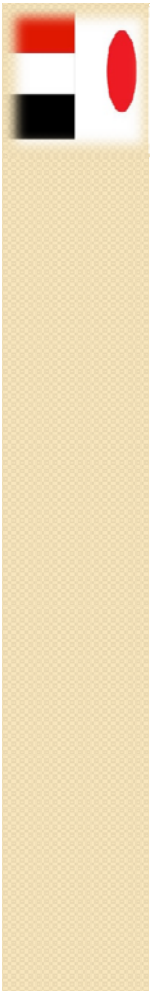
When any talk about tools and strategies for integrated management of water resources, clearly referred to awareness as the first step in the management of water resources and the basic requirement for effectiveness. Consequently, the communication and awareness of water issues is not a goal in itself, but a means to achieve the objectives of integrated management of water resources, and therefore they are an integral part of the overall strategy for the management of water resources. But the richest on the participation of the local community. Obviously, to achieve integrated management of water resources requires the direct participation of the leaders and all water Users alike; hence, raising the level of awareness among all social strata and political represents basic elements of the national strategy for water. We live in a new era of scientific progress, where the humanitarian community is witnessing the amazing developments of the discovery of the genetic map to the technological revolution of communication and media, and the stream of news has become the most prominent features of the current era control of the means of communication and community by means of mass media. And led the modern means of communication and transportation to accelerate the dissemination of information. And, media are many and varied, and each type of media properties and features unique to the other such as TV Newspapers and magazines, Publications (posters, brochures, etc ...), Flashes and documentaries, Mobile phones and Internet



Water in everything



Water is future



Means of raising awareness in local communities in Yemen:

- Establish leadership meetings and legal persons in local councils
- Raise awareness of proper irrigation methods and the exchange of opinions through established council's afternoon.
- During the work on the farm.
- Books used in primary and secondary schools in Yemen, looking for mentions of water resources and advice for proper use of this scarce resource.
- Awareness of the importance of water in mosques in schools
- we can raise people's awareness by Awareness movie - TV and radio spots - Street posters - Water songs - Wheel covers - Et

The challenge in awareness about water issue in Yemen:

- water is not an issue of public concern also the People don't trust government
- Conventional means of communication have not proved successful to reach decision - makers and the public.
- as water policies promote expanding use of the scarce resources there is little interest to communication the corresponding pressing problem



Raindrop shape used for awareness people about water issues



Difficulties



- **Continuous uncontrolled groundwater abstractions and drilling.**
- **Deepened and dry wells in highland plains:** Several new attempts to introduce water resource
- **Management and control** (draft legislation submitted to Parliament)
- **Low level of extension services:** The continued use of traditional agriculture techniques is blamed on inadequate inputs and support services provided to farmers.
 - Furthermore, there is little public investment in agricultural research and extension services
- **Water scarcity and inefficient irrigation system:** Water use is inefficient due to dominance of traditional flooding and gravity irrigation, despite existing water depletion in almost all water basins.
- **Low productivity:** Fragmentation of land holdings, inappropriate inputs, and water scarcity lead to low productivity, which is reflected in low labor wages. Yields for many crops are well below technical potential compared to that in other countries. The yield gap can be as high as 40% for potato and tomato, 60% for banana, and 20% for oranges. Post harvest losses are high due to harvesting techniques which are seen to reflect rough handling, poor packaging and weak transport networks. Also, lack of quality control undermines competitiveness of agriculture exports.
- **Growing Qat production:** it is inevitable that any interventions or solutions will have to touch upon all various aspects of Qat production and consumption, making use of advantages and overcoming negative aspects. The GoY, having convened a national conference in 2003 to address these issues, is drafting a strategy and an action plan which builds consensus around the various qat issues.
- **Water scarcity and inefficient irrigation system:** Water use is inefficient due to dominance of traditional flooding and gravity irrigation, despite existing water depletion in almost all water basins.



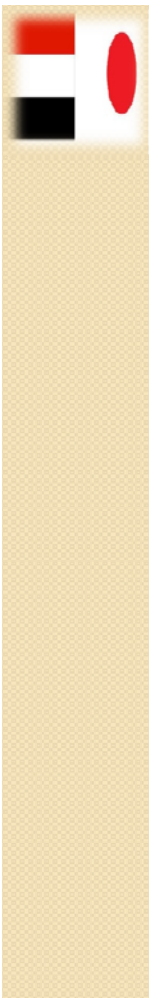
Challenges of the water resources in Yemen :

- Scarcity of water resources,
- Low water supplies and use efficiencies,
- Weakness enforcement of water related laws/regulations,
- Lack of proper coordination among the water related agencies.
- Minor participation of the private sector,
- High population growth (3.01%)
- Minor public awareness.
- Lack of data/information
- Lack of investment of water sector.
- Severe water scarcity
- Groundwater overexploitation
- Water overuse for drug irrigation
- Illegal drilling activities
- The public is ignoring Yemen's water
- Water mismanagement



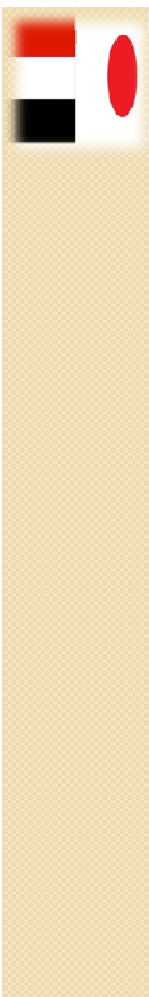
Recommendations:

- Support is still needed to steer the attempts of the National Water Resources Authority to have country wide organized information system and Activation of the Water law.
- Although the phenomena of climate had been changing are not or only partly understood by the prediction of data & climate projection for the future, the National Government must draw up appropriate adaptation measures
- Need to develop water resources information guidelines.
- Need to develop guidelines for predictions, estimations and indicators in Yemen water resources information.
- Need to develop and improve data base information system.
- Need to specific and targeted training programs.
- Need for donors coordination to support water resources management programs.
- Need for proper capacity building and establish database to awareness public.

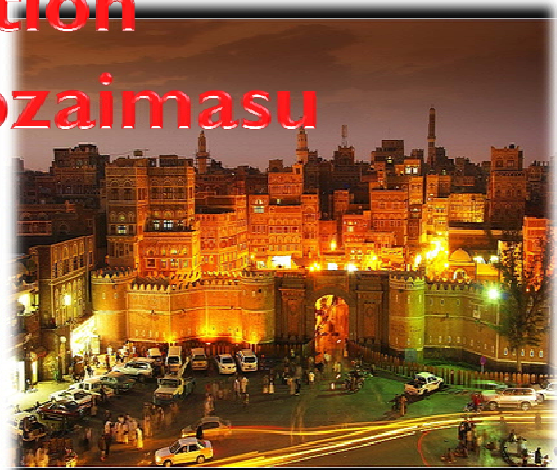


CONCLUSIONS

The ultimate goal is to attain sustainable socio-economic development through management and development of the water resources of the country in an efficient, equitable and sustainable manner. Specifically, the following immediate objectives have been identified in the Five Year Development Plan: Protect water resources from over-exploitation, quality degradation and irreversible damage; Allocate water resources among different users to sustain economic growth with equitable distribution of benefits and balanced demographic distribution, and; Satisfy society's need for water, food and ecological stability by meeting drinking water requirements, by providing for safe disposal of wastewater and solid wastes, by increasing productivity per units of land and water, and by maintaining an ecological balance.



**Thank you for your
attention**



Arigato gozaimasu