

Hour of Rural Damascus, before starting of the 3rd Field Work. The recommendable modern irrigation system was properly installed for field crop type, vegetable type and tree cops type, respectively. General feature of each demonstration farm is outlined as follows:

Table4.3.2 Outline of Demonstration Farms

Item	Hama	Daraa	R. Damascus
Village, site	Kafr Zeita	Tafas	Kafr Hour
Irrigation method	Sprinkler Drip tube (GR)	Drip tube (GR) with mulching sheet	Drip emitter Micro sprinkler
Irrigation water resource	Well	Well	Well
Target crops	Field crops	Vegetables	Tree crops
Target farmer(s)	Individual farmer	Individual farmer	Individual farmer and group of farmers
Farm composition	1 farm plot	1 farm plot	6 farm plots
Farm size	3.7ha	6.0ha	3.4ha

All Demonstration Farms

The main components of the modern irrigation system consisted of pumping unit, control unit, pipeline (main, sub-main, lateral line) and emitters. The control unit is characterized as pioneering equipment to enable water saving management and intensive operation of modern irrigation network. The control unit composed of flow meter, fertilizer injector unit, filter, pressure gauges, air valves and other valves, were set up in correct order as the following figure.

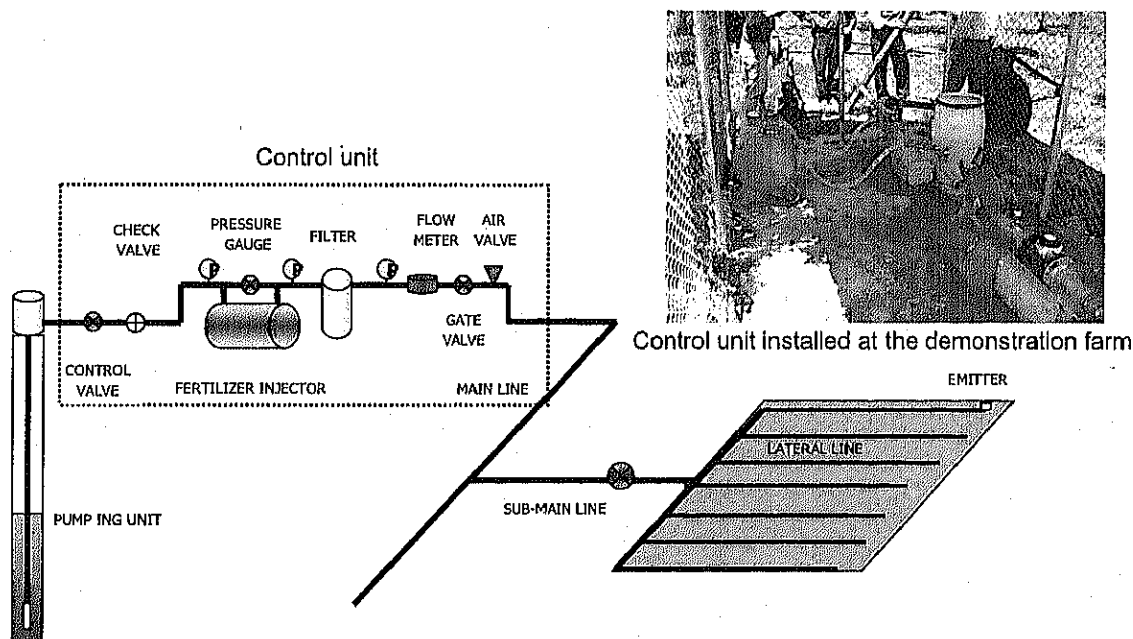


Figure 4.3.1 Schematic Diagram of Control Unit

Hama Demonstration Farm (Field Crop Type)

The movable sprinkler irrigation was employed for the field crops of Hama Demonstration Farm, and besides, drip irrigation using GR drip tube was employed for cotton cultivation. The farm shows long rectangle shape having total area of 3.7 ha. The farm is divided into 4 irrigation sections. Each irrigation section consists of 2 irrigation blocks for the convenient of crop rotation.

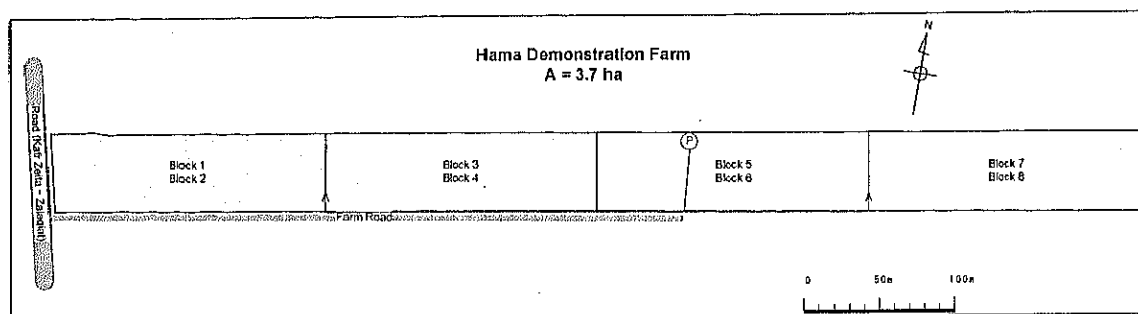


Figure 4.3.2 Layout of Hama Demonstration Farm

Recomendable arrangement of lateral lines was devised for uniform water spraying in movable sprinkler irrigation. In order to obtain allowable uniformity of sprinkler discharge: i.e. not over 10% in deference, the deference of water pressure was kept within 20%. Thus, number of sprinklers was determined to be sixteen (16) on one lateral line according to the specification of the applied sprinklers.

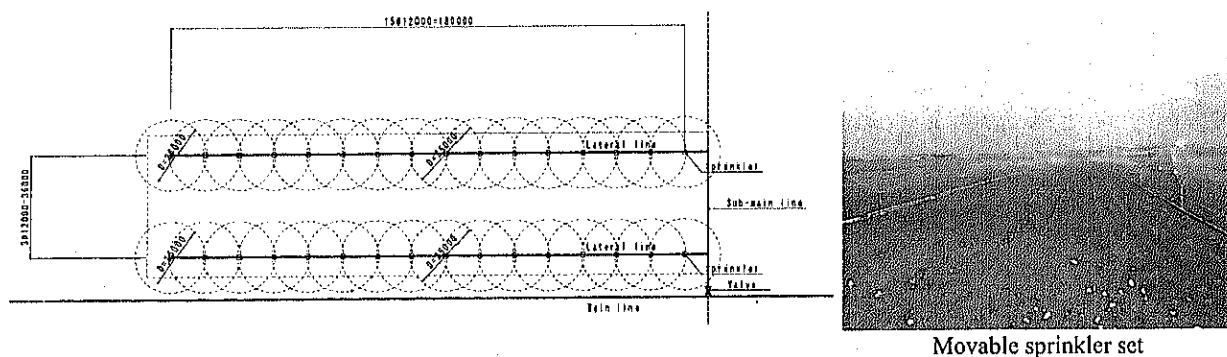


Figure 4.3.3 Movable Sprinkler Irrigation Set

Drip irrigation has been applied for cotton field in Hasaka and other governorates with technical assistance of GCSAR. Water saving effect of drip irrigation was so far verified in the experimental farms. Aiming at expanding these achievements, the Project presented applicable model of drip irrigation with uniform water distribution in Hama Demonstration Farm.

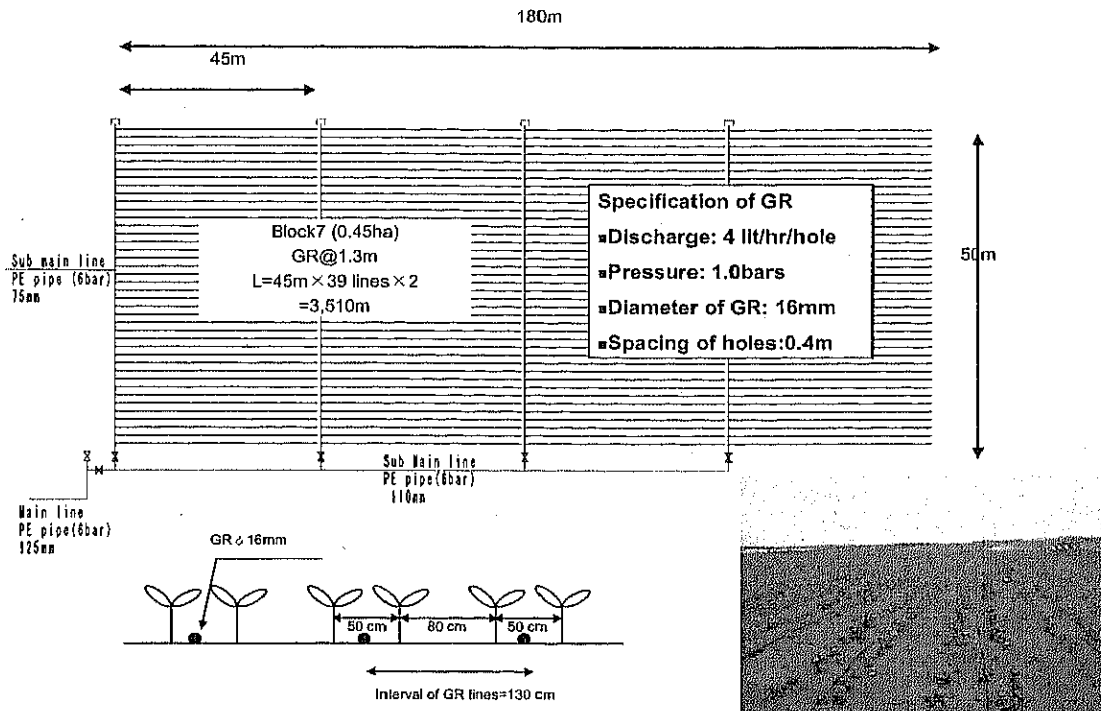
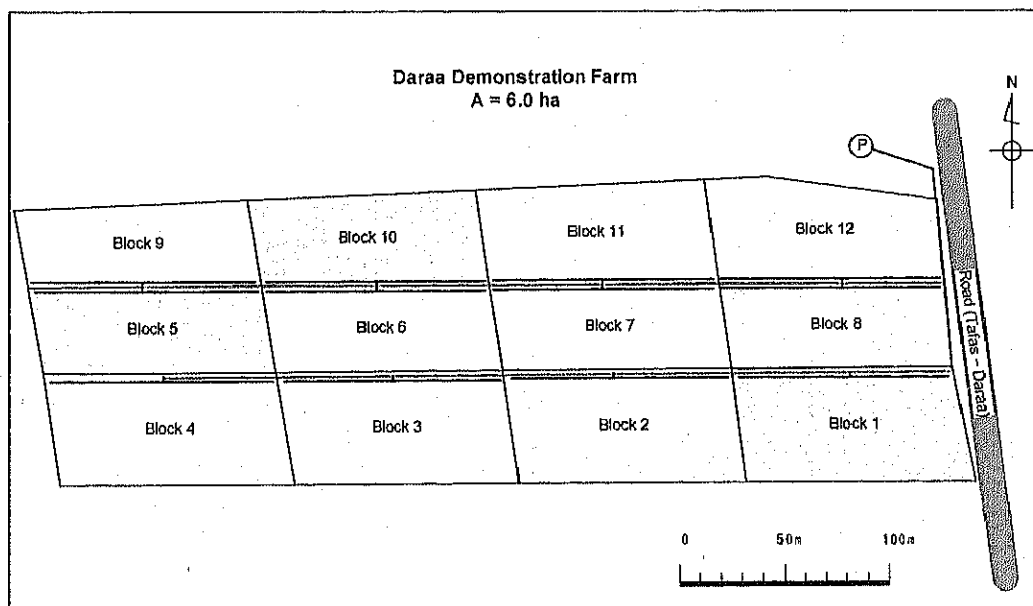


Figure 4.3.4 Drip Irrigation for Cotton Field

Daraa Demonstration Farm (Vegetable Type)

The drip irrigation system was insatalled for the vegetable field of Daraa Demonstration Fram. It is noticed that drip irrigation with mulching sheet has advantages in water saving: i.e. restraint of evaporation from soil surface, and conservation of soil moisture. The total irrigation area of the farm is 6.0ha. The farm is divided into 12 irrigation blocks in which GR drip tubes were set set up in having interval of 0.9m to 1.2m depend upon crop applying.



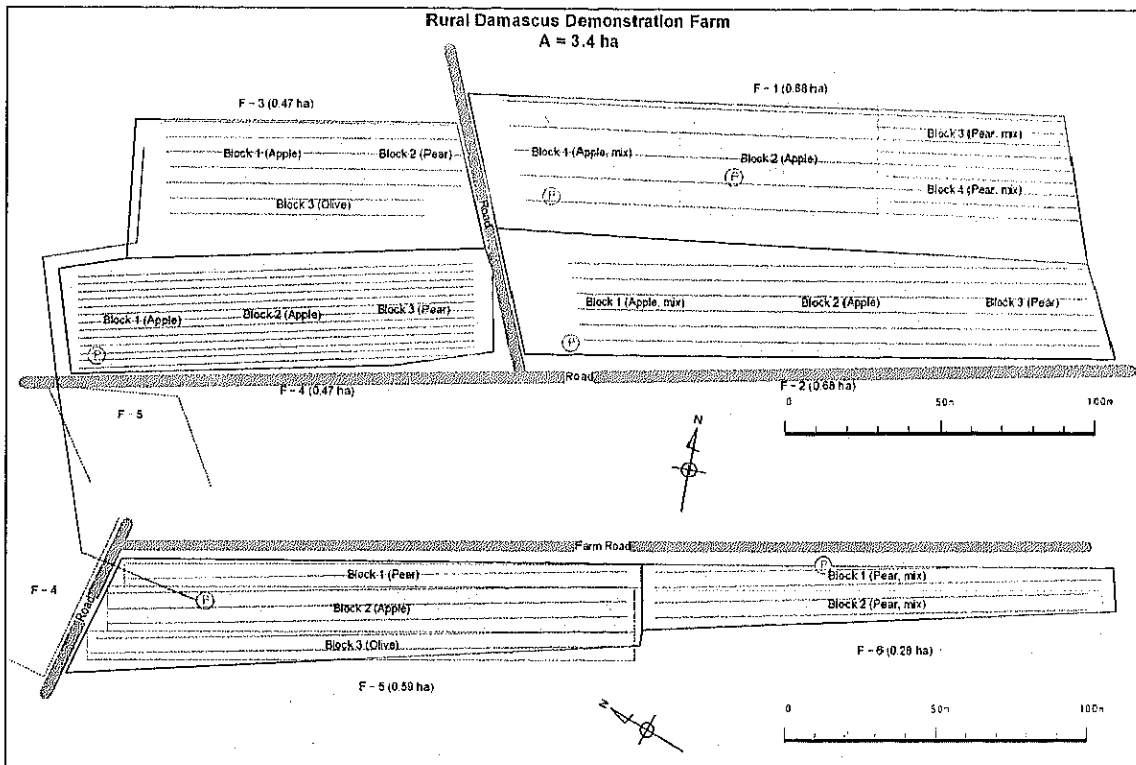


Figure 4.3.7 Layout of Rural Damascus Demonstration Farm

It is one of the targets of the demonstration activities to show proper installation of drip emitters which ensure uniform water spraying for the fruit trees. For each fruit tree, four or six drip emitters with same specification were attached on two lateral lines being laid along tree alignment.

