

GP- CoCooN-Integrated Project



# CoCooN-Integrated Project

## GROUNDWATER IN THE POLITICAL DOMAIN

1<sup>st</sup> & 2<sup>nd</sup> Reports



Republic of Yemen  
Sana'a University



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# 1. Introduction

Yemen is one of the ten poorest countries in water resources in the world. The annual per capita water share is about 125m<sup>3</sup> (MWE, 2005). “In 2000, the total annual water demand of the country is estimated to be 3.4 billion m<sup>3</sup>. The renewable is 2.1 to 2.4 billion m<sup>3</sup> with deficit is about 1 billion m<sup>3</sup> which withdrawal from groundwater resources. “(NWSSIP, 2005). The estimated number of wells in the country is around 45000 together with about 200 drilling platforms”. (SwESA, 2008).

Many cities suffer from water shortage and face continuous water drawdown and water deterioration. This has various reasons, natural reasons like the location of Yemen is in the south-western part of the Arabian peninsula and within the northern extension of the arid tropical climate, where the amount of evapotranspiration exceeds the rainfall in most situations. Besides, Yemen doesn't have permanent rivers and rely on the groundwater as the major source and the little amount of rainfall, flood water harvesting.

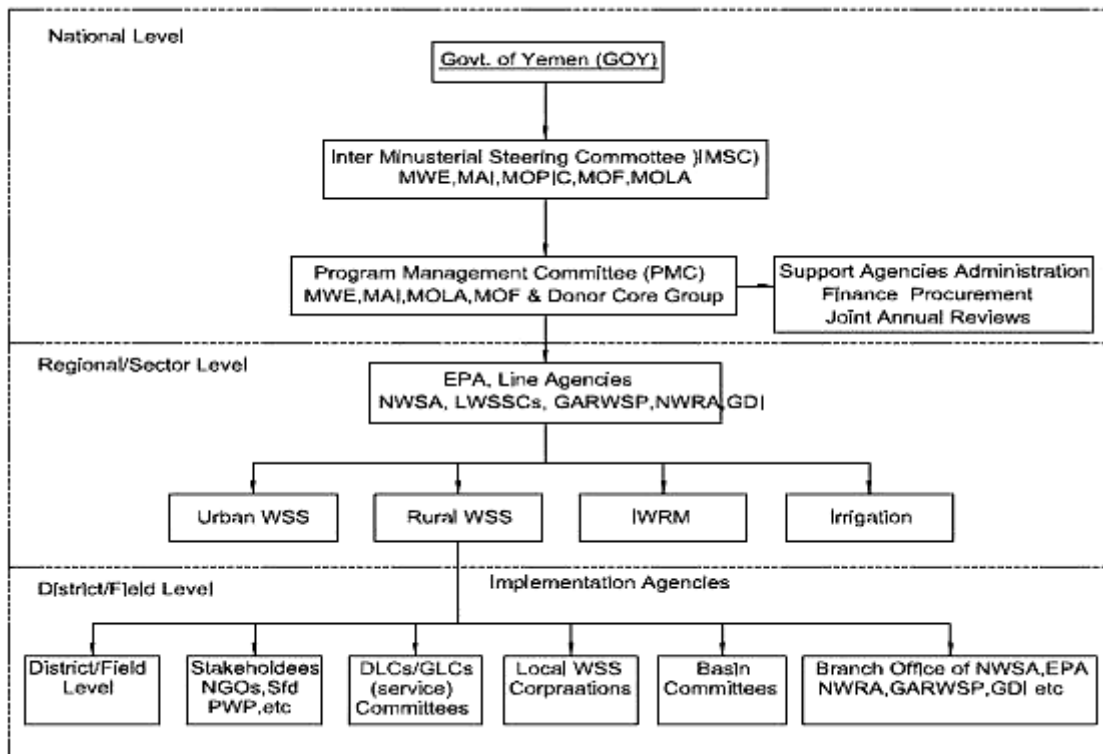
The socio-economic reasons behind the water shortage in the country are the high population growth, especially in the north-western highlands, where high population density coincides with increasing urbanization, increasing of industrial and commercial activities, and expansion of agricultural land use, with high water demand crops as well as low efficiency of irrigating schemes.

The water crises in Yemen, was also related to the poor management of the water resources at national and local levels. There is also an important factor of water deteriorate in the country which is the role of water sector's policies, laws, regulations and institutional setup. This report describe the institutional setup of the water sector and identify roles and responsibilities of the main players including cooperation, harmony, and overlapping between different institutions.

The goal of this report is to identify the weakness and gaps of the institutional setup and to characterize the effectiveness of polices, decision making process and conflicts and finally to come up with policy paper.....

## 2. Overview of the institutional setup of water sector

The institutional setup of water sector is the overall framework of informal and formal institutions that are responsible for the water management. It can be classified as follows,



## 3. Traditional Institutional Setup:

Yemen has an ancient civilization and historical heritage, as it was known “Arabic Felix”. The water harvesting and water diversion are the most famous method (Marib Dam). The inheritance customs and traditions still play a role in resolving disputes related to the distribution of surface water. Recently, after the emergence of modern drilling techniques, most people adopted the deep drilling wells to get the water with decrease in using harvesting and management tetchiness. ....

### 3.1. Irrigation, Traditional practices:

In 1950s spate schemes were adapted as an excellent controlled system, at that time agriculture area depended on dry practices and spate irrigation. In the 1970s with the arrival of Tubewell technologies, agriculture area started to expanded depended on groundwater as result of increasing tubewells (Al-Hamdi- water in arab world- swesa). From 1970 to 2000,

85% of the irrigated area was equipped (making the most scarcity). Water consumption in irrigation sector continues to increase to 5% per year. By 1990 irrigated agriculture was consuming 130% of Yemen's renewable water resources, by 2005 it had reached 150%, and by 2025 it is expected to be 200%. (CWESA-Water in Arab World).

### 3.2. Domestic Water, Traditional practices:

Traditionally, springs, wells or ponds that collect runoff were the main resources of domestic water. In other words, Water fetching activities from such sources (especially in rural areas), was the traditional way of supply, woman and girls had their time and effort to fetching water. However, new technologies have brought relief and release time from tedious water fetching. But for most rural areas woman and girls still suffering the fetching activities. Very poor health and education are results of such activities (CWRAS).

- Traditional water rights:

Traditionally, water rights have been ruled by (traditional institutions)

- sharia, as a formal law
- Urf – (Al a'la fa al al a'la ) (The upper above the upper) as a custom and local practice, principle that gives priority to the upstream users before their downstream neighbors This traditional system is still working today, but generates equity issues as it disadvantages the tail-enders (Making the Most of Scarcity).
- Tribal governance

Although there are regional differences, in general water rights are as follows:

spate – upstream first

spring – time share ownership rights

run off – goes with land

groundwater – what can be extracted by digging under owned land

However, there were absences of clear individual rights to water and of a regulatory system that can limit use, moreover farmers with tubewells pump out as much water as they want, draining the aquifer to the detriment of other areas and of future generations (SWAT) provide opportunities for extractors to sell as much water as they can find buyers for and thus further increase the incentives for users to overexploit the resource (Ref, making the most scarcity).

### **Excellent traditional**

#### **techniques RWH Techniques**

..... Watershed Management

Traditional watershed management using the tools of ancient terrace and historical dams provide other excellent samples. Reducing soil erosion and slowing damaging run-off, aiding Infiltration to groundwater and streams, and retaining water and providing high yielding agricultural land for the farmer are results of such old techniques of management.

### **3.3. Sheikhs and Tribal**

The most important of such community mechanisms is the tribalism as the major system of governance and community organization in most highland rural communities. Sheikhs and tribal leaders still play a vital role in settling disputes in these tribal areas and elected officials also have tribal affiliations, so that tribal and modern power structures largely overlap. In non- tribal areas of Yemen, traditional and modern community institutions exist for water management and for dispute resolution. (CEDRE, 2006)

### **3.4. Religion, Traditions and Customs:**

Traditional right to the water use spate water for irrigation which shall be exercised according to regional tradition and customs, but without any administrative inference, these rights not subject to prior authorization.

## 4. The legal foundations and Administrative setup of the water sector, Legislative Framework

### 4.1. Introduction (Water Governance Promotion)

Water governance has many definitions. One of these definitions is "*Governance systems determine who gets what water, when and how. The representation of various interests in water decision making and the role of politics are important components in addressing governance dynamics*" (UNDP). This section discusses how the water governance in Yemen has been developed during the last four decades (1970s – 2000s) and how it dealt and is dealing with the ongoing water crises.

### 4.2. Bad Water Governance (1970s-1980s)

#### 4.2.1. Governmental Subsidies Policy

With the beginning of the 1970s, with arrival of tubewell technologies, people in Yemen were highly encouraged to extract and use the groundwater resources. The agricultural sector started to be expanded dramatically. Individual water rights and regulatory system, that can limit water use, were not clear. Moreover, the Government of Yemen (GOY) committed itself at that time to *high food security policy*.

The two main reasons behind this policy were; i) to promote self-sufficiency of wheat<sup>1</sup>, vegetables and fruits; and ii) to protect the local market and farmers from the threat caused by the foreigner goods. However, the main three type of subsidies introduced to the farmers by the government then were:

- 1) Diesel Price Subsidy (which still existed to some extent)
- 2) Allowing farmers to import the large Rigs machines that could reach the deeper aquifers
- 3) Exempt farmers from paying any taxes or any custom fees when importing any agricultural equipment such as water pumps and their spare parts...etc.

Even though at the beginning Yemeni farmers could achieve some temporal direct economic benefits for some years during the 1970s and 1980s but adopting such fully subsidized policy

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<sup>1</sup> Around 16,000 MCM annually was needed to cover the whole country with wheat.



induced the farmers to act careless when they used the water for irrigation. Moreover, it motivated them to expand their cultivated area as much as they could<sup>2</sup>. As a result, they had to deep their wells following the water table that started do drop down.

**However, it is worth to mention that, even the agriculture, the main water consumer sector, does contribute only with 18% in the past and currently with 14% of the GDP, the GOY gives the agriculture high priority since it absorbs more than 50% of the national labor (Ref...).**

#### 4.2.2. Water Sector Structure

*“The two main institutions responsible for water in Yemen are the Ministry of Electricity and Water (MEW) and the Ministry of Agriculture and Water Resources (MAWR). The MEW is in charge of water supply and wastewater collection and treatment in urban centers, in addition to water supply in rural areas. Three organizations are directly attached to the MEW: the National Water and Sewerage Authority (NWSA), the General Directorate of Rural Water Supply (RWSD) and the High Water Council (HWC). The NWSA is a financially autonomous authority in charge of water supply and wastewater collection and treatment for the urban areas. Since the establishment of the authority in 1973, its jurisdiction has expanded to cover 12 cities in addition to Sana'a. The minister of MEW chairs the board of directors that runs the authority. The RWSD is mainly in charge of the rural water supply. The main role of this directorate has been the construction of small-scale water supply projects (mostly funded by external donors), which are usually handed to local councils for operation and maintenance. So far, rural sanitation has not received much attention, and on-site disposal facilities are the most common approach in the rural communities. The HWC was established under the same legislation that established the MEW in 1981, and its role is to co-ordinate the activities of all agencies in the water sector. The main task of the Council was to formulate national water plans and strategies and to prepare national water legislation. The Council consisted of deputy ministers of concerned ministries and was chaired by the Minister of Electricity and Water. As a result of under-staffing, the council was reformulated in 1986 to consist of concerned ministers and chaired by the Prime Minister. The Technical Secretariat of the HWC was also established in 1986 to assist the Council in the performance of its duties. Currently, no law had been passed to support the formulation of the Council as an independent agency and, therefore, it had been facing difficulties in meeting its obligations and duties” ( Al-Hamdi, 1997).*

The main characteristics of the **bad water governance** structure during this period are summarized as follows:

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<sup>2</sup> The cultivated area increased from 37,000 ha in the 1970 to more than 370,000 ha at present.

- *The main dominant institutional body in the water sector structure was the MAWR which kept focus on building dams, as water supply tool, and neglected the water demand management tools that people were strongly in need of.*
- Very low level of coordination, if not absence, between the different water sub sectors.
- It was characterized as pure top-down management. In other words, lack of participatory approach.
- Many agricultural cooperative associations and, later on, their cooperative agricultural federation, were established. The main tasks of them were confined to receive the governmental subsidies to distribute it between farmers. On the contrary, they highly supported farmers to either deepen the existed wells or to dig more new deep tubewells reaching the deep aquifers.
- Lack of transparency and accountability.

#### 4.2.3. Water Legislative Framework

During the 1970s and 1980s there was no any kind of national legislations related to water. However, customary rules which have been existed from immemorial time were in charge of resolving any water conflicts. Even though these customary rules were able to deal with the water rights and conflicts related to the surface water resources, they were too sterile when dealing with groundwater, and the reason is that the G.W is a new recent water resource to Yemenis who were customized to use the only source of surface water for all uses. So, they have not developed any rules related to G.W management.

#### 4.3. Water Governance during the 1990s (the wallow phase )

This period was characterized as the vaguest phase. The water crisis started getting worse and worse especially in some cities such as Taiz and Sana'a. The illegal wells were being continually drilled; the GOY was almost unable to deal with the situation. As a result, the annual drop of groundwater level started to be increased rapidly. However, any steps, regardless good or bad, in the governance path were.

- MAWR has been given the responsibility of national water resources management; it has become a water manager and a major water user at the same time. Moreover,

MAWR was very burdened with its heavy tasks related to the agriculture duties and dams constructions.

- Due to the high G.W depleting, the HWC had prepared and drafted a national water law and G.W by-law. However, the drafts were put aside and postponed.
- The HWC realized the strong need of establishing a specialist Authority to manage the water resources. So, another law to establish a national water resources authority was drafted by HWC.
- After Yemen established collective water resources assessment studies with help of Dutch Government in 1995, the **National Water Resources Authority (NWRA)** was established ([Al-Asbahi, 2005](#)).
- The MAWR had given up the water resources management tasks to NWRA and accordingly has been changed to be the ministry of Agriculture and Irrigation (MAI).
- MAI was established in 1996. MAI is responsible for Irrigation, which uses about 90% of the available water, with a high rate of (irrigation efficiency). In the water sector reform and restructuring, most of its sub-sector authorities (i.e. NWRA, NWASA, GARWSP, and EPA) were incorporated in MWE. Water management is the responsibility of the General Department of Irrigation (GDI) and the Central Water Monitoring Unit (CWMU). The MAI is responsible for the management, construction and maintenance of dams, reservoirs, irrigation structures and wells. It is also responsible for improving irrigation efficiency and is in charge of training on new irrigation technologies (MAI 2009) ([References....](#)).
- In the end of this decade, two national five years plans for water and Agriculture were prepared.
- Many national studies were conducted to assess the national water resources in some basins.

Despite what have been done in this decade the water governance still very weak for many reasons:

- Even though establishing NWRA was considered as the end of the fragmented and nested water management structure, NWRA itself was very weak body due to many reasons such as; lack of both appropriate capacities and financial resources, vague vision, lack of the suitable leverage on the other water sub sectors, furthermore,

- MAWR still holding many responsibilities that should be handled to NWRA ...etc
- The legislative framework was not issued yet.
  - High reluctance by the political elites to adopt and support the water issues and to give them the adequate priority they deserve. The political will then did not dispute the farmers who represent a wide segment of the Yemeni Society.
  - The top-down approach continued to be the dominant one by all of water sectors.
  - Almost all of the water organizations were working based on the engineering approach which keeps focus on the technical measures and neglects the other water governance aspects such as social and environmental measures.

#### **4.4. Water Governance (Shaping the Way, 2000s)**

This phase is considered as the corner stone of the water governance in Yemen. Many important steps have been done.

##### **4.4.1. Water Sector Reform**

- **Establishment of Ministry of Water and Environment (MWE)**

In order to consolidate national authorities of water In the face of water crisis in Yemen, the Government of Yemen (GOY) has reformed and restructured the water sector and created a new ministry of water and environment (MWE) in 2003. MWE has pulled the Environment responsibilities from the Ministry of tourism and water responsibilities from the Ministry of water and Electricity (MWE) to leave it as Ministry of Electricity. Vireos water and environmental sectors have been brought under MWE's control. MWE has been established to consolidate the government plans in the water, sanitation and environment sectors ([Water in Arab world 331-334, JAICA, SWESA](#)). In spite the MWE has overall institutional responsibility for water resources management, it does not involve itself in the technical aspects of water for the agricultural sector ([Babgi](#)). Irrigation sector is still under the control of MAI, In other words, overlapping, clashes on responsibilities and funds between the two ministries MWE and MAI and their agencies still exist. The Ministry of Water and Environment and its corporations are responsible for planning and developing water supply and sanitation services ([ALwa, Babgi](#)).

The following agencies fall under the tutelage of MWE

- Environmental Protection Authority (EPA)

- National Water Resources Authority (NWRA)
- General Authority Rural Water Supply and Sanitation Project (GARWSP)
- Local Water Supply and Sanitation Corporations (LC)
- National Water and Sanitation Authority (NWSA) (Babgi)

- **Urban Sector Reform:**

After establishing the MWE, a technical secretary (TS) for the urban water sector was set up. The main task of the TS is to enhance the decentralization in urban water and sanitation sectors by helping and supporting the drinking water suppliers in the cities to be independent from the mother body, NWSA. This step was a great one on the way of enhancing the water governance in urban sector. About fourteen local water and sanitation corporations are currently full independent. This helped them a lot to enhance the services efficiency and cost recovery. **A similar step must be done with the rural sector, NWRA and MAI.**

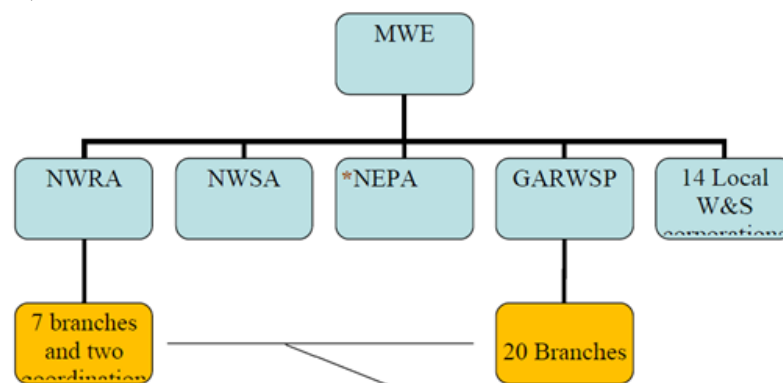


Figure (X) The Water Sector Structure. Source: Ministry of Water and Environment's

Both Branches are still attached to the mother body (Head Quarter). In other words, they are still suffering the high centralization, long routine and the bureaucratic hierarchy

## 4.4.2. Water Legislation Framework

### Water law (# 33) Of August 2002

After long time of waiting by the international donor community and years of intensive political discussions the water law finally has been signed by the Government of Yemen. Water law # (33) that has been drafted since early 90s was approved by the Parliament in July 2002. Water law, as a major step towards a better management of water, set up a range of regulatory management measures such as water rights, licenses, water use guidelines, and regulatory control (water in arab world+ (gtz)+ .(SWESA)+JAICA).

Traditional Private water rights regime didn't attached unless there is critical needs or for public welfare, in this cases the government should compensate any infringement on the right of use. Weather Traditional water rights derived from rainwater harvesting and natural runoff flows or traditional water use from natural springs, brooks, creeks, and surface wells (with depth of 60 meters as maximum), all have been maintained. In the law all customs, traditions systems have been taken in to consideration. The forewarning of all of these rights is that they should be registered with the Water Authority (water in Arab world).

The aim of the Law as stated (in Article 3):

*“to regulate, develop and ration the exploitation of water resources, as well as the protection thereof from depletion and pollution, the improvement of the efficiency of conveying and distributing their uses and the proper maintenance and operation of the installations thereof, and the participation of the beneficiaries thereof in their management in the various stages of their development, investment and conservation thereof.”*

The Law contained nine Chapters, some chapters with sub-sections:

- 1) Nomenclature and Definitions
- 2) Objectives and General Concepts/Principles
- 3) Water Resource Management and Planning
  - i. Management of Water Resources
  - ii. Water Resources Planning
- 4) Water Use
  - i. Priorities of Water Use

- ii. Controls for Dealing with the Use of Water
- 5) Water Rights and Permits
  - i. Water Rights
  - ii. Licenses
- 6) Water Conservation and Protection From Pollution
  - i. General Technical Standards and Specifications
  - ii. Conservation of Water Resources from Depletion and the Rational use of Water
- 7) Protection From Floods and Rainwater Runoff
- 8) Enforcement and Penalties
  - i. Enforcement Procedures
  - ii. Criminal Punishments
- 9) General Final Provisions

Even this step was a great achievement, however, there are two major issues arising from the formulation of the Law; i) Lack of a national water resources Strategy and ii) lack of executive procedures (gtz, 2003). In addition, there were many gaps and undetermined roles i.e. who is responsible on what and how? (ALw)

#### **The National Water Sector Strategy and Investment Program (NWSSIP):**

In 2005, a national water strategy and investment program was prepared for the period from 2005 to 2009. NWSSIP is considered one of the great achievements of the water management and governance. It includes four main components ; i) The main strategic challenges face the water sector, ii) Goals, Policies and proposed approaches, iii) Investment program with estimated budget of 1538 million USD for 2005-2009, and iv) Implementation plans and mechanisms.

The NWSIP was the most ambitious program in the water sector that was supposed to enhance the water management and governance to a high level, however, normatively always differs from reality. The implementation progress reports of NWSIP state that the implementation status was ranked as moderate unsatisfactory.

### **Water law (Amendment) # 41 of December 2006.**

In the Water Law 2006 some articles of the law No. 33 for the year 2002 have been amended.

*The water law was amended after reformed and restructured the water sector, especially, after establishing the MWE and issuing the NWSIP.* However, the National Water Law No. (41) of 2006 is more or less similar to the Water Law NO. (33) Of 2002 ([Water law 2006 + Yemen socio economic](#)).

Both of the Water Law no. (33) of August 2002 and no. (41) of December 2006 (Amendment Act) set out, inter-alia, the general objectives and principles, the organization, management and planning of water resources, water use guidelines, sectoral water uses, water rights and licenses, conservation and protection of water from pollution/contamination/floods, general technical standards and specifications as well as control procedures and penalties. ([SWESA](#)).

### **Water Bylaw Issuing**

The water law, as a general legislative framework and guideline that determines the roles, responsibilities, relationships...etc, it lacks the executive implementation mechanisms and the necessary details. Therefore, the need of having a water bylaw was so high. NWRA with support of donors had prepared the bylaw draft in 2007 and 2008 and raised it up to the cabinet in order to be approved. However, the approval came somehow late and was issued in the end of 2010. ([Reference...](#))

### **Basins Water Regulation and Governance Decree:**

The water bylaw focuses more on the implementation rules and standards; however it does not quantify the water governance structure clearly. Therefore, the bylaw gives the water and environment minister the authority to issue any supplemental bylaws, mechanisms...etc. Thus, in March, 2011 the minister of W&E issued his decree no (6) which clearly identified and detailed the water regulations and governance in the level of basins. By this step, theoretically, the water legislative framework in Yemen is considered to be complete ([Reference.....](#)).

#### **4.4.3. Decentralization and Participation:**

The water law states explicitly the necessity of promotion the decentralization in the water management by involving all stakeholders particularly the end users. Thus, in this decade many Water User Associations (WUAs), especially in critical basins, were organized, established, promoted, and provided with the necessary knowledge to participate in water management.



## 4.5. What are norms and what are realistic?

It is difficult to answer such wide question in few lines; nevertheless, the followings bring an overview on what is norm and what is not.

### 4.5.1. The Water legislation framework:

Even though the legislative framework is well done in proper way; however it is partially applied, if not non-applicable. Many reasons are behind that;

- i) The tribe has the first and strongest power in the field even more than the state itself in many districts,
- ii) Since the farmers are the biggest society segment who elect the elites, the political regime is very weaker than impose them to follow the laws and rules, and
- iii) Corruption plays a negative role breaking up the application of laws.

### 4.5.2. Water sector form:

There are two main constrains still challenging the water governance in the sector;

- i) Very week coordination, cooperation and integration between water sub sectors. Even it seems by the structure that everything is organized and determined; but when it comes to reality it is something different; and
- ii) The rural sector and NWRA still have strong centralized system within the sector itself. The branches are allowed only to prepare the annual operation plans and to implement them; however they are neither allowed to prepare the management plans on the basin levels nor to draw their own implementation approaches, important and critical decisions are not their responsibility as well. They have to go back to the head quarters in such issues which take lots of time and often resisted and refused.

### 4.5.3. Decentralized Governance Structure

Notwithstanding of the very decentralized governance structure has been set up with wide range of responsibilities and roles to different stakeholders, it is still lack the real application for many reasons; 18

- i) Most of the relevant stakeholders still not realize the structure,

- ii) The official sectors like NWRA (HQ) is afraid to lose its ownership in water resources management by giving such critical mandates to the local sectors,
- iii) The local players such as NGOs, WUAs, LCs are still lacking the real abilities and capabilities to tackle the tasks they are supposed to do, ( wide range of capacity building for them is needed),
- iv) NWRA Branches as a head of the Technical Secretary still struggling to fulfill their tasks i.e. they are in high need of financial support to bring them up to tackle such important roles, and
- v) To bring the real needed structure to the light and to make it applicable, two factors must be ensured; firstly, allocating adequate financial resources, secondly, ensuring a political will and support in order to go on such decentralized approach.

#### 4.6. Main Strengthens and Weaknesses

<u>Strong points</u>	<u>Weak points</u>
<ul style="list-style-type: none"> <li>• Good laws, regulations and strategies</li> <li>• Existence of basin committees and water user associations (incipient stakeholder participation)</li> <li>• Existence of local water corporations; with performance indicators</li> <li>• Issuing of a manual for local government services</li> <li>• Issuing of a statistical yearly book</li> <li>• Existence of web sites for most agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of implementation of laws and strategies</li> <li>• Implementation timeframe for strategies is not specified</li> <li>• Absence of the concept of monitoring and evaluation</li> <li>• Over-centralization in the water sub-sectors</li> <li>• Responsibilities are often not well understood</li> <li>• Duplication of responsibilities and mandates among agencies</li> <li>• Weak capacity of local administrations</li> <li>• Little transparency in the criteria for appointing governmental staff and allocating the funds</li> <li>• Poor accountability and poor integrity within agencies</li> </ul>

## 5. Formal (Governmental) Institutional Setup:

### 5.1. Background: describe the situation of WM in \north and \south before of WM in north and south before Yemen unity

**The HWC:** was established under the same legislation that established the MEW in 1981, and its role is to co-ordinate the activities of all agencies in the water sector. The main task of the Council was to formulate national water plans and strategies and to prepare national water legislation. The Council consisted of deputy ministers of concerned ministries and was chaired by the Minister of Electricity and Water. As a result of under-staffing, the council was reformulated in 1986 to consist of concerned ministers and chaired by the Prime Minister. The Technical Secretariat of the HWC was also established in 1986 to assist the Council in the performance of its duties. Currently, no law had been passed to support the formulation of the Council as an independent agency and, therefore, it had been facing difficulties in meeting its obligations and duties.

**MAWR:** After reunification of North and South Yemen in May 1990, the MAWR was formed from the previous Ministry of Agriculture and Fisheries in the north and the Ministry of Agriculture and Agrarian Reform in the south. These ministries had been in charge of development of water resources for agricultural purposes. However, since May 1990 the MAWR has been given the responsibility of managing national water resources, i.e. it has become a water manager and a major water user at the same time (Al-Hamdi).

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Formal institutions designed to govern human conduct in an orderly manner can give way to a flexible and adjustable set of rules. Formal institution can be categories in to two levels, National Institutions, Local institutions.

The two main national administrative institutions responsible for water in Yemen are the Ministry of

Water and Environment (MWE) and the Ministry of Agriculture and Irrigation (MAI).

### 5.2. The National Level Institutions Setup of the Water Sector:

The national institutional setup of the water sector consists from the following ministries:

- **Parliament Committee of Agriculture, Fisheries and Water Resources.**
- **Ministry of Water and Environment (MWE):** the following authority is governed

by the ministry:

- National Water Resources Authority (NWRA).
  - General Authority for Rural Water Supply Projects (GARWSP).
  - National Water and Sanitation Authority (NWSA).
  - Local Water Supply and Sanitation Corporations (LWSSCs).
  - Environment Protection Authority (EPA).
- **Ministry of Agriculture and Irrigation (MAI):** the most important authorities and projects that related to water issues are:
- Agriculture Credit Bank (CAC Bank).
  - General Corporation and Authorities:
    - Groundwater and Soil Conservation Project (GSCP):
    - Tihamah Development Authority (TDA).
- **The other ministries that plays a role in water sector are:**
- The **Ministry of Planning and International Cooperation (MOPIC)**
  - The **Ministry of Finance (MoF)**.
  - The **Ministry of Local Administration (MoLA)**.
  - **The Ministry of Interior (Mol)**.
  - **Ministry of Oil and Minerals (MOM)**, under (GSMRB).

### 5.2.1. Parliament Committee of Agriculture, Fisheries and Water Resources.

- **Established Date:** According to the investment law No. (22), 2002, Part 2: organs of the parliament council, act 5: the formation of committees and terms of reference.
- **Structure:** The members of the permanent committees are nominated by the presidency of the parliament according to the members' desire, specialization, expertise, and qualification. Every committee consists of 11 members at least and not exceeds 15. It re-formed after three years.
- **Goals (Proposed Role):** It is responsible for studying and reviewing all matters relating to agricultural affairs, fisheries, livestock, water resources, irrigation, dams and rural development, forestry and productive cooperative association , and the other related institutions and authorities. Furthermore, it is following up and evaluating the agricultural and water policies which be taken by the government. In addition, the committee is monitoring the entities' activities within the jurisdiction of the committee.

### 5.2.2. Ministry of Water and Environment (MWE):

- **Established Date:** 2003
- **Structure:** As in the appendix 1
- **It's authorities:** NWRA, GARWSP, NWSA, LWSSCs, and EPA.
- **It's Sectors:** Water and sanitation sector, and environment sector.
- **Goals (Proposed Role):** MWE has overall institutional responsibility for water resources management but does not involve itself in the technical aspects of water for the agricultural sector. The Ministry and its corporations are responsible for planning and developing water supply & sanitation services. The following agencies fall under the tutelage of MWE:

.....

In order to consolidate national authorities of water In the face of water crisis in Yemen, the Government of Yemen (GOY) has reformed and restructured the water sector and created a new ministry of water and environment (MWE). MWE has pulled the Environment responsibilities from the Ministry of tourism and water responsibilities from the Ministry of water and Electricity to leave it Ministry of Electricity vireos water and environmental sectors have been brought under MWE's control. MWE has been established to consolidate the government plans in the water, sanitation and environment sectors (Water in Arab world

331-334, JAICA, SWESA). In spite the MWE has overall 22 institutional responsibility for water resources management, it does not involve itself in the technical aspects of water for the agricultural sector. The Ministry and its corporations are responsible for planning and developing water supply & sanitation services.

The following agencies fall under the tutelage of MWE

- Environmental Protection Authority (EPA)
- National Water Resources Authority (NWRA)
- General Authority Rural Water Supply and Sanitation Project (GARWSP)
- Local Water Supply and Sanitation Corporations (LC)
- National Water and Sanitation Authority (NWSA)

### 5.2.3. Ministry of Agriculture and Irrigation (MAI):

- **Established Date:** 1953, 1963, 1975, and 1990.
- **Structure:** As in the appendix 2.
- **It's sectors related to water issues:** Irrigation Sector, Agricultural Sciences, and Agricultural Development.
- **It's authorities related to water issues:** CAC Bank, GSCP, TDA.
- **It's offices:** Hadramout coast, wadi Hadramout, Ibb, and Taiz.
- **Goals (Proposed Role):** MAI was established in 1996. Water management is the responsibility of the General Department of Irrigation (GDI) and the Central Water Monitoring Unit (CWMU). The MAI is responsible for the management, construction and maintenance of dams, reservoirs, irrigation structures and wells. It is also responsible for improving irrigation efficiency and is in charge of training on new irrigation technologies (MAI 2009).

MAI was established in 1996. MAI is responsible for Irrigation, which uses about 90% of the available water, with a high rate of (irrigation efficiency). In the water sector reform and restructuring, most of its sub- sector authorities (i.e. NWRA, NWASA, GARWSP, and EPA) were incorporated in MWE. Water management is the responsibility of the General Department of Irrigation (GDI) and the Central Water Monitoring Unit (CWMU). The MAI is responsible for the management, construction and maintenance of dams, reservoirs, irrigation structures and wells. It is also responsible for improving irrigation efficiency and is in charge of training on new irrigation technologies (MAI 2009).

#### 5.2.4. The Other Ministries that Have a Role in Water Issues:

- **The Ministry of Oil and Minerals (MOM):** It is responsible for the technical studies through Geological Survey and Mineral Resources Board (GSMRB). Some of the technical works are identification and assessment of the groundwater aquifers, aquifers properties, geological and geo-environmental mapping, prior technical works of dams sites, water sample analysis and ...etc.
- **The Ministry of Planning and International Cooperation (MOPIC):** It is responsible for sustainable development, poverty reduction as well as investment planning and programming.
- **The Ministry of Finance (MoF):** Deals with budgeting, resource allocation for schemes, investment subsidies and trade policy, regulations of diesel price.
- **The Ministry of Local Administration (MoLA):** It is responsible for oversees **decentralization** programs and activities of the Local Authorities, as well as implementation of the Water Policy and laws at the local level.
- **The Ministry of Interior (MoI):** It is responsible for enforcement of laws, rules and regulations, including the water law.
- **The Ministry of Justice (MoJ):** It is responsible for resolve the conflicts related to the water. There are no specialized courts for water conflicts.
- **Ministry of Public Works & Urban Planning (MPWUP)** is responsible for observing and monitoring the drinking water purification stations.

#### 5.2.5. National Water Resources Authority (NWRA):

NWRA has a strong institutional role and is the key agency for framing policy measures, implementing water laws, exploring technical options for efficient water use, as well as management and development of the water resources. According to the Water Law, NWRA manages water in the 14 basins of Yemen, through co-management schemes in partnership with local stakeholders, and using Water Resources Management Action Plans. It has branches in Taiz, Aden, Saada, Hadhramout.

- **Establishment Date:** NWRA was established in 1995 (Republican Decree No. 154), and was restructured in 2005 (Republican Decree No. 22).
- **Governed by:** In 2003, it was transferred and was included to MWE.
- **Structure:** As in the appendix 3, two main sectors are responsible for the implementation of studies and field activities, Studying and Planning Sector Head, Monitoring Public Awareness and Water Rights Sector Head, beside the other important department and Branches offices.
- **It's Branches offices:** Seven branches, Sana'a/Amran, Taiz/Ibb, Aden, Sa'adah, Seyun, Al-Hodeidah, and Dhamar/Al-Beida.
- **Goals (Proposed Role):** to ensure conservation, efficient use, proper management and sustainable development of the country's water resources. (NWRA, 2006).
- **Steps carried out to achieve the objectives:** As mentioned in NWRA's web site and according to the available references, NWRA takes actions at different levels:
  - **At policy level:** determine the adequate activities to be undertaken and ensure the coordinating planning between all water institutions and donors. In that regard NWRA participate in the preparation and updating of NWSSIP.
  - **At legal level:** implementing the water laws, by controlling the water abstraction through mandatory licensing and applied legal measures against unauthorized (random) drilling wells. By the end of 2007 the concerned offices had issued 1171 licenses for drilling or deepening wells, rejected 1220 applications for licenses, and registered 234 drilling companies in the country. In several cases, application forms were rejected by NWRA after field checks and verifications as required by available regulations. Regarding to the tracking illegal drilling, by January 2009, the Operations Unit (in charge of tracking illegal drilling) had dealt with 428 illegal drilling cases. (NWRA's Web Site, 2012).
  - **At social level:** awareness rising about the importance of water and encourage communities to conserve and rationalize use of water. As an example of these activities are, awareness raising in schools and in school manuals, awareness raising within the religious community, awareness raising among farmers, publication of water-related articles in the journalism, distribution of materials (posters, brochures, paper bags, etc), awareness raising through TV and Radio, and etc. In



addition to that, NWRA, its branches, and with the support of GIZ, established number of water basin committees in some basins.

- **At technical level:** studying and evaluating the water resources throughout the country from the different aspects like, well inventories, water quality, geophysical surveys, social and economic studies on the water use, and etc. In addition, classification of the groundwater basins and hydro-geological provinces (fourteen water management regions has been identified over the territory of Yemen), delineate groundwater protection zones in some areas, set a local groundwater monitoring networks (water level and quality monitoring), set a national water quality standards (public drinking water, bottled drinking water, irrigation water and treated wastewater), and established National Water Resources Information Centre at the headquarters.

**-There are shortcomings in some of the following activities:**

- There is a weakness in implemented the water law, especially in mandatory licensing and in applied legal measures against random drilling wells, registration of wells and pumping quantities, and applied groundwater protection zones.

- There isn't enough coordination between NWRA and Irrigation Sector and Land Reclamation toward the water use in irrigation (an overexploitation of groundwater for irrigation purposes), and water harvesting techniques (the purpose, locations and the types of harvesting methods).

- The role of NWRA in the technical studies is not enough; a lot more remains to be done (SwESA, 2008). So, a better cooperation between NWRA and GSMRB will be required to fulfill the gap of the technical studies. In many countries, for example Saudi Arabia, British, and USA, Geological survey authorities are responsible for water studies.

### 5.2.6. General Authority for Rural Water Supply Projects (GARWSP):

- **Established Date:** 2002 by the Republican Decree No. (60).
- **Governed by:** In 2004, it was transferred and was included to MWE by the Republican Decree No. 77.
- **Structure:** As in the appendix 4.
- **It's main sectors:**
- **It's Branches offices:** In the most of country's governorate.

GARWSP provides technical guidance for planning, executing and the operation and maintenance of rural water supply and sanitation projects. The Authority looks after planning, statistics and follow-up studies, Control Supervision and Inspection, Financial Affairs, Legal Affairs, Branch Affairs etc. Its branches cover all the Governorates.

### 5.2.7. National Water and Sanitation Authority (NWSA):

- **Established Date:** 1997, by the Cabinet Resolution No. 237 under the previously Ministry of Electricity and Water.
- **Governed by:** MWE in 2003.
- **Structure:**
- **It's main sectors:**
- **It's Branches offices:** covering all the Governorates.

Created in 1995, NWRA has a strong institutional role and is the key agency for framing policy measures, implementing water laws, exploring technical options for efficient water use, as well as management and development of the water resources. According to the Water Law, NWRA manages water in the 14 basins of Yemen, through co-management schemes in partnership with local stakeholders, and using Water Resources Management Action Plans. It has branches in Taiz, Aden, Saada, Hadhramout.

### 5.2.8. Environment Protection Authority (EPA):

- **Established Date:** According to The Environmental Protection Law No. (26) of 1995, the EPA established in 2005 by the Republican Decree No. (101).

- **Governed by:** MAI

- **Structure:**

- **It's main sectors:**

- **It's Branches offices:**

EPA is the responsible agency for applying the Environment Protection Law of 1995. EPA is responsible for conservation of environmental elements from negative effects of pollution; safety and balance of the natural environment by implementing appropriate policies and plans; and carrying out environmental surveys, monitoring, evaluating and reporting on relevant programs and activities.

### 5.2.9. Cooperative and Agriculture Credit Bank (CAC Bank):

- **Established Date:** 1982, by the law No. 39. Previously, the bank is registered with the Ministry of Industry and Trade.

- **Governed by:** MAI

- **Structure:**

- **It's main sectors:**

- **It's Branches offices:** 52 branches spread all over the country's governorate.

- **Goals (Proposed Role):** It is sporting farmers by long, medium, and short term loan. The long term loan has a duration between 5 to 7 years and shall be offered to projects geared for farming fruit products like, bananas, papaya, mango, Citrus, Guava, ...etc. Beside other cash products like coffee, palm, and cotton and various gardening projects.

### 5.2.10. Irrigation Sector and land reclamation:

- **Established Date:**

- **Governed by:** one sector of MAI

- **Structure:** As in the appendix 2.

- **It's main departments:**

The GDI is the regulatory department that oversees the preparation and execution of long-term strategies and plans related to on-farm irrigation modernization and advisory services, rehabilitation and development of irrigation infrastructure, groundwater exploration, as well as farmers' training and capacity building activities (MWE 2008).

### 5.3. Local Level Institutions of the Water Sector:

#### 5.3.1. Local Water Supply and Sanitation Corporations (LWSSCs).

These corporations were set-up as part of the water sector reforms with the objective of decentralizing service provision. These units work in close coordination with District and Governorate Local Councils, which were set-up under the Local Authority in 2000. It is planned for these corporations to function as autonomous commercial entities with tariff structures that fully cover their capital, operational and maintenance costs. Currently, 15 local WSSCs receive technical assistance from MWE and are going through a transitory phase towards full autonomy and commercial operation.

- **Established Date:**

- **Governed by:** MAI

- **Structure:**

- **It's main sectors:**

- **It's Branches offices:**

#### 5.3.2. The Social Fund for Development (SFD):

- **Establishment Date:** 1997 by the law No. 10

- **Governed By:** Board of directors chaired by the Prime Minister. It is financially and administration independent. Its financial sources are Yemen Gov., donors from brotherly and friendly countries as in the appendix 5A.

- **Structure:** It consists of 8 implementation units beside and 11 supporting units, as in the appendix 5B.

- **It's Main Units:** the units that related to water are three units, Water and Environment Unit, Agriculture and rural development Unit, and Health and Social Protection Unit.

- **It's Branches Offices:** there are 9 branches offices cover the country.

- **Main Programs:** SFD has four main programs, Community Development, Capacity Building, Small and Microenterprises Development, and Labor Intensive Program.

- **Goals (Proposed Role):** SFD carried out their works through phases. Three phases have been finished since its establishment. The first phase from 1997 to 2000, second phase from

2000 to 2003, and the third phase 2004 to 2010. The fourth phase started from 2011 and will end in 2015.

In General, the SFD goals are, improving access of the poor to basic services, enhancing economic opportunities and reducing the vulnerability of the poor as well as building capacities at national levels including local authorities and community structures.

The activities related to water are carried out through the Water and Environment Unit (WEU) and Agriculture and Rural Development Unit (ARDU), which includes some projects and programs. The aims of WEU are to improve poor communities' access to water and sanitation. WEU supports communities with rain water harvesting (cisterns, tanks, dams, and etc), improve water quality in the rural areas, support with mechanized water systems (dug well, pump, storage tank and conveyance system), wastewater management, solid waste management, and improving shallow wells and springs.

Communities must be able to meet some conditions like establishment water user committee, provide running and maintenance cost, and provide land for the project's components. Regarding to the supporting of mechanized water systems from groundwater source, other conditions must be fulfilled as; the static water depth in the well should not exceed 100 m, one pumping stage is enough to transport water to the community and etc.

ARDU concentrate on activates associated with irrigation, soil and water conservation. Those activities include; terraces rehabilitation, wadi diversion canals, wadi bank protection, gabions, check dam construction. In addition to that improving traditional spate irrigation (surface water irrigation system), small dams with attached irrigation systems, Qat substitution, and training and awareness raising in all of the mentioned activities.

**-The shortcomings:**

In the implementing the of SFD activities, there are a lot of good points as the following:

- SFD gives priority to projects that depend on renewable water resources.
- To support drinking water and rainwater harvesting projects, communities must be able to establish a Waters Users' Committee.

- For the supporting of GW mechanized systems, SFD support drilling dug wells.
- There is collaboration between MAI and SFD in implementing the Rain-fed agriculture components.

But, some of these works represent duplication with other sector activities like, Irrigation and land reclamation sector, and General Authority for Rural Water Supply Projects.

### 5.3.3. Water Users Groups (WUGs)& Water Users Associations (WUAs):

- **Established Date:** WUA's are registered under Law No. (39) of 1998. The Article 10 of the Water Law No. 33 of 2002 encourages the establishment of user community organizations in water resource management as well as in operation and maintenance of the facilities and installations. (SwESA, 2008)

- **Governed by:** NGO.

“WUGs were originally formed around irrigation wells already in operation with 5 to 10 co-owners. Such conventional WUGS function on an informal basis, relying on customary usage and practice, to operate/maintain the wells, and distribute water equitably to their members. However, many of these WUGs failed to regulate/control ground water discharge of their wells as well as of those in the neighborhood”. WUGs and the WUAs play an important role in demand management. Improvement and formal recognition of WUGs and WUAs is currently in progress.

A number of WUGs have a recognized boundary, such as a village or a tribal area, and are organized into WUAs. An officially recognized WUA is a prerequisite for participation in irrigation improvement program. WUAs participate actively in basin level water management programs.

Broadly, the WUAs/WUGs perform the following functions:

1. Manage available water resources
2. Monitor well abstraction
3. Install new water savings technology
4. Market agricultural products
5. Increase water use efficiency

#### 5.3.4. Water Basin Committees (WBCs):

- **Established Date:** Abyan in 2007, Sa'dah in 2004, and Amran in 2008
- **Governed by:** NWRA.
- **Goals (Proposed Role):** Regularly meetings to implement committee plan. The Technical Secretary is coordinating, facilitating, exchanging information and is mediating between the stakeholders. The WBC is participating in decision making of management plans concerning water resources development, irrigation projects, water related regulation's enforcement and monitoring tools concerning water use, saving and protection issues in the basin. The enforcement of the water Law and by-laws is monitored as well as the implementation of the water resources management plans along with water sector related strategies and policies. (GIZ, ---)

#### 5.3.5. Yemeni Association for water and sanitation (YAWS):

- **Established Date:** 2010
- **Governed by:** NGO, the membership of this association is foreseen for LCs (institutional), other institutional stakeholders and Individuals (professionals).
- **Structure:**
- **Goals (Proposed Role):** to serve as professional's organization which provides technical advice/options as intellectual support. The Main tasks will be between others the experience exchange/networking all over the countries water sector, enforcement of operational cooperation between LCs and representation of Yemeni interests in regional and international associations. (DWA, 2010)

#### 5.3.6. Integrated Water resources Management Working Group (IWRM-WG)

- **Establishment Date:** September, 2005.
- **Governed By:** IWRM-WG is an informal and independent association of professionals in the water sector from relevant government agencies, donor representatives, NGOs and other relevant stakeholders.
- **Structure:** It is run by committee based in NWRA. The Chairman of IWRM-WG is NWRA's chairman, and the co-chairman is a representative of donors group.

- **Goals (Proposed Role):** To exchange information, share knowledge and experiences, cooperate, coordinate and discuss projects, activates, policies and concepts in the fields of IWRM, groundwater resources and related topics.

#### 5.3.7. Sana'a Basin Management Project (SBMP): 2004 -2010

- **Governed by:** MWE.

- **Structure:**

- **Goals (Proposed Role):** Extend the life of the aquifers in Sana'a basin, increase the efficiency of agriculture irrigating water use within Sana'a basin, and strengthen and build an institutional and legal framework cable of dealing with basin management issues.



## 6. Institutional Analysis and Suggestion.

- MAI (CAC Bank), MOPIC, MoF, and... etc, when and why the incentives (Loans, ...etc) better to be given to the farmers. Is the incentives to reduce the GW abstraction and use, to enhance water resources management, and to implement the strategies that avoid drought and depletion.....
- The role of NWRA in the technical studies is not enough; a lot more remains to be done (SwESA, 2008). A cooperation between NWRA and GSMRB will be help in fulfill the gap of the technical studies. In many countries, for example Saudi Arabia (developing country), British, and USA (developed countries), Geological survey authorities are responsible for technical water studies. ....
- There is an overlap in the some activities accomplished by SFD and GARWSP.....
- Irrigation sector, and MWE, is there cooperation related to construct the dams, when, why, what is the purpose of the dams, is it for artificial recharge, or for irrigation, the amount of water that better to be used annually for irrigation. ....
- Two sector are under the MWE, Water and Sanitation Sector, and Environment Sector, what the linkage between them and specialist authorities, NWRA and EPA. ....
- **Inter Ministerial and Parliament water Committee** is better to be establishing in the top of the water sector institutions as in chart bellow. This will lead to better coordination and cooperation between different institutions, so that it will be no contradictory among the strategies adopted by each institution. All efforts must be concerted to overcome the phenomenon of arbitrary digging of wells and over-abstraction of groundwater resources to avoid disaster drought that threatens many aquifers in the country.
- The figure below shows the institutional set-up of Yemen water sector with the suggested, “Inter Ministerial and Parliament water Committee”, on the top of Institutional set up.

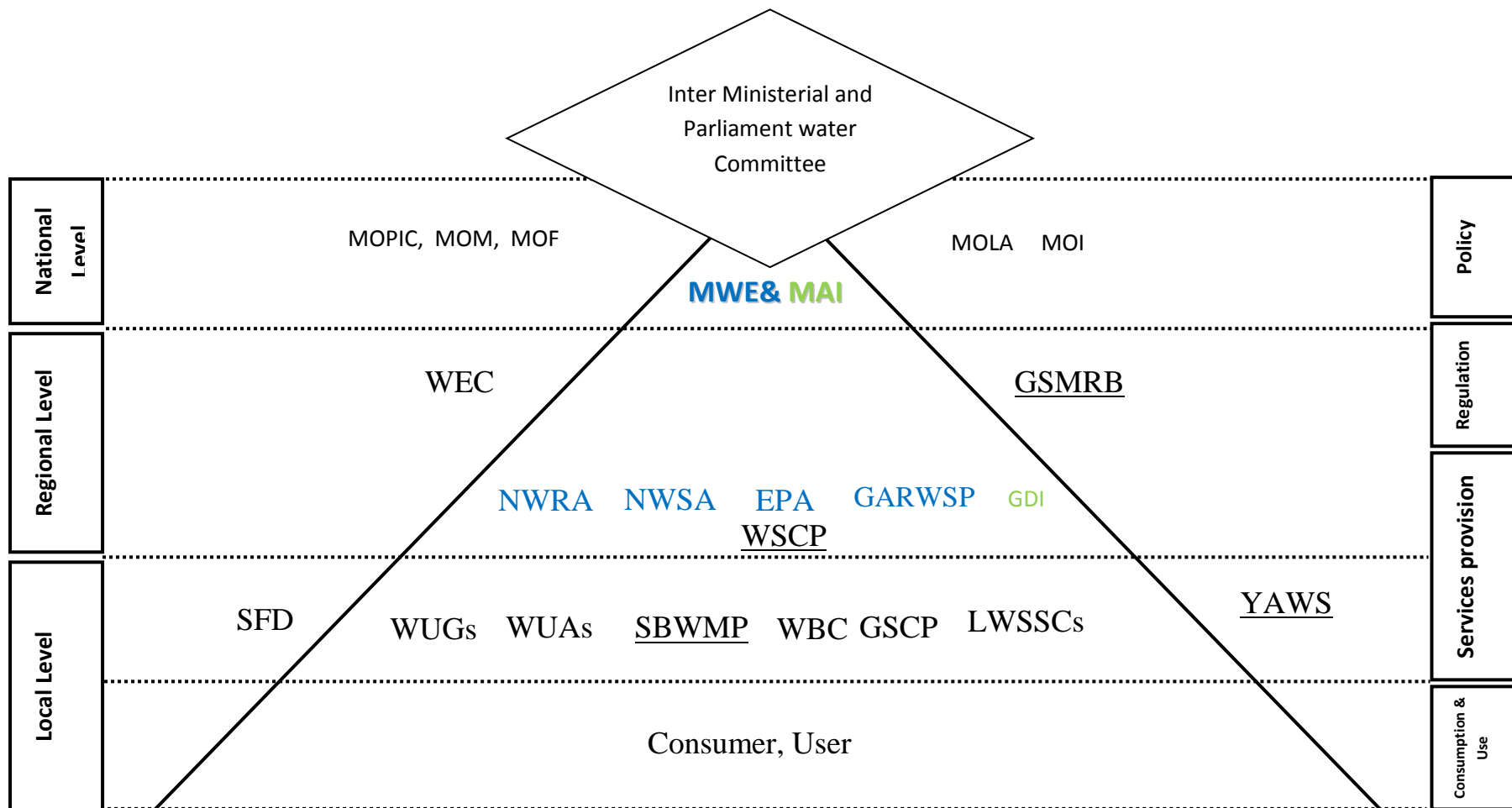


Figure: The institutional set-up of Yemen water sector with the suggested, “Inter Ministerial and Parliament water Committee”, on the top of Institutional set up. (Based on Kenya experience on Institutional reform of the water sector)

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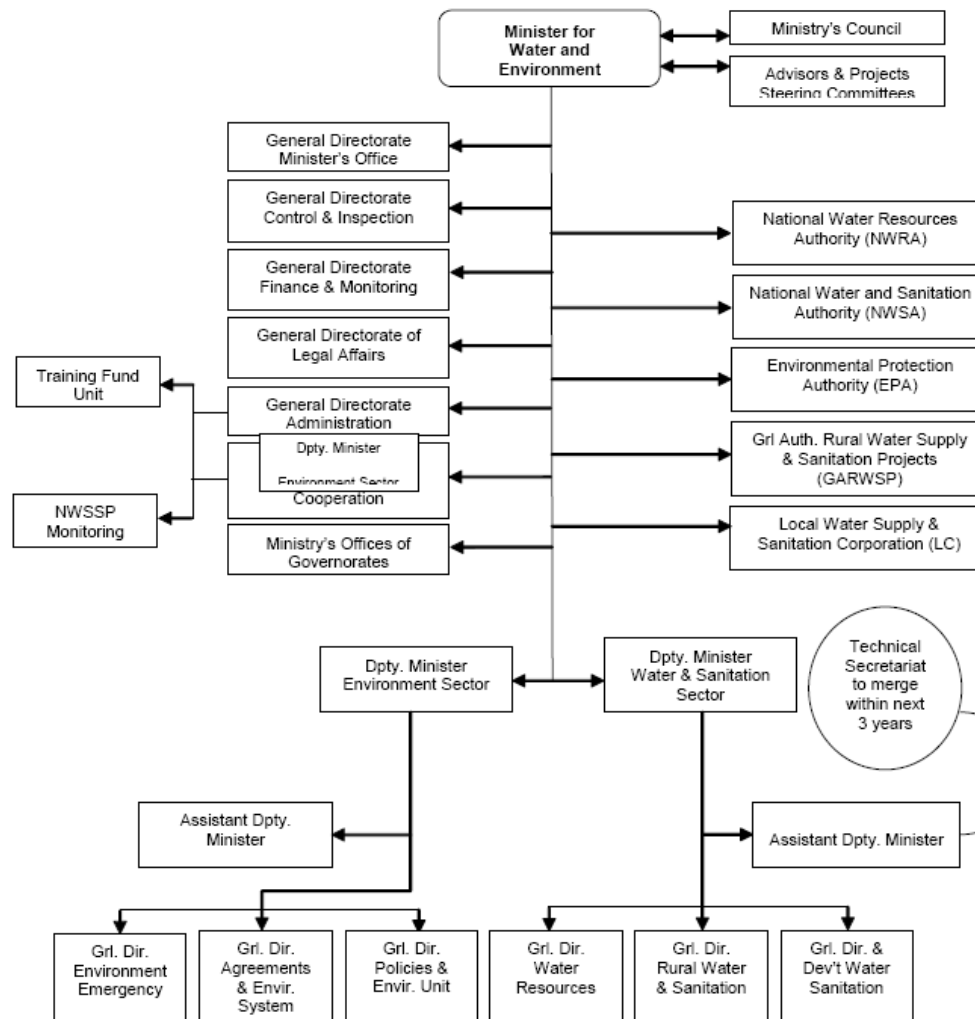
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## 8. Appendixes

### Appendix 1:

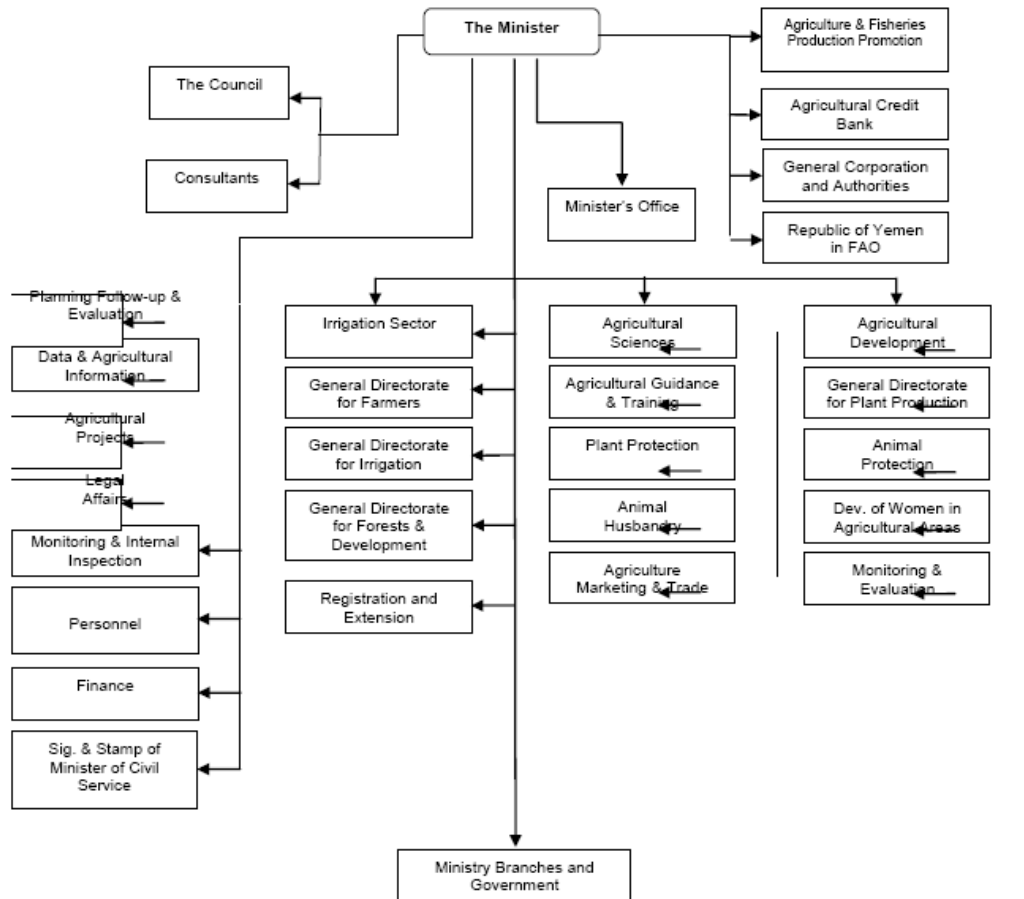
Appendix 1: Schematic Organizational Chart of Ministry of Water and Environment (SwESA, 2008)

Annex 4.1 : Schematic Organizational Chart of Ministry of Water and Environment



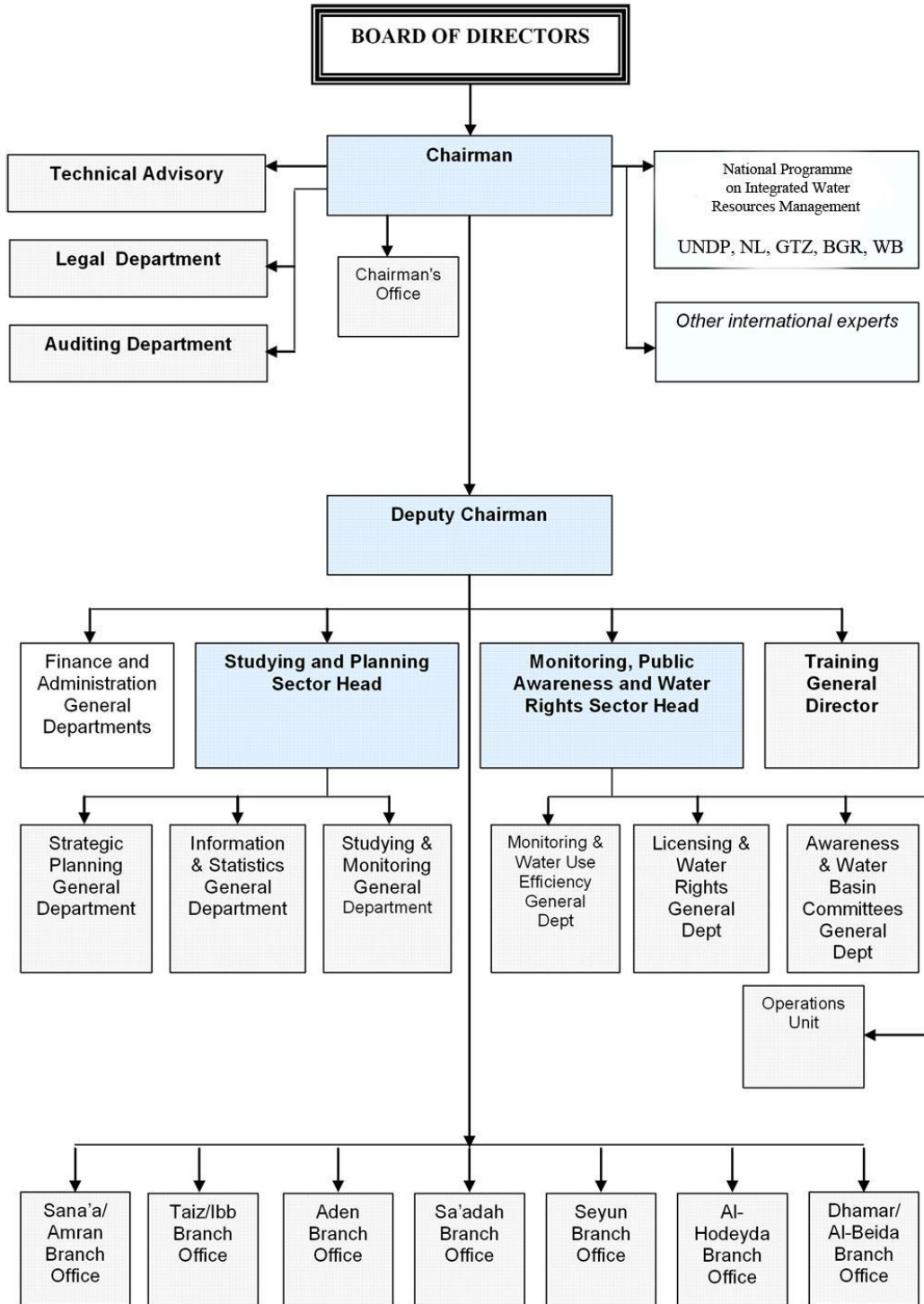
## Appendix 2:

Appendix 2: Organizational Chart of the Ministry of Agricultural & Irrigation (SwESA, 2008).



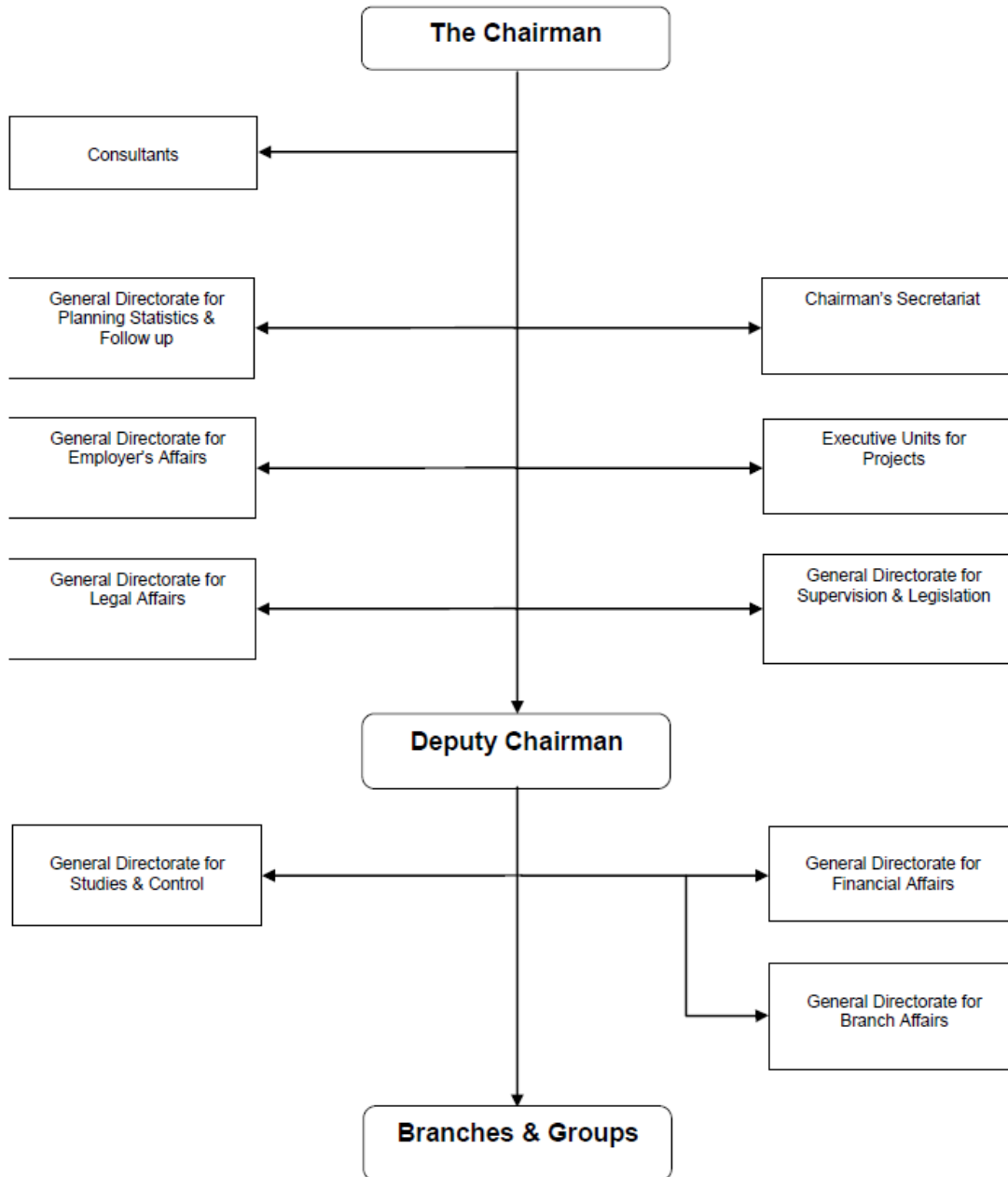
## Appendix 3:

Appendix 3: Current institutional structure of NWRA, (Source: <http://www.nwrayemen.org/index.asp?SeldN=55>)



# Appendix 4:

Appendix 4: General Authority for Rural Water Supply Projects (SwESA, 2008)





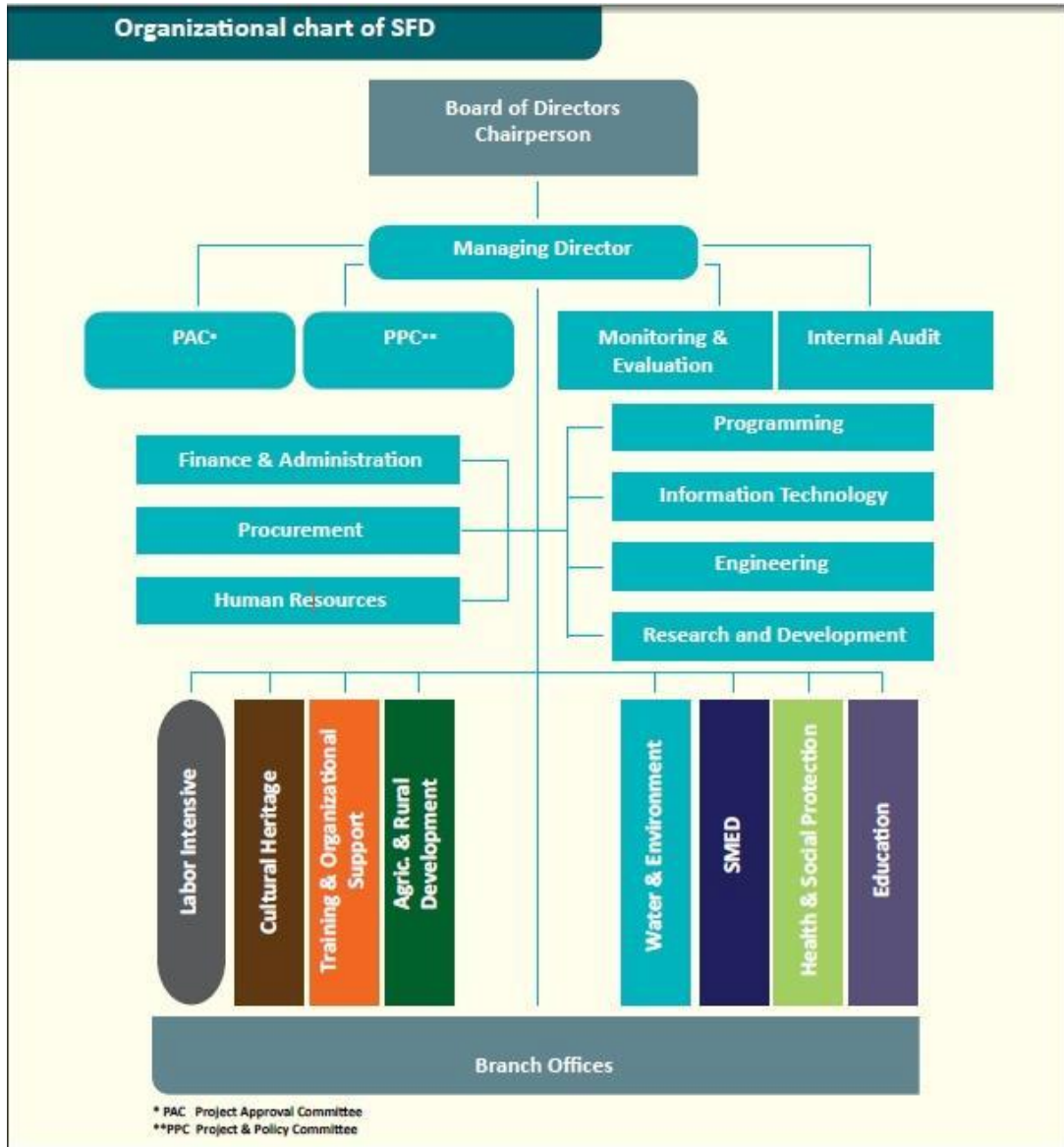
## ***Appendix 5A***

### **Sources of External Funding, Grants and Loans, for SFD Phases**

Netherlands	World Bank	Abu Dhabi Fund for Development
Italy	European Community	Arab Fund for Economic and Social Development
Germany	International Fund for Agricultural Development (IFAD)	Islamic Development Bank
United States of America	United Nations Educational, Scientific and Cultural Organization (UNESCO)	Kuwaiti Fund for Arab Economic Development
United Kingdom	OPEC Fund for International Development	Saudi Fund for Development
France		

## Appendix 5B

Organization Chart of SFD (Source: [http://www.sfd-yemen.org/SFD\\_SITE/about\\_SFD/SFD\\_Structure.php](http://www.sfd-yemen.org/SFD_SITE/about_SFD/SFD_Structure.php))



# Appendix:

## 8.5. Sana'a Declaration



...to retake the activities to found an Yemeni Association for water and sanitation

... and to form a foundation Committee by 7 representatives out of the present 21 utilities.

تشكيل لائحة اللجنة التأسيسية للجمعية اليمنية للمياه والصرف الصحي  
المستأجرة من أمانة (21) مرفق مياه وصرف صحي في المناطق المستهدفة  
المستأجرة في مركز تنمية الموارد البشرية في صنعاء - الأربعة المرفق 2010/06/02

الاسم	الصفة	التوقيع
1. ايماهم محمد محمد	مديرة إدارة مياه	[Signature]
2. محمد سعيد العاصمي	مدير إدارة مياه	[Signature]
3. محمد شبيب عبدالرحمن	مدير إدارة مياه	[Signature]
4. محمد احمد محمد	مدير إدارة مياه	[Signature]
5. محمد احمد العتيق العتيق	مدير إدارة مياه	[Signature]
6. محمد احمد العتيق العتيق	مدير إدارة مياه	[Signature]
7. محمد احمد العتيق العتيق	مدير إدارة مياه	[Signature]