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Final Report On

Legal Survey of Existing Traditional Water Rights in the Spate Irrigation Systems in Wadi Zabid and Wadi Tuban.

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By

Awadh A. Bahamish

Legal Consultant

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Abbreviations

EPA	Environment Protection Authority
GDI	General Directorate of Irrigation
GWSCP	Groundwater And Soil Conservation Project
IC	Irrigation Council
IIP	Irrigation Improvement Project
IMT	Irrigation management Transfer
ISF	Irrigation Service Fee
LRAO	Lahej Regional Agricultural Office
LWCP	Land and Water Conservation Project
M&E	Monitoring and Evaluation
MAI	Ministry of Agriculture & Irrigation
MWE	Ministry Water & Environment
MCM	Million Cubic Meters
MIS	Management Information System
NGO	Non-Governmental Organization
NWRA	National Water Resources Authority
NWSA	National Water and Sanitation Authority
O&M	Operation and Maintenance
PIM	Participatory Irrigation Management
PIU	Project Implementation Unit
PMU	Project Management Unit
RAO	Regional Agricultural Office of MAI
RDA	Regional Development Authority of MAI
RIA	Regional Irrigation Agency
RID	Regional Irrigation Department
RWSA	Rural Water Supply Authority
TA	Technical Assistance
TDA	Tihama Development Authority of MAI
ToR	Terms of Reference
WBC	Water Basin Committee
WUA	Water User Association
WUG	Water User Group
WZC	Water Zone Committee

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Legal Survey of Existing Traditional Water Rights in the Spate Irrigation Systems in Wadi Zabid and Wadi Tuban.

1. Introduction

Spate Water distribution is largely in both Wadis of Tuban and Zabid based on "Aurf" or traditional customs rights, where upstream beneficiaries of spate water have first claim on water. This system of traditional spate operation poses equity issues (7).

The objectives of the legal consultancy services are to review the legal basis for participatory spate irrigation management so that to ensure sustainable and efficient distribution and use of water in the spate irrigation schemes of Wadi Tuban and Wadi Zabid, and the current prevailing laws which were issued lately in this respect. In this respect suggestions and proposals shall be submitted to identify ways for dealing with them.
Particular attention shall be paid to water rights in both wadis and how they were allocated transferred, suspended or cancelled as well as to review with farmers how water disputes were settled and the manner in which they were solved. The objective of such study and analysis is to improve the current situation of spate irrigation at both wadis. This objective shall be achieved through the undertaking of survey and analysis of the traditional customs regarding distribution of spate water in both Wadis and the existing laws in this respect.

2. Approach and Methodology

Spate Water irrigation management at Wadi level is essential for future sustainable irrigation management and also in order to be able to manage the rehabilitated spate irrigation schemes in a sustainable manner. Coordination with other water users in the wadis is necessary in order to settle water allocation and other activities.
Therefore all documents and traditional customs concerning spate irrigation distribution shall be studied through individual interviews and group discussions in both wadis.
Also, the prevailing laws concerning spate irrigation shall be reviewed. This shall include the following:

a. The new constitution of 2001.
b. Water Law no (33) of 2002 and its draft Executive Regulation.
c. The New Civil Law no (14) of 2002 issued in April 2002.
d. Law no (4) of 2000 concerning Local Authority Law
e. Republican Decree no (269) of 2000 concerning the executive regulation and procedure of implementation of the Local authority Law.
f. Establishment decrees and regulations that define the functions and responsibilities of the ministry of agriculture and irrigation MAI in particular of spate water irrigation as well as to clarify the role of the General Directorate of irrigation GDI and MAI branches in both wadis. The role of GDI and its branches in both Wadis shall be clarified and its relationship with the Local Councils in both governorates in accordance with the Local Authority Law no 4 of 2000 and its Executive Regulation as far as spate water irrigation

management is concerned. Also, the Tihama Development Authority TDA and its role in spate irrigation in accordance with its Decree of Establishment.

g. The Role of the new Ministry of Water and Environment and NWRA on the basis of the new Water Law no (33) of 2002 and their responsibility in spate irrigation management as far as water allocation and formulation of foundation for water planning and classification system for water basins and registration of water rights and other functions as stipulated in the new Water Law.

There are many Articles in the above mentioned laws which deal with spate water irrigation and its regulation. A detailed review of such articles shall be explained as well as the customs and traditions in both Wadis. In this respect it is necessary to survey and evaluate the current situation related to spate water distribution and its obstructions in all the command areas and this shall be undertaken through field visits to both Wadis and through individual interviews and group discussions with farmers and other local stakeholders.

After detailed study of the existing laws, decrees and regulations pertinent to the issue of spate water irrigation along with the review of customs, traditions in both Wadis and the evaluation of the effectiveness of such customs and whether such customs are complied with or whether there are violations to such customs and how disputes are settled, then as a consequence of the above a legal proposal shall be produced which shall contain clear recommendations and program for improved and equitable distribution of spate irrigation for each Wadi which shall take consideration of water rights of all farmers in both Wadis.

3. The present situation of Wadi Zabid

Wadi Zabid is located in the Tihama region, Hodeidah governorate. Some half a dozen kms from Zabid district capital town. This Wadi, that has a perennial base flow, is one of the most developed and studied of the Tihama spate area. The scheme has been modernized in 1980 to divert spate flows into feeder canals. The total irrigated area is about 15,215 ha and it has a network of 16 main canals. This irrigation system is provided with several diversion structures. The irrigation system is managed by the Tihama Development Authority (TDA). From a physical point of view the wadi is divided into three major areas: upper, medium and low. The command area has been divided into five subprojects and one traditional ogma receiving water from their canals. (10)

The Wadi has a long tradition of agricultural production and it was famous for cereal crops (maize, sorghum, millet). After the construction of the diversion system all the agricultural production has increased and at present has very good potentials. Major cash crops are: cotton, sesame, banana, mango vegetables. Major food crops are: millet maize and sorghum. Banana plantation is increasing dramatically due to the high revenue this production is giving. At present there are at least more than 4,000 ha banana plantation. Irrigation depends 60% from spate and base flows; 20% from rain and 20% from ground water. (10)

The population concerned by the irrigation scheme it has been estimated nearly 90,000, that is an estimated 14,000 households living in 127 villages. It has been estimated that the average number of persons per HH is 6.3. Only 6% of these villages are relatively big with more that 5,000 inhabitants, while 85% are smaller with an average of less than 1,000 inhabitants each (5).

3.1 Traditional and modern irrigation system in Wadi Zabid

Unlike other areas where water is distributed giving priority to upstream users, following the usual al a'la fal a'la rule, since centuries a system was devised to distribute water on a time schedule, all year long following the seasonal changes. The schedule is as follows:

- The upper delta area (group 1 – weir 1 and 2): from 18th October to 2nd August.
- The middle delta area (group 2 – weir 3 and 4)): from 3rd August to 13 September.
- Lower delta area (group 3 – weir 5): from 14th September to 18th October.

These rules are based on years of analysis of water flows and were established in the 16th century. During peak periods of spate water, these traditional rules are combined with the al a'la fal a'la rules (5).

The modern improvement of the irrigation system took place in the late seventies and was aimed to increase the irrigated area, to make a better utilization of spate and base flow water, to protect the land from erosion and to assure equity among farmers. From 1978 TDA, Zabid branch, took over the responsibility for water allocation and for all other related problems of management (5).

In its management TDA utilized and supported the existing traditional control system that was operative at the level of secondary canals, weirs or traditional Uqmas. This traditional system is still working until today and supervises water distribution among farmers. The responsible for supervision and for farmer's organization is a Sheikh al Sharej, the channel master. Each command area related to a secondary canal or weir has a channel master and this area is well defined and known to all farmers. The position of Sheikh al Sharej remains always inside the same family, inherited from father to son (7).

This is considered a good position, of high respect and well paid (5% of the farmer's crop). The tasks of a Sheikh al Sharej are mainly to gather and organize farmers to build earth dikes (uqmas) and to calculate the costs and charges for each farmer proportionally to his irrigated area. The channel master also supervises the distribution of water among the fields. He decides which particular piece of land is first to get irrigated when the new flood comes. These traditional rules are foreseen to regulate all the cases and to avoid disputes among farmers. So that, for instance, there are rules that prohibit land from receiving flood water more than once in a 14 days period; to add new land to the command area of a given channel or to dig a new channel in order to irrigate reclaimed land or to irrigate a neighboring land which is not part of the command area (5).

3.2 The traditional customs and water rights concerning the spate irrigation distribution in wadi zabid.

Spate irrigation distribution in Wadi Zabid remained customary and is largely in accordance with the traditional water rights and is supervised by the water masters and staff from Tihama Development Authority TDA.

Traditionally, small uncontrolled systems have been managed by the communities concerned, i.e. those landholders who have benefited from the irrigation water and also those concerned by the dangers inherent in the water flow. The communities in this context are defined by the flow of the wadi and the diversion structures, rather than along kin or tribal lines. The two often overlap as people from the same lineages and tribal groups live in close proximity to each other. But there can be cases where a spate system covers different lineage and tribal groups. Cooperation between the families concerned is essential for management of spate flows, and the spate structures and systems. Without

such cooperation, water flows are likely to be wasted and lost. In extreme cases, mismanagement of spate flows can be responsible for death of people by drowning, or loss of livelihood due to lack of irrigation. Despite the importance of cooperation, conflicts occur frequently as water is scarce and everyone tries to get the most they can.

While Wadi water is regarded as belonging to no-one or to Allah, channels which have been constructed by people are considered the property of the community of people who benefit from its water; secondary channels can be considered to belong to those who own the land which it irrigates. Custom established over centuries determines who is entitled to irrigate land from the spate irrigation structures, and these customs have been administered over a long period by recognized families of administrators who are widely respected.

Wadi Zabid is the most developed and studied of the Tihama spate areas. The total command area in the early 1980s was 16500 ha. Unlike other areas where water is distributed giving priority to upstream users, since generations back a system was devised to distribute water on a time schedule. This is based on years of analysis of water flows and was established in the 16th century. A.k. El-Iriyani on Wadi Zabid (1971) describes how customary rules have been developed and enforced for over 500 years, he said: "This water distribution system, and its time-space relationship, is based on centuries of experience with the probable occurrence of the floods and has been devised to maximize the use of the base flow and of periodic floods in the wadi…the irrigation zone is divided into three service areas and the water distributed according to the following schedules:

- The upper delta service area, with 6 canals are allocated the base flow from 18 October to 29 March during which established numbers of days of base flow water are allocated to each of the six canals in accordance with the location of their intake… at other times irrigation water is also allocated to the area, but according to the primacy of the upstream…
- Middle delta service area includes 7 canals which receive water between 3 August and 13 September, a period which coincides with the peak of the rainy season, principal of al a'la fal a'la applies;
- Lower delta service area includes 4canals for which water is allocated between 14 September and 18 October.

During our field visit to the whole Wadi Zabid Command Area, we have discussions with individual farmers, sheikhs, members of WUAS and local councils in the three districts of Wadi Zabid.
The purpose of our meetings with those individuals in particular was in fact to hear their point of view and comments concerning the existing distribution spate irrigation system and the water rights which were related to it as well as to hear the traditional customs which are still prevailing in Wadi Zabid. (list of names whom we discussed with is attached in annex (1)).

In order to study the traditional customs existing in Wadi Zabid in relation to spate water distribution and water rights interviews and discussions with old expert religious and respected persons were undertaken as well as old experienced farmers. I found that old hand written documents and books were available in the old religious libraries in Zabid in particular Al-Mashaira Religious Library which contained a lot of old hand written documents and books as well as old court rulings and fatwa concerning spate irrigation distribution and water rights based on customs and traditional aurf.

Sheikh Abdul Rahman Abdullah Al-Hadrami who was a famous religious man with great experience in customs and spate irrigation stated in his handwritten book of 1978 (8) that (" The existing spate irrigation system in Wadi Zabid goes back to the second half of the ninth century Al-Hegira. Before that the custom of Al A'A LA FA ALA'A LA was prevailing. Sheikh Ismail Al-Gabarti who died in 877 Hegira prepared such irrigation system and it is due to him. Therefore that custom was prepared five hundred and fifty years ago and up to now did not change. Al-Gabarti concluded such system after his understanding of problems which were prevailing at that time. He took into consideration the proposals and recommendations given to him by the experts in the Wadi and after hearing the different point of view of all concerned and water beneficiaries and water users. Also, he took into consideration while preparing the system, all existing customs which were prevailing at that Time.") (8)

The regulating rules of the traditional system for distributing spate water between the different diversion structures which were developed by the renowned Moslem scholar Sheikh Ismail Bin Ibrahim Al-Gabarty some 650 years ago is based on the Ala'ala Fala'ala rule, whereby the lands of the Wadi are divided into three areas:

- Upper Wadi comprising the shrouj (channels) of Buni, Bari and Jerbah, Mansouri, Rayan and Bogr;
- Middle Wadi comprising Mawi, Youssifi, (Wadi) Nassri, Ebri, Jerhazi, Birah and Greeb; and
- Lower wadi comprising Shara'abi, Haram and Wadi Ain.

Each of these wadi areas is irrigated during certain periods of time and it has been recognized by the State. At a certain period of stability which Wadi Zabid witnessed in its history, the different social forces agreed to a code which became an URF and custom which was accepted generation after generation. This code or system is known as Al-Gabarty code or system which was set more than six hundreds and fifty years ago. This code became the system for the distribution of water which later was endorsed by court ruling and then ratified by the supreme court in Sana'a before more than two hundred and forty years ago. (11)

It remains valid until today despite the violations that used to happen during certain periods of history. Under this system, the year is divided into two seasons and each season is further sub-divided in certain periods:

- Season 1 has a duration of almost 5.5 months covering the base flow irrigation period (6 October- 15 March) and, based on priority rules, the water is allocated to the upper Wadi;
- Season2 spans the period from 16 March to 5 October, during which the water is allocated to the three Wadi areas according to the rule of priority:

  i. Upper Wadi receives water from 16 March to 20 July (97 days);
  ii. Middle Wadi receives water from 21 July to 31 August (40 days) and this period is characterized by frequent floods (locally known as "forty rainy days"); and
  iii. Lower Wadi receives floods from 1 September to 5 October (35 days). (12)

The assignment of irrigation turns is governed by a traditional rule that prohibits land from receiving spate water more than once in a 14-day period. The command area of each canal is well defined and known to all farmers and it is prohibited to add new fields to the

command area or to construct a new canal for the irrigation of reclaimed or new land that is not part of the command area. (12)

It is important to understand the definition of the word "custom" in this context and as far as spate irrigation and water rights are concerned.
Custom which is the third cornerstone or source of the legal system, in Yemen is defined as "the continued repetition of certain actions or practices by a collectivity in the conviction that they are legally binding". Since customs have to adhere to Sharia'ah, the customary rules in a given region are simply an instrument to implement certain Sharia'ah principles at the regional or local levels taking into consideration the physical circumstances and/or the recognized Islamic school in that region. That is why customary rules can vary regionally according to the physical and socio-economic circumstances (e.g.' climate, type of water source, land-use, predominant economic activity, etc) and/or the prevailing Islamic school.
Although customs are rarely documented, the majority of Yemeni tribes recognized a set of customs which are collected in what is known as the "Document of Seventy"; i.e., the document of seventy rules. Drafted and signed by the various Sheikhs some 300 years ago, this document contains three rules which are of relevance to water, water rights and water structures. The first rule (no. 36) deals with the "legal" status of wells. It gives a well owner the right to obtain free wood to construct or repair his well, regardless of where the wood is cut from, be it from trees in public property or in private property. Understandably, since people have the right to obtain drinking water from the wells then they are obliged to contribute to the construction and maintenance costs/materials. The second rule (no.43) declares that the roads which lead to country-side market-places and to major settlements are secured (safe), so that people can move in and out of these places to exchange "benefits". Finally, the third rule (no.58) defines the protection zones around wells.

The system of water rights in Wadi Zabid is based on four sources; namely: Islamic law (Sharia'ah), the constitution, civil law and customary law. However; all sources share the common characteristic that they all originate from, and form and integral part of, a single system, vis-à-vis; the Islamic system.
The basic regulations of water and water rights are embodied in the constitution, Sharia'ah, civil law and customs. The regulations which apply to the various aspects of a water right at the national level and which are part of the legal framework may be differentiated into four categories as follows:

a) **Water Ownership Rights:** which cover the legal status of water in general and the conditions for water ownership'
b) **Water Diversion Rights:** which cover the basis for initiation of the diversion right, changes in the right (by selling or transferring), protection of the right (protection zones), and the conditions for losing the rights;
c) **Water Use Rights:** in terms of priorities of use, quantity of use, place of use (transfer/transport of water use), and the burden of shortages;
d) **Water Administration:** which cover the water allocation system, the operation and maintenance, the organization of users, quantity and quality protection measures, conflict resolving procedures, and law enforcement procedures.

Distinction is made between water diversion rights that were acquired centuries ago, and the water use rights which are the rights of benefaction (rights of usufruct) that can be acquired for a specific period of time or even seasonally. The former were acquired in old times when a person or a group of persons began to utilize the water to develop agricultural land with no objections by or conflicts with others, and with no interruption

in their use of water for appreciable periods of time. Such rights exist in Wadi Zabid for surface water, springs and gravity wells.
Farming practices in Wadi Zabid have changed over the past 20 years following the construction of the five permanent weir structures, the rapid increase in the number of wells and the introduction of banana as a cash crop.

In 1979 the modernization of the irrigation system was completed. The traditional systems of earthen spurs was replaced by five diversion structures and 123km of canal distribution network serving a net area of about 15,200 ha, in order to increase agriculture production. Three of five diversion structures have a capacity of 1,459cm/s , one with 900cm/s and another with 200cm/s. Customary rights rule the distribution of water over the upper, middle and lower section of the Wadi. During the modernization of the system an effort was made to reconsider these rules-but this effort failed. The customary rules are:

Group1:
Weir 1 and Weir 2 shall receive all base and spate flow from Oct 19 to Aug 2 (288 days) with a mean water allocation of 79.93 mcm for gross application of 1.85m, whereby water is allocated for a specified number of days to each canal, depending on the location of the intakes and is distributed according to the Ala'ala Fala'ala rule.
Group 2:
Weir 3, Weir 4 and Wadi Nassri shall receive all spate flow from Aug 3 to Sep 13 (42 days), which coincides with the peak of the rainy season, with a mean water allocation of 32,44 mcm for gross application of only 0.35m, whereby the Ala'ala Fala'ala rule applies for the first 5 canals but the two lower intakes share surplus water in equal amounts.
Group 3:
Weir 5 and four uqum shall receive all spate flow Sep 14 to Oct 18 (35 days) with a mean water allocation of 16.55 mcm for a gross application of 0.96m, whereby 50% of the low flood is allocated to the upstream two intakes and the surplus is divided equally between the next lower two canals and when the floods fills the upper three canals, the surplus flows to the lowest intake. Also, Shareej Al-Sharabi receives water for 50% of the time, while Shareej Al-Mahraqi and Shareej Al-Haram share the water the remaining period.

Spate flows are used for a pre-planting irrigation for field crops and for banana. The flow is diverted from a primary canal by a temporary earthen bund built downstream of the outlet. Outlets generally comprise gated pipe orifices that extend under the primary canal embankments.
The area commanded by each outlet varies from about 15 ha to about 100 ha, and the number of and size of pipe orifices varies accordingly, from 1-3 in number and from about 0.3m to 0.6m in size.
Occasionally there are short (say 100m) lengths of distributary canal leading from the pipe orifice, but mostly the water is discharged directly into the adjacent field, or into a winding channel along a field's edge.
Fields are irregular and vary greatly in size, from about 1-6 ha.
While the principle of Ala'ala Fala'ala applies below each diversion structure, spate flows are rotated between diversion (Ogma and Weir) structures as follows:

i. From 19th October to 2nd August (288 days) water is diverted to Canal Group1 (Primary canals off taking from Weir 1 and Weir 2);
ii. From 3rd August to 13th September (42 days) water is diverted to Canal Group 2 (Primary canals off taking from Weir 3 and Weir 4) including seven ogmas downstream in Wadi Nasery;

iii. From 14th September to 18th October (35 days) water is diverted to Canal Group 3 (primary canals off taking from Weir 5 and from four ogmas downstream in Wadi Ain).

Within each Group, the upstream (weir) structure diverts water first, then the down stream ones. At Weir 3, diversion is to the right side primary canal first, the Mawi-Yusfi canal, and for the Mawi canal; then to the left side primary canal, the Ebry-Gerhazi canal and the Ebry canal; then for the right side again for the Yusfi canal; finally for the left side for the Gerhazi canal. However, when spate flow is large, water may begin to be diverted to more than one of these canals at a time. This system does not appear to provide for equity of flow along the Wadi (9).

Established water rights do not appear to provide for equity of water distribution, and increasing the time that water is provided to Group 2 is recommended. However, it is acknowledged that it may not be possible to get consensus agreement from stakeholder to this. Some water masters carry out their duties conscientiously, while a few may accept bribes to allocate water "out of turn". Also, some groups of farmers or landowners may try and abuse the system. However, once objections are raised by farmers being disadvantaged, the "correct traditional " distribution is adopted.

3.3 Evaluation of the current situation related to spate water distribution and its obstructions in Wadi Zabid.

In the command area of Wadi Zabid access of farmers to use of spate irrigation flows has traditionally been governed by the unwritten principles referred to as al a'la fal a'la which give priority to upstream users, then those below them in the middle areas, then those in lower or downstream areas. These are the basis of the water allocation along with the allocation of specific time periods for the operation of individual canal as has set by Al-Gabarti about six hundred years ago as explained above.

The water master most directly controls access and delivery of the water. These water rights are dictated by traditional water allocation practices historically set, or developed, over a period of centuries with an implicit endorsement from the corporate body of water users. Although it is not clear whether these rights were democratically determined when initially set out. Some farmers contend that they were never "equitable" to begin with, having been originally set up to favor existing elites. In any case, farmers in the Wadi report that these traditional rights are no longer respected.

From the discussion, with farmers it appears that generally 60-70% of farmers are receiving flood waters when it is their turn. Farmers that were complaining for not receiving enough water stressed that the main reason is due to the fact that the use of water is not really always appropriate. Sometime a farmer keeps irrigating his field even after having received the right quantity. This has two negative consequences: the field downstream will not receive its quota of water and the farmer who irrigates too much his fields will jeopardize the production. Farmers say that a second reason is due to lack of maintenance so that spate water cannot reach the fields as it was in the past. Therefore small farmers, especially those having land in the lower zones, remain with a very small quantity of water or, if the spate is small, don't get water at all.

Farmers confirmed that in the past the channel masters were stronger and capable to inhibit farmers violating customary rules. At present, the important issue is to assure equity among farmers. They say that traditional rules are no more respected and if somebody breaks the rules, nobody say anything not even the Sheikh al Sharej who has

no real power to impose the appropriate behavior. This is the case of landlords with large properties that often obtain priority for irrigation and they get water even during periods when water was supposed to irrigate somebody else fields.
Furthermore with the widespread introduction of fruit crops (especially bananas) the customary schedule for irrigation is no more equitable. Owners in the upper zone have always the right of irrigating their fields utilizing this rule. Not only, but they also keep all the water without allowing the water going downstream. During 9.5 months this rule allows the utilization of water only for upper lands, leaving only 2.5 months for all the remaining middle and downstream fields. To worsen the situation, the new organization of canals has merged previous minor canals into one that has only two gates. Only one of these gates is working and receives regularly water while the other is always closed and the interested fields do not receive water any more.

Spate irrigation in Wadi Zabid shows many differences from conventional irrigation, both in water deliver principles and property rights. These should be given more attention in development of appropriate design routines for spate irrigation. Existing water distribution rules should be respected, even if they constrain the optimization of crop production by spreading water thinly across an area.
Where possible, the introduction of single point controls on spate systems should be avoided. Where possible, systems could be returned to their earlier form by reopening old intakes once opening directly onto the wadi.
Farmers contribute own labor or cash in maintenance work. Contributions can be related to capacity to help, in relation to assets. However, the different demands and benefits between types of structures need to be appreciated. Farmers already take responsibilities in cleaning of local canals and repair of field bunds.
While these rules are in place, there are large deviations. As may be expected these deviations are biased towards the water supply of upstream landowners. The main digressions are:

a. An area of approximately 500 ha under banana cultivation in Group 1 now cultivated but outside the area defined as being entitled to spate flows.
b. The practice of some upstream farmers to take 3-4 spates flows in disregard of the Al'a'ala Fal'a'ala rule.
c. Related to this as well as the excessive sedimentation in Wadi Zabid tail ends do not receive water supplies-even in the Upper Wadi 23% of farmers received no surface supplies.

In Wadi Zabid centralized management of water distribution and improved infrastructure has not, contrary to intention, improved the living conditions of the downstream users and particularly the small farmers.
Proper operation of the weirs is a problem because of inadequate flood warning systems.
Also, and more critical, is the inadequate distribution of the water, giving an oversupply of water to the users close to the weirs and leaving little for downstream users who need supplemental irrigation from wells as a result. Ownership of land close to the weir is with large entrepreneurs and small farmers constitute most of the downstream users.
"Furthermore, the ownership situation has developed in such a way that the best land was purchased by large entrepreneurs, while small farmers were pushed to the periphery of the scheme.
Consequently, the implementation has only resulted in increased values of crop production in the upper areas; it has neither resulted in an increase of total area reliably served by surface water nor in an increase of the income of small farmers. The benefits went to already wealthy entrepreneurs who now receiving abundant water free of charge.

While the small farmers had to develop and operate costly groundwater irrigation schemes.
Customs in Wadi Zabid are not applied properly and therefore no equity in water distribution at canal level and bad planning of dams upstream with changing of cropping pattern where we found more bananas and mango fields everywhere in Wadi Zabid. Water resources become less due to changing natural resources where spate water to Wadi Zabid is decreasing by about 20 to 30% as the latest studies indicated while cultivating bananas need more water than other crops. This caused many wells to be drilled and the problem is that distances between wells were not according to customs. Lands are cultivated at the fringe of the Wadi and irrigated from the canals which were not cultivated before which cause problems with farmers. Also, there is the problem of some lands having its levels higher than others due to mud and silt. So, the increasing level of some lands poses a problem in water distribution.

There is another problem of sedimentation in Wadi Zabid and the absence of effective silt exclusion. This resulted in heavy sedimentation and the problems of sedimentation appear in land going out of surface command and sand deposition in the field and heavy sedimentation in canals.
Therefore there is a wrong application of traditional water right due to the changing cropping pattern where we see more bananas and mango.

Discussion with farmers and technicals on our field visit revealed the following which have an impact on equitable water allocation:

- In addition to season I , the upper Wadi (Group I) also receives all base and spate flow from 16 March to 20 July during season II, which was fair and equitable under traditional crops. However, it is less fair and equitable these days, as the cropping pattern has changed dramatically with the cultivation of bananas, which require irrigation every 4 days.
- Large landholders have reclaimed some 480ha of land (locally known as Golal) along the wadi, which is irrigated with water that would otherwise be available for downstream fields.
- Bogr-Rayan canals do not receive any base flow and its allocated irrigation days are insufficient to irrigate all fields within their command areas.
- The replacement of several independent diversion structures into one new one, so that two or more canals have to share the diverted floodwater, has caused frequent conflicts between farmers as it violates traditional priority rights.

Also revealed that farmers on Diversion Weirs No.3,4 and 5 prefer the traditional distribution system whereby water flows from field to field with full force allowing the water to reach the middle and tail reaches of the Wadi. Due to the modern system with secondary and tertiary canals and numerous secondary pipes fragments the water flow and it hardly reaches the lower reaches of the Wadi. Therefore, the farmers demand for the installation of large gates in order to allow spate water to reach all fields.
The pipes built at the same location of the traditional ma'aqem are often too small, so that not all fields in the command area of some canals can be irrigated.

4. The present situation in Wadi Tuban

Wadi Tuban a seasonal river located in Tuban District of Lahej Governorate. The total irrigated area is about 11,000 ha. A total of nine weirs have been constructed over a period of more than 30 years along the wadi. Two of these weirs which are Al'Arais and Ras al'Wadi are located in which is called Al'Wadi al'Aadam. Three in Wadi al'Kabir which are Faleg, Mojahed, and al'Wahet weirs and four in wadi al'Saghir which are Beizeg, Al'Hadarem, Al'Bustan and Al'Manasira weirs (8). The command area has been divided into five subprojects or sub areas receiving water from their canals. Approximately 70% of the irrigated agricultural land in the Tuban delta is irrigated by the highly variable spate flows from the wadi, 5% from base flow and 25% from ground water (5).

Main crops in the delta are cotton, millet, groundnuts, sesame, maize, tomatoes, melons, banana, mango and papaya. Cotton, sesame and melons are the main crops grown under spate irrigation (4).

The population concerned by the irrigation scheme has been estimated 75,000, that is more than 13,000 households living in 80 villages, one capital town (Al-Hota) and one small town (El-What). Following the census of 1994 the average number of persons per HH is 5.8. More than 50% of the villages are small, with a population of less than 500 persons, which means an average of 86 HHs per village. Big villages are 27%, including the two towns (2).

4.1 Traditional and modern irrigation system in Wadi Tuban

In wadi Tuban there are at present three main forms of irrigation: spate irrigation, base flow irrigation and ground water from wells with motor pumps. Spate and base flow irrigation are utilizing both traditional and modern structures. The modern system with permanents canals (primary and secondary), branches and gates delivers water to the fields without entailing field to field irrigation. This system serves the upper regions of the two wadis. The traditional irrigation, using uqma (earth dikes) and obar (canal intakes), serves mainly the lower area. It has canals headworks made of reinforced concrete and the irrigation is field to field. In traditional and modern irrigation system the general rule for distributing water among farmers is the al a'la fal a'la rule (1).

Responsibility for water distribution and for the application of traditional water rights is within the Irrigation Department (ID) of MAI office. This department prepares the wadi spate irrigation plan for modern and traditional schemes for the two main agricultural seasons (Seif season –March/June- and Kharif season-July/October-) (3).

Distribution of spate water and base flows is carried out by the Irrigation Council (IC) composed by representatives of MAI offices in Lahej, local authorities and some well known farmers in the area. The IC prepares schedules of irrigation for each diversion structure (weir or traditional uqma) and its command areas of each canal. IC is also supposed to monitor the application of traditional rules in order to foster equity among farmers also for downstream fields. These rules are based on the concept that, at flood times, spate water will not be diverted to the fields that have received water either from base flow or from earlier floods. Kharif season's spate water will be allocated to fields that have received no water during that year and only when these requirements have been met, the previously irrigated land will get additional amount of water (3).

The traditional irrigation system is supervised by 30 Sheikhs Al-Obar (community water masters) appointed by the Tuban District Irrigation Council and paid by farmers at the harvest time with 5% of their crops. Therefore the water master is not a government staff. Those Sheikhs are usually respected and experienced men of the farming community who represent certain canal command areas. Each of these command area is related to 10 small canals (shrouj), receiving water from primary canals, uqmas and diversion weirs. Sheikh Al-Obar is responsible for the organization of farmers whose land is irrigated from these small canals. This area approximately 80-200 feddan. Sheikh Al-Obar is responsible for the following tasks:

- Supervise canal maintenance.
- Supervise irrigation and water allocation to the fields.
- Assist irrigation Extensionists in implementing the irrigation plan.
- Assist the ID in resolving water-related disputes among farmers.

Sheikhs Al-Obar are assisted by 36 agricultural extensionists who are staff of MAI office in Lahej. They assist Sheikhs Al-Obar in water distribution, in the organization of canal maintenance and they report to the ID any violation of the irrigation plan or of the regulations. They assist Sheikhs Al-Obar in solving and settling water-related disputes among farmers (5).

4.2 The Traditional Customs and Water Rights Concerning the Spate Irrigation distribution in Wadi Tuban.

Spate irrigation distribution in Wadi Tuban is different from the unique system of Wadi Zabid. Each canal of Wadi Tuban has a water master who arranges the priority of water rights to various fields and farmers according to rights. He is also responsible for organizing the repair and maintenance of both canals and deflector structures… "A water master is responsible for the distribution of water within one or several irrigation networks, for the settlement of water disputes and for the levying of irrigation canal maintenance charges. His services are paid for by the community and, in cases where he himself is a cultivator, by an additional preferential water right".

In Tuban he was known as the Sheikh Al-Wadiyain, referring to the two main branches of Wadi Tuban, Wadi Sahgir and Wadi Kabir. The responsibilities of a water sheikh is to:

a. safeguard the full share of water from the channels under his control;
b. apportion water fairly between secondary channels according to the customarily agreed allocation of water;
c. organize landowners and farmers to carry out maintenance and repair work;
d. settle water disputes between farmers in the channels under his control;
e. settle disputes with the sheikhs of other water channels when the disagreement concerns a wider area;
f. estimate the maintenance contribution every farmer should pay for the channel he uses and:
g. collect fees.

Qualifications for becoming a water sheikh include the following: being an experienced farmer, being trustworthy and having the confidence of the farmers who accept his decisions, being knowledgeable of the flood seasons, of methods of building barrages and the system of water distribution. The office was often inherited from a father or uncle but this could be challenged. Water sheikhs and their assistants were paid a fee as service providers, i.e. farmers paid when they received a service. These services were not village

based but irrigated area based, i.e. people from the same village having land on different channels would receive services from different sheikhs.(4)
As far as water rights and allocation in Wadi Tuban, the principle of Ala'ala Fala'al'a (locally known as Rada'ah) applies throughout Wadi Tuban and gives precedence to upstream users, both between and within diversion structures and canal systems. This means that upstream users have the rights to a single full irrigation before their downstream neighbors.

The irrigation system in Wadi Tuban is still predominately traditional system which has evolved over a considerable period of time. Traditional irrigation methods are primitive, but effective to a limited extent, and recently replaced some of the more important traditional structures with permanent hydraulic works designed and constructed on accepted engineering principles.

The Traditional Spate Irrigation System is based on the 'obars', "atm" & 'ogmas' that are built by the local farmers. The 'ogma' is an earthen bank constructed across the main stream of the wadi with the objective of diverting the entire low stage flow of the flood onto the fields.
If a larger spate comes down, the 'ogma' is either broken deliberately or allowed to break under the strain. When this happens a large part of it is then washed away, often before the total acreage has been irrigated. The flow cannot be again diverted to the fields until the 'ogma' has been rebuilt. The rebuilding of the 'ogma' depends on the subsequent behavior of the wadi flow, and sometimes the 'ogma' cannot be re-built before the ensuing spate. Another local system of irrigation is by small earthen banks, the form of temporary bunds or spurs called locally 'obars' projecting into the wadis, which deflect a portion of the spate water over the adjacent fields.
An 'ogma' is cheap to build, but usually very expensive to maintain. The initial capital cost and the annual recurring replacement costs are often the same. If the wadi is well disposed the 'ogmas' can be very effective for small to medium flood flows; but a sinous wadi can result in the expenditure of much effort without much result, for a medium to large flood may carry all the 'ogmas' and 'obars' with it to the sea or desert. Nevertheless, the basic principle is to divert water low stage and of allowing large floods to pass unchecked .

The traditional conveyance system tends to be very complex with rather sinuous canals, mostly earthen canals, interconnected at several points often providing alternative paths for the floodwater to reach a particular field. Feeder canals often run a considerable distance parallel to the wadi before reaching the main command.
Such canals often provide a direct supply to small terraces formed in the wadi bank. Escapage from these terraces frequently results in severe erosion which if not controlled eventually, destroys the canal itself.

On reaching the main command, the main canal usually traverses gradually away from the wadi to provide for as many fields as possible with a direct supply from the main canal and its principal branches. Often these canals may eventually interconnect with the canals in the command of the next off take. Over the years, escapage from the upstream may supplant the supply from the lower offal. However, in the past it is evident that new off take have sometimes been constructed in an attempt to provide a more reliable supply to the tail of an existing command. Such adaptations are necessary to maintain supplies without the benefits of permanent structure to prevent soil erosion and control the flow of spate to fields which are gradually raising due to accumulated sediments. Temporary earth checks or bunds are used to provide a sequential supply to each canal and field in

turn. Even where permanent structures exist within the traditional system, they are now normally used in conjunction with an earth check.

The traditional water rights system in Wadi Tuban tends to waste water resources because upstream farmers arbitrarily take their full requirement of spate water prior to releasing the flow for downstream users. This system of traditional spate operation poses equity issues. However, this old system seems to function on a relatively equitable basis during large floods where upstream users can not divert the flow which may destroy their upstream irrigation system and structures. Since large floods does not occur often, due to the random nature of the floods, the downstream agricultural lands sometimes do not get spate water for a number of years. (6)
As far as the customs which are still prevailing in Wadi Tuban spate water utilization rights are as follows:

- The main principles of irrigation water utilization rights lie in the fact that the water coming from the valley should be distributed according to the followed customs, which are almost determined by the irrigation priority called (Radaa System). Which is Al-Aala Fa Al-Aala.
- The Office of the Ministry of Agriculture and Irrigation in Lahej, represented by the Irrigation Department, is considered the concerned side for managing and distributing Irrigation water at the level of the great Valley, the Grand Valley and the small Valley via irrigation guides and gates guards existing along the different dams as well as through the assistance of the sheiks of canals (Abrs) and locations.
- Usually, the spate water is distributed in accordance with a plan set by the Irrigation Council in the district under which the spate water is distributed at the level of dams and Abrs, although it is not followed at present.

The spate water has two seasons a year; a main season and a secondary season. The duration of the secondary season is from April to June and the duration of the main season is sometimes from July until November.
The amount of spate water coming in the secondary season varies as the main season from a year to another.

Generally what determines the direction of water march to the top of this dam or Abr is the amount of water coming to the Great Valley at the beginning of Al-arayes Dam. If the water reaching the gate of Al-arayes Dam equals less that 4 Abrs (Abr is 30 cm high in the ruler of the dam), it is then directed to the Al-arayes canal in order not to leak to the middle of the valley when letting it flow to the bottom of the valley. In other words the public welfare is the basis in water distribution. The measurement of this amount will be either by the ruler existing on the wall of the dam or by eye estimation of irrigation guides for (the number of Abrs). If the amount of water is more than five abrs, then the gates of Al-Arayes dam will be closed and water will be directed to the bottom area of the valley. It includes Ras Al-Wadi Dam, the Small Valley and the Grant Valley. The canal gate of Ras Al-Wadi will be opened if the amount of water coming to the gate of the canal is less than 5 Abrs. If the amount of water is more than 10 Abrs, the water shall be distributed between the two valleys; the grand one and the small one.

Usually, water is directed in the secondary season; April-June to the low areas of the valley. But if the water amount reaching the Great Valley (Al-Arayes Dam) is big, all the dams and the Abrs shall be opened. In case of constructing any new Abrs in the area to irrigate new lands, the priority should be for the older Abrs even if they are below the

new ones. After that, the lands of the new Abrs shall be irrigated. If a person violates the rights of water distribution according to what is followed, this will cause dispute between the two parties, which may sometimes leads to armed fighting.
As a general rule, the distribution of water is performed on the basis of Al-Aala Fa Aala. In other words, when water reaches the main canal, the sub-canals of the main canal shall be irrigated first. The sub-canal located on the right of the canal is a modern system and that one on the left of the canal is a traditional system. The directing of water into the sub-canals is controlled by cross gates. Water then is prevented from falling into the lower canals except after irrigating the upper lands. This happens if the amount of water is little. But, if the amount of water is big, more numbers of sub-canals gates shall be opened according to the amount of water in the main canal. However, water distribution inside the sub-canals of modern system shall be performed as the same system in the main canal. But, in the traditional system, it shall be performed as follows:

- P1 in the beginning of the canal, there is a divider that distributes water into branches; (a) upper branch (b) lower branch. The priority shall be for the upper branch and water is distributed internally by small maqum into the sub-canal (Laja). However, for P7+P9, water is distributed to a Laja subsequently.
- P11 first irrigates the first field then next one. In the next field, there is a construction called Hajar Tharaa, which divides water into two openings. The priority shall be for the right opening in which there is one farm. The left opening has two farms and water is distributed into a Laja. P13 is divided in the beginning into two branches and water is distributed into sub-canal maqum (Mashaba) as the fields are too small and do not bear the large quantity of water. In P15, water is distributed into Mashabas subsequently. In P17, there are 4 fields; the first one irrigates his field then the land maqum shall be broken into small canal (Sharj) to irrigate the rest of pieces by Lajas subsequently. In P12, water is distributed into Lajas subsequently.
- P23 shall irrigate the first field where there are rooms opening to Husseinia Maqum that irrigates two fields by a Laja subsequently. P25 has 5 field irrigated by gates then by a pipe that irrigates Al-Misdaa Sharj lands in which water is distributed internally by Lajas. (14)

Based on an interview with Fadhel Gaber Yamani (retired ID Director), the following traditional rules and institutional arrangement existed with regard to the allocation and distribution of water at Wadi level:

- Until 1950, one sheikh Al-Wadi was responsible for the entire Wadi Tuban scheme and he decided the length of each uqma. However, it was not allowed to construct a structure across the entire riverbed and to divert to full spate flow into the flood canal.
- If all fields commanded by one uqma were irrigated, the flood canal must be blocked by the concerned farmers and a small breach was made in the uqma to reduce pressure on the diversion structure and to allow spate water to flow further downstream. The Sheikh Al-Wadi monitored if this rule was observed.
- In principle, no upstream field can be irrigated for a second time until all fields have been irrigated once.
- In case of a small to medium spate flow, which cannot reach the tail reaches of Wadi Kabir and Wadi Saghir, the farmers in the upper and middle reaches have the right to divert these flows to their fields following a decision by the Sheikh Al-Wadi.

- The distribution of spate water along the primary canal was the responsibility of the Sheikh Al-Obar.
- If an upstream uqma would take water without the permission of the Sheikh Al-Wadi, the following sanctions would be imposed:

  i. The concerned farmers were not allowed to grow any crop on their fields and the immediate downstream farmers have the right to grow crops on these fields; and/or
  ii. If crops were already cultivated, the yields must be given to the immediate downstream farmers after deducting the costs on inputs.

From 1950 to 1967, the role of the Sheikh Al-Wadi was taken over by an Agricultural Council comprising the Sultan as Chairman, Director Agriculture Department and 17 to 24 representatives of landowners and sharecroppers, who were selected on the basis of their experience and knowledge. Each uqma was duly represented in this council with the majority of representatives coming from the middle and tail reaches. From 1950, staff of the Irrigation Department became responsible for the assessment of the irrigated areas following each spate flow.

The Agriculture Council was replaced by an IC in 1967 and their members were state farm directors, farmer representatives from state farms and cooperatives, political leaders and representatives from the Agricultural Cooperative Union. Reportedly, the Irrigation Council was as effective as its predecessor with regard to the equitable distribution of spate water along the Wadi.
Following the unification in 1990, there are more conflicts between upstream and downstream water users as the traditional rules regarding the distribution of spate water are not any more observed due to the weakness of the local authorities, such as the ID and the Governorate. (13)

4.3 Evaluation of the Current Situation related to Spate Water Distribution and its Obstructions in Wadi Tuban.

In Wadi Tuban procedures for calculating area that can be irrigated under different spate flows are still weak. One problem is the difficulty of predicting frequency of waterings, and not simply area that will receive watering. Some intervention programs have superimposed their own water rotations, as a means to control this frequency dilemma. Typically, however, these new water rotas have over-ruled local water rights and thus become a source of controversy.

Conventional irrigation design is now based on calculation of crop water requirements and use of efficiency factors. Spate irrigation systems have also been designed and evaluated in relation to these routines. However, these conventional norms are not appropriate. Spate systems have to deliver an inundation depth that can recharge soils at intermittent intervals. Seepage and losses are also valuable in the overall operation and conveyance of water across fields and recharge of groundwater. Field-to-field irrigation also has lower efficiencies than other field application methods, but is a rational method in the short time interval of spate conditions. Spate systems are often described as being 'inefficient', as too much water may be applied: however, this water is rarely wasted at catchment level. The net effect of designed interventions has been to underestimate the demands of water from farmers, to anticipate unrealistic improvements in efficiency and generally increase the sense of water scarcity in system. This is why many spate farmers now state that they get a reduced quantity of water supply from new canal developments,

even though these canals theoretically convey crop water requirements and allow refined water control.
Today many engineers advocate more modest forms of intervention to assist spate irrigation control, internationally and in Yemen. One idea is to confine external assistance to structures involving earth-moving activities that farmers can understand and replicate. The use of simple gabion structures in spurs and erosion control works is also increasingly popular.

In times of shortages, i.e. when rains are low, collectively owned water (such as a spate which has structures developed by a community) must be shared among the people concerned in proportion to their shares "the allocation may be either on the basis of time shares or on the basis of appropriate openings to be dug alongside the water channel. The time period, or the opening sizes, are made proportional to the areas of their respective lands. During dry years, the allocated amounts are reduced proportional to the shares. In all situations, changes in the distribution system cannot be implemented unless they are agreed by all partners.

Along each primary canal in Wadi Tuban, precedence to divert spate flows to be given to the upstream users. This means that upstream users have the right to a single full irrigation before their downstream neighbors. This entitlement is traditionally defined as the height of a man's ankle, about 150 mm. However, application depths are largely acknowledged and accepted to be deeper than this.
Interviews and discussion with farmers on our field visit to Wadi Tuban revealed that there are obstacles and problems which are an increasing inequity in water distribution and increasing expansion of agriculture while there is no water. This led to increasing random drilling of groundwater wells which consequently resulted in increasing pollution and salinity.
The problems associated with spate irrigation in Wadi Tuban can be summarized as follows:

1- Control and Diversion of Spate Water to the Agricultural areas.
2- Sediment Transport.
3- Efficiency of Spate Irrigation.
4- Operation and maintenance of Spate Irrigation system.

1. Control and Diversion of Spate Water:

The diversion of spate for irrigation is still mostly practiced traditionally. The random nature of floods both in time and size make it very difficult for the traditional system, especially upstream of the wadi, to have any control over the quantity of the water diverted to the agricultural areas during large floods. In the event of a large flood these "Ogmas" as washed away by the floods in its downward course. Moreover the "Ogmas" require substantial maintenance work or rebuilding after each flood. The situation become worse and unfortunate for the downstream users since the supposed " Ogams" should have been in operation and weakened the flood flow for them to be diverted to their fields. In the event of exceptional floods, such as that of 1982 and 1989 were discharges in some of the wadis exceeded 3000m³/S, and the lack of a warning system, many diversion weirs, roads, bridges, other hydraulic structures can not even perform the first of the above five criteria and totally or partially destroyed as well as some of the fertile agricultural lands at the banks of the wadis got washed away and villages threatened.

Therefore a number of measures have to be worked out and executed which can be listed as:

- Establishment of a warning system for the major wadis where much of the destruction occurred or prove to occur large floods.
- Improvement of the traditional spate intake structures.
- Improvement of in-field works.

2. Sediment Transport:

The spate floods transport with it substantial amount of suspended load and heavy bed load as well as floating materials such as bushes, trees and trash.
To show the magnitude of the problem, the study done for wadi Tuban by GDC consultants in 1981 gave the following results which is indicative for other Yemeni wadis with similar gradient and volume of annual flow:

> *" The total amount of suspended sediment brought down by the wadi in 1980 was 2.6 million tones which represents about 3% of the total discharge in that year (85.7Mm³) and since the average discharge of the wadi is in the order of 120Mm³/year, the total sediment load probably averages at least 4.0 to 4.5 million tones/year".*

3. Efficiency of Spate Irrigation:

The efficiency of Spate Irrigation as can be expected under those circumstance is very low and ranges between 30-40%. This is due mainly to the nature of the flood which is very random and erratic in nature and sometimes occurs at night when the users can not strengthen the structures and control water spreading.
Other factors for the low efficiency are:

a. Poor management and control of spate water; for due to the uncertainty of the magnitude of the floods, the operators tend to open all the gates and control, with the result that only the lands in the upper reaches, spate irrigated, leaving the bulk of the land in the downstream of the wadi without irrigation. This happens several times especially with below average floods.
b. Water Spreading: the traditional spate irrigation method of spreading needs improvement at the inlet of each basin to increase the efficiency. But advantage of the traditional water spreading is that it is the best means of recharging the ground water (beside wadi bed and canals infiltration).
Thus the overall water balance would allow somewhat greater groundwater abstraction than for scheme with higher irrigation efficiencies.
c. Field to Field Irrigation: the pattern of fields and bunds is as irregular as any unplanned farm development, and includes as many small patches of ground left between the original fields and bunds.

4. Operation and Maintenance of Spate Irrigation:

The main problem encountered in operation and maintenance of Spate Irrigation areas are concerned with:

a. Organization and staff to operate the system.
b. Clear understanding of local traditions and water rights in relation to the required rules.
c. Sediment and trash exclusion, ejection and routine clearance.
d. Recovery of operation and maintenance costs.
e. Participation of the beneficiaries in the maintenance or its costs.

It seems that depletion and pollution shall continue and increase as well as increasing shortage of water in Wadi Tuban due to increasing population pressure especially in the neighboring Aden.

Another problem is that bad planning of dams and weirs upstream because there is no link between the irrigation organizations that work in irrigation in Wadi Tuban and the MAI activities in the catchment areas. Also, irrigation in Wadi Tuban has no official links with the new Ministry of Water and Environment and neither NWRA has a branch in Lahej. There exists an old link with the local government in Lahej through the previous Irrigation or Agricultural Council but this council does not really function at the moment. Farmers interviewed called for the reinstalling and strengthening of the old Irrigation Council with more WUA representation.

There is lack of coordination at present in Wadi Tuban amongst different water users and so there is a need for an institutional setting to coordinate between all different parties working in the water resources in Wadi Tuban not only spate irrigation. In Wadi Tuban there is higher priority for the regulation of groundwater than in Zabid, where fair distribution of spate water was the topmost concern on the basis of their unique irrigation system.
It is obvious that the current spate water use of Wadi Tuban is under strong pressure inspire of the fact that there is indirect evidence of a smaller flood volume recently around 20 to 30% as the latest studies indicate, while water usages is increasing due to increase in population and rapid grow of Aden.

The water activities in Wadi Tuban were not coordinated where we found investments for water resources development of dam's constructions upstream without any coordination with spate irrigation development.
This fragmentation is due to lack of any institutional linkages between irrigation department, MAI and local government in Lahej and Tuban district in particular.
Therefore there is the need for coordination amongst users, MAI, Ministry of Water and Environment and the Local Government.

The above problems and obstructions can be overcome if practical institutional setting that is able to coordinate water users in agriculture, industrial and domestic use as well as water users in catchment, base flow users and spate users. Also to regulate ground water use and operate and maintain the rehabilitated spate irrigation in Wadi Tuban in accordance with the new Water Law no (33) of 2002 and the Local Authority Law no (4) of 2000, where these two laws along with the new Civil Code no (14) of 2002 define crystal clear the functions and the responsibilities of all institutions involved and the mechanisms for their coordination on the level of district, governorate and on the level of ministries in Sana'a. (list of persons whom I interviewed and discussed with in annex 2).

5. Prevailing laws and documents concerning spate irrigation distribution and water rights.

The new constitution of the Republic of Yemen was issued in 2001 which amended that constitution of 1994. It specifies in article 3 that the Sharia'ah is at the basis of the country's legal system and its principles may not be contradicted by legislation. The legislation of the Republic of Yemen consists of the constitution, laws resolutions and regulations. The new constitution added for the first time a new article which is article (35) concerning the protection of the environment which stipulates as follows:
(The protection of the environment is the responsibility of the state and society which is religious and national duty upon each citizen.)

The Civil Code (Law no. 19 of 29 March 1992) consists of a modern formulation of the principles of the Sharia'ah and contains about 30 articles relevant to water resources. (2)
The Civil Law no (19) of 1992 was amended in 2002 by the law no (14) of 2002 which was issued on the 10th April 2002. As far as water rights and spate irrigation distribution there are no amendments from the previous Civil Law of 1992.

The legal framework of spate irrigation management is mostly based on customs or unwritten laws, which stem from the Sharia'ah and can be defined as "the continued repetition of certain behaviors by a community in the conviction that such behaviors are legally binding". Customary rules are an instrument to implement the Sharia'ah and may vary from place to place depending on a number of local circumstances, including climate, water availability, socio-economic conditions and the prevailing Islamic Schools.
Article (8) of the 2001 Constitution states that all natural resources, including surface and ground water, are owned by the State, which is responsible for ensuring their optimum exploitation in the public interest. The Constitution prevails over any other written law, including the Civil Code. Since water is owned by the State, only the State may regulate the manner in which water may be used. According to article 18 of the Constitution, no concessions for the exploitation of natural resources may be granted, except on the basis of a law, which shall determine the cases in which the State's property may be transferred freely as well as the modalities and the procedures for such transfer.

The new water law no (33) of 2002 which was issued in August 2002, stipulates in article (4) that water is a right which is accessible to all and does not become privately owned except by means of transport, acquisition or any related methods.
The following articles in the new water law are related to spate irrigation distribution and water rights as follows:

Article 6: States that all beneficiaries of any of the water resources shall enjoy the right to benefit from this resource in such a way as not to harm the resource or the interest of other beneficiaries and shall carry out all the duties required to him with respect to the conservation of these resources and safeguard them from depletion and pollution.

Article 12: Provides that NWRA shall take the sufficient measures and procedures to ensure fairness and equity of distribution of available water and to protect such water from overexploitation and pollution.

Article (17): Provides that NWRA shall undertake in coordination with MAI plans for protection from floods and measures which relate to improvement and development of methods to utilize rain, spate and base water and to recharge groundwater.

Article (25): which provides for the functions and responsibilities of MAI especially in relation to spate irrigation and constructing water structures and their operation and maintenance. Also, to make plan for protection from floods and making monitoring systems. MAI has the right to take appropriate and urgent measures as it deems fit in case of floods to destroy any structure or canal or to make any structure to avoid dangers of floods provided that fair compensation is paid to those affected by such measures taken. MAI, shall set and implement plans and programs that relate to cleaning Wadi and Public Canals and to monitor flowage of spate water and floods and to supervise use of water irrigation and its structures so that to ensure the safety of such structure and to conserve water from waste and pollution.

Article (27): Stipulates the following "the right of water use authorizes the holder thereof to dispense the water, in such a way as not to conflict with public interest and the prevailing customs and traditions in each water zone or water basin, and in all cases, the existing and acquired water rights, whether prior to the issuance of the law or thereafter, shall be maintained and shall not be touched upon, except for the utmost necessity thereof and with fair compensation provided therefore."

Article (28): "Due consideration is to be given to benefiting from the traditional water rights of rainwater harvesting and natural runoff flow, with respect to their use in irrigation and their link with agricultural land that benefits from such water resources. This should also take into consideration the properties and characteristics of each region with respect to the customs, traditions and irrigation systems in effect in each region of the Republic."

Article (29): " The traditional rights to benefit from natural springs, streams brooks, creeks and maintained surface wells, the depth of which does not exceed sixty meters, and the common rights associated with them, prior to the issuance of this law, on which the holders thereof maintain their currently hold as existing rights. This is without prejudice to the rules for registration and these rights remaining allocated for the purposes. For which they were originally granted. In the event that such rights are transferred to other parties, then such rights shall be compulsorily transferred to the new owners, and in the event that the land benefiting from the water are partitioned, the water shall be apportioned according to the land areas resulting from the partitioning of such land."

Article (30): " Without prejudice to the sanctified and water quarantine areas, quantities of water may be acquired in cisterns, pools or streams, by means of directly harvesting the water from rainfall that falls on the surrounding land thereof, which is owned by the beneficiary thereto, or in the neighboring areas, where the beneficiary has been authorized to benefit from harvesting the rain there from. Such acquisition is considered as an acquired benefit, if it does not harm the benefits previously acquired thereto and does not conflict with acquired water rights, in accordance with the recognized traditional rights and customs related to the right of benefit from rainfall water. The beneficiary may also, according to this article, set up the required water installations, which take advantage of the water quantities gained, as well as the construction of small irrigation structures and to excavate for subsidiary canals, in accordance with the procedures and controls that are set forth in the Executive Procedures."

Article (31): " The Executive Procedures shall spell out the cases when the Government may withhold the acquired rights of benefiting from water, if public interest so dictates or if the rationing of water use is required, with fair compensation to be provided in accordance with the effective laws."

Article (32): "All holders of rights of utilization in accordance with articles (28-29) of this law are required to come to NWRA to register their rights accordingly within a period of three years maximum from the date of announcement accordingly issued by NWRA after the issuance of this law."

Article (33): "All holders of rights of utilization benefit from groundwater wells dug prior to the issuance of this law and the holders of common rights thereto, whether such rights are utilized or not, are required to come to NWRA or any of its branches in the governorate offices or district centers to register their rights accordingly and to continue benefiting from such rights of benefits and the common rights therewith associated, within a period of three years maximum from the date of announcement accordingly issued by NWRA after the issuance of this law."

Article (34): " NWRA and all of its branches shall maintain a register of acquired rights of benefit from water. The Executive Procedures shall spell out the system and rules for maintaining such a register and the procedures for registering and amending such registration accordingly."

Article (37): Specifies that no beneficiary may exceed the amounts or purposes spelled out by General Authority for Water Resources (NWRA) in the permit and must comply with all the terms spelled out in the license.

Article (45): Para 2, stipulates that URF and customs as recognized and accepted shall be adhered to in relation to water rights of beneficiaries and its servitude rights as well as its structures.

Article (61): Provides for protection from spate water MAI is responsible to set measures to regulate the catchment areas and control flood and its flowage and distribution. This responsibility shall be carried out through the cooperation of the local authority and all water users.

Article (62): Stipulates that all users and beneficiaries of spate water and those having agricultural lands or structures adjacent to its flowage must participate and contribute to the protection of their properties and in regulating water flowage from which they benefit. Those beneficiaries who are adjacent to spate water flowage are entitled to construct fences to protect their properties to safeguard it from dangers of floods provided that such shall not affect the public interest.

Article (69): Concerning penalty for a period not exceeding two years to any person who drills a well or construct any water structure to capture spate water or to divert it from its natural course whether for himself or for others with or without charge having no license to do so from NWRA.

Article (70): Provides for imprisonment of a period not more than six months or fine not more than YR 200000 along with suspension of any work in relation to such violation and obligation to repair the damage in case of any expansion or extension or reclamation of agricultural land or civil or industrial establishments or others occurring in Wadi flowage of spate or in public canals which results in obstructions of spate flowage in such Wadis in their specified flowage courses.

Article (71): Provides for imprisonment no more than a month or fine not more than YR 30000 to any person who did not register his beneficiary rights with NWRA in time. Also,

any person who assigns to other person his drilling license or his beneficiary right without NWRA approval.

Article (74): Stipulates that NWRA shall consult and coordinate with MAI concerning the functions and responsibilities of MAI as provided for in this law.

Article (75): Provides for compensation to any damages to holders of water rights. The responsibility shall be born by the person who carries such violation that resulted in such damages.

Article (79): Stipulates that as far as sources of water and its flowage and in relation to irrigation and its rights or customs, the provisions of the Civil Law shall apply.

Article (80): Stipulates that in case there is no provision in this law (the water law).Then provisions of the Civil Law and the Principles of Sharia'a shall apply.

Therefore it is essential to review the Civil Law provisions in relation to spate irrigation distribution and water rights.

5.1 The Civil Code no (14) of 2002 Issued on 10th April 2002.

Based on the Sharia'ah, Article 1359 of the Civil Code provides that water is originally nobody's property (mubah or res nullius). As such, it is the entitlement of the whole community and may not be privately owned, unless contained in a receptacle (i.e. reservoir, canal) that separates it from the source. The Civil Code contains a number of provisions regarding water use rights, such as:

Article 1360 stipulates that res nullius water is the entitlement of whoever reaches it first, even if the water is located in someone else's property, but the water taken may not exceed the appropriator's needs;

Article 1363 specifies that the right to use water for irrigation is an appurtenance to the land, so that it is inheritable but it cannot be sold separately from the land, neither may it be rented or donated, except in accordance with a recognized custom.

Article 1364 states that sufficiency is to be determined on the basis of water use when the land was first reclaimed or, if this use rate in unknown, on the basis of use when the land began to be irrigated.
In spate irrigation, the quantitative measure of the right of the upstream user is customarily established at the height of man's ankle; and
Reflecting the Sharia'ah and custom regarding equitable allocation of water the Civil Code has the following provisions:

Article 1365 states that "a person is not allowed to draw water to irrigate land that has no water right if such appropriation harms those who have a water right";

Article 1361 specifies that "a partner in a common canal has no right to connect another channel to it unless he obtains the other partners' permission";

Article 17 states that " anyone using his right in a way that contravenes Sharia'ah and custom is liable for the damage caused to others as a result of his unjustified use".
Civil Law provisions dealing with irrigation are contained in part (4) of the Civil Law which deals with "Servitude Rights".

In essence, a servitude right a kind of obligation or liability on one property to serve or benefit another; like the right of a piece of land to get irrigation water from a given source, or to have its water supply run over a neighbor's land, or to discharge its drainage water into a given drain. In each case, the served property (land) has a "servitude right" over a serving property (the water source, neighbor's land or drain).

Two chapters in this part are of interest to us: chapter (5) which deals with the " water way rights"; and chapter (6) which deals with the "water flow or drainage rights".

In the chapter on "Water-Way Rights" the law defined the water-way right as "the right of the land owner to have passage of irrigation water over the land of other people so as to reach his land". The law prohibited the owner of the intermediate land (land between the source and the irrigated land) from denying the owner of the right his servitude right (article 1366).

Article (1366): the right of water-way is the right of a land owner to have the irrigation water flow in other people's land in order to reach his land. If this right is proven for somebody then the owners of the other lands on which the water flows have no right to prevent him.
It also set the obligations of each party with respect to maintaining and rehabilitating the water-way so as to prevent damage to the intermediate land (article 1367).

Article (1367): a water channel owner must operate and repair it so as to remove the harm which may occur to the land in which it passes through. If the channel owner refuses, then the land owner may undertake and pay for the repairs then claim the expenses.
The law also regulated issues of compensation to Intermediate Land, the right of the intermediate land to benefit from the passing structures (canals or pipes) provided a share of the cost is paid.

Article (1368): a landlord who irrigates his land using extracted natural water and other waters has the right to obtain (for his irrigated land) a channel-way in the intermediate land between it (the water) and his land… for a fair compensation to be paid without delay, unless it is customary not to compensate, and provided that the benefits that accrue to the owner of the intermediate land are not clearly damaged, and if a damage actually occurs then the landlord (of the intermediate land) can demand compensation for the incurred damage.

Article (1369): the owner of a land which is located in-between the water source and the land to be irrigated should permit passage of the necessary pipes to transport the water in exchange for a fair compensation to be paid in advance. He may utilize these structures provided that he contributes to the costs of construction and that he pays for utilization in proportion to the benefits he receives.

Article (1370): if a property is damaged due to water-transport pipes, then property owner may claim compensation from the benefactor.

The Flow or Drainage Right is the right to drain excess or surplus (naturally flowing) water or wastewater from a land, a house or a factory into public drains or drainage channels using a surface channel or buried pipe. The difference between this and the right

to a water-way is that the latter serves to bring good quality water to the land, while the drainage right is to drain unfit water away from a land or house.
The civil law defined the flow right as the "path over which water flows naturally or the path of flow of drainage water over the lands of others. The law prohibited the downstream land owner from building dikes to prevent the flow from reaching his land. It also prohibited the owner of upstream land from making changes which would increase the burden on downstream land . Article (1373) through (1377) also regulated the details of the rights of upstream and downstream land owners.

Article (1371): the "flow channel" is the pathway for flow of natural water or drainage of unfit water or surplus water through the property of others.

The civil law contains several rules regarding the drainage right, as follows:

Article (1372): the low lands receive naturally flowing runoff water which flows from the highlands without interference from man in its flow. The owner of lowland is not permitted to construct a dam to prevent this flow from reaching his land, the owner of the highland is not permitted to undertake a work which would increase the burden on the lowland.

Article (1373): the owner of land who irrigates his land from naturally flowing or extracted water has the right to drain the wastewater or surplus water to the acknowledged place (customary location) by having it pass through other people's property using pipes, provided that he doesn't harm land owners and in exchange for a fair compensation.

Article (1374): the owners of land which receive flood water (spate) have the right to utilize the structures which drain the water from their lands, provided that each one bears the cost of constructing, modifying, and maintaining these structures on a pro-rata basis.

Article (1375): it is not allowed to construct a harmful flood-flow channel in other people's property or in public or private roads. Harm is removed by removing the channel.

Article (1376): the owners of new water structures are not allowed to drain the water into the (land) property of others without permission.

Article (1377): a property owner is obliged to prepare the surface (of his property) in such a way that rain water flows freely in his land or in the public road, with due consideration to special regulations…, It is not allowed to let these waters flow into adjacent land owned by others.
Finally, according to article (1378) of the civil law, a servitude right may be terminated under 6 conditions as shown below.

Article (1378): the servitude right terminates in the following situations:

1) conclusion of its (pre-determined) time period,
2) disappearance of its location,
3) when the two properties become the property of a single owner……,
4) when it becomes unfeasible to use the servitude right due to changes in the condition of either properties…..,
5) when the owner of the right concedes his use right and notifies the other property owner,
6) when it becomes no more useful……

5.2 Law no (4) of 2000, Concerning the Local Authority.

This law on Local Authority was issued on 10th February 2000, and immediately its Executive Procedures and Regulation was issued six months later on 21st August of 2000 by the Republican decree no (269) of 2000. This indicates its importance and desire for its quick implementation at the level of governorates and districts. This law is the first step of decentralization of functions and responsibilities of ministries at Sana'a.
The water law no (33) of 2002 which was issued two years and a half after the Local Authority Law no (4) of 2000 refers in many articles to the Local Authority Law and the Local Councils in particular article (61) in part seven concerning protection from spate and floods. This article stipulates that MAI, shall with other parties concerned set measures to regulate catchment areas that cause spate and floods and to regulate areas where spate and floods water are harvested. Also, to make measures to regulate flowage wadis and spate distribution. MAI, shall make plan for the catchment areas and spate and flood water flowage wadis in such a way that to protect and safeguard and to prevent from its damages. MAI, shall undertake the above functions and responsibilities in cooperation with the local authority and all water users.
Therefore the local authority law no (4) of 2000, plays very important role in the water management on the level of governorates and districts.

The following article in the Local Authority Law are pertinent and relate to water management in general and spate distribution and water rights in particular as follows:

Article (145): Each minister, in the sphere of his ministry's activity in respect of the administrative units, shall undertake the following:
Inform the governors of the contents of the state's general orientations and policy, as well as whatever of technical guidelines and directives leading to improvement of the level of performance of services at the local level and control over them that he sees fit.
Co-ordinate with the governors on needs of the administrative units at the governorate level and need for technical and specialist cadres and act for their provisions.
Adopt measures to raise the level of competent performance of the executive organs of the administrative units and that through the process of training and qualification of various forms and types.
Organize management of national campaigns and fund their implementation.
Formulate and prepare the general technical specifications, designs and plans.
Issue the organizational regulations in the sphere of activity of his ministry.

Article (165): Specialist funds of economic and social development must co-ordinate projects and activities that are funded by them with the local councils from the planning and implementation aspects.

Article (168): The local council may constitute special committees from among the beneficiary public to manage, conduct and maintain services projects of the administrative unit. The Regulation or Executive decisions shall show the fundamentals governing that.

The Local Authority Law specifies the exact relationship between the ministries in Sana'a and the local councils in the governorates and districts. In this context and for our purpose in this study the relationship between MAI and the Ministry of Water and Environment MWE in one hand with the Local Councils in both the governorates and districts in the other hand.

The Local Authority Law crystally defines the functions and responsibilities in regard to the supervision execution and implementation as well as management of projects within the geographical limits of the governorates and districts as follows:

Article (14):

a. The powers of the central organs, each within its sphere of competence, over the executive organs of the administrative units are determined in formulation of general policy, enactment of organizational regulations, control, qualification and training and implementation of projects which are difficult to implement by the local councils in the administrative units and that upon their request or projects that are of a general national nature.
b. In accordance with the provisions of this law, its regulation and resolutions in implementation thereof, the executive organs of the governorate undertake the role of central authority organs, each within its sphere of competence, in implementing activity at the level of the governorate and technical supervision over organs corresponding to it in the districts, without prejudice to the contents of paragraph (a) of this article.
c. The executive organs of the administrative unit are deemed to be local organs. They represent the technical, administrative and executive organ of the local council and under its supervision, management and control they undertake founding, equipping and management of all development and services projects incorporated in the administrative unit's annual plan and budget. The Regulation shows the levels of the development and services projects whose implementation is assigned to the governorates and the districts.

Article (19): The Governorate Local Council shall undertake the study of draft comprehensive plans at the level of the governorate and supervise over their implementation. It shall also undertake direction of, supervision over and control of the work of the District Local Councils and the executive organs of the governorate. In particular, it will exercise the following tasks and responsibilities:

a. Consider and approve fundamentals and rules organizing citizens' contributions to the funding, founding and maintenance of essential services projects funded by them or with their participation.
b. Supervise over and control implementation of water policy, protection of water basins against exploitation and pollution and that in accordance with the provisions of laws and regulations in force and directives issued by the central authorities in this respect.
c. Promote the founding of qualitative co-operative societies of various forms as well as association of a social, vocational and creative nature and furnish them with facilities.
d. Supervise over co-operative their plans and programs in a manner that ensures their complementation with the development plans of the administrative unit.

Article (61): The district local council shall undertake the suggestion of the draft social and economic development plans of the district, supervise over their implementation in a manner that provides and develops essential services for the local society and its development. It shall also undertake direction, supervision over and control of the work of its executive organs. In particular, it will exercise the following responsibilities and tasks:

a. Care for development of water resources through promoting the founding of dams and water weirs, protecting water from depletion and pollution and that in accordance with scientific studies and water legislation in force.

b. Promote the establishment of qualitative co-operative societies of various forms as well as associations of a social, vocational and creative nature and provide them with facilities.
c. Supervise over co-operative activities as well as those of societies of a social nature and co-ordinate their plans and programs to ensure complementation with the integrated development plans of the district.
d. Supervise over implementation of environmental policies and legislation, adopt the necessary measures ensuring preservation of the environment and natural resources preserves and protect them from pollution and destruction upon them.
e. Propose fundamentals regulating citizens' contributions to the founding and maintenance of essential services projects funded by them or with their participation and supervise over their execution after approval of the Governorate Local Council.

The financial resources of the administrative units are comprised of the following:

First: The local resources of the district and these are the resources that are collected by the district in its own favor and are made up of fees on digging seep holes.

Second: The joint resources at the governorate level and these are the resources that are collected in the districts of the governorates in favor of the governorate as a whole and are composed of digging artisan wells permits fees.
With the issuance of the Local Authority Law no (4) of 2000 and the Water law no (33) of 2000 decentralization has started and there are opportunities to promote water management at local levels especially in both Wadis of Zabid and Tuban provided new mechanisms and institutional arrangements for local water management based upon the above mentioned laws.
With decentralization, branches of Ministries and National Authorities become 'local organs' under the governorate. Local Councils and staff will be treated as personnel of the governorate. According to the law, local councils have a role in supervising the implementation of water policies and protecting water resources from overuse or pollution.

5.3 Regulations Concerning Water Management in General and Spate Irrigation Distribution and Water Rights in Particular.

MAI was regulated in accordance with the Republican decree no (5) of 1996 concerning the re-structuring of MAI. The general functions and responsibilities of MAI are as follows:

1) Prepare irrigation policies and plan to maximize benefit of agriculture's sector share of water.
2) Undertake studies, provide extension, and take measures to improve water productivity.
3) Operate and maintain structures for rainwater harvesting.
4) Draw up plan for protection of rainwater runoff and flooding and set up meteorological stations.
5) Flood emergency measures and flood control.
6) Prepare plans/ implement river trimming plans, monitor rainfall runoff, monitor use of irrigation water.
7) Prepare projection of water demand.
8) Control of wadi beds, erosion control, avoid encroachment and remove barriers.

5.4 Regulations concerning spate irrigation in Wadi Zabid.

Irrigation committees in the Tihama were organized by decree of the MAI dated 19 Sept. 1988. The decree consists of 7 articles and it specially deals with certain regions of the Tihama (wadis Zabid, Rima and MAWR) where irrigation systems have been developed.

Composition of the Irrigation Committees: According to article (1) of the decree the irrigation committee is to comprise 7 members, 5 have official capacities and two represent the farmers (northern and southern banks of the wadi). The five members are:

- The director of the irrigation branch or regional director (of irrigation) as chairman.
- The assistant head of O&M in the wadi as member.
- Representative of the administrative district of wadi as member.
- A representative of the Government Lands and Real Estate and Properties Office in the district. This composition means that the farmers' representatives have no effective role in these committees since the government representatives were the majority.

Selection of Members of the Irrigation Committees: The decree (article 2) authorizes the chairman of TDA (in consultation with the governor of Hodaidah) to select (nominate) the committee members provided that their number is 5-7. It is noted that the representatives of the farmers are "selected" not " elected". At the same time, it is obvious that if the number is reduced to 5, then it will be the farmer's representatives who will be dropped.

Article (3) authorizes appointment of more than one district representative (one from each district) if the wadi covers more than one district; provided that these districts are administratively under the governorate of Hodaidah.

Article (4) limits the membership period in the irrigation committees to 3 years which can be renewed. This provision is indeed meaningless for the five members from the government side who will always be there by virtue of their official posts.

Article (5) outlines the tasks of the irrigation committees, as follows:

a. documentation: documenting the traditional irrigation system, traditional water rights and customs, and the lands which have irrigation rights from flood or base flows.
b. resolving conflicts regarding water allocation and making appropriate recommendations in this regard.
c. defining the relationship with the farmers, outlining their duties and responsibilities in protecting and implementing the water distribution system.
d. making proposals to define the role of farmers in O&M, advising on optimal use of the irrigation water, assisting in the implementation of the irrigation plans.
e. Meetings of the irrigation committees are organized in article (6) which defines the criteria for legal meetings, for voting and resolutions adoption, the frequency of meetings, the archive system, absentia of committee members, and financial compensation for members.

The Irrigation Committees in Tihama

Decree 6/1990, dealing with the establishment of irrigation committees in the wadis of Tihama, was issued by the TDA. Its main features are as follows:

- geographic area of implementation of the resolution is wadi Zabid, Rima, and MAWR (article 1).
- composition of the irrigation committees: two committees were established, one for wadi Zabid and one for wadi Rima.

Wadi Zabid committee: consists of 7 members:

1. chairman: director of the southern agriculture region (a representative of the TDA).
2. vice chairman: O&M head in the irrigation unit in the wadi.
3. a representative of the local (district) administration (member).
4. a representative of the WAQF (religious trust) office in the district (member).
5. a representative of the local development council (member).
6. a representative of the farmers, to be nominated (member).
7. a representative of the farmers, to be nominated (member).

We note that official representatives of the government side are (4) persons (including the Chairman and Vice Chairman), which gives the government a majority voting.

Article (6,7, and 8) of the decree deal with regulations for the ordinary and extraordinary meetings, and regulations for invitations for meeting and for running the meetings.

Tasks of the Irrigation Committees: These are of four types

a. Documenting of: the irrigation system prior to the modern diversion works, the water rights and customs, and lands which have prior irrigation rights from flood or base flow waters.
b. Conflict Resolution: to solve problems forwarded by TDA chairman or project directors, and to make recommendations regarding water allocation and means to maintain the structures.
c. Relationship with the Farmers: to make recommendations regarding the farmers' tasks with respect to water allocation system (article 5.3).
d. The project: proposing the farmers' role in the maintenance of the spate systems, encouraging the farmers and guiding them to improve irrigation practices, etc.

Cooperation by the official and non-government organizations: the decree obliged all district managers and officials of the local administration at the governorate level as well

as in the general secretary of the local development council (at the governorate level), all are to cooperate with the irrigation committees and provide them with assistance and any data/ information to help it carryout its tasks as best as possible (article 10).

Validation of the recommendations made by the irrigation committees: recommendations of the irrigation committees do not enter into force until approved by the governor of Hodaidah, who receives them for approval via the chairman of TDA (article 11).

5.5 Regulations concerning spate irrigation in Wadi Tuban.

In April 1996, the governor of Lahej, upon a proposal by the director of the office of the MAI in Lahej, issued a resolution (No. 14/1996) ratifying the irrigation regulations in the governorate. Subsequently, these regulations were approved by the Executive Council of the governorate. These regulations were organized in (9) chapters as follows:

Chapter (1): Citing and Definitions.
Chapter (2): Purpose.
Chapter (3): Tasks of the Irrigation Department.
Chapter (4): Duties and Jurisdictions of the Director and his Deputy.
Chapter (5): The Irrigation Council in the Governorate.
Chapter (6): Functioning of the Irrigation Council.
Chapter (7): Regulating the Irrigation Works.
Chapter (8): Penalties.
Chapter (9): No title.

1. **Purpose of the Regulations:** the regulations are intended to organize and regulate the use of water, the maintenance of the irrigation structures and network, and to expand the participation of the beneficiaries in the irrigation process by securing contributions from the village Sheikhs, the intake Sheikhs and the community leader. We note here that the farmers, who constitute by far the largest group, are not explicitly included as contributors. This despite the fact that the regulations emphasize that farmers' awareness should be increased so as to better handle the system and that the farmers should be encouraged to express their opinions on how to develop/ improve irrigation (article 4).

2. **Tasks of the Irrigation Department:** Some 13 tasks were identified. These are broadly categorized into:
   - Supervisory tasks: to supervise the infrastructures built by the government, build more public structures and maintain them, and provide technical advice.
   - Monitoring tasks: to monitor unauthorized activities in the wadis and canals.

3. **Duties and Jurisdictions of the Director and his Deputy:** the director proposes the irrigation plan, notifies the DG of the MAI office in the governorate of any violations, accidents, etc. regarding the irrigation process. The deputy is only resumes the responsibilities of the director and carry out duties assigned to him by the director.

4. **The Irrigation Council:** this is established in accordance with the law of "Local Administration", by a resolution to be issued by the governor upon a proposal by the DG of the MAI office in the governorate. The council is consultative in nature. It is led and supervised by the DG of the MAI office in Lahej. It advises the Irrigation Department (ID) and helps implement these advises. The council has 3 main functions: to discuss and approve the irrigation plan and forward it to the governor, to

decide how to best use floods in the delta, and to assist in the irrigation management and maintenance of structures.

5. **How the Irrigation Council Functions:** the ID, in coordination with the chairman of the council, prepares for the council meetings. Extraordinary meetings are held under certain conditions described in the regulations. Voting system and rules for decision-making are also defined.

6. **Organizing the irrigation Activities:**
   - **Supervision:** the ID supervises the use of water.
   - **Forbidding repeated irrigation:** the regulations prohibit irrigation of the same piece of land more than once during the season/ year except if flood waters are "Plentiful" (as decided by the ID or the irrigation council).
   - **Water cut-off**: the ID may cut the water off (from an agricultural land under the following conditions:
     - the land/areas has already received irrigation water during the season.
     - to enable undertaking of irrigation works.
     - to avoid damages to lives, property, or irrigation structures.
     - when the beneficiary miss uses the water.
     - If the channels are not fit to receive the water (flow rate greater than channel capacity).
   - **Exceptional cases:** the ID any remove earth dikes/ structures for fear of damages caused by such dikes/ structures.
   - **Private intakes:** the regulations also allow the use of a private channels/ intakes to serve another land. The regulations also give the ID the right to supervise and use that private channel/ drain.
   - **Irrigation fees:** a fee of 100 YR per feddan is collected per irrigation per season (500 YR/year for lands irrigated from base flow). The fees are used to operate and maintain the irrigation structures in the governorate. The regulations charged the MAI or the local authorities with the responsibility of building and maintaining the structures, the irrigation network, the main and branch canals, and the protection of land from erosion. However, the implementation of these activities is the responsibility of the ID and the MAI office in Lahej.
   - **Private Irrigation works:** each farmer is given the right to build private irrigation works to irrigate his land, in coordination with the ID and the MAI office in Lahej.
   - **Irrigation dikes:** a user must remove the earth dikes (which they build in main and branch canals) as soon as he finishes irrigating his land and as instructed by the Irrigation Extensionist.
   - **Other organizing provision:** the deal with: damages and compensation, prohibited activities, and irrigation of land with special irrigation rights.

7. **General Provisions:** these deals with implementation and modification of these regulations, establishing regulations for irrigation at the district-level, allocation of the income from fines (75% for O&M and 25% for management expenditures). The regulations also included provisions dealing with incrimination of violators, tasks of the A'abar (intake) Sheikhs, procedures to modify the irrigation council, cancellation of the provisions, and the effective date of the new regulations.

8. **Penalties:** The regulations outlined a number of violations and their respective penalties, as follows:
   - Repeated irrigation: a fine of 10,000 YR for repeated irrigation of the same piece of land more than once per season or per year (article 9-1-a). If the violator

repeats the violation then he is fined 20,000 YR and legal actions are taken against him (article 9-2-b).

- Offense against the irrigation water works: a fine of 10,000 YR and legal actions are taken against every person who un-rightfully opens a diversion structure or establishes an earth dike.
- Offense by opening the gates: similar fine of 10,000 YR but this time per feddan, and legal actions are taken against every person who un-rightfully opens a gate.
- Other types of violations and penalties are described such as offenses against diversion structures, the wadi course, etc. In general, the offender pays a fine of 10,000 YR and he is turned over to the public attorney with the appropriate charge.

5.6 The Regulatory ordinance of the Ministry of Water and Environment .MWE

MWE was established in May 2003, while the water law was issued in August 2002, so there was no mention of MWE in the law. This necessitated amendments to the water law which have been submitted to the cabinet and approved this month whereby the cabinet sent the amendment to parliament to be issued by law which is expected soon. These amendments to the water law are necessary because MWE was established later and functions and responsibilities were given to NWRA. The amendments aim to give the MWE its functions and NWRA to be the executive and implementing authority. Also, the amendments provide for NWSA to be transferred to MWE as one of its authorities as well as the Rural Water Supply Authority was transferred to MWE. Now MWE has the following Authorities affiliated to it:

1) NWRA 2) EPA 3) NWSA 4) RWSA 5) Local water supply and sanitation authorities.

The amendments to the water law no (33) of 2002 are expected to be approved soon by parliament and issued by law. Meanwhile a Republican Decree was issued this month August 2004, regulating the MWE. This regulatory ordinance of MWE is very important because it is the first time to start restructuring the water sector and its various authorities, corporations and agencies within one central ministry which is MWE, while MAI is responsible for the irrigation sector and the water law obliges both ministries to cooperate and coordinate their activities in both supply and demand water management.
In accordance with the Regulatory Ordinance of MWE issued in August 2004, by a Republican Decree, MWE shall undertake the following:

1. To develop water resources on the basis of strategy of integrated water management and provide water for drinking and services of sanitation as well as allocation of water for other uses.
2. To encourage the local communities participation as well as NGOS and civil society organization, private sector and women in the efforts to reform the water and environment situations to ensure their contribution to enhance sustainable development.
3. The above objectives shall be executed by the authorities and corporations that are affiliated to the ministry and through the coordination and co operations of other concerned ministries e.g. MAI.
4. MAI, shall contribute in setting mechanisms for the capacity building of the concerned local communities to manage water zones and basins and to enhance their role in this respect to achieve the integrated water management for the water resources in accordance with the provisions of the water law.
5. MWE with NWRA shall prepare plans to guide for the establishment of water structures as dams and lakes in the mountains on the level of water zone and basin

and in accordance with the basin plan of each basin with the coordination of MAI and other concerned e.g. the local councils.

6. To study any proposal by NWRA, concerning establishing protected areas and prohibited water zones in the water basins or water zones and to submit as such to the cabinet for approval.
7. To encourage and strengthen the role of the traditional systems in particular that relate to the management and development of the water resources and to work on the documentation and protection of such traditional systems. This shall be carried out with the coordination of NWRA and other concerned parties.

5.7 Republican Decree no (269) of 2000.

Concerning the Executive Procedure of the Local Authority law no (4) of 2000.

This Executive procedure of the Local Authority Law was issued six months after the issuance of the Local Authority Law no (4) of 2000, which stipulates the following:

Article (12) *of the Executive Procedure specifies that all Executive offices of the ministries in the governorate shall be under the supervision, control, and management of the Local Councils in the governorate within the framework of the general policy of the state and the prevailing laws and regulations. Such executive offices in the governorate shall carry out the role of the central authority in the execution of their activities on the level of the governorate and shall take the responsibility of the technical supervision on the Executive offices in the districts of the governorate such as the supervision and control on the implementation of policies and the public plans in agriculture and irrigation and water resources and the protection of the water basins from pollution and overexploitation at the governorate level.*

Article (13) specifies the functions and responsibilities of the Local Council in the districts of the governorate as follows:

> *To provide the urgent and future requirements of the people for water whether for drinking or other house consumption and to execute projects and provide services of sanitation. Also to take measures necessary to conserve water resources from pollution and over exploitation. Granting licenses to drill artisan wells in the district shall be in accordance of policies and national strategies and after the approval of the concerned authority in the governorate, i.e. NWRA. Also, the local council shall carry out awareness campaigns among farmers concerning the modern agricultural systems and improve irrigation methods.*

Article (16) stipulates that the functions of the governorate in the field of implementation of development and service projects shall be defined on the following levels:

Establishment, management and maintenance.

Para (7) of this article mentions the dams as one of the functions. Another function in this article is the establishment, management and maintenance of projects that serves two districts or more of the governorate districts. This applies to the projects in Wadi Zabid, because there are three districts in Wadi Zabid which are Zabid, Garrahi and Al-Tahaita districts.

There is another function for the local council of the governorate to establish, manage and maintain any projects assigned or delegated by the central ministries to the governorate. Such projects which are centrally financed may have national characteristics. Also, on the basis of this article, the local council on the level of the governorate shall manage and

operate and maintain any project which is executed by any central authority and transferred and assigned through delegation of powers to the governorate. This article is in compliance with article (72) of the water law no (33) of 2002 which authorizes MWE to delegate some of its powers and functions to any entity whether council, committee or office provided that it does not contradict or contravene the local authority law no (4) of 2000.

Article (17) of the executive procedure stipulates the functions of the local council on the level of the district concerning execution of service and development projects as follows:

Establishment, management and maintenance of water barriers and water irrigation projects as well as local projects of water and sanitation for the district in accordance with paragraph (10) and (18) of article (17) of the Executive Procedure.

5.8 The Draft Executive Procedure and Regulation of the Water Law no (33) of 2002.

According to the water law no (33) of 2002, the Executive Regulation of the law must be issued within six months of the issuance of the law. But this did not happen. On May, 2003, a new government was established and new Ministry of Water and Environment was created. The establishment of the Ministry of Water and Environment necessitated amendments to the water law in particular some functions of NWRA to be assigned to the new ministry on planning, supervision and relationship with the cabinet.
Also, developments after the establishment of the new Ministry of Water and Environment such issuance of Republican Decrees transferring NWSA from the Ministry of Electricity to the MAI and then to MWE, as well as issuance of Republican Decree transferring rural water supply authority to MWE necessitated preparing draft amendments to the water law. This is the reason why the Executive Regulation of the water law had not been issued as stipulated in the law.
The draft Executive Regulation of the water law has been prepared taking into consideration the amendments to the water law submitted to the cabinet which have been approved by the cabinet this month and expected to be issued by law by the parliament soon. So, the draft Executive Regulation of the Water Law has been drafted on the basis of the new realities of the existence of new Ministry of Water and Environment with NWRA, NWSA, EPA, RWSA and Local NWSA as executive authorities of the new Ministry of MWE.

The draft Executive Regulation of the water law specifies the following in relation to spate water irrigation and water rights:
Article (5) provides that Wadis are common property for all beneficiaries and so wadis are not owned privately and as such the characteristics of customs and traditions as accepted and recognized as well as water rights which were recognized through succession in each region of the Republic shall be approved and accepted to continue provided that beneficiaries shall not create changes in the courses of floods which result in preventing natural water from flowing in their normal courses or to cause negative environmental effects in such courses of the wadis.

The state shall through MWE and MAI carry out any activities or take any measures in such Wadi for the benefit of the water users within the public interests as such:

a. Establishment of main and secondary irrigation systems and to clean the wadi beds and courses.
b. To divert the water from its natural courses.

c. Establishment of water monitoring and control stations and management and protection of such stations.
d. The conservation of water and control of water uses and its rationalization.
e. To take measures to protect from spate and floods.
f. To recharge ground water.
g. To transfer part of the water to renew and create life for pasture and grazing and natural parks whether temporarily or permanent.

All beneficiaries and water rights of spate water shall be subject to the rules that regulate it in the Civil Code and each case shall be treated separately subject to its legal status of the rights of land ownership and water use rights and subject to shariaa principles or custom upon which such water rights were established.

Article (6) of the draft Executive Regulation provides that any beneficiary and user of any resource of ground or surface water resource whether through succession or transfer or acquisition must satisfy and fulfill the following conditions and measures:

a. That such water right has accrued to him or acquired by him through legal means in accordance with the water law.
b. He must not inflict any damage whether direct or indirect with the traditional and non-traditional water resources and the environmental systems related to it which may affect negatively upon the quantity sustainability of such resources or deterioration of its quality or which might cause obstruction or disruption of the equity of water distribution or which may damage the private and public interests at present or within the foreseeable future.
c. The water user shall not sell his water right or dispose of it in a way that contradicts or violate the rules of the water law and this Executive Regulation and that he must take into consideration the other interests as servitude rights of others attached to their water right or any other interest or servitude right recognized by law or by custom.
d. The water beneficiary must bear the same duties imposed upon other beneficiaries in relation to protection from spate and floods and irrigation system and development and rationalization of water resources and its conservation and protection from overexploitation and pollution.
e. The water beneficiary shall not exploit the groundwater resources except with special licenses permitting such action in accordance with the rules of the water law and this Executive Regulation.
f. The water beneficiary accepts the right of the state to regulate the water beneficiary's rights and duties in using their water rights and the state right to control and monitor the methods of exploitation of such water resources and its structures located in the private and public properties. The state can impose measures that include reduction of the allowed water to be utilized when such measure is necessary to be taken for the purpose of conservation of the sustainability of the water resources and for the fairness and equity of water distribution or when it is necessary to allocate water for drinking and for household consumption on the expense of other purposes.
g. The water beneficiary must register his existing water right at present and which he might acquire in future and recording as such in accordance with the system which NWRA prepares for this purpose in accordance with the law and this Executive Regulation.
h. The water beneficiary shall bear the responsibility and liability for any damages that he might inflict with the water and environment or with other interests and

water rights. He shall pay the fines and the fair compensation in accordance with the law and other prevailing laws.

Article (24) of the draft Executive Regulation, stipulates that MAI shall undertake the following:

a. To survey and collect data on the existing water irrigation rights and to encourage its beneficiaries to have vertical agricultural expansion in the irrigated areas and to provide the necessary facilities to farmers in this respect and for that particular approach of policy.
b. MAI shall not give any guarantees for any new irrigation rights that arise from horizontal expansion in irrigated areas and to limit granting new irrigation rights to lands reclamated in areas where there is an excess of spate water availability or in areas where it is allowed to drill water wells and to acquire water rights in accordance with the special system of granting licenses for drilling wells and water rights as provided for in the water law and this regulation.
c. MAI shall include farmers to participate in the management of the water irrigation and to enable them to actually contribute in the finance, establishment, operation and maintenance of irrigation projects and structures and to regulate field irrigation through the encouragement to establish and support WUAS in accordance with the law and this regulation.
d. MAI shall increasingly carry out efforts towards activities of water catchment and rainwater harvesting and to invest in the establishment and operation and maintenance of dams, barriers and diverting weirs to keep and store such water as well as to establish irrigation systems for the purpose to control spate and floods in the wadis for irrigation and recharge of the groundwater purposes.
e. MAI shall set plans on water basins levels and water zone level on the basis of the following indications:
    1. The specified quota and defined allocation of water for the agricultural sector.
    2. The estimated irrigation requirements of water in accordance the different crops to be irrigated and for animal wealth needs and other requirements which are necessary and needed for the agricultural sector.
    3. The environmental requirements of water so that to assist to conserve base-flow and springs and natural wet lands, plants and wild life.
    4. Changes in the volume of rain water and the probabilities of decreases of rain, spate and floods in their seasons and the irregularity of water recharge of ground water and so the probability to revise and amend the irrigation plan either to decrease or increase the amount estimated in advance.

MAI shall establish water structures, operate and maintain so that to benefit from rain and spate water on the basis of water basins and standards and criteria to establish such structures in the Republic and subject to the water plan. MAI, shall set specifications and designs of such structures as well as the necessary conditions and measures for the operation and maintenance and to provide materials and equipments to enable it to manage and monitor use of the irrigation water and its structures. Again MAI shall set a plan for the development of water resources for agricultural purposes in coordination with MWE and those related at the water basins and zones and adjacent areas based upon the integrated water resources management and to make ultimate use and benefit of all resources

provided that such new water structures shall not constitute an additional burden on the water resources or contradicts or obstructs with existing water rights or constitute obstructions against economic activities which are more feasible and beneficial from sustainable development point of view. MAI shall carry out survey and investigation concerning the water rights and servitude rights with the users and beneficiaries of such rights so that to include them in the participation in the implementation and management so that to achieve equity and fairness in the distribution of water which is provided by the public water structures and also to ensure the continuation of services which MAI provides as well as compensation to any one affected if any in accordance with the law.

Water structures shall be designed and implemented by MAI provided that no negative effects occur upon the water rights of those in the downstream areas which constitute and create social disputes among beneficiaries. Also, MAI shall manage catchment areas in cooperation with the local communities so that to avoid activities that lead to desertification such as destroying the soil and excessive cutting of wood. MAI, shall encourage the preservation of agricultural terraces and to maintain the traditional irrigation systems and to monitor any illegal activities in the courses of spate water flowage.

MAI shall set programs for the periodical maintenance of the storage structures and the diversion of spate water and maintenance of wadi courses. Such programs shall be executed by the offices of MAI in the governorates and with the cooperation of the local communities and WUAS. Also, MAI shall complete the creation of its representatives and equipments and materials to be available at the levels of basins and zones. Such representation of MAI, whether departments or units or centers or offices must be assigned with functions and delegated with powers to take necessary actions in case of floods and spate. MAI must provide their representatives in the governorates with all equipments and materials as well as delegation of powers to them to take action when necessary.

Article (26) of the draft Executive Regulation.
This article provides for the measures and conditions to benefit from the water rights as follows:-

a. the holder of water right must establish his water right and obtain certificate from NWRA entitling him of his acquired water right after the issuance of the water law.
b. The beneficiary name must be included in the list of beneficiaries of water projects.
c. If the water right whether through succession or transfer is before the issuance of the water law, such water right must be established by the beneficiary through evidencing documents or witnesses.
d. Such traditional and acquired water rights shall be subject to rationalization. NWRA may limit or reduce the amount to be used by the beneficiary from each water resource or water establishment.
e. In case of necessity to re-allocate water to existing holders of water rights for reasons that relate to shortage of water or to allocate part of it for drinking or household purposes, then the beneficiary must comply to use the allocated quantity of water for him and he is not allowed to expand in new other usages of water.
f. Water rights must be specified on a well known water source with defined location area or with defined boundaries and clear and well known geographical

aspect. Such information must be recorded in the certificate of the beneficiary of water right or in accordance with the traditional water rights through succession or transfer.

g. The beneficiary of water right shall not be compensated from another water resource in lieu of water quantity re-allocated if the remaining quantity is sufficient to satisfy his water right for his specific purpose before the re-allocation or when such remaining quantity is sufficient to satisfy his water right in compliance with new methods and means imposed for the purpose of rationalization of water.
h. The beneficiary of water right shall be fairly compensated if he is prevented from his water right completely and absolutely whatever the reasons which called for such action of re-allocation of water.
i. Water rights shall be considered null and void and without compensation if any resource of water resources upon which such water rights were established had become dry for natural causes.

Article (27) of the draft Executive Regulation provides for the use of rain and spate water in irrigation and the relationship of such use of rain and spate water with the agricultural land as follows:-

a. The existing traditional water rights on rain and spate waters should not obstruct or contravene with development and protection of the water resources and procedures of its management in general and in particular the protection of surface and groundwater resources which entail control, inspection and investigation procedures as well as study and having the necessary structures to execute the above mentioned tasks.
b. To establish storage and distribution structures and to modernize irrigation systems and methods of rationalization of water for the public interest and which ensure and guarantee the continuation of the existing traditional water rights or to improve the use of such structures.
c. Projects of public interest shall be constructed upon lands which are used for rain catchment harvesting provided that holders of traditional water rights shall be compensated from the same projects or structures of quantity of water or to be given other fair compensation which is equivalent to the damages incurred upon those holders of water rights.
d. Water rights on spate water irrigation that flow naturally through modern weirs and canals before the issuance of the water law which had been allocated to irrigate agricultural lands shall remain such water rights in accordance with the measures and systems of irrigation which were set for that purpose. But water rights shall not be recognized if such rights have been transferred to other benefits or purposes.
e. Transfer of ownership of traditional water rights of catchment harvesting or spate water shall not be recognized separately of the ownership of the land attached to such traditional water right unless such land does not need any water any more for whatever reason. In case of transfer or assignment or sale of the ownership of the land, then the land shall remain having the water right upon it. In case of partition of the land having the water right then water shall be divided on the basis of areas of the land that had been divided.
f. Spate and catchment water harvesting shall not be transferred to another areas or regions unless traditional water rights have been considered or after the approval of the traditional water rights owners either to surrender such rights or to ask for fair compensation.

g. The excess of spate and catchment water may be transferred to utilize it in other purposes which the public interests necessitate to do so.

Article (30) stipulates that the state may take over water rights if it is necessary for the public interest or to rationalize water uses provided that fair compensation is given to the beneficiaries in accordance with the law and subject to the following measures and conditions:

a. If there is an urgent need for water for drinking purposes and there is no other resource of water available.
b. If such water right is existing for agricultural purposes or other purposes other than for drinking and household purposes and it is located in an area which is designed to be for drinking in the public interest.
c. Quantities of water for beneficiaries may be reduced if there are methods and opportunities to save water by the beneficiary through adopting technological methods and means of saving water provided that such means and methods are practical to use in order to obtain excess of water than before.

6. Conclusions

6.1 Wadi Zabid

Established water rights in Wadi Zabid do not appear to provide for equity of spate water distribution along the wadi, but it is not impossible to get agreement of all stakeholders to change as such.
Therefore, no major changes to such traditional arrangements which are existing and prevailing since long time before to be undertaken. Many farmers in the wadi revealed to us that those traditional rights are no longer respected and that lack of maintenance resulted in that spate water did not reach lower zones as it was in the past. Also, channel masters are not stronger and capable as before to inhibit farmers violating customary rules and to assure equity of spate distribution among farmers. Again there is the problem of landlords with large properties often obtain priority for irrigation and they get water even during periods when water was supposed to irrigate somebody else fields and that there is no real power to impose the appropriate behavior by Sheikh Al- Sharej.
Furthermore with the widespread introduction of fruit crops especially bananas and mangos the customary schedule for irrigation is no more equitable. Owners in the upper zone have always the right of irrigating their fields utilizing this rule not only that, but also keep the water without allowing the water going downstream. Therefore existing water rights and distribution rules should be applied and respected by all as before, even if they constrain the optimization of crop production by spreading water thinly across an area.

Proper operation of the weirs is a problem because of inadequate flood warning systems. Also, and more critical, is the inadequate distribution of water, giving an oversupply of water to the users close to the weirs and leaving little for downstream users who need supplemental irrigation from wells as a result. Ownership of land close to the weir is with large entrepreneurs and small farmers constitute most of the downstream users.
Furthermore, the ownership situation has developed in such a way that the best land was purchased by large entrepreneurs, while small farmers were pushed to the periphery of the scheme.
Customs in Wadi Zabid are not applied properly and therefore no equity in water distribution at canal level and bad planning of dams upstream with changing of cropping pattern where we found more bananas and mango fields everywhere in Wadi Zabid.

Farmers on Diversion Weirs No.3,4 and 5 prefer the traditional distribution system whereby water flows from field to field with full force allowing the water to reach the middle and tail reaches of the Wadi. Due to the modern system with secondary and tertiary canals and numerous secondary pipes fragments the water flow and it hardly reaches the lower reaches of the Wadi. Therefore, the farmers demand for the installation of large gates in order to allow spate water to reach all fields.
The pipes built at the same location of the traditional ma'aqem are often too small, so that not all fields in the command area of some canals can be irrigated.

Currently all organizations (TDA, PMU, and GDI) that work in irrigation in Wadi Zabid are loosely connected to the Ministry of Agriculture and Irrigation. There is no coordination point within the Ministry of Agriculture and Irrigation. There is also no link between the agricultural policies and activities of the Ministry and the irrigation policies and activities of the Ministry.

Irrigation has a weak link with Local Government (Governorates and District Local Councils) and no official link exists with the Ministry of Water and Environment.
Because of the fragmentation of the local water sector, it is difficult to implement irrigation policies, develop an institutional linkage, ensure quality and link irrigation development with water resource management.
The current water distribution in Wadi Zabid is under pressure. There are indications that the water inflow into the Wadi Zabid system will decline by as much as 30%. There appears to be one large aquifer under the Tihama, which is used for pump irrigation and drinking water. The number of wells using groundwater is still increasing gradually. Result is that groundwater levels in Wadi Zabid decrease with about 1 meter a year.

The water sector in Wadi Zabid is fragmented:

- There is no coordination between investments for water resource development (dam construction upstream) and spate irrigation development.
- There are hardly any institutional linkages between irrigation agencies and Local Government.
- Coordination between upstream and downstream users is difficult and based on traditional water distribution arrangements which are not properly applied.

This situation calls for a practical institutional setting that is able to coordinate water uses (agriculture and domestic use) and water users (in catchment, base flow users and spate users), regulates groundwater use, and operate and maintain the rehabilitated spate irrigation scheme at wadi level.

6.2 Wadi Tuban

The traditional water rights system in Wadi Tuban tends to waste water resources because upstream farmers arbitrarily take their full requirement of spate water prior to releasing the flow for downstream users. This system of traditional spate operation poses equity issues. However, this old system seems to function on a relatively equitable basis during large floods where upstream users can not divert the flow which may destroy their upstream irrigation system and structures. Since large floods do not occur often, due to the random nature of the floods, the downstream agricultural lands sometimes do not get spate water for a number of years.
The office of the Ministry of Agriculture and Irrigation in Lahej, represented by the Irrigation Department, is considered the concerned side for managing and distributing Irrigation water at the level of the great Valley, the Grand Valley and the small Valley via irrigation guides and gates guards existing along the different dams as well as through the assistance of the sheiks of canals (Abrs) and locations.
Usually, the spate water is distributed in accordance with a plan set by the Irrigation Council in the district under which the spate water is distributed at the level of dams and Abrs, although it is not followed at present.

As a general rule, the distribution of water is performed on the basis of Al-Aala Fa Aala. In other words, when water reaches the main canal, the sub-canals of the main canal shall be irrigated first. The sub-canal located on the right of the canal is a modern system and that one on the left of the canal is a traditional system. The directing of water into the sub-canals is controlled by cross gates. Water then is prevented from falling into the lower canals except after irrigating the upper lands. This happens if the amount of water is little. But, if the amount of water is big, more numbers of sub-canals gates shall be opened according to the amount of water in the main canal. However, water distribution inside the sub-canals of modern system shall be performed as the same system in the main canal.

Following the unification in 1990, there are more conflicts between upstream and downstream water users as the traditional rules regarding the distribution of spate water are not any more observed due to the weakness of the local authorities, such as the ID and the Governorate.

Among the various regulations examined in this study, the decree regulating irrigation in Wadi Tuban (Lehej governorate) seems to be the most detailed as it outlined the violations and penalties. One reason is that the region was an independent sultanate with its own irrigation council and irrigation court which were established in 1950. In other words irrigation traditions in this governorate have been regulated, in a legal written form, for nearly five decades.
But all regulations and decrees dealing with the organization of irrigation in Tuban as well as in Zabid wadis were not implemented at present times. This means that:

a. Irrigation practices are still run according to unwritten customs.
b. The government and its representatives at the local level have no real influence to implement these decrees for many reasons either they did not have the sufficient personnel or equipments and materials or no real delegated powers and authority from the central authorities had been transferred to them.

Currently, the Irrigation organizations (RAD, RID, PMU) that work in irrigation in Wadi Tuban are strongly connected to the Ministry of Agriculture and Irrigation. However, there is no link between the agricultural policies and activities of the Ministry in the catchment area.
There exists an old link with Local Government through the previous Irrigation or Agricultural Council although this Council does not really function at the moment.
Irrigation in Wadi Tuban has no official links with the Ministry of Water and Environment through for instance the NWRA Aden Branch or with the Drinking Water Companies in Lahej and Aden.

The current water distribution of Wadi Tuban is under strong pressure. There is indirect evidence of a smaller flood volume while water use is increasing due to rapid grow of Aden. Groundwater depletion for agricultural purposes increases rapidly as well, which causes a drop in groundwater levels in Wadi Tuban and intrusion of salt water.
The water sector in Wadi Tuban is fragmented:

- There is no coordination between investments for water resource development (dam construction upstream) and spate irrigation development;
- There are hardly any institutional linkages between irrigation agencies and Local Government;
- Coordination amongst users hardly exists.

Above calls for a practical institutional setting that is able to coordinate water uses (agriculture, industrial, and domestic use) and water users (in catchment, base flow users and spate users), regulates groundwater use, and operate and maintain the rehabilitated spate irrigation scheme at wadi level.

The main problems in Wadi Tuban areas are the following:-

- Increasing inequity in water distribution.
- Increasing random drilling wells
- Increasing misuse of water e.g. drinking water for irrigation
- Increasing pollution and salinity
- Weakness of media and extensionists services.
- Expansion of agriculture while there is no water.

While in Wadi Zabid there is a decreasing amount of water available for an increasing number of people and the shortage of water in Wadi Zabid is mainly because of an increase of the numbers of dams upstream which started since four years ago. Also, sedimentation which is the result of the large control of spate flows particularly the ability to capture the very big and heavy silt-laden floods and the absence of effective silt exclusion causes heavy sedimentation in the Wadi Zabid area. Sedimentation problems appear in several forms:

i.e. Land going out of surface command.
ii. Sand deposition in fields.
iii. Heavy sedimentation in canals.

The groundwater level is decreasing with about 1 meter per year. There is a wrong application of traditional water right due to the changing cropping pattern e.g. more bananas and mango.

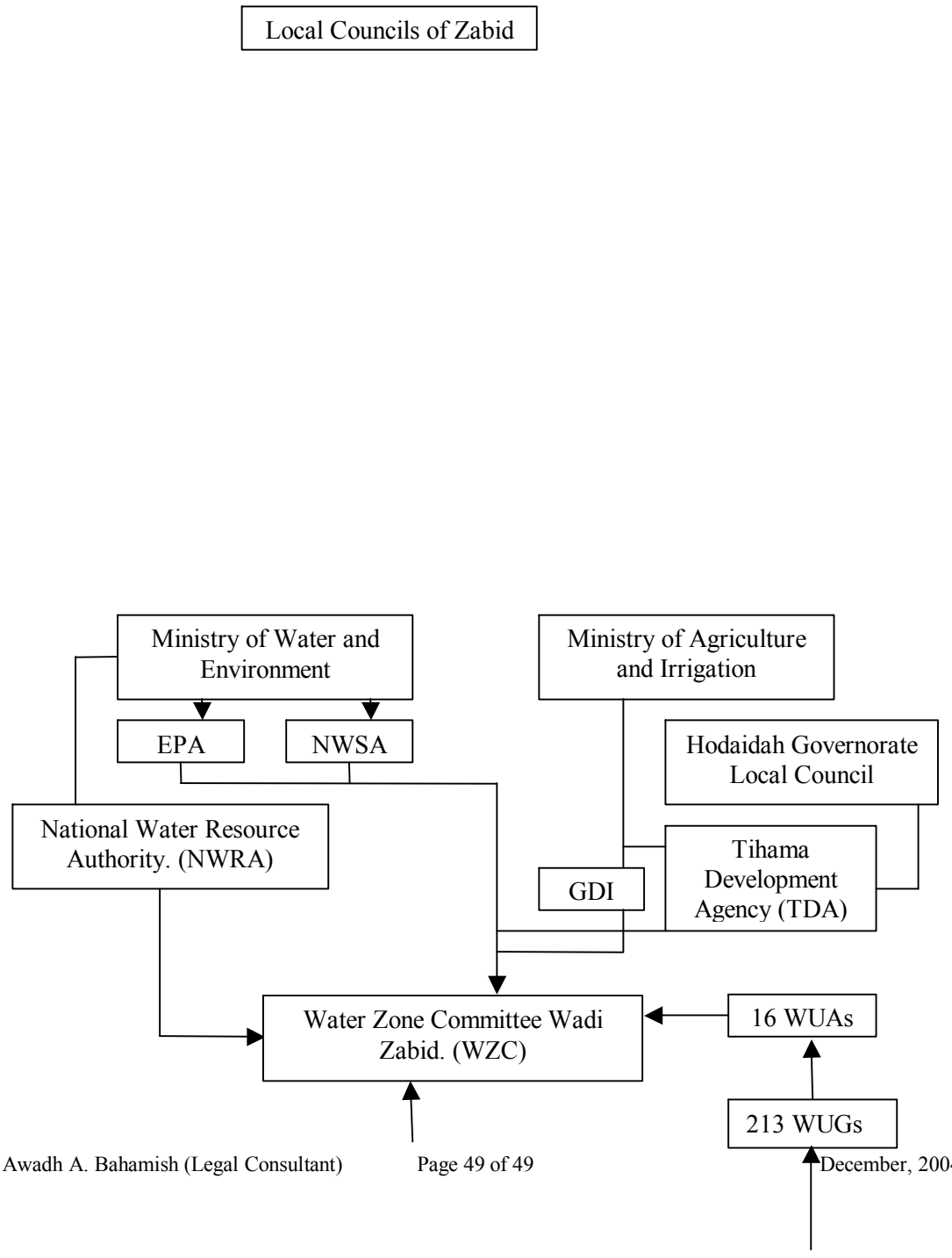
7. Recommendations

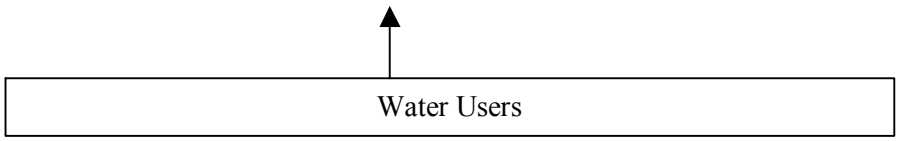
In order to achieve improved and equitable distribution of spate irrigation for each wadi and at the same time preserve water rights of all farmers we propose the following recommendations:

7.1 The establishment of water Zone Committees for each wadi. We propose the establishment of WZC and not water basin committee because Wadi Zabid is geographically part of Tihama and Hodeidah governorate and Wadi Tuban also is only district of Lahej governorate. So, we start establishing WZC in these two wadis. The Draft Executive Procedure and Regulation of the water law provides that in future two or none WZC may be unified in one WBC. So, the beginning we propose for the establishment of WZC to replace the previous Irrigation Committee in Wadi Zabid and Irrigation Council in Wadi Tuban as well as to take the functions and responsibilities of the integrated water management on the local level as stipulated in both water law and the Local Authority Law as explained above.

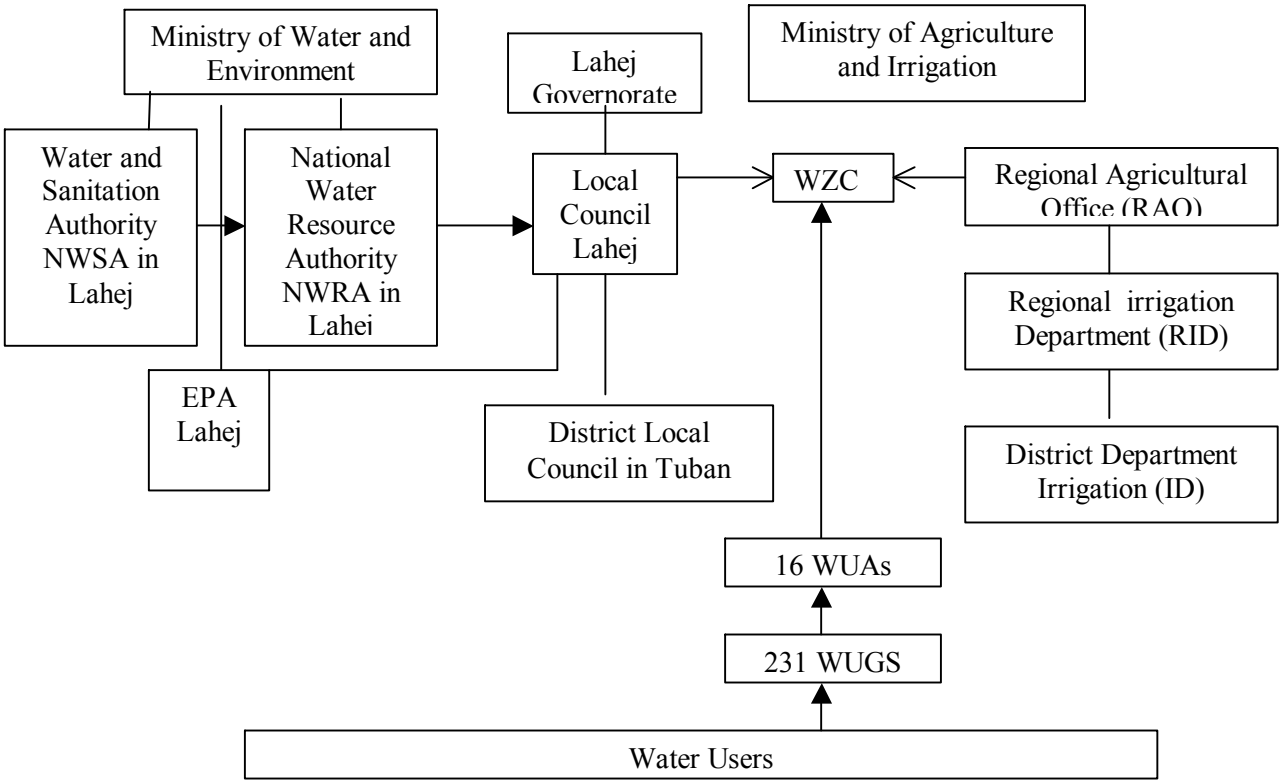
Article 11 of the new water law describes a coordination body in water management, called the Water Basin Committee (WBC) and Water Zone Committee (WZC). The Water basin committee and Water Zone Committees will be set up by the Ministry of Water and Environment. The Executive Procedures of this Law described the duties of this committee, so as to be in conformity with the law on Local Authorities, no. 4. The duties will be in the implementation of the provisions of the water law, in particular in water resource planning and regulating groundwater use. The Water Zone Committee will have a representation of the local councils and all other stakeholders.
The institutional setting of a WZC in Wadi Zabid and Tuban is given below. In this institutional set up, the WZC will include Governmental as well as Water Users' representation. The Committee will decide upon water management issues at Wadi level including catchment level.

Water Zone Committee in Wadi Zabid.


Local Councils of Zabid
Ministry of Water and Environment
Ministry of Agriculture and Irrigation
EPA
NWSA
Hodaidah Governorate Local Council
National Water Resource Authority. (NWRA)
GDI
Tihama Development Agency (TDA)
Water Zone Committee Wadi Zabid. (WZC)
16 WUAs
213 WUGs



Water Zone committee in Wadi Tuban



In this institutional set up, the established WZC will decide upon irrigation management issues at wadi spate irrigation level. WUA are responsible for irrigation management of their canals. The WZC can consist of 22 members in Wadi Tuban, 16 WUA representatives, and the rest as follows:

1. Governor of Lahej Governorate Chairman of the Local Council.	Chairman.
2. MWE/NWRA in Lahej Governorate.	Deputy chairman.
3. MAI/ID.	Member.
4. NWSA in Lahej Governorate.	Member.
5. EPA in Lahej Governorate.	Member.
6. Chairman of Tuban district Council.	Member.

As far the composition of Water Zone Committee in Wadi Zabid, it is recommended to be as follows:

1. Governor of Hodeidah Governorate Chairman of the Local Council.	Chairman.
2. MWE/NWRA.	Deputy Chairman.
3. MAI/TDA	Member.
4. NWSA in Hodeidah Governorate.	Member.

5.	EPA in Hodeidah Governorate.	Member.
6.	Chairmen of the three Local District Councils of Zabid, Tahaita and Jarahi.	Members.
7.	16 Representatives of WUAs in Wadi Zabid.	Members.

The Total membership of WZC in Wadi Zabid shall be 24 members.
In accordance with the Draft Executive Procedure of the water law, the composition of WZC shall be in accordance with the size of the zone and the number of beneficiaries and stakeholders available in that zone. So, no number is fixed and it is up to the circumstances of each zone and that are the reasons for our proposal provided MWE, NWRA and NWSA establish their branches and offices in both governorates and districts of Wadi Zabid and Tuban.

After the issuance of the water law, there are now only two ministries responsible for the water sector MWE and MAI, and so the disintegration and fragmentation of several institutions, authorities and corporations of the past is over. It is high time for MWE and MAI to restructure and set up the required institutions in accordance with the prevailing laws in particular the water law and the Local Authority Law and their Executive Procedures. The water sector suffered in the past from the disintegration of the several institutions working in the water sector whether in supply or demand activities without coordination or cooperation. But now all issues of water management shall be dealt with and managed on the basis of integrated water management that is why we propose the establishment of WZE in both Wadis to start with. So, it is essential for MWE/NWRA and NWSA to complete the establishment of their branches and offices in both districts of Zabid and Tuban or to delegate their functions and responsibilities to the local councils and other entities as stipulated in article (72) of the water law.

The proposal of establishment of WZC in both Wadis shall be submitted by MWE to the cabinet for issuance by a resolution from the prime minister.
This shall be undertaken after coordination with MAI and the Local Councils of both governorates to select representatives provided that they are experienced in the water situation and selection to be based on the posts not on names to give flexibility in the replacement of such members. WUAs, shall choose 16 members from each Wadi representing their associations and the names can be replaced from one year to another as WUAs may deem fit and appropriate.

The Prime Minister shall issue the establishment resolution of WZC in each wadi, and the resolution shall include the geographical boundaries of each zone, duration of the work of the committee, its functions, as well as any other measures, rules, and procedures of its meetings and taking its decisions.
The functions and responsibilities of the WZC in each wadi shall be in accordance with the provisions of the water law, the Local Authority Law and the Executive Procedures and in particular the following:

- Supervision and control of implementation of Public Policies and plans in the issues of water resources, irrigation, sanitation and protection of the water zone from overexploitation and pollution.
- To approve or to suggest water and irrigation projects as well as sanitation projects in the Water Zone on the basis of the Water Zone plan to ensure and obtain the basic and necessary needs of the population for water and food and to conserve water resources and maintain sustainability of such resources.

- The WZC shall submit any remarks, comments or observations in relation to the component of draft water plan for their zone when preparing such draft of the plan of Water Zone and before submitting as such to the MWE.
- WZC, shall approve granting licenses of drilling wells, establishment of barriers and dams, building treatment stations and water desalination stations and other licenses as specified in the water law and other laws e.g. Local Authority Law. WZC, shall transfer such approvals to NWRA or its office or to the other offices authorized or delegated to by NWRA for the purpose of Execution and implementation and to issue such licenses after the approval by WZC. In all cases WZC shall not approve granting any license unless technical report about the Water Situation and the water rights is first submitted to WZC by NWRA for it review before taking any decision of approval and also to give the chance and opportunity to any person to protest and object to the WZC. The WZC, shall listen to and hear to any objection or protest by any person and take decision on such protest and objection by others.
- The WZC shall give its point of view towards projects of water transfer outside the zone or within the framework of the water basin in general e.g. within Tihama basin. Before taking any decision, the WZC shall listen to the point of view of the Local community, the beneficiaries, the WUAs and the other concerned parties in the Zone.
- The WZC shall have right to ask other concerned parties to submit to it reports which relate to irrigation projects, sanitation and other water projects. The WZC shall give its comments and observations to such projects and WZC shall take the appropriate measures to supervise and control such projects e.g. spate irrigation project. Such supervision and control shall be in coordination with the ministries of MAI, MWE and other competent authorities as NWRA, NWSA, TDA and Rural Water Projects Public Authority.
- The WZC, shall review all cases and issues that are pertinent and relate to the water rights and beneficiaries of water resources and its structures as well as WZC shall hear cases and disputes that relate to applications of compensation which are due and because of damages that occur provided the law provides for such compensation. The WZC shall take the necessary measures and decisions in this respect. Such decisions by the WZC shall be subject to appeal before the Competent Court.
- The WZC shall assist MAI and MWE to activate Public awareness campaigns on water issues. This assistance shall be through coordination and cooperation with the public and official media on local and central level and that WZC shall convey all information to all WUAs, NGO, and Civil Society Organizations within the zone as well as the general beneficiaries and the Local Community in the zone in general.
- The WZC shall take the appropriate measures to ensure the sustainability of the water resources within the zone and to ensure and achieve equity in the water distribution of spate irrigation in accordance with the water law and through the coordination and cooperation of MAI/TDA and MWE/NWRA in Wadi Zabid and MAI/ID and MWE/NWRA in Wadi Tuban.
- The WZC, shall have meetings and undertake discussions with all stakeholders in particular WUAs, NGOs in order to achieve a united point of view and agreement towards the sustainability of water resources and create public awareness towards the issues of water management and the problems of pollution and to protect water resources and the environment.

- The duration of WZC shall be for three years and any member can be replaced by another member during this period if the stakeholder in the WZC desires to replace its representative by another person during the three years period.
- In accordance with the water law no (33) of 2002 MWE may delegate more powers and functions to WZC, or to amalgamate two or more WZC into one in the future provided that such amalgamation of WZC shall be within the geographical framework of the same water basin.

The representatives of MAI and MWE in particular NWRA office in Zabid which should be established and TDA representative shall be the executive technical secretariat of the WZC in Wadi Zabid. This Executive Technical Secretariat of the WZC shall be responsible to implement the decisions of WZC in Wadi Zabid since they are responsible to implement the water law as specified above. MWE and MAI are responsible to implement the provisions of the water law through their authorities in the governorates e.g. TDA in Hodeidah governorate. So, representatives of both ministries in the two governorates shall constitute the Executive Technical Secretariat of both WZC in both wadi.

Daily management of WZC, shall be carried out by a smaller executive technical secretariat which we propose to be from NWRA and TDA in Wadi Zabid and NWRA and MAI/ID in Wadi Tuban. Three technical persons shall be added to them in order to be able to execute the water management plan and operate and maintain the head works. The WUAs can consult this Executive Technical Secretariat of the WZC on technical matters and can hire equipments for O&M at WUA level. The Executive Technical Secretariat shall be responsible for irrigation management of spate water distribution at wadi level, but WUAs shall be responsible for the management of spate water distribution of their canals. So WUA, shall be responsible for equitable distribution of spate water irrigation in accordance with existing water rights and customs as explained above. WUAs can solve any disputes or problems arising from such distribution among water right owners and beneficiaries, otherwise WZC could however mediate in conflicts between water users at canal level and set up an arbitration group for this purpose or decide upon each dispute or case by taking decisions as explained above which depends upon the aspects and magnitude of each conflict, dispute or case concerning water rights and spate water distributions.
The daily management of the Proposed Executive Technical Secretariat of the WZC shall include the following responsibilities by them, but remain accountable to WZC:

- Oversee fair distribution of water in line with agreed rights and rules on sequence and division of water and second turns.
- Agree on adjustments to the water distribution in consultation with the concerned water users associations.
- Manage the heavy equipment and make it available to Water Users Associations.
- Arrange service and spare part contracts for heavy equipment.
- Resolve conflicts on water distribution and inadequate maintenance at wadi level and canal level and issue penalties as appropriate.
- Set up and agree on system for penalties for water users associations in case of default on financial contributions.

The above recommendation of establishment of WZC in both WAdis shall create coordination amongst users which hardly exists, since there is no coordination between investments for water resource development as dam construction upstream and spate irrigation development.
Also, this recommendation shall put an end to the fragmentation of various institutions in both governorates working in water sector separately and some times there is overlapping

and duplication in their activities and there are hardly any institutional linkages between irrigation agencies and local government. So, the practical solution is to recommend setting up an institutional structure on the basis of the provisions of the water law and the Local Authority Law and the Executive Procedures and that is establishment of WZC in both Wadi to start with the enhancement and strengthening of the policy of an integrated water management of the water sector as envisaged in both laws mentioned above.

In this institutional set up, the WZC in both Wadis shall include governmental with the governor of the governorate, chairman of Local Council as chairman as well as water user representatives via WUAs. Some members of WUAs are also members of ACU and NGO and Civil Society Organization. So, WUAs are in fact representative of the Local Community in the Zone. Also Local Councils shall be represented in the WZC. Due to the complex use of both Wadis, the WZC shall include NWRA, EPA and NWSA representatives. MAI representative e.g. TDA in Wadi Zabid and ID in Wadi Tuban along with MWE representative, i.e.. NWRA shall play the important coordinating role in the committee.

The WZC shall decide upon water management issues at wadi level including catchment level and as such have a policy role as well. Execution shall take place by the Proposed Executive and Technical Secretariat and within the different water sectors in the Zone according to the issues to be implemented and its relevance.
The implementation of the above mentioned recommendation depends upon the approval by parliament of the amendments to the water law no (33) of 2002submitted to it as well as issuance of the Executive Regulation of the water law and establishment of branches and offices by the competent authorities, i.e.. MWE and NWRA in both governorates of Hodeidah and Lahej.
But it seems that such requirement will take much time. Therefore in order to achieve improved and equitable distribution of spate irrigation, it is recommended to accelerate the establishment of Irrigation Councils in Wadi Zabid and Tuban under IIP, which will be responsible for irrigation policy and overseeing on farm irrigation activities and fair water distribution between all users. At later stage Water Zone Committee (WZC) will be formulated in each wadi on the basis of integrated water management basis as stipulated in article (11) of the new water law no (33) of 2002 and the Local Authority Law no (4) of 2000 which provide for decentralized management of water issues. The above mentioned laws provide the legal basis and framework for the establishment of WZC and their functions and responsibilities to deal with water issues as a whole whether supply or demand or groundwater or catchment areas or other pertinent issues of water conservation and protection from pollution. So spate irrigation issue is only an integral part of the principle of integrated water management as a new approach of water management.

The legal basis for the establishment of the Irrigation councils in both Wadi Tuban and Zabid is article (168) of the law no (4) of 2000, which stipulates the following:
(The Local Council may constitute special committees from among the beneficiary public to manage, conduct and maintain services projects of the administrative unit. The Regulation or executive decisions shall show the fundamentals governing that) .
Also, in accordance with article (271) Para. (c) of the Executive Regulation and ordinance no (269) of 2000 of the Local Authority Law , the local council in the governorate as represented by the chairman of the Local Council who is the governor shall determine the mechanisms and procedures of the management and administration of such Irrigation Councils. This means that governor of the governorate shall issue resolution to this effect as it happened in the previous IC in both governorates and explained in detail in the above paragraphs.

There is a lot of discontent at present in both Wadis because different organizations interfere with the water distribution. But IC with Local Council involvement shall put and end to such interference and improve the enforcement of spate water rights.
The role of farmers in both Wadis in the management, composition and functions of the proposed IC shall be as follows:

A) Role of farmers:

- The role of farmers of WUAS shall be limited to the operation, maintenance and management of irrigation within the branches of the canal.
- WUAS shall participate in preparation of the irrigation plans.
- WUAS shall prepare the internal regulation and procedures of the IC and submit to the IC for discussion and approval.

B) The composition of the proposed Irrigation Council (IC):

- The proposed IC shall be composed of all chairmen of the 16 WUAS as each Wadi has 16 WUAS.
- Representatives of Local Councils. Three directors of the three districts in Zabid and two directors of the two districts in Tuban.
- Representatives of the competent authorities in the area e.g. MAI, MWE, NWRA and NWSA.
- Representatives of the Prosecutor general in the district to ensure enforcement and respect of the law.
- Members of parliament representing the three districts in Zabid and two districts in Tuban shall attend meeting of the IC without having the right to vote.

C) Functions of the proposed IC

- preparation of water distribution plan each year in accordance with the prevailing customs in the area and in conformity with the existing laws.
- Supervision on the management of the main water structures and facilities.
- Supervision on collection of fees for rendering services of operation and maintenance as specified and defined by WUAS.
- To regulate extraction and drilling of ground water in the district in accordance with the prevailing laws.

7.2 In order to achieve improved and equitable distribution of spate water irrigation in both Wadis, it is recommended for reforms in MAI structure in Sana'a and then in its offices in both governorates. We recommend establishment of General Directorate of Irrigation Management within MAI, so that to give technical support to the WUAs so that to be able to manage irrigation systems adequately and use water efficiently and to make sure that the interests and needs of the WUAs are safeguarded in the process of developing irrigation systems and hydraulic structures in the irrigation sector.

The General Directorate of Irrigation Management shall undertake the following duties and responsibilities:

- Coordinate with the General Managers of Directorates in developing an irrigation program and develop and review practical procedures to support this.
- Coordinate irrigation projects, and ensure farmers participation and private sector participation is given shape.
- Provide support to Irrigation Offices in irrigation development, together with capacity building component.
- On regular basis inspect and provide support to Irrigation Offices to make sure that after care is adequately taken care of.

- Ensure that the designs and approaches in the irrigation development are adequate and up-to-standard.
- Propose training courses to improve the ability of farmers to manage the irrigation systems and make good use of water being made available.
- Make sure the departments within the General Directorate are providing support to the Local Irrigation Offices, where required.

MAI/ID in Wadi Tuban must be activated as it was before through the provision of its needs of personnel, equipment and materials as well as delegation of power to implement its responsibilities in accordance with the above mentioned laws. So that the above proposed General Directorate of irrigation management shall make sure that procurement and providing support to local irrigation offices in the governorates have been implemented. Also it shall identify training needs and set up training programs for WUAs.
In Wadi Zabid, TDA is representing MAI in the irrigation issues, but in spit of that it is recommended that MAI, to have an office in the Hodeidah Governorate as it has an office in Lahej Governorate, because it is necessary for the implementation of the water law and Local Authority Law to have offices of both ministries MAI and MWE in order that integrated water management in both Wadis succeed.

7.3 MWE, has no offices in both Hodeidah and Lahej Governorates, neither NWRA has any branches in both governorates so, it is essential for MWE to start establishing offices and NWRA to have offices in both Zabid and Tuban districts to participate in the proposed WZC for both Wadis.
The Regulatory ordinance of MWE is issued this month August 2004, whereby the ministry legal framework has been set up and general directorates within the ministry are regulated and their functions and responsibilities are defined as well as the relationship between the Ministry and the Authorities that are affiliated to it e.g. NWRA, NWSA, EPA, RWSA and local NWSA. It is noted that one of the general directorates within MWE, is General Directorate of water resources to ensure integrated water management on decentralized basis on the lines of water law and the Local Authority Law in coordination with NWRA and MAI as explained above. So, it is recommended that MWE to establish offices in both governorates of Hodeidah and Lahej and also that EPA and NWRA to have representation in both Wadis of Zabid and Tuban.

7.4 The new institutional structure as recommended to be established in both wadis as well as the laws pertaining to such institutions need to be understood and conveyed not only to the ordinary beneficiaries, but to the responsible officials in the ministries, Local Councils, WUAs and NGOs whether in Sana'a or in both governorates, so we recommend holding three workshops to explain laws, regulations and other issues pertaining integrated water management and establishment of WZC in both Wadis.
-Public awareness campaigns and holding such three workshops must be prior the establishment of the proposed WZC. All materials, documents, laws and regulations must be circulated to all those concerned in advance to ensure their participation and discussion.

7.5 Meanwhile, it is recommended to continue with the construction of more dams and barriers in the zones and catchment areas but we recommend the establishment of such dams and barriers should be in accordance with the principles and rules stipulated in the water law and its draft Executive Regulation as mentioned earlier and on the basis of Local Authority Law in coordination with both MWE and MAI. Some dams were built in response to the wishes of big and influential landlords and some of them were proven to be useless and in fact waste of money and time.

7.6 Because of the limited national experience with cooperative work in the field of water, it is recommended that the transfer of responsibilities from the MAI to the WUA's be gradual and transitional, at least for the first seven years.

7.7 In order to implement the provisions of the water law and other laws related to the Protection of Environment in all aspects, it is important to establish a specialized prosecution office to deal with agriculture, water and environment issues, offences and violations. This will enhance the legal system in Yemen by transforming the unwritten customary rules into written rules. MWE has already started the procedures to establish such specialized prosecution office within the prosecutor general offices with branches in other governorates for the purpose of implementing the laws that deal with Water and Environment. It is noted that some influential landlords recently had diverted spate water from their courses of flowage into their land without any reaction or response from any law enforcement machinery against such offences and violations to the provisions of the water law. The establishment of such specialized prosecution offices shall put an end to such violations and offences to both the water law and the protection of the Environment law no (26) of 1995.

7.8 The implementation of regulations regarding irrigation, and the organization of this sector by the competent central and local government entities, as well as the application of the provisions of these regulations by courts and prosecutors, requires that these regulations be published in the official gazette. Any legislation not published in the official gazette does not acquire the power of law and hence cannot be binding to all government or non-government entities. Hence it is recommend that both MAI and MWE publish all their laws regulations and any relevant information to inform the public and create public awareness of the water issues and in particular integrated water management. Such publication of relevant laws and regulations and dissemination of information on water issues to the public in general shall be undertaken mainly by MAI and MWE through the coordination with both ministries of legal affairs and information.

The following program is recommended to be implemented by the different stakeholders as specified:

8. Schedule of stakeholders and tasks for implementation

Task	Stakeholder	Implementation	Coordination	Time
1. Establishing offices in Hodeidah and Lahej governorates	MWE	*	*	Jan 2005
2. Establishing General Directorate of irrigation management to assist WUAs in both Wadis of Zabid and Tuban.	MAI	*		Jan 2005
3. Establishing offices in Hodeidah and Lahej governorates	NWRA/EPA	*	*	Feb 2005
4. Establishing Irrigation Councils in both Wadis	MAI/IIP Local Councils	*	*	March. 2005
5. Organizing workshops on water law, regulations and	MAI	*	*	April 2005

institutional set up in coordination with MWE and the Local Councils.				
6. Establishment of specialized prosecution offices in coordination with the Ministry of Justice and the prosecutor general office.	MWE	*	*	May 2005
7. Setting WZC in Wadis of Zabid and Tuban in coordination with MAI and the Local Councils in the two governorates.	MWE	*	*	May 2005
8. Organization of public awareness campaigns on water issues in the Media in Coordination with the Ministry of information.	MWE/MAI	*	*	All 2005
9. Publishing laws and regulations on water and irrigation in the official gazette with the coordination of the legal Affairs Ministry.	MWE/MAI	*	*	All 2005
10. Prosecution of offenders and violators of provisions of the water law and protection of environment law	Juridical authority attorney Authority Law enforcement Authority.	*		Permanent
11. Public awareness among NGOs and Local Communities of Water issues and WZC.	Local Councils of both governorates of Hodeidah and Lahej.	*	*	All 2005

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10. Annexes

Annexes: List of names interviewed and have discussion with, in both Wadis Zabid and Tuban.

Annex (1)

List of persons interviewed and discussed with in Wadi Zabid and Hodeidah Governorate.

1. Eng. Khalid Al.Attas. Director of PIU. Zabid.
2. Dr. Mohammed Al-Ghasham. Chairman of TDA.
3. Eng. Abdul Wali Haider Saif. Director of Water Section TDA Hodeidah.
4. Eng. Mohammad Saif Sharaf. Director of TDA Director General Office.
5. Eng. Nawaf Salim Ahmed. Head of Water Section TDA. Zabid.
6. Brigadir Abdullah Mohammad Al-Modwahi. Director General of Zabid District.

7. Mr. Mohammad Hogainah. Lawyer and member of Zabid Local Council.
8. Mr. Saleh Gadhib. Sheikh of Sharej Al-Bagar.
9. Mr. Fattah Hittari. Farmer of Al-Zariba.
10. Mr. Hassan Atiyah. Farmer of Al-Yousifi.
11. Eng. Saif Abdo Saif. Deputy Director of PIU.
12. Mr. Ahmed Hussein Al-Wajieh. Chairman of ALMAWI WUA.
13. Mr. Sulaiman Sharaf. Chairman of Al-Youssif WUA.
14. Mr. Hasan Zaher. Shaikh in Zabid.
15. Mr. Salim Mohammed Tabak. Member of WUA of MAWI.
16. Eng. Najib Magtari. Director of TDA Office. Zabid.
17. Mr. Arafat Abdul Raman Al-Hadrami, Director of Al-Ashaira Reigiours Library in Zabid.
18. Mr. Shaif Ezzi Sagir. Director of Cotton Corporation. Zabid.
19. Eng. Abdul Razzag Al-Hamili. TDA Office. Zabid.
20. Eng. Abdul Bagi Haddah. TDA Office. Zabid.

Annex (2)

List of persons interviewed and discussed with in Wadi Tuban:

1- General Mansoor Abdul Galeel Abdul'Rabb, Governor of Lahej Governorate-Chairman of Local Council.
2- Eng. Anwar Abdul Karim. PIU-Director- Wadi Tuban IIP Lahej.
3- Eng. Abdul Wali Haider. PIU-Engineer. Tuban –Lahej.
4- Mr. Mahdi Gaderi. Supervisor of Agricultural Extensionists.
5- Mr. Mohammed Mehdhar- Chairman of WUA of Abar Yagoup.
6- Mr. Mohsen Al-Kaila. Chairman of WUA of Alarais.
7- Dr. Abdulla Daameem. Agricultural Research Center-Aden.
8- Eng. Talal Soufi. Specialist, Institutional Set up.
9- Dr. Kamel Al-Rashahi. Specialist. Institutional Set up.
10- Mr.Said Haidra. Director-General. Tuban District. Lahej.
11- Mr.Saleh Howaizel. Chairman of WUA of Falaj Eiadh.
12- Mr.Hussein Abdulla Hassan. Chairman of WUA of Bizeag.