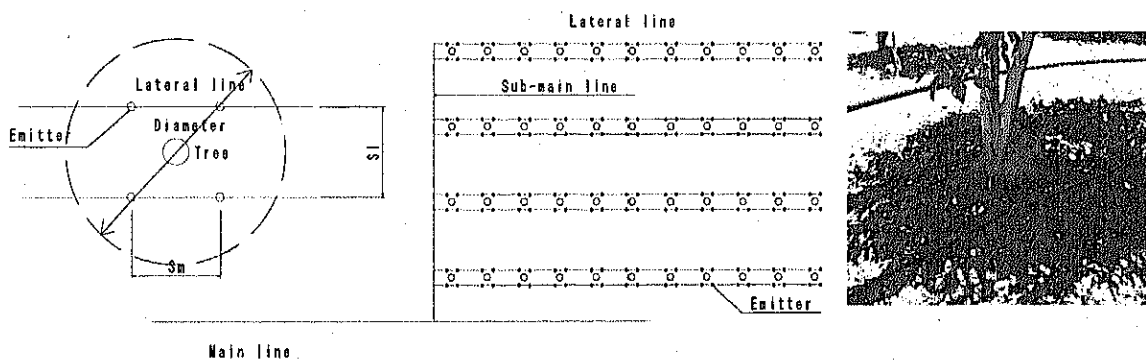


Figure 4.3.8 Drip Irrigation for Fruit Tree Field

4.3.2 Irrigation and farming Plan

(1) Proposed Cropping Calendar

Taking any factors of demonstration purpose, intension of farmers, and possibility and constraints of the physical conditions, into consideration, following cropping patterns in each demonstration farm were established. Those were improved at the beginning of the cultivating season so as to reflect the lessens learned in the previous year.

Table 4.3.4 Cropping Pattern of Demonstration Farm in Kafr Zeita, Hama

Demonstration Farm Total Area: 40 donum = 5 donum * 8 blocks المساحة الإجمالية: 40 دونم = 5 دونم * 8 مقلام

Block	2006												2007													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1				Sugar Beet (Winter) شوندر سكري - شتوي											Wheat قمح											
2				Sugar Beet (Winter) شوندر سكري - شتوي																						
3																Sugar Beet (Autumn) شوندر سكري خريفي										
4																										
5			Wheat قمح														Potato (Spring) بطاطا ربيعية									
6			Wheat قمح														Potato (Spring) بطاطا ربيعية									
7										Potato (Autumn) بطاطا - خريفية										Cotton قطن - ري بالتنقيط						
8										Potato (Autumn) بطاطا - خريفية										Cotton قطن - ري بالتنقيط						

Table 4.3.5 Cropping Pattern of Demonstration Farm in Kafr Hour, Rural Damascus

Demonstration Farm Total Area: 34 donum, 6 blocks المساحة الإجمالية: 34 دونم، 6 مقلام

Block	2006												2007												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
F-1 8.8 d.				Fruits 279 (Apple 163, Pear 45, Olive 24, Others 47) أخرى 47 ، زيتون ، 24 اجاص ، 45 فلاح ، 163 شجرة مشمرة																					
F-2 6.8 d.				Fruits 210 (Apple 131, Pear 60, Olive 6, Others 13) أخرى 13 ، زيتون ، 6 اجاص ، 60 فلاح ، 131 شجرة مشمرة																					
F-3 4.7 d.				Fruits 130 (Apple 86, Pear 28, Olive 31, Others 5) أخرى 5 ، زيتون ، 31 اجاص ، 28 فلاح ، 66 شجرة مشمرة																					
F-4 4.7 d.				Fruits 142 (Apple 80, Pear 38, Olive 1, Others 23) أخرى 23 ، زيتون ، 38 اجاص ، 80 فلاح ، 80 شجرة مشمرة																					
F-5 6.9 d.				Fruits 200 (Apple 77, Pear 28, Olive 62, Others 33) أخرى 33 ، زيتون ، 62 اجاص ، 28 فلاح ، 77 شجرة مشمرة																					
F-6 2.8 d.				Fruits 106 (Apple 0, Pear 58, Olive 0, Others 48) أخرى 48 ، زيتون ، 0 اجاص ، 58 فلاح ، 0 شجرة مشمرة																					

Canal Irrigation Pear Apple Canal Irrigation Pear Apple

Table 4.3.6 Cropping Pattern of Demonstration Farm in Tafas, Daraa

Demonstration Farm Total Area: 60 donum = 5 donum * 12 blocks المساحة الإجمالية: 60 دونم = 5 دونم * 12 مقلام

Block	2006												2007											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1							Tomato بندورة														Eggplant بندجان			
2							Cucumber خيار		Cucumber خيار															
3																								
4																								
5																								
6																								
7																								
8				Wheat قمح																				
9																								
10																								
11																								
12																								

Remarks: 1.8m Int.
1.6m Int.
1.2m Int.
0.9m Int.

Block layout was changed in 2007.

(2) Irrigation Scheduling Plan

Referring design specifications, irrigation scheduling about irrigation interval and irrigation hours was temporally quantified by means of scientific estimation of crop water requirements and field capacity data of each site, as shown in the table below. Out of the irrigation requirements indicated in the tables, additional water like supplemental water for nursery and seedling should be added as required.

The irrigation interval for the sprinkler irrigation in Hama Demonstration Farm was set at 5 days. At the demonstration farm in Daraa, the irrigation interval was set at 5 days. In the case of Rural Damascus, the irrigation interval was finally set at 7 days for the convenience of farmers' subside businesses, while it was calculated at 8 days scientifically. When applying micro sprinkler in the F-4 farm, the irrigation hour should be made shorter than the case of drip irrigation, simply it was proposed reducing 15 % from the normal case. Irrigation hour by season was summarized as below:

Table 4.3.7 Provisional Proposed Irrigation Hour in Demonstration Farms

(Unit: hours/per irrigation)

Crop	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Hama												
- 5 days interval, Sprinkler irrigation with the discharge of 1.5 m³/hr, Drip only for cotton seasonally												
Wheat	0.3	0.7	1.6	2.5	3.9	3.1						0.2
Sugar Beet - Autumn	0.4	0.9	1.7	2.6	4.1	4.9	4.2			0.8	0.3	0.3
Potato - Spring		0.4	1.0	2.6	3.9	3.8						
Cotton = Drip irrigation				0.4	0.9	1.9	2.4	2.1	1.1			
Daraa												
- 5 days interval, Drip irrigation (GR) with the discharge of 4 lit/hr/emitter												
Tomato				1.2	2.7	3.7	3.9	3.5	2.9	1.5		
Eggplant				1.3	2.6	3.2	3.4	3.0	2.6	1.8	1.2	0.7
Cucumber				1.4	2.6	3.0	3.0	2.1	2.4	1.7	1.0	
Green Pepper				1.4	2.6	3.4	3.5	3.2	2.7	1.9	1.2	0.8
Water Melon				1.2	2.8	3.5	3.2					
Rural Damascus												
- 7 days interval, Drip irrigation (Micro emitter) with the discharge of 8 lit/hr/emitter												
Apple			3.2	5.4	8.8	10.3	11.2	10.5	8.5	5.6	3.2	
Pear			3.2	5.4	8.8	10.3	11.2	10.5	8.5	5.6	3.2	
Olive			3.2	5.0	6.9	7.6	8.2	7.7	6.2	4.4	2.8	
Apple - micro sprinkler			2.7	4.6	7.5	8.7	9.5	8.9	7.2	4.8	2.7	
Pear - micro sprinkler			2.7	4.6	7.5	8.7	9.5	8.9	7.2	4.8	2.7	
Olive - micro sprinkler			2.7	4.3	5.8	6.4	7.0	6.6	5.3	3.7	2.4	

The Project Team prepared irrigation scheduling plan for every concerned crops on the basis of the above mentioned irrigation hours. Prepared irrigation scheduling of typical crop in each demonstration farm is shown in following figures:

(3) Supporting and Monitoring

In order to operate the established Demonstration Farms properly and to manage demonstration activities in the Demonstration Farms effectively, general roles of every person and/or parties concerned were divided up as shown in the following table by Demonstration Farms:

Table 4.3.8 General Roles of Concerned Parties in Operation and management of Demonstration Farms

Concerned Persons/Parties	General Roles	Remarks
Farmer(s) who is owner of the Demonstration Farm	To perform farming and irrigation in the relevant Demonstration Farm	
Concerned Extension Unit	To guide farmers with proper techniques in irrigation and farming	To organize water users group in appropriate manner (in Rural Damascus)
Concerned Maslaha	To provide more specified skills and techniques in irrigation and farming	
Concerned Agricultural Governorate	To support Demonstration Farm farmers in agriculture on the whole	
Project Counterparts in Local	To manage demonstration activities, and to coordinate all doings on training/extension	
Project Counterparts in Central	To manage and coordinate project activities to be taken in and around the Demonstration Farms	
JICA Project Team	To give advice to any project activities to be taken concerning to the Demonstration Farms	
JOCV assigned in the concerned area	To continuously monitor farmers' practice in irrigation/farming of field crops, and to give technical support in a straight line	

4.3.3 Demonstration Work

During the project period, the designed demonstration activities were given at the demonstration farms without any interruptions. At the same time, some field events were held at the demonstration farms as mentioned in the other sections related to training and extension. Occasional visitors also called at the demonstration farms to inspect the irrigation practice of the farms.

It is sure that demonstration activities at the demonstration farms of the Project have given some influence to farmers on their irrigation practice and their mind in water-saving. To identify the influences to the farmers, social relations and interaction between demonstration farm and surrounding farmers were investigated during 4th Field Work of the Project. In this context, surveys for farmers' awareness of saving water were also conducted in demonstration farms in three governorates. Farmers around demonstration farms were selected randomly and interviewed by questionnaire sheets. Numbers of interviewed farmers sampled were 37 in Rural Damascus, 72 in Daraa, and 66 in Hama respectively.

(1) Farmers' Recognition of the Demonstration Farms

Acknowledgement of the demonstration farms in each distance was shown in Fig.4.3.8. In Kafr Hour in Rural Damascus, demonstration farm is known in high rate within 2km in radius area. In Kafr Zeita in Hama, acknowledging rate within 0.5km is high but decreases drastically to less than 30% in 1-2km. In Tafas in Daraa, acknowledgement rate in average is rather low within 0.5km in radius in comparison with other two demonstration farm. Average rates within the whole 2km in radius are 94.7% in Kafr Hour, 66.7% in Tafas and 60.0% in Kafr Zeita.

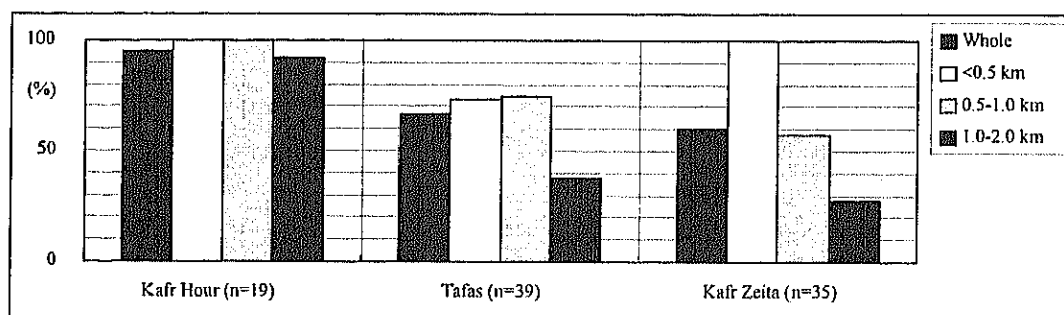


Fig.4.3.12 Rate of Acknowledgement of Demonstration Farms

(2) Farmers' Visit to the Demonstration Farms

Experiences of surrounding farmers visiting to the demonstration farm have tendency that near farmers visits in high rate and decreases according to the distance. Average rates of the sampled farmers visited to the demonstration farm as a whole within 2km in radius were 42.1% in Kafr Hour, 56.4% in Tafas and 42.9% in Kafr Zeita respectively. Tafas farmers were the highest in three demonstrate farms.

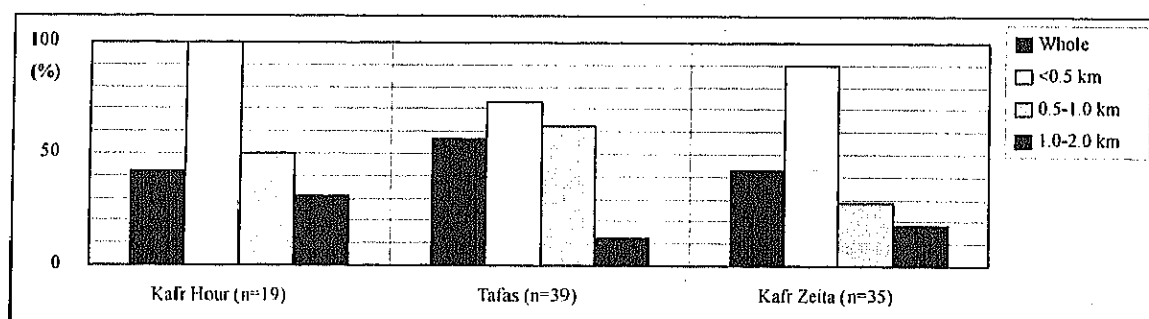


Fig.4.3.13 Farmers' Visit to the Demonstration Farms

(3) Rates of farmers who have learned something from the demonstration farms

Rates of farmers who answered that they have learned something from the demonstration

activities were 21.1% in Kafr Hour, 41.0% in Tafas and 20.0% in Kafr Zeita. Within 0.5km in radius, Tafas farmers showed the highest rate in three demonstration farms, especially rather high, which scored 66.7%. Succeed to Tafas, scores in Kafr Hour and Kafr Zeita were 50.0% and 30.0% respectively.

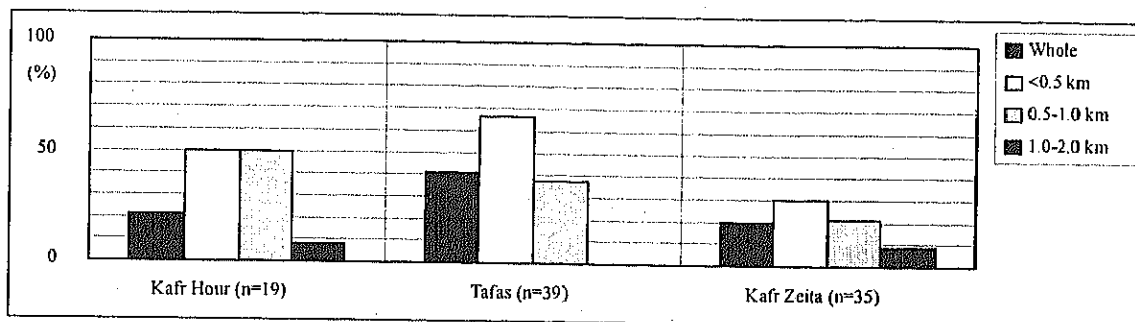


Fig.4.3.14 Rates of Farmers who Learned Something from the Demonstration Farms

(4) Specific items learned from the demonstration farms

Some of the farmers who have answered to learn something from the demonstration farm, have also given specific items to be learned. Items were shown in each demonstration farm. In Kafr Hour in Rural Damascus, items related to 'Network' including installation, operation and maintenance took the large portion (61.1%) of the whole answer. In Tafas in Daraa, items related to 'Network' were in rather high portion (31.3%), but the highest interests were shown to 'Efficient water management' (56.3%), including ideas of saving water. In Kafr Zeita in Hama, items of 'Efficient water management' and 'Increase experiences' showed high score at 35% for both.

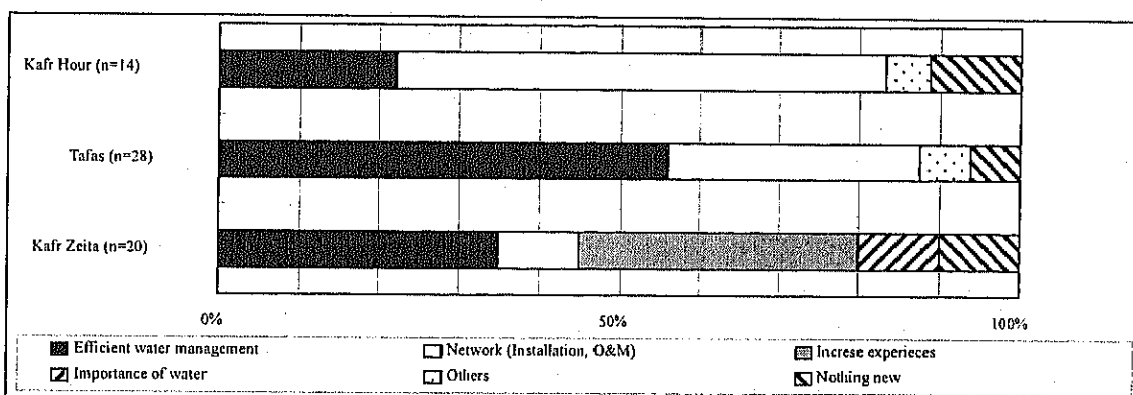


Fig.4.3.15 Specific Items Learned from the Demonstration Farms

(5) Specific Assessment of the Demonstration Activities

Demonstration activities in the demonstration farms were due implemented as planned and on schedule. Besides achieving the specified results of demonstration activities at the

demonstration farms, the demonstration works have given significant influence to not only farmers who are close to the sites, but also peoples who are with a distant place. In this respects, it is assessed that the demonstration activities deserve to continue as it is.

4.3.4 Monitoring Results

(1) Monitoring System

The irrigation manner and crop management in the demonstration farms should be investigated as a case study of the appropriate water-saving irrigation. The most important information is amount of irrigation water supply and crop production. The record of crop management, for example cropped period, fertilizer application, and pest and disease control, is also necessary for clarification of the conditions of the investigation.

The project team and local counterparts prepared the monitoring plan and provide necessary guidance to the extension staffs and farmers concerned. The extension staffs supervised and supported the farmers in record keeping and necessary farm management issues. The responsible farmers kept daily record on irrigation water supply for each crop, by using the form, which the project team will provide to them. In addition, the farmers recorded daily crop management and weight or volume of harvested crops in the season. Relevant personnel to the demonstration activities were responsible for their duties as the members of the proposed Task Force.

The monitoring method is summarized in the following table and the workflow is illustrated below.

Table 4.3.8 Monitoring Method by Item and Responsible Party

Item	Farmers	Extension Staff	Project Team/ Local Counterpart
General	<ul style="list-style-type: none"> • Management of Demonstration Farm • Daily record keeping 	<ul style="list-style-type: none"> • Supervision on record keeping • Collect the records monthly 	<ul style="list-style-type: none"> • Preparation of monitoring plan • Guidance for proper recording
Irrigation water supply	<ul style="list-style-type: none"> • Daily record keeping on water flow by crop or block 	<ul style="list-style-type: none"> • Supervision on irrigation 	<ul style="list-style-type: none"> • Aggregation and analysis of irrigation records
Crop management (planting, fertilizer, pest & disease control, weed control, etc.)	<ul style="list-style-type: none"> • Daily record keeping on any activities of crop management by crop 	<ul style="list-style-type: none"> • Supervision on crop management 	<ul style="list-style-type: none"> • Aggregation of crop management records
Crop production (harvested amount)	<ul style="list-style-type: none"> • Daily record keeping on weight or volume of crops harvested 	<ul style="list-style-type: none"> • Supervision on crop harvesting 	<ul style="list-style-type: none"> • Aggregation and analysis of production records

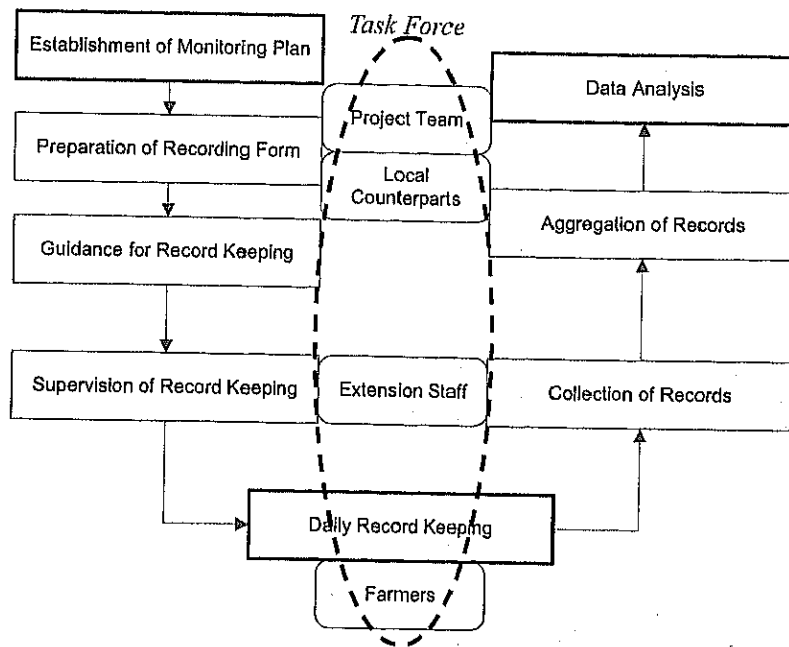


Fig.3.4.16 Flow of Monitoring on Demonstration Farm

The draft monitoring sheet was prepared in the project team level, as shown below. The farmer utilized one sheet in a month for every crop in the farm. The main part is a subject of the daily irrigation water supply. Other farming activities and harvesting were written in the last column. This form was improved in terms of farmers' usability in the course of discussions and trials in local level.

Table 4.3 9 Sample of Monitoring Sheet

Date	Irrigation Water Amount (m ³)			Irrigation Hours by Block (hr)											Fertilizer, Harvesting, etc.	
	Start	End	Vol.	1	2	3	4	5	6	7	8	9	10	11		
1	00118	00126	8	2.5												Fertigation; Urea 10 kg
2																Harvest; Tomato 300 kg
3	00126	00140	14			3.0				1.0						

31	00189	00202	13	1.5								3.0			Fertigation; NPK 1 lit	

(2) Monitoring Farms

In order to assess the improvement in the practice of irrigation through introducing modern irrigation in the demonstration farms, monitoring farms were established in the near sites of the demonstration farms. The monitoring farms were selected in consideration with its

current manner of irrigation practice, and farmers agreement. Outline of the selected monitoring farms are as follows:

Outline of Monitoring Farms in Kafr Zeita

General Feature of Farms in Kafr Zeita, Hama

Name & Code	Hama Monitoring Farm 1 (HMF-1)	Hama Monitoring Farm 2 (HMF-2)
Farmer's Name	Khale Gramesh	Abdo Abdalla
Total Area	38 donum	105 donum
Major Crops	Wheat, Potato, Sugar Beet, Green Pepper	Wheat, Sugar Beet, Cotton, Green Pepper
Irrigation	Sprinkler, Surface Deep Well	Sprinkler, Surface Deep Well + Reservoir

Cropping Pattern of Farms in Kafr Zeita, Hama

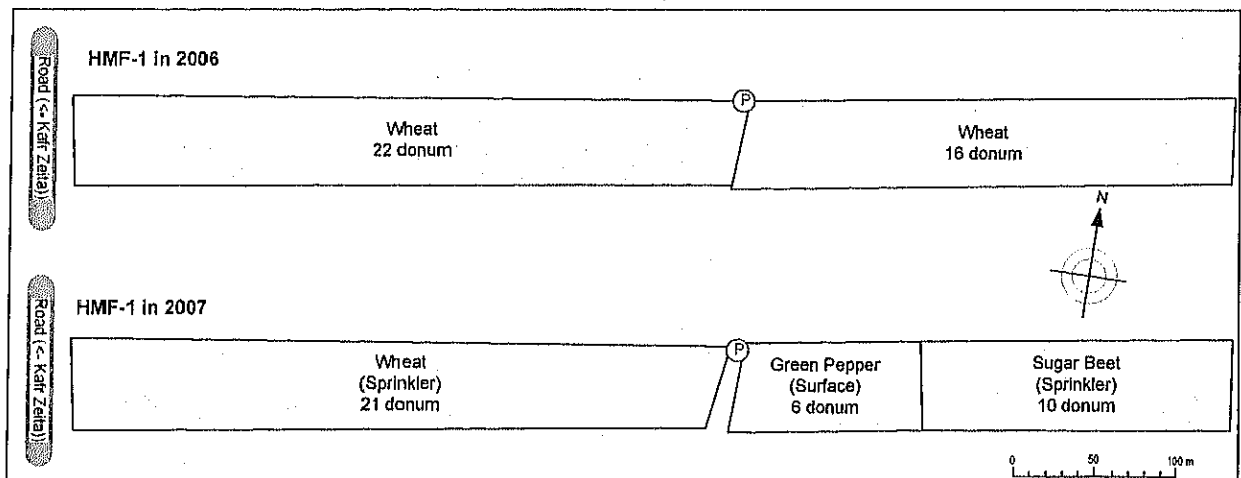
Monitoring Farm 1 Total Area: 39 donum

Block	2006												2007											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 24 d.												Potato (Autumn) بطاطا - خريفية												
2 15 d.			Wheat قمح																					Green Pepper فلفل اخضر
													Sugar Beet (Autumn) شمندر مبكر خريفية											

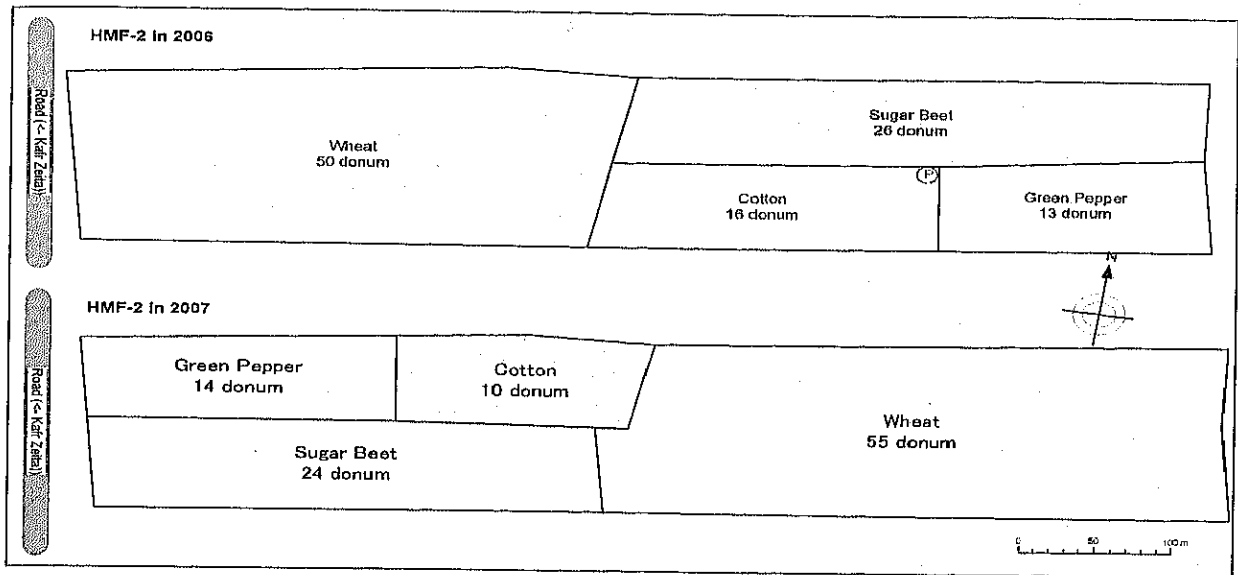
Monitoring Farm 2 Total Area: 105 donum

Block	2006												2007											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 26 d.				Sugar Beet (Winter) شمندر مبكر - شتوي																				
2 15 d.																								
3 10 d.																								
4 25 d.																								
5 24 d.																								

Layout of HMF1



Layout of HMF2



Outline of Monitoring Farms in Tafas, Daraa

General Feature of Farms in Tafas, Daraa

Name & Code	Daraa Monitoring Farm 1 (DMF-1)	Daraa Monitoring Farm 2 (DMF-2)
Farmer's Name	Mohammad Sultan Al Natour	Mohammad Abdallah Al Rahman Natour
Total Area	12 donum in 2006, 11 donum in 2007	12 donum in 2006, 37.5 donum in 2007
Major Crops	Tomato, Cabbage	Tomato, Eggplant, Green Pepper
Irrigation	Drip Tube (GR-type) Deep Well	Drip Tube (GR-type) Deep Well

Cropping Pattern of Farms in Tafas, Daraa

Monitoring Farm 1 Total Area: 12 donum (2006) Total Area: 11 donum (2007)

Block	2006												2007											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 6 d.																								
2 5 d.																								
3 1 d.																								

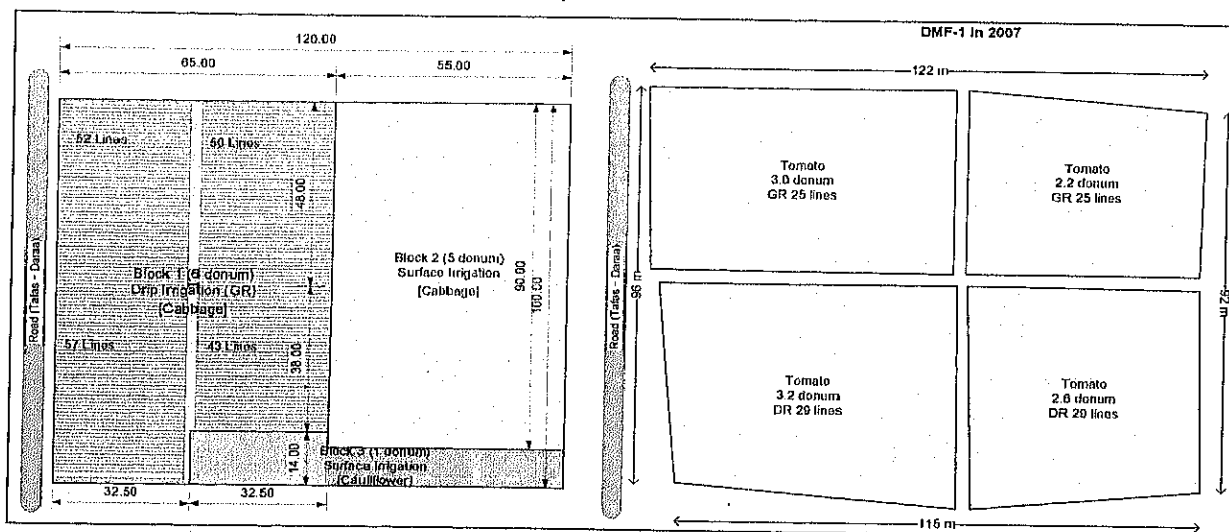
Monitoring Farm 2 Total Area: 12 donum (2006) Total Area: 38 donum (2007)

Site was changed in 2007 (Operator was not changed)

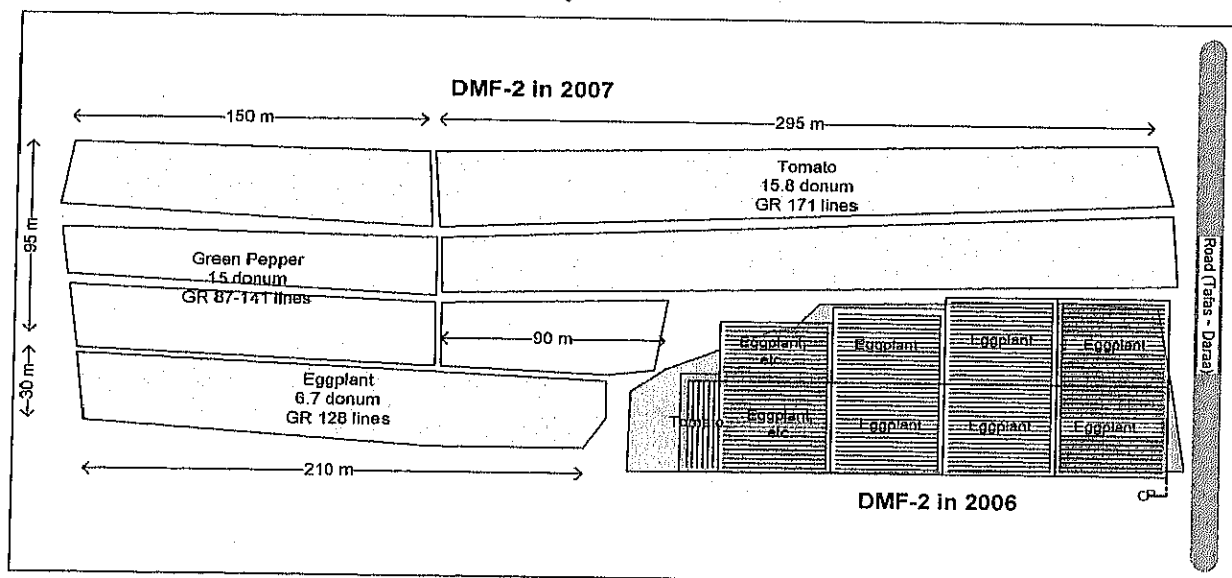
Block	2006												2007											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 12 d.																								

Site was changed in 2007 (Operator was not changed)

Layout of DMF1



Layout of DMF2



Outline of Monitoring Farms in Kafr Hour, Rural Damascus

General Feature of Farms in Kafr Hour, Rural Damascus

Name & Code	Rural Damascus Monitoring Farm 1 (RMF-1)	Rural Damascus Monitoring Farm 2 (RMF-2)
Farmer's Name	Ahmad Taha	Khaldoun Rajeh
Farmland Area	4 donum	9 donum for monitoring (71 donum in total)
Major Crops	Apple, Pear, Olive	Apricot, Olive
Irrigation	Drip Irrigation Deep Well + Reservoir	Drip Tube Arabic Well + Reservoir

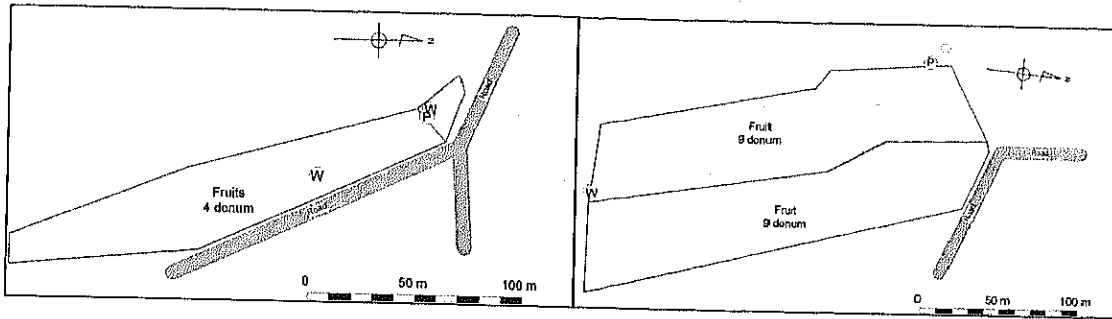
Cropping Pattern of Farms in Kafr Hour, Rural Damascus

Monitoring Farm 1 and 2 Total Area: MF-1 = 6.5 donum, MF2 = 20 donum

المساحة الإجمالية: 34 دونم، 6 مقياس

Block	2006												2007											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MF-1 6.5 d.												Fruits												
MF-2 20 d.												Fruits												

Layout of RMF1 and RMF2



(3) Result of Monitoring of Demonstration Farms

Demonstration activities were monitored in the collect manners as planned. The results of the monitoring in irrigation and farming are summarized in Table 4.3.10. The result could be effectively utilized exactly at it is, to the evaluation purpose of the final evaluation of the Project.

4.4 Training Work

4.4.1 Training System under the DEITEX Project

According to the training structure proposed by the DEITEX Project, two kinds of extension agents have been established in the field of irrigation, namely water extensionist and SMS (Subject Matter Specialist) on irrigation. The water extensionist is supposed to be a front line worker who contacts with farmers closely and frequently. On the other hand, SMS on irrigation is expected to have higher and deeper knowledge, experience and skills on irrigation than the water extensionist, who shall guide and teach water extensionists.

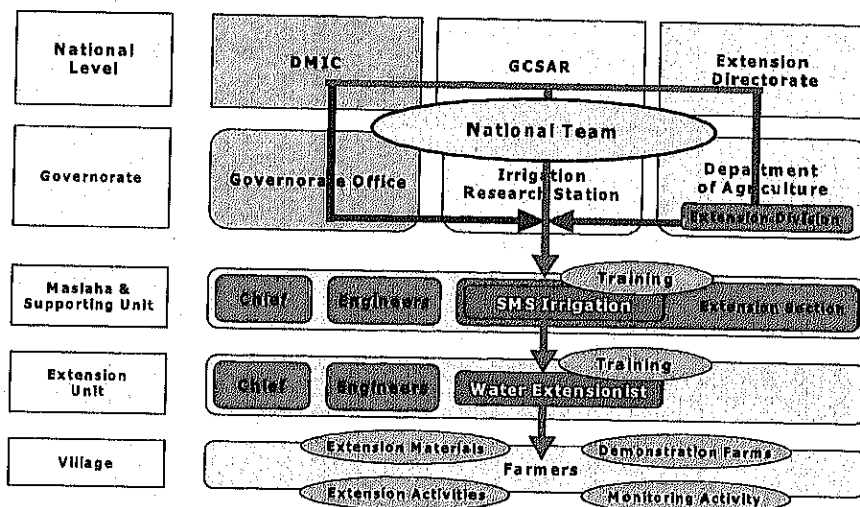


Fig.4.4.1 Structure of Training System under the DEITEX Project

Based on the role of water extensionist, the four steps of training courses have been

established so as to train competent water extensionist who has basic knowledge and skills on irrigation, and is able to identify farmer's problems related to irrigation. As an extensionist, he is also capable to prepare extension materials and to organize extension activities for dissemination purpose. The details of the training curriculum are shown in the following section.

In addition, more specialized training on irrigation system was organized to train irrigation SMS, by delivering more details regarding design, installation and operation of modern irrigation system. The candidates of SMS were selected from the trained water extensionists, who accomplished successful results through the training courses. Since SMS is expected to work as trainer of water extensionists, TOT (Training of Trainers) course was also provided to them in order to improve teaching skills.

4.4.2 Training Curriculum and Teaching Materials

Training curriculum was carefully examined so as to cover necessary subjects which meet the training requirement determined by the expected role of water extensionist. The following table shows necessary subjects to be learned by water extensionists.

Table 4.4.1 Necessary Training Subjects for Water Extensionist

Subject	Objective	Topic	Description
Agriculture and Irrigation in Syria	Understand the current status of agriculture and irrigation in Syria	Agriculture and Irrigation in Syria	Understanding the characteristics of agricultural production and irrigated agriculture in Syria
		Utilizing agricultural statistics	Utilizing agricultural statistics to identify characteristics of certain area
		Modern Irrigation and Saving Water	Understanding characteristics of modern irrigation and efficient water use in agriculture
Farmer Survey Method	Understand survey method to identify farmers' present conditions and needs/problems	Farm Survey method	Learning objectives and method of farmer survey
		Selecting target farmers	Selection of target farmers based on existing data
		Preparation of questionnaire	Learning how to prepare questionnaire for the survey
		Conducting farmer's survey	Learning and practicing how to conduct the questionnaire survey
		Analyzing survey results	Analyzing survey results to identify needs and problems of farmers
Modern Irrigation System (for irrigation extension)	Understand modern irrigation system basically in order to disseminate the relevant knowledge/ skills to farmers	Crop Water Requirement (CWR)	Basic idea of CWR and proper amount of irrigation water
		Irrigation Schedule	Determination of irrigation schedule based on CWR
		Design of Modern Irrigation System	Basic idea of designing of modern irrigation system
		Installation, operation & maintenance of Modern Irrigation System	Basic idea of installation, operation and maintenance of modern irrigation system
Extension Materials	Learn how to prepare extension materials	Conducting Problem Analysis	Conducting problem analysis workshop to identify farmer's problems regarding irrigation
		Preparation of Extension Poster	Preparing extension poster based on the identified farmers' problems

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		Preparation of Extension Broacher	Preparing extension brochure to give information related to the prepared extension posters
		Economical Analysis on Effects of Modern Irrigation	Effects of modern irrigation on saving water, increasing crop yield and reducing cost of fuel and labors
Extension Methods	Learn effective extension methods and skills	Extension Methods	Introduction of various kinds of extension methods and assessment of current activities
		Preparing Extension Activities	Preparing action plan of extension activity by using activity sheet, timetable and evaluation questionnaire
		Organizing Field Day	Conducting extension activity based on the prepared action plan
		Reporting of Extension Activity	Writing report of the conducted extension activity

Based on the necessary training subjects, training program was prepared, which consists of four steps. The subjects and objectives of the training are shown in the following table. The training subjects were determined principally based on farmers' needs on irrigation, which is the crucial starting point of the extension activity. Consequently, the first training course was focused on conducting farmers' survey to identify their needs and problems especially related to irrigation. The training subjects were followed by topics on design/installation/operation and maintenance of modern irrigation system, preparation of extension materials, and conducting field day for farmers as a dissemination activity. Details of the training course program along with training overview are shown in Annex 4.

Table 4.4.2 Subjects and objectives of the training courses for Water Extensionists

No.	Subject of the Training Course	Objectives of the Training Course
1	Survey and Diagnosis of Irrigated Farm	To learn how to conduct farmers' survey in order to understand present conditions of farmers and their problems and needs
2	Design, Installation and Maintenance of Irrigation System	To learn basic and practical knowledge and skills on design, installation and maintenance of modern irrigation system
3	Preparing Extension Materials	To learn how to prepare extension messages including brochure and poster for effective extension activities
4	Organizing Field Day	To learn how to organize field day activity in order to transfer information and techniques on irrigation to farmers in practical and effective way

Accordingly, teaching materials were prepared so as to achieve the established goal of each training course. The major characteristics of the training courses are as follows;

1) Step by step approach

In order for the trainees to understand contents of the training sufficiently, the training course was prepared with four steps of training structure consisting step by step approach. It was also aimed that subjects and contents of the training should meet the needs and level of the trainees. Since most of them are not very accustomed with irrigation, the first course was assumed as introductory module to be familiar with modern irrigation system, which was followed by training courses including specific topics such as irrigation design, extension

materials and extension methods.

2) Good relation among delivered topics

In addition to the step by step approach, training contents were carefully selected so that all delivered topics were related each other, which created one sequential story under the main subject of each training course.

3) More practices than lectures

Conducting practices by the trainees were considered very important in order for them to acquire knowledge and skills adequately. Therefore, not only lectures but also more practices were given to them during the training course.

4) Providing necessary tools and stationeries

Necessary stationeries, tools and apparatus were provided to the trainees, related to the subject of training course. For example, tools and apparatus were supplied such as pressure gauge, stopwatch, beaker, and plastic wrenches, which were utilized for the practices of pipe fitting and emitter discharge measurement. These tools shall be used not only during the training course but also for daily extension activities.

5) Check list for preparation works

Good preparation work of training course is essential for conducting successful training. The preparation work includes copying and binding the distribution materials, purchasing materials and equipment for the practice, arrangement of training room and necessary equipment, and so on. In order to achieve the preparation work effectively and efficiently, it is recommended to prepare check list of the works and to take necessary actions by following the list.

6) Follow-up activity (Homework)

It is very important to make use of those skills, knowledge and information which the trainees learned through the training course in their daily activities. In order to encourage them to do so, homework was obliged to the trainees as a follow up activity of the training. The homework consists important contents of the training including preparing farmers list, conducting farmer survey, analyzing the survey result, and writing report of the homework.

7) Preparing Action Plan to unify Training and Extension Activities

The 4th training course is the last one, but this is not the end of the training. After completing the four steps of training courses, the trainees are expected to utilize the acquired skills and information in their extension works. Therefore, preparation of action plan was given to the trainees as homework of the 4th training course, which should be prepared by making use of what they have learned during the training courses. Implementation of the action plan was

supported by the Project as OJT (On the Job Training) of the water extensionists.

In addition to the training course for water extensionist, necessary subjects for irrigation SMS were also determined according to their role. Since SMS shall be a trainer of water extensionists, he should have more knowledge on modern irrigation than the extensionists as well as teaching skills. Therefore, two kinds of training programs were established for SMS, i.e. advanced class of modern irrigation system and TOT (Training of Trainers) course. Each training course was conducted for two weeks separately, with focusing on the subjects showing in the following table. The trainees were selected from water extensionists those who completed the training courses with excellent results.

Table 4.4.3 Necessary Training Subjects for the Irrigation SMS

Subject	Objective	Topic	Description
Modern Irrigation System	Acquire advanced skills and knowledge on modern irrigation system	Crop Water Requirement (CWR)	Understanding how to calculate CWR by using Blaney-Criddle method
		Topographic Survey	Conducting topographic survey by using GPS and drawing a map based on the surveyed data
		Design of Modern Irrigation System	Conducting hydraulic calculation for pipeline network
		Installation and Operation of Modern Irrigation System	Installation of modern irrigation system and measurement of emitter discharge
		Irrigation Schedule	Determination of proper irrigation schedule based on CWR
		Establishment of Farmers' Group	Understanding group modern irrigation project and water user's association in Japan
TOT (Training of Trainers)	Acquire theoretical knowledge as a trainer in general	Adult Learning	Understanding the characteristics of adult learning
		Communication Skill	Learning communication difficulties and how to make good relation with others
		Relationship with trainees	Learning different style of trainees and how to be an active trainer
		Method of Training	Learning different type of training method such as group discussion, brain storming and role playing
	Acquire practical skills as a trainer for water extensionists	Training Structure of Water Extensionists	Understand training structure and details of training program for water extensionists
		Training Guideline	Understand how to use training guideline for the training of water extensionists
		Presentation Skill	Conducting lecture by using teaching material and training guideline for the training of water extensionists
		Action Plan of Extension Activity	Understand how to prepare action plan of extension activity

4.4.3 Training Guideline

In order to encourage efficient and effective use of the teaching materials, training guideline has been prepared for trainers of water extensionists. The teaching materials of the training courses are mainly prepared by Power Point presentation, and the training guideline describes important points of each presentation. As it is described previously, the training courses for

water extensionists consist four steps, and accordingly the guideline is divided into four modules. Each module contains overview of the training course, including objective, major expecting outcomes, structure of the module. Then, summary sheet is attached to each presentation, containing objective, learning goal, teaching materials, teaching process, and time allocation. Following to the summary sheet, description of each presentation slide is given in details, including essential contents to be explained, important points to be learned by the trainees, and allocated time for explanation.

The overall aim of this guideline is to provide specific training standard to trainers so that the same level of training can be delivered even in different Governorates by various trainers. This guideline will be useful and helpful for trainers, and to be fully utilized in conducting the training of water extensionists successfully.

Summary sheet of the presentation

[Summary Sheet]	
Subject	Role of Water Extensionist
Objective	The lecture explains the role of water extensionists, followed by the training structure for water extensionists, which has been prepared by DEITEX to develop the capacity of WE in order to achieve the specified role successfully.
Learning Goals	The participants understand the role of water extensionists, including the difference between WE and irrigation SMS. In addition, the participants understand the training structure and contents of the four steps of training course for water extensionists.
Teaching Materials	Power Point Presentation: Role of Water Extensionist
Process	1) Structure of Water Extension System 2) Role of Water Extensionist 3) Farmer's Problem related to Modern Irrigation 4) Necessary Subjects of the Training Course for Water Extensionist 5) Structure of the Training Courses (continuous training) 6) Contents of the Four Steps of Training Course
Time Allocation	30 minutes.

Explanation of each presentation slide




Item	Time	Description	Teaching material
1) Title of the presentation 		Firstly, this lecture explains the structure of water extension system, consisting of water extensionists and irrigation SMS (Subject Matter Specialist). The major subject of this lecture is the role of water extensionists. Training structure for WE will be also explained, which has been prepared by DEITEX to develop the capacity of WE in order to achieve the specified role successfully.	Slide No 1
2) Structure of Water Extension 	3 min	The figure shows the structure of water extension system, which is proposed by the Project. As shown in the figure, two levels of water extension agents will be established, namely water extensionist and SMS on irrigation. The water extensionist is supposed to be front line worker contacting with farmers closely and frequently, who will be allocated at Extension Unit. On the other hand, SMS on irrigation is expected to have higher and deeper knowledge, experience and skills on irrigation than the water extensionist, who will be assigned at Maslaha and/or Governorate offices. The SMS on irrigation shall guide and teach water extensionists when necessary. [Important point of the slide] Understand the structure of water extension and the difference between water extensionist and irrigation SMS.	Slide No 2
3) Role of Water Extensionist 	2 min	The slide explains the role of water extensionist. Firstly, water extensionist should be capable to make survey and diagnosis irrigated farms in order to identify farmers problems related to irrigation. Water extensionist also should have basic knowledge and skills on design, installation, operation and maintenance of modern irrigation system. As an extensionist, he/she is also assumed to be able to prepare extension materials, including poster and brochure. Water extensionist should be able to organize extension activities such as field day (and field visit, competition, and etc) for dissemination purpose. [Important point of the slide] Understand the role of water extensionist.	Slide No 3

Fig.4.4.2 An Example of Description of Training Guideline

4.4.4 Establishment of Effective Training and Extension System in the field of Irrigation

Training activity, in general, is to be conducted so that acquired knowledge and skills through the training shall be effectively utilized in the following activities after participating the training. This is the most important difference in “training” and “education”. However,

most of the training courses under the Agriculture Ministry in Syria have been conducted as “education” without establishing distinct goal to be achieved by the given training. There is no clear picture about what kind and how deep of knowledge and skills to be acquired by trainees during the training course. Evaluation of the training activity is also weak, therefore effectiveness of the training is not verified enough. Consequently, most of the training activities have been conducted without bringing fruitful results to the trainees, which can not be utilized in their daily works.

On the contrary, the DEITEX Project introduced completely different idea of training system, in which training activities have been conducted in order to accomplish given goal, and trainees can acquire specified abilities by participating the training activities. For example, firstly the role of water extensionist were determined, then training curriculum was carefully prepared so that trainees can acquire necessary knowledge and skills which are determined by their expected roles.

The Projects also focused on well-organized evaluation and follow-up activity systems. The depth and the range of understanding by the trainees were confirmed through examination at the end of each training course, covering all important points delivered during the given training. In addition, homework was obliged to the trainees, in which they should remind and confirm essential things they attained through the training course. The homework also brought them a good chance to make use of skills, knowledge and information which they learned. Because of these evaluation and follow-up activity systems, most of the trainees attained required ability as a water extensionist, which is effectively utilized in the following extension activities. These evaluations were carried out in each training course with the objectives as shown in the table below.

Table 4.4.4 Objectives of the Evaluation in Training Courses

Evaluation	Objectives
Pre-Evaluation	To be carried out at the beginning of each training activity in order to know the characteristics of the trainees such as past experiences, past participation in the related training and skills for the target subject.
Final Evaluation	To be carried out at the end of each training activity in order to know the opinion of the trainees such as interesting subject, suggestion to improve the course, problems faced during the course and the subjects expected in the future training.
Examination	To be carried out at the end of each training activity in order to judge the understandability of the trainees through written test related to the contents of the training course. Final examination was given at the end of the last training course.
Evaluation Meeting	To be organized based on the results of Pre-Evaluation, Final Evaluation and Examination of each training activity in order to evaluate the training in general and also to reflect the results on the following training courses.
Homework	To be obliged to the trainees in order for them to make use of the skills, knowledge and information that they learned through the training course. Excellent reports were selected and rewarded so as to encourage the trainees.

In addition, one of the most distinct characteristics of the training and extension system which has been established by the DEITEX Project is close and significant linkage between training and extension activities. The figure shows the training and extension system in the DEITEX Project. After completing the four steps of training courses for water exetsnionists, the trainees are obliged to prepare action plan of extension activity in which they will utilize acquired knowledge and skills through the training. The planed extension activities consisted of field day, field visit, technical demonstration, seminar, workshop, and mobile theater.

Before implementing the planed extension activities, it was strongly emphasized that preparation works were crucially important in order to carry out the activities effectively and successfully. Therefore a series of preparation meetings were held for each of the planned activity, in addition to conduct rehearsal of the activity. The planned activity itself was managed by activity sheet and timetable along with list of necessary materials and location map. The activity was evaluated by questionnaire which was asked to the participated farmers as pre-evaluation and final evaluation. The trainees learned this newly introduced extension method as OJT (On the Job Training).

So far, Syrian extensionists are not very confident enough in extension work of modern irrigation, because they have little knowledge and skills of the relevant technology or they are not very skillful with extension method regarding the subject. The trainees of the DEITEX Project, however, have received useful and practical training, and they are now capable to conduct extension activities effectively and efficiently. This is one of the most important outcomes which has produced by the Project.

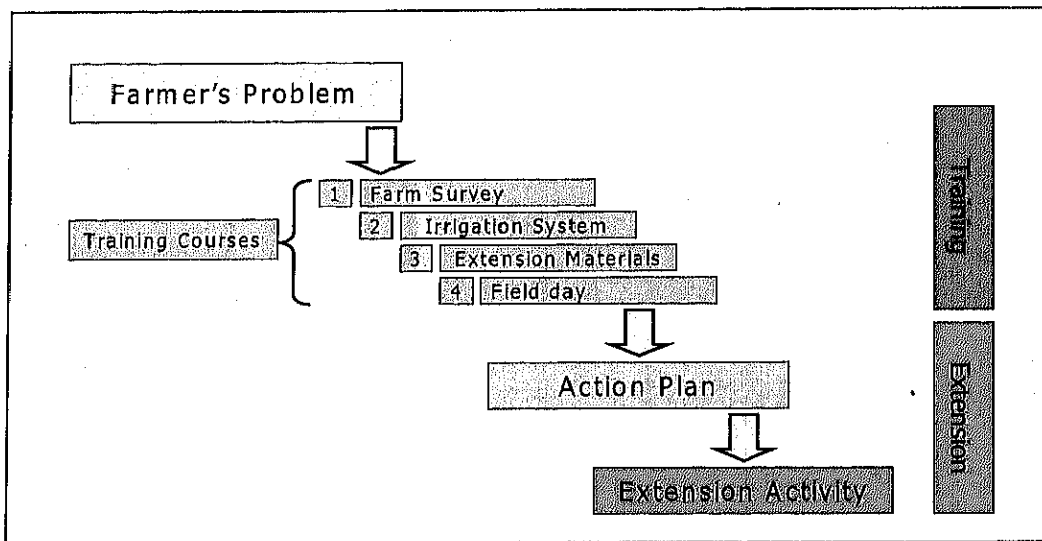


Fig.4.4.3 Training and Extension System in the DEITEX Project

4.5 Extension Work

4.5.1 Review for the Activities of Extension Directorate and Baseline Survey

Followings are the summary results of the review for the activities of Extension Directorate and the baseline survey carried out at the beginning of the Project.

- It seems, in general, many of the extension activities are structured in the supply-driven manner. Engineers are always designing the extension activities not based on the needs of farmers but based on the materials readily available. More efforts should be made in order to find out the real problems of farmers through proper needs assessment by incorporating the demand-driven manner. More effective extension activities should then be designed according to the results of such needs assessment.
- All the extension activity should have clear goal to be achieved as the relation of goal-output-activity are defined in PDM for any projects to be implemented. When the goal is clearly defined, the necessary activities can be delineated through expected outputs. At the same time, the target group of the activity should also be defined clearly. In case the goal is the capacity building of the extension agents, the output is that the extension agent should have enough capacity for supervising farmers. The activities for that will be the training for the extension agents on necessary agricultural knowledge together with the extension methods. In case the goal is the capacity building of farmers, on the other hand, the output is that the farmer will be able to execute proper farming practices. The activities will be the training of farmers on farming practices and also the dissemination of useful farming technologies. The contents of field day, seminar and the materials to be delivered will thus be completely different according to the objectives and the target group.
- Extension materials including the leaflet to be distributed to the participants in the field day and seminar activities, TV and Radio programs and extension messages should be designed according to the results of needs assessment, the objective of the activity and the target group. As for the written information such as leaflet, text and guidelines, the contents should always be designed by considering who will read for what purposes. As for the mobile theater and TV programs, the recent topics should be selected in order to attract the audience instead of standardized and uniform contents.

4.5.2 Training for Extension

According to the results of the review for the activities of Extension Directorate and the baseline survey as mentioned above, the needs assessment for farmers, the preparation of

proper extension materials and the implementation of effective extension activities were considered as important functions of extensionists mainly stationed in the extension unit. The training course for the water extensionists was therefore designed by including all such aspects. Followings are the results and the products of such trainings for extension.

(1) Needs Assessment

The training on “Survey and Diagnosis of Irrigated Farm” was carried out as the first step of the training for the water extensionists. Through this training, the water extensionists were expected to be able to perform the needs assessment by understanding the problems to which farmers are facing through survey and diagnosis of irrigated farm. Followings are the major subjects of the training and the materials prepared;

Major Subjects

- Role of Water Extensionists,
- Necessity of Farm Survey,
- Selecting Farmers,
- Method of Farm Survey, and
- Analysis and Evaluation of Survey Results.

Materials Prepared

- Model Checklist for Farm Survey,
- Model Analysis Sheet for Survey Results, and
- Model Prescription Sheet for Diagnosis.

(2) Extension Material

The training on “Preparing Extension Materials” was carried out as the third step of the training for the water extensionists. Through this training, the water extensionists were expected to be able to prepare various extension materials including posters and brochures based on the results of the needs assessment and the successive problem analysis. Followings are the major subjects of the training and the materials prepared;

Major Subjects

- Kind and Role of Extension Activities and Extension Messages,
- Introduction to Problem Analysis,
- Preparation of Extension Poster,
- Preparation of Extension Brochure,
- Economy Survey and Importance of Recorded Data,

- Utilization of Soft wares such as Power Point and Photoshop, and
- Other Extension Activities such as Competitions.

Materials Prepared

- Sample Images of various Extension Activities,
- Sample Results of Problem Analysis,
- Sample Extension Poster,
- Sample Extension Brochure, and
- Sample Format of Pocket Book.

(3) Extension Activity

The training on “Organizing Field Day” was carried out as the fourth step of the training for the water extensionists. Through this training, the water extensionists were expected to be able to organize various extension activities including field day, field visit, practical demonstration, seminar and workshop based on the results of the needs assessment and the successive problem analysis. Followings are the major subjects of the training and the materials prepared;

Major Subjects

- Introduction to Field Day,
- Definition of Good Irrigation System,
- Preparation of Extension Activity Program,
- Preparation of Pre & Final Evaluation Form,
- Implementation of Rehearsal of Field Day,
- Implementation of Field Day, and
- Evaluation of Field Day.

Materials Prepared

- Examples of Bad Irrigation System,
- Presentation of Model Extension Activity,
- Model Extension Activity Program,
- Model Pre & Final Evaluation Form, and
- Model Report of Extension Activity.

4.5.3 Model Extension Activities

(1) Implementation

On the completion of training course for water extensionists, each extensionist prepared

action plan for the feasible extension activity based on the irrigation situation in the area and the knowledge and skills obtained through the training course. Based on such action plans prepared, several activities to be considered effective for the extension of water saving irrigation were extracted and implemented as a model extension activity of the Project.

Each extension activity consists of 3 stages, namely preparation stage, implementation stage and evaluation stage. In the preparation stage, water extensionists discussed about the subject and goal of the activity according to the local situation and summarized into activity sheet. Various arrangements such as establishment of the selection criteria of target farmers, preparation of the farmers' list, timetable and the list of necessary materials and equipment were also considered as an important process in this stage. In order to carry out such arrangements smoothly, the use of roles sharing checklist was highly recommended. In the implementation stage, water extensionist tried their best to make maximum use of knowledge and skills obtained during the training course. Pre and final evaluation were also conducted in order to assess the understandability of participated farmers. Furthermore, photographs and videos were taken to transmit the field activity and the reaction of farmers to other water extensionists. In the evaluation stage, the implementation team presented the results of activity to the remaining water extensionists for the discussion of the positive and negative points of activities. Based on the discussion and comments from participated extensionists and observers, implemented activity was evaluated and the points to be improved were reviewed for the future day-to-day extension activities. Such a workflow can be summarized in the following Figure.

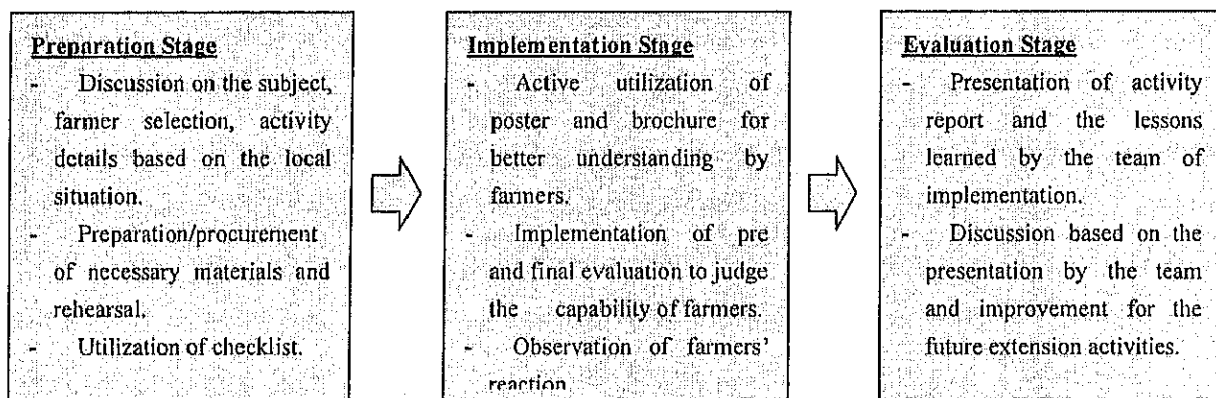


Fig.4.5.1 Procedures of Model Extension Activities

Extension activities actually implemented in 3 Governorates as model activities were as follows;

Table 4.5.1 Model Extension Activities Implemented

Governorate	Type	Outline
Rural Damascus	Field Visit	Diagnosis of modern irrigation system for fruit crops
	Seminar	Installation and maintenance of drip irrigation system
	Workshop	Disturbance of fruit trees due to change of irrigation system from surface to drip
	Fair	Fair on advantage and proper operation of modern irrigation system
Daraa	Field Visit	Diagnosis of modern irrigation system (GR)
	Seminar	Crop-wise water management under modern irrigation system
	Field Day	Proper installation of modern irrigation system
	Workshop	Economic evaluation of tomato cultivation
Hama	Field Day	Introduction of drip irrigation system for cotton cultivation (No.1 & No.2)
	Practical Demonstration	Proper pressure distribution of sprinkler irrigation system
	Field Visit	Proper discharge distribution of sprinkler irrigation system
	Mobile Theater	Mobile theater for advantage of modern irrigation system

Each extension activity was implemented according to the extension concept that was gradually established based on the progress of this project. The concept is to emphasize the individual extension for individuals or specified small group in addition to the collective extension for masses or unspecified majority. One of the most important roles of the water extensionists trained under this project is the execution of this individual extension. Field visit and practical demonstration activities were allocated in each Governorate as a major individual extension activity.

Extension activities were also implemented by focusing on the incentive factors that can touch off the motivation towards irrigation modernization and water saving. Based on the past survey activities in the village level, such incentive factors can be summarized into 5 following items.

- Monetary Benefit: Profit to be provided through water saving,
- Mutual Relation: Good relation with neighborhood to be promoted through water saving,
- Religious Belief: Conformity of water saving with religious doctrine,
- Scientific Rationality: Conformity of water saving with scientific rationality, and
- Problem Solving: Problem solving to be provided through water saving.

The degree of impact on each incentive factor by the farmers differs from Governorate to Governorate. Since the incentive on monetary benefit is rather strong in Daraa, for example, the case study on economic evaluation with modern irrigation system was included. While

in Hama and Rural Damascus, various activities to solve certain problem were included due to high incentive in the present problem solving. The following table shows the relation among extension types, incentive factors and model extension activities.

Table 4.5.2 Relation among Extension Types, Incentive Factors and Model Extension Activities

Extension Type	Extension Method	Capacity Building on Software	Incentive Factor (Enhancement of Water Saving Mind)				Problem Solving
			Monetary Benefit	Mutual Relation	Religious Belief	Scientific Rationality	
Collective Extension	Field Day	Daraa-3 (Proper installation)	Hama-1 (Cotton by drip system)				
	Seminar	Damas-2 (Installation and maintenance)		Friday speech by Mosque (Common)	Daraa-2 (Water management)		
	TV/Radio	Technical Video (common)					
	Mobile Theater	Scenario preparation (common)		Hama-4 (Mobile theater performance)			
Individual Extension	Extension Message	Poster/Brochure (common)	Damas-4 (Fair for proper operation)				
	Practical Demonstration	Hama-2 (Pressure distribution checking)					
	Field Visit (Programmed)	Damas-1 (Drip system diagnosis)				Hama-3 (Discharge distribution checking)	
	Field Visit (Upon request)						Daraa-1 (Drip system diagnosis)
	Workshop		Daraa-4 (Economic evaluation)				Damas-3 (Fruit tree disturbance)

Governorate	Characteristics	Software	Monetary Benefit	Mutual Relation	Religious Belief	Scientific Rationality	Problem Solving
Hama	Cooperative and inquiring	●	⊙	●	○	⊙	●
Daraa	Less cooperative	●	●	△	○	○	⊙
R. Damascus	Water sharing experience	●	⊙	○	○	○	●

Note: Degree of impact is based on the results of rural society survey and classified from minimum to maximum (△→○→⊙→●)

(2) Activity Report of Model Extension Activity

On the completion of model extension activities mentioned above, it was obligated for each organizing group of extensionist to prepare the activity report by arranging all available information such as activity sheet, participants list, timetable, material list, evaluation results and lessons learned. The process to prepare the report is indispensable for the organizing group of extensionist to evaluate and review their own extension activity. This report is also considered to be useful as a reference document for the future activities. The major components of the report were as follows;

- Activity Sheet,
- Participants List,
- Timetable,
- Materials List,
- Pre & Final Evaluation sheet,
- Results of Evaluation,
- Results of Discussion, and
- Lessons learned.

Activity reports thus prepared for all the model extension activities were translated into Arabic language and compiled as case study report. This case study report can be utilized by any water extensionists for their future activities.

(3) Extension Manual

Through the implementation of model extension activities and the preparation of activity report, all concerned personnel including extensionists, extension officers at the Governorate level and the project staff acquired many useful experiences. In order to effectively utilize such experiences by the future water extensionist in their extension activities, the preparation of extension manual was intended. This extension manual was thus designed for the water extensionists mainly stationed at the Extension Unit to be utilized as a field guideline for carrying out needs assessment and various extension activities. The manual shows the practical steps necessary to perform successful extension activities. The total process was divided into the following 11 steps and the important point in each step was schematically shown in the manual. Water extensionists can utilize the manual whenever he/she would like to carry out field survey, diagnosis of irrigation system and various extension activities such as field day, field visit,

practical demonstration, seminar and workshop.

Table 4.5.3 Outline of Extension Manual

Step	Title	Objective	Contents
1	Utilization of Readily Available Information	For understanding the characteristics of the target area	Statistics, Village Inventory, Farmers Inventory and GIS
2	Farm Survey	For proper problem analysis and needs assessment	Problem Analysis, System Diagnosis and Socioeconomic Survey
3	Determination of Theme Based on Needs Assessment Results	For focusing on appropriate theme	Selection of Suitable Themes and Narrowing down the Theme
4	Selection of Participants	For proper utilization of farmers list	Utilization of Farmers List and Relation with Selected Theme
5	Determination of Extension Type and Method	For selection of proper extension type and method	Suitable Type for Activity & Participant and Suitable Method for Activity & Participant
6	Preparation for Extension Activity	For designing effective activity	Activity Sheet, Timetable, Necessary Materials, Messages to be Conveyed, Questionnaire and Sharing of Roles
7	Implementation of Rehearsal	For confirming appropriateness of activity plan	Confirmation of Timetable, Confirmation of Materials and Modification of Activity Plan
8	Implementation of Extension Activity	For effective extension activity	Important Points to be Considered and Interaction with Participants
9	Evaluation of Activity	For proper evaluation of activity	Evaluation by Organizers and Evaluation by Observers
10	Report Preparation	For proper record keeping	Activity Report and Sample Format
11	Monitoring Activity	For proper aftercare	Monitoring, Follow-Up and Needs Assessment

4.5.4 Distribution of Extension Materials

Followings are the extension materials produced and distributed under the Project and the list of those products are listed in ANNEX 6.

(1) Video Programs

In the course of 4 steps training courses for the water extensionists, various video programs including video clips, photographs, figures and cartoon were created in order to increase the understandability of the participants. Through this experience, it was revealed that the video program is quite useful for the participants to understand particularly the contents that cannot be explained easily by verbal expression such as piping practices and diagnostic processes. This kind of video program might be very useful especially for farmers due to their feeling of "seeing is believing". The technical video program on "Installation of Modern Irrigation System" was prepared as a model case for farmers to be the distributed to the extension units.

(2) Poster/Brochure

Various posters and brochures were created during the training courses especially in the

third training course (Preparation of Extension Materials) for Water Extensionists. Some of them were created by the Project as a sample or teaching material and the others were created by the participants as their products. Posters and brochures thus produced were graded and voted by the participants to select good products. Some of the very good products were finalized by professional illustrator and printed. Posters and brochures thus printed were then distributed to the regional agriculture offices and the extension units in which the participants stationed. Since the name of the designer was printed on the poster, the participants who produced the poster might have been encouraged. Furthermore, these posters were mounted to be used as panels and these were effectively utilized in the extension activities such as field day and field visit at the Governorate level.

(3) Case Study Report and Extension Manual

Activity report of the model extension activities and extension manual were prepared as described in the previous chapter. These materials can effectively be used by the extensionist whenever he/she would like to carry out field survey, diagnosis of irrigation system and various extension activities such as field day, field visit, practical demonstration, seminar and workshop as reference documents.

4.5.5 Impacts of Extension Activities

(1) Extensionist Level

As a part of project evaluation activities, a survey was carried out to assess the behavior modification of trained extensionists by asking them to fill the record of extension activities both in extension unit and in the field. Although the results were collected only from several extensionists in each Governorate, the general trend of major activities carried out by them and the frequency of activity was revealed. According to the results as shown below, many extensionists are answering the farmers' questions and explaining about irrigation system and also loan system. Furthermore, some extensionists are (i) diagnosing existing irrigation system, (ii) doing demonstration works and (iii) implementing lectures and field day activities. Based on the results so far obtained, the average number of extension activities per one month by one water extensionist is 2 times at the extension unit and 2.5 times at the farmers' field.

Table 4.5.4 Extension Activities Carried Out by Trained Water Extensionists

Governorate	Extensionist	Activities in 3 months from June to September		Major Activities
		at the Unit	at the Field	
Rural	-----	21	9	Answering the farmers' questions, <u>Demonstration</u> of installation and maintenance, Consultation on system designing
Damascus	-----	4	11	Answering the farmers' questions, Investigation for improving the existing irrigation system
	-----	18	12	Answering the farmers' questions, Explanation about advantages of modern irrigation system
Daraa	-----	0	3	Explanation about proper materials and installation
	-----	2	7	Consultation on material selection and designing, Explanation about advantages of modern irrigation system, <u>Checking</u> the existing irrigation system
	-----	1	13	Answering the farmers' questions, Explanation about advantages of modern irrigation system, <u>Checking</u> the existing irrigation system
	-----	2	2	Consultation on material selection and designing, Calculation of water requirement
	-----	0	5	Consultation on material selection & designing, Installation of network, <u>Diagnosis</u> of irrigation network, <u>Demonstration</u> of installation & maintenance
	-----	4	3	Consultation on material selection and designing, <u>Demonstration</u> of installation and maintenance

Hama	-----	6	9	Answering farmers' questions and distributing brochures, Explanation about loan system for modern irrigation, Explanation about advantages of modern irrigation system
	-----	6	9	Consultation on material selection and designing, Explanation about loan system for modern irrigation, Explanation about advantages of modern irrigation system
	-----	3	0	Explanation about fertilizer mixer, Explanation about proper sprinkler system operation, Explanation about the importance of pressure gauge
	-----	9	6	Answering the farmers' questions including the subjects not related to irrigation, Issuing certificate for harvesting
	-----	4	11	Explanation about loan system for modern irrigation, <u>Checking</u> the existing irrigation system, Explanation about advantages of modern irrigation system
	-----	12	3	Explanation about loan system for modern irrigation, <u>Demonstration</u> of various measurement procedures, Consultation on material selection and designing
	-----	8 (Office)	7	Explanation about loan system for modern irrigation and distribution of brochures, Explanation about advantages of modern irrigation system
	-----	2 (Office)	17	<u>Demonstration</u> of various measurement procedures, <u>Lecture</u> on the advantage of modern irrigation system, <u>Field day</u> on diagnosis and maintenance
Total	17	102	127	
		2.0	2.5	Average Number of Activities/Water Extensionist/Month

(2) Unit Level

As a part of project evaluation activities, another survey was carried out to assess the change in extension activities of extension unit from which the extensionist is dispatched as a trainee to the project by collecting the daily or monthly activity sheet for the current year and the year before for the comparison purpose. Since the data was collected in September 2007, the data of the year 2007 was from January to August and the data of the year 2005 or 2006 was for whole year. The results of different years in each unit can therefore not be compared directly. In addition, the format of activity sheet is different from unit to unit. It may not be appropriate to compare the results among different units. Furthermore, whether the change of the activities in the unit is affected by the project activity or not is also not clear. According to the results shown in the following figure, however, the general trend was revealed as stipulated below.

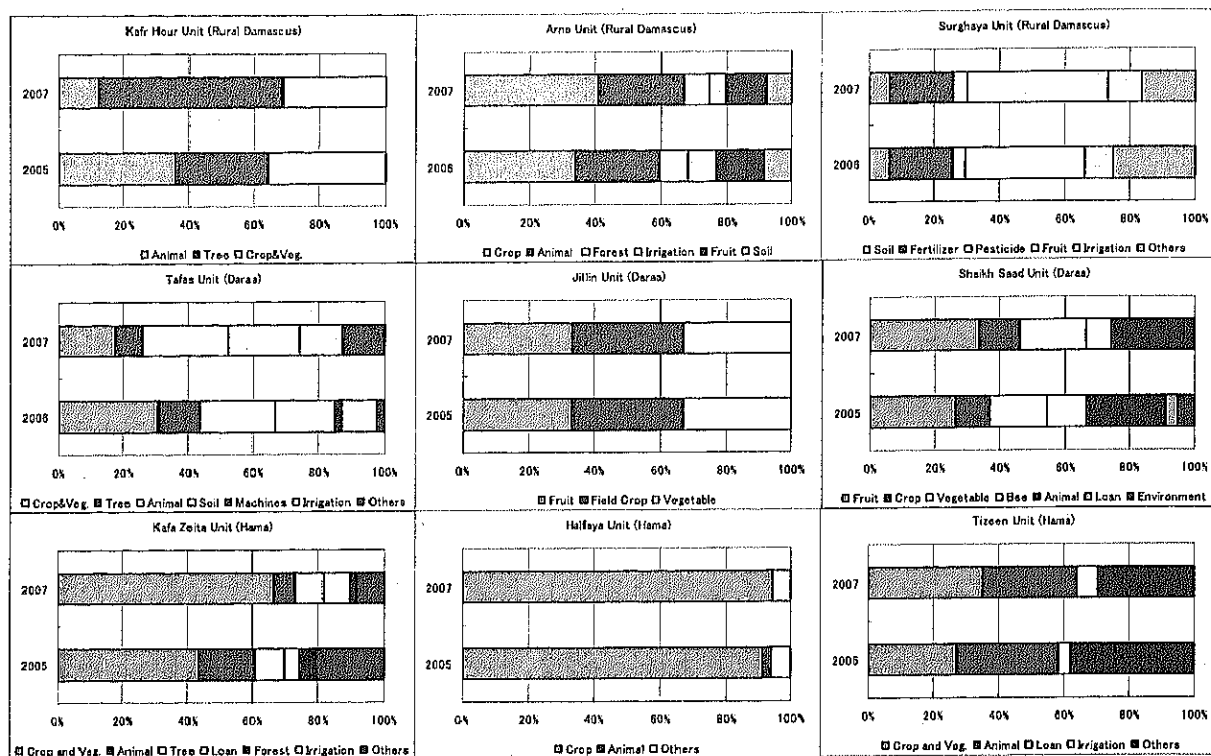


Fig4.5.2 Extension Activities in the year 2005 and 2007 at the Extension Unit in the Project Area

- The activity related to the irrigation is generally very limited at all the units in 3 Governorates.
- In Rural Damascus, the activity related to irrigation increased at Surghaya and decreased at Arne. There might be a possibility to increase the irrigation activity by the end of the year at Arne.
- In Daraa, the activity related to irrigation increased at Tafas. The demonstration farm operated by the project was located at Tafas.
- Although it is not clear from the figure, in Hama, there are very limited activities related to irrigation and no change at Kafir Zeita and decreased at Tizeen.
- It is also not clear whether the loan activity is related to irrigation or not. However, the percentage of loan activity increased at Kafir Zeita and Tizeen in Hama. On the contrary, it was decreased at Shaikh Saad in Daraa.

(3) Central and Governorate Level

During the terminal evaluation of the Project, various questionnaire and interview surveys were carried out for counterpart personnel in central and Governorate level in order to evaluate the Project. The analysis results of such surveys were described in the terminal evaluation report based on the five criteria namely relevance, effectiveness,

efficiency, impact and sustainability. The following points were revealed as provable effects of extension works related to the descriptions under each criterion.

Relevance

As one of the article in “relevance” of the terminal evaluation report, it was mentioned that this Project covered from central to local level, and worked on the necessary organizations and departments to cooperate together. For the implementation of model extension activities under this Project, in fact, the chiefs of Governorate office, district office and extension unit were invited in order for them to appreciate the performance of trained extensionists. Through such occasions provided by the Project, the coordination among such concerned organizations from central to local level might have been strengthened.

Effectiveness

As one of the article in “effectiveness” of the terminal evaluation report, it was mentioned that the linkage between various organizations positively encouraged the achievement of the Project purpose. For the effective preparation of model extension activities, in fact, the collaboration between the staff from various organizations such as research, extension and irrigation modernization was practically promoted. The counterpart from research center contributed to the technical aspects and the counterpart from extension contributed to the administrative aspects. In this way, the model extension activities were accomplished in collaboration with such counterpart personnel and organizing extensionists group. It means that the extension activity in the Project greatly contributed to the strengthening of coordination among various organizations in addition to the coordination from central to local level as mentioned previously.

Efficiency

As one of the article in “efficiency” of the terminal evaluation report, it was mentioned that the Subject Matter Specialist (SMS) trainees were selected carefully from the ex-trainees of Water Extensionist (WE) course, and they were represented from targeted Project areas. All the ex-trainees of WE course participated in the model extension activities designed and organized by them in each Governorate. The model extension activity is, therefore, the chance for them to apply the knowledge and skill obtained during the training course. Some of them had another chance to present their model

activities for the following year's WE trainee as SMS. This might be a good chance for the WE trainee to hear the fresh voice from their seniors and for SMS as TOT training. Through the annual rotation of this process, the training and extension system for the water saving agriculture might be strengthened.

Impact

As one of the article in "impact" of the terminal evaluation report, it was mentioned that the Project counterparts became gradually confident to make any training plan and undertake extension activities in the Project. By participating into various model extension activities, counterpart personnel both in central and Governorate level had a chance to observe the performance of water extensionists and the reaction of farmers. These experiences may raise their capability to judge the effectiveness of the extension activities and such kind of capability is indispensable for them to prepare the training program and extension plan within each Governorate in future.

Sustainability

As one of the article in "efficiency" of the terminal evaluation report, it was mentioned that all the counterpart organizations would be able to sustain and provide necessary assistance to the farmers. Similar to the capacity development of counterpart personnel mentioned above, the capacity development of the concerned organizations might have been promoted through the implementation of model extension activities.

4.6 Technical Manual

4.6.1 Preparation of Technical Manual

Technical Manual for the efficient irrigation, like water-saving modern irrigation, was prepared during the first half of the 4th Field Work. The Technical Manual is summarized as follows:

The Technical Manual is:

- To be prepared in the scope of the Development Efficient Irrigation Techniques and Extension Project (DEITEX) aiming to establish a standardized technical guideline of modern water-saving irrigation for the convenient use of Syrian engineers/technicians concerned to technically support irrigation farmers.
- To take up modern irrigation methods utilizing "handy pressurized irrigation equipment" like drip and sprinkler.

- To be assumed that irrigation water is supplied by shallow or deep wells with motors.
- To deal with subjects related to irrigated agriculture and agro-economy which are referred in this manual in order to fulfill the modern irrigation comprehensively, besides subjects concerning to the technical aspects.
- To be intended for individual irrigation farmers who are going to convert their irrigation from traditional method to modern ones, or to improve their existing modern irrigation system and their current irrigation practices.
- To be also referred consultative networks and organizations to which farmers can visit and inquire as the need arises, for farmers conveniences.
- To be expected for Syrian engineers/technicians who may utilize this manual, to guide irrigation farmers so as to handle appropriate modern irrigation by their own initiative.
- To be prepared so that more attention should be paid for the farmers' own intension and inventions.

Taking above concept for preparation into consideration, the Technical Manual was prepared consisting of the contents showing as follows:

Table 4.6.1 Contents of Technical Manual

Category	Chapter	Sub-chapter	Remarks
General Subjects	I. Water-saving in Irrigated Agriculture	Irrigation Water Use and Water Balance in Syria	Necessity and importance of irrigation modernization in Syria is emphasized.
		Advantages of Modern Irrigation Method	Advantage of modern irrigation to saving water is explained.
		Outline of Water Policy and Water Right in Syria	New Water law (No.31) is instructed.
	II. Rationalized Farm Management under Modern Irrigation	Water-saving Agriculture	Water-saving agriculture is generalized.
		Economic Advantage of Modern Irrigation	Economic advantage of modern irrigation rather than traditional method is justified.
		Cropping Pattern under Modern Irrigation	General idea and information about cropping pattern to suite for modern irrigation is given.
		Point in Farming Practices under Modern Irrigation	Additional information on farming under modern irrigation is mentioned.
Engineering	III. Planning and Designing of Modern Irrigation System	1. Setting Target of Irrigation Modernization	Levels of modern irrigation to be introduced are clarified.
		2. Procedure of Irrigation System Design	General procedure of designing of modern irrigation system is outlined.
		3. Site Investigation	Investigation and planning of modern irrigation system is instructed.
		4. Crop Water Requirement	
		5. Irrigation Scheduling	
		6. Irrigation System Design	Designing of modern irrigation system is instructed.
		7. Modern Irrigation Equipment	

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		8. Installation	Installation and setting up of irrigation system is instructed.
		9. Operation and Maintenance	Operation and maintenance including water management to meet realizing water saving is instructed.
		10. Water Management	
		11. Consideration for Pressurized Irrigation System	Additional information concerning modern irrigation system is added.
Supportive Information	IV. Extension of Efficient Irrigation Techniques	Loan Support for Procuring Irrigation Equipment	Loan support prepared by the Government is explained.
		Extension Support on Irrigated Agriculture	Extension support for irrigation modernization is introduced.
		Other Technical Supports	Available technical supports for farmers when needed are mentioned.
	V. Crafting WUA in combination with Irrigation Modernization	Merit of Water Users Association	On the occasion of applying water-saving modern irrigation, merit of taking collective action by WUA is explained.
		Promotion of Water Users Associations	The procedure and qualification for promoting WUA is mentioned.
		Motivating Farmers for Organization of Water Users Associations	Remarkable points for establish and maintaining sound WUA are given.

The Technical Manual (English version) was in the hands of utilization. It's Arabic version was also prepared for the easy use of local staffs.

4.6.2 Delivering of Technical Manual and After Care

(1) Posts and Places delivered

Copies of the Technical Manual were delivered to the necessary posts and places which were selected with the following criteria:

Selection criteria:

- avoiding individual concealment
- considering users' convenience for on-the-spot usage
- considering easiness for public use
- avoiding losses and damages

The selected posts and/or persons to be delivered the copy of the technical manual are listed in Table 4.6.2

(2) Method of utilization of the manual

The manual has to be put on an open bookshelf within the delivered office so that every one who wants to consult can use freely without any hindrances. However, in order to

avoid losses and damages, a superintendent of the manual shall be nominated. The superintendent should confirm its usage and existence in the appointed bookshelf on every week. The superintendent shall take notice of users' opinion and request about its revision and enlargement.

When delivered, the project team designated superintendents of the each delivered copies of the manual, and instructed the manner of handling.

(3) Maintaining and Revising Procedure

The project team set the method of revising of the technical manual, and requested to the project counterpart to follow rightly.

Counterparts of the project will visit around the delivered posts in order to check usage of the manual and handling condition twice a year. When visited, the counterparts collect users' opinion and request about its revision and enlargement, and take note about their opinion about usefulness of the manual. Three years passing after delivering the manual, an editorial group will be organized by the counterparts if necessary. Revising of the manual could be done in consideration with the collected opinions and ideas. The revised manual will be delivered to the same posts in exchange for the old version.

4.7 Institutional Arrangement

4.7.1 Cooperation among concerned Organizations

Since necessary activities for the realization of water saving agriculture extend to wide range of fields such as research, extension, financial support and etc., proper cooperation among concerned organizations is essential. In order to promote such cooperation, the Project tried to make the following arrangements in different activities. Through such activities the Project could provide the concerned personnel from different organizations with the chance to make collaborative works.

(1) Demonstration Activities

Demonstration activities were mainly carried out at the demonstration farms selected in the typical village representing the agricultural type of the area. The Project was operating the demonstration farm by (i) designing and installing the appropriate irrigation system, (ii) giving suggestions on proper operation of the irrigation system including irrigation scheduling for each crop and (iii) collecting monitoring data including irrigation details, farm inputs and crop yield from farmer. This process was carried out

under the full cooperation among various organizations in the following manner.

- Irrigation system was designed and installed by the contractor under the Project supervision in collaboration with the counterpart personnel from GCSAR.
- Irrigation scheduling including irrigation intervals and irrigation hours was also prepared in collaboration with the counterpart personnel from GCSAR especially the engineers from irrigation station in each Governorate.
- The Project appointed an extensionist in charge who had been trained in the Project and working at the extension unit covering the village in which the demonstration farm is located as general supervisor for the proper operation of the demonstration farm.
- Important role of this extensionist in charge was also to collect monitoring data including irrigation details, farm inputs and crop yield from farmers for the analysis of water saving effect and economic feasibility.
- In this way, the Project made various institutional arrangements for the effective implementation of the demonstration activities in collaboration with GCSAR and Extension Directorate.

(2) Training Activities

Training activities were carried out jointly by Japanese experts and Syrian counterparts during the first year and mainly by Syrian counterparts under the supervision of Japanese expert during the second year. In order to assure the sustainability of the execution of the training activities, the following institutional arrangements were made by the Project, GCSAR, Extension and Training Directorates.

- The counterparts from GCSAR mainly covered the technical aspects of the training contents such as designing the training, preparing the training materials, executing the lectures and the field practices, evaluating the capability of trainees and following up the post training activities.
- Similarly the counterparts from Extension Directorate covered the extension aspects of the training contents.
- The Project arranged the collaboration with Training Directorate (i) to ensure the venue for training activities with accommodation arrangement and (ii) to execute TOT training for SMS trainees.
- In this way, the Project made various institutional arrangements for the effective implementation of the training activities in collaboration with GCSAR, Extension and

Training Directorates.

(3) Extension Activities

Model extension activities were carried out by the trained extensionists mainly stationed in the extension unit and also by the trained engineers from the Directorate of Modern Irrigation Conversion (DMIC). In order to effectively carry out those extension activities, the following institutional arrangements were made by the Project, GCSAR, Extension Directorate and DMIC.

- All the model extension activities were arranged to be executed under the teamwork of the organizing group of trainees (extensionist in the unit, officer in district / Governorate office, engineer of DMIC).
- During the preparation of the model extension activities, the counterpart from research center contributed to the technical aspects and the counterpart from extension contributed to the administrative aspects.
- All the model extension activities were executed under the participation of observers such as unit chief, village chief and representatives from research, extension, training and DMIC in Governorate level for them to appreciate the performance of organizing group and also to give comments for improvement in future.
- In many of the model extension activities, the staff of DMIC explained about “ The National Project of Modern Irrigation Conversion” for the farmers to understand the loan system for the irrigation modernization.
- In this way, the Project made various institutional arrangements for the effective implementation of the extension activities in collaboration with GCSAR, Extension Directorate and DMIC.

4.7.2 Arrangement by each Organization

The table below shows the role of each organization in different activities such as demonstration, training and extension activities with the following arrangements made by each organization for the smooth execution of activities.

Table 4.7.1 Role of each Organization in different Activities

Agencies	Demonstration Farm	Training Activities	Extension Activities
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GCSAR	<ul style="list-style-type: none"> - Design & installation of irrigation system for demo farm - Preparation of irrigation program including irrigation intervals and irrigation hours 	<ul style="list-style-type: none"> - Designing training structure - Preparing training materials - Executing lectures and practices - Evaluating the capability of trainees - Follow-up of the post training activities 	<ul style="list-style-type: none"> - Technical support to the extensionists for executing model extension activities - Evaluating the model extension activities and giving necessary comments for improvement
Extension Directorate	<ul style="list-style-type: none"> - Operation of demo farm through extensionist in charge - Collection of monitoring data from demo farm and monitoring farms 	<ul style="list-style-type: none"> - Designing training structure - Preparing training materials - Executing lectures and practices - Evaluating the capability of trainees - Follow-up of the post training activities 	<ul style="list-style-type: none"> - Administrative support to the extensionists for executing model extension activities - Evaluating the model extension activities and giving necessary comments for improvement
DMIC			<ul style="list-style-type: none"> - Implementing model extension activities under the cooperation with extensionists - Notification of "National Project" in the model extension activities
Training Directorate		<ul style="list-style-type: none"> - Ensuring the venue for training - Executing TOT training for SMS trainees 	

(1) GCSAR

As a main counterpart agency of the Project, GCSAR played a major role in general as shown below.

- Allocation of counterpart personnel in the field of irrigation, system design, training, agro-economy and socio-economy,
- Execution of all administrative works including general coordination in project implementation, correspondence with concerned organizations and various arrangement such as meeting, transportation and others, and
- Various activities in the operation of demonstration farms, execution of training courses, execution of model extension activities as mentioned previously.

(2) Directorate of Extension

As a counterpart agency of the Project, Extension Directorate played various roles in relation to the extension of efficient irrigation technology as shown below.

- Allocation of counterpart personnel in the field of agricultural extension,
- Various activities in the operation of demonstration farms, execution of training courses, execution of model extension activities as mentioned previously,
- Taking measures for the transfer restriction of trained Water Extensionists,
- Taking measures for the proper allocation of trained SMS according to the

- administrative structure which might be restructured, and
- Taking measures for the budget arrangement to the extension activities at the Governorate level.

(3) Directorate of Modern Irrigation Conversion

As a new counterpart agency of the Project, DMIC played various roles in relation to irrigation modernization as shown below.

- Allocation of counterpart personnel to the Project,
- Deployment of Water Extensionist trainee at the Governorate level,
- Notification of "National Project" through the DEITEX Project activities, and
- Arrangement for the extensionists training course at the Governorate level.

(4) Directorate of Training

As a cooperating agency of the Project, Training Directorate played various roles in relation to the training as shown below.

- Ensuring the venue for training activities with accommodation arrangement, and
- Executing TOT training for SMS trainees.

4.7.3 Institutional Arrangement for Further Works

Upon completion of all demonstration, training and extension activities programmed under the Project, the meetings have been held in 3 Governorates to discuss about institutional arrangement for further works in the presence of local counterparts and all unit chiefs concerned. The discussion was mainly about the effective utilization of the trained staff under the Project and the necessary arrangement for the execution of training and extension system in each Governorate. Followings are the summary results of the discussions in general.

- The training course for water extensionists will be conducted in each Governorate by the Agriculture Directorate not by extension unit according to the 4 steps of training courses established by the DEITEX Project as a training standard.
- The chief of extension in each Governorate is ready to promote the extension activities on modern irrigation and water saving under the full utilization of trained staff in DEITEX under the provision of financial and other necessary support.
- Extension activities will be conducted by the trainees of the last year for water extensionists according to their action plan under the support of Extension Division in

Agriculture Directorate in each Governorate.

4.8 Capacity Building and Technical Transfer

Since the DEITEX Project includes many of training and extension activities, the project implementation has realized variety of capacity building of counterparts and related personnel during the Project period. One of the most perceptible results in capacity building is improvement of knowledge and skills of extensionists who attended training courses for water extensionist and irrigation SMS. They have acquired useful knowledge and skills regarding modern irrigation system and extension methods through the training courses.

The following table shows the number of trained personnel in the target Governorates. The table indicates that 71 of water extensionists and 15 of irrigation SMS have been trained in total during the Project period. The number of water extensionists under extension unit is 58, which meets 46% of the requirement. On the other hand, the number of the trained SMS under extension unit is 12, which is equivalent to 57% of the necessary numbers, since SMS will be primarily located at supporting unit. List of the trained SMS and WE are shown in Annex 5.

Table 4.8.1 Number of the Trained Water Extensionists in the Target Governorates

Governorate	Total number of extension unit	Number of Unit selected by Extension Chief (a)	Number of the Trained Water Extensionists (b)	The Ratio of the Trained Water Extensionists (%) (b / a)
R Damascus	63	49	16	33 %
Daraa	63	23	21	91 %
Hama	74	55	21	38 %
Subtotal	200	127	58	46 %
DMIC & GCSAR	-	-	13	-
TOTAL	-	-	71	-

Table 4.8.2 Number of the Trained Irrigation SMS in the Target Governorates

Governorate	Total number of supporting unit (c)	Number of the Trained Irrigation SMS (d)	The Ratio of the Trained Irrigation SMS (%) (d / c)
R Damascus	13	5	39 %
Daraa	6	2	83 %
Hama	9	5	67 %
Subtotal	28	12	57 %
DMIC	-	3	-
TOTAL	-	15	-

These water extensionists are now capable to conduct farm survey to identify farmer's problems regarding irrigation, to make diagnosis of irrigation system, to prepare extension materials such as posters and brochures, and to carry out extension activities such as field day, field visit, workshop and seminar. On the other hand, irrigation SMS

is ready to work as a trainer of water extensionists in conducting training courses of modern irrigation. Some of them have already participated training courses as trainers, and more training courses are planning to be conducted by SMS in the Governorates during the post-Project period.

In addition to the training activities, conducting model extension activities such as field day, field visit, seminar, workshop and mobile theater were also very effective in capacity building as water extensionists. Before participating the DEITEX Project activities, they did not have enough information and skills to be transferred to farmers, nor they did not know effective method of extension, and because of these reasons they were not very confident of dissemination on modern irrigation techniques. Through practical experience in conducting the model extension activities under the Project, they are capable to conduct extension activities in effective way. They have also learned significantly improved extension method by the Project. Each extension activity has been discussed very well by implementation team before execution, with preparing activity sheet, timetable and evaluation questionnaire. Because of these improvement of the method, extension activity has become much more effective than the conventional way which is not well-planned without specifying distinct target of the activity.

It should be mentioned that those eligible engineers have been qualified as SMS and Water Extensionist by the DEITEX Project. Generally, training course participants received "attendant certification" which does not endorse their capability of the concerned duties. In addition to the attendant certification, "technical certification" has been given to SMS and WE those who have adequate ability which is qualified by the Project. These qualified engineers should be fully utilized during the post-Project period in their relevant fields of work.

As far as the counterparts are concerned, central and local counterparts worked as trainers during the above-mentioned training courses, who organized the training activities by working with the Japanese experts. Through these experiences, they have learned a lot about how to organize training courses not only implementation but also preparation and evaluation works. It was specially emphasized on importance of the preparation work, because good preparation makes training activity better and more effective.

In the course of Project implementation, various kinds of activities were conducted by the Japanese experts together with the Syrian counterparts, which worked very effectively as technical transfer activities. The following table shows contents of technical transfer

performed during the Project period, which was mainly targeting central and local counterparts. The table includes different categories such as survey, irrigation system, training and extension. For example, in case of the baseline survey, counterparts learned how to design and carry out questionnaire survey in order to identify the characteristics of project area and to select suitable site for establishment of demonstration farms. In addition, designing irrigation system and preparing irrigation schedule for the farms were very practical exercise for the counterparts. They also got great experience from training and extension activities, which was significantly useful to improve their capacity.

Table 4.8.3 Technical Transfer Performed during the Project Period

Category	Subject	Contents of Technical Transfer	Reference Materials
Survey	Baseline Survey	Conducting baseline survey to identify the characteristics of project area and to select suitable site for demonstration farm.	Baseline survey report
	Farmer Survey	Conducting farmer survey to identify farmer's current conditions and problems/needs	Check list and analysis sheet for farmer survey
Irