

**JOINT ANNUAL REVIEW
OF
NWSSIP YEAR 2005
IRRIGATION AND WATERSHED**

1. Key Issues

- Agriculture consumes 90 % of available water, but the irrigation efficiencies are very low (35 % under Spate Irrigation and 40-45 % under groundwater irrigation);
- The AFPPF is an important fund to increasing the irrigation efficiency and water harvesting schemes. A higher allocation from the fund for irrigation system is required within the irrigation sector.
- Eleven-fold increase in groundwater irrigated area, from 37,000 ha in year 1970 to 407,000 ha in year 2004 and reduction of rain-fed irrigated area to nearly one-third from 1.20 mha to 0.46 ha in the same period;
- Returns on agriculture water use are generally low except for some cash crops (including Qat), Qat need to be treated as a crop;
- Lack of O&M of irrigation infrastructure and abandonment of terraces and spate and other water harvesting structures;
- Agriculture Research and Extension Services very weak;
- Coordination between MAI/MWE needs improvement;
- Abnormal delay in restructuring of irrigation sector.

2. Resulting Problems

- Annual water consumption in Yemen (3.2 BCM) exceeds renewable fresh water supply (2.5 BCM);
- Present availability of water of 136 m³/per person/per year is lowest in the world and is far below world average of 7,500 m³/per person/year and much below 1,000 m³/per person/year necessary for food production requirements for self sufficiency;
- In the year 2031, when the population of Yemen is estimated to be double (about 38 million), the water availability is likely to reduce to 65 m³/per person/per year resulting in unsustainable situation for human living;
- Delay, in restructuring of the Irrigation Sector of the MAI and its capacity building, is responsible for construction of large number of dams without proper investigations, designs and quality control.

3. Summary Analysis

a. Capacity Building and Organizational Strengthening

No funds were provided during 2005 for design and implementation of irrigation part of NWSSIP monitoring system, restructuring program of MAI based on A21 A, capacity building and institutional strengthening of Irrigation Department of MAI, applied research and extension and various studies relating to rational and sustainable use of water in irrigation and improvement of water use efficiency etc.

Capacity building and institutional strengthening of the Irrigation Department in the MAI, taken up on skeleton basis, under Groundwater and Soil Conservation Project, Irrigation Improvement

Project, Sana'a Basin Water Management Project, and Groundwater and Soil Conservation Project has not been effective.

b. Results Indicators

- **Annual Water savings from introduction of improved irrigation technologies (piped conveyance and pressurized systems):**
 - 16 MCM from 10,500 ha under the completed Land and Water Conservation Project (LWCP)
 - 10 MCM from 4,000 ha under the on-going Sana'a Basin Water Management Project (SBWMP)
 - 47 MCM from 27,000 ha under the on-going Groundwater and Soil Conservation Project (GSCP)
 - Above savings are 14 % of present Industrial and Water Supply Demand of whole Yemen
 - The area covered under the above three projects is about 10 % of the total area of the country under groundwater irrigation.

c. Savings of water and diesel per ha as a result of improved irrigation systems

No.	Items	Unit	Groundwater Irrigation through open channels	Irrigation after installation of piped conveyance	Irrigation after installation of pressurized (Drip, Bubbler, Sprinkler) systems
1	Water consumption	M ³ /ha	9500	7980	5235
2	Net water saving	M ³ /ha	0	1520	4275
3	% Water Savings	%	-	16	45
4	Diesel Consumption	Litres / ha	1360	1142	750
5	Saving of Diesel	Litres / ha	0	218	610
6	Cost of Diesel	YR/ha	47,700	40,600	26250
7	Saving in cost of Diesel	YR/ha	0	7100	21450
8	Pumping time required to irrigate one ha	Hrs/ha	300	255	165
9	Saving in Pumping time	Hrs/ha	0	45	135

d. Indicators for Implementation of National Strategy for Water Sector during 2005-09

These are given in the following table along with the analysis of the indicators:

No.	Description	Unit	Target up to 2009	Achievement during 2005	Target for 2006	Remarks
1.	Improved Irrigation System					
	(a) Modern Irrigation System (Drip, Bubbler, Sprinkler etc)	Ha	4,230	467	1,518	
	(b) Piped Conveyance System	Ha	30,040	2,380	11,032	
	(c) Cost for (a) and (b)	US\$ million	24.64	3.11	7.35	
	(d) Water Saving from (a)	MCM	10.10	1.97	5.50	
	(e) Water saving from (b)	MCM	44.91	3.58	16.60	
	(f) Total of (d) and (e)	MCM	55.01	5.55	22.10	
	(g) Increase in farmer's income from (a) and (b)	US\$ million	7.79	0.12	2.80	
	(h) Cost sharing by beneficiaries	US\$ million	4.68	1.11	1.76	
1.1	Analysis of data under 1 above					
	(i) Water saved per US\$ spent	M ³ /US\$	2.23	1.78	3.01	
	(ii) Water saved per US\$ of cost shared by beneficiaries	M ³ /US\$	11.75	5.00	12.56	
	(iii) Increase in farmers' income as % of total cost	%	31.61	3.86	38.09	
	(iv) Increase in farmers' income as unit cost of water saved	US\$/M ³	0.14	0.02	0.13	
2	Improved Spate Irrigation and Water Harvesting					
	(a) No. of Spate and Water Harvesting Schemes	Nos.	1,133	114	342	
	(b) Total cost of these schemes	US\$ million	20.43	17.66	10.83	
	(c) Water saved from above schemes	MCM	8.90	3.05	3.59	
	(d) Cost-sharing by beneficiaries	US\$ million	1.91	0.41	0.45	
2.1	Analysis of data under 2 above					
	(i) Water saved per US\$ spent	M ³ /US\$	0.44	0.17	0.33	
	(ii) Water saved per US\$ of cost shared by beneficiaries	M ³ /US\$	4.66	7.4	7.98	

It is quite evident from the above table that the modern irrigation systems save maximum water per unit of money spent as compared to other schemes.

4. Comments on 2005 Performance

Against the planned investment requirements of US\$ 34.35 million during 2005 for Irrigation and Watershed Management Program, the committed donor funds were US\$ 17.42 million and estimated local budget funds were US\$ 11.94 million, leaving a deficit of US\$ 5.00 million. However, the actual donor funds available during 2005 were US\$ 7 million and actual local funds were equivalent of US\$ 21.33 million leaving a deficit of US\$ 6.00 million.

The AFPPF spent US\$ 2.00 million to introduce the modern irrigation systems in 2005, in comparison with US\$ 0.8 million in the investment program of NWSSIP, which mean the increase ratio about 250%.

**Table of Investment Program and disbursement of Irrigation and Watershed Management
(2005-2006)**

No	Activity/Project	Location	Target 2005	Target 2006	Actual disbursements in 2005 (US\$ million)	
					Local	Foreign
1	Design and Implement irrigation part of NWSSIP monitoring system	National Level (MAI)	0.10	0.01		
2	Irrigation Improvement Project (IIP)	Wadi Zabid Wadi Tuban	2.90		4.2	1
3	Pilot Implementation of Agriculture Reform Program (A21A)	National Level	0.30		0.3	0.03
4	Restructuring Program in MAI based on A21A, including MIS for MAI.	National Level	1.00	1.70		
5	Capacity building and institutional strengthening Irrigation Department MAI	National level & local Level	0.50	1.00		
6	Southern Governorates Project component for spate Irrigation & Wadi Rehabilitation	Hadramawt, Shabwah, Abyan, Lahj	3.00	0		NA
7	Dhamar Rural Development Project Component for irrigation & watershed Management	Dhamar Governorate	1.50	1.50		
8	Rayma Rural Development Project Component for Irrigation & Watershed Management	Rayma Governorate	1.50	1.50		NA
9	Groundwater and Soil Conservation Project (Excluding IWRM measures)	Country	5.40	8.00	1.7	1.2
10	Sana'a Basin Water Management Project (excluding IWRM measures)	Sana'a Basin	4.95	6.43	0.8	0.1
11	Construction of water structures & small dams for recharge & irrigation purposes	Country	8.00	8.00		16.8
12	Watershed management, Terrace Rehabilitation & Water harvesting Project	Ibb, Mahweet, Sana'a, Manakha, Taiz, others	1.20	1.80		
13	Pilot Projects with re-use for agricultural purposes (downstream" software & Hardware)	Pilot Areas	0.30	1.70		
14	Desertification Project	Pilot Areas		5.50		
15	Applied research and extension (Farmer support Software and Hardware)	Pilot areas in highlands eastern plateau & Coast		4.00		
16	Promotion of modern irrigation techniques to increase water use efficiency	Country	0.80	0.80		2
		National	0.80	0.80		
17	Study to determine the effect of lifting subsidies on groundwater mining			0.30		
18	Study to determine the effect of & perception of local communities on water rationing cost recovery & Production	National		0.50		
19	Study on water rights in flood irrigation schemes (spate irrigation)	Pilot areas	0.30			
20	Awareness raising on A21Aa reform program through conducting nation-wide workshops	Country	0.60			
21	Preparation of multi-media programs on rational & sustainable use of water in irrigation	National	0.40	0.40		

22	Traveling workshops on rational water use/modern irrigation techniques for farmers groups & Water User Associations	Country	0.40	0.40		
23	Mobile fairs and shows on modern irrigation techniques.	Country	0.40	0.40		
	TOTAL planned investments		34.35	44.74		
	Total committed /pipelined donor funds		17.42	16.19	7	
	TOTAL estimated allocated local funds		11.94	11.74		21.33
	TOTAL required additional funding		5.00	16.81	10.42	-9.39

5. Recommendations

- The table under para 3 indicates that to cover an area of 34,270 ha under improved irrigation system, an investment of US\$ 24.64 million is needed. To cover the entire area of 400,000 ha under groundwater irrigation under improved irrigation system by 2025, a massive investment of US\$ 328 million or US\$ 15-16 million per year would be needed;
- Presuming that 50 % would be available from the donors for improved irrigation systems, the balance of about US\$ 8 million per year would have to be arranged from local resources;
- Funds of over US\$ 20 million per year are generated under AFPPF. Out of this, about US\$ 16 million were spent on dams and other structures and US\$ 2 million on piped conveyance system and pressurized irrigation systems during the year 2005. It is recommended that funds from AFPPF be rationalized so as to meet the following urgent annual requirements of the sector according to the availability of the sources:
 - Improved Irrigation Systems.....US\$ 8.00 million
 - Restructuring program in MAI and capacity building and institutional strengthening of irrigation department for MAI up to 2009..... US\$ 1.50 million
 - Agriculture research, extension and other studies/programs related to improving crop production and irrigation efficiencies..... US\$ 1.50 million
 - Water Harvesting & other structures.. US\$ 7.00 million
- Based on the increasing frequency for the tasks of the irrigation sector it is necessary to increase the human abilities and institutional strength for the sector by the direct support not through the components in the different projects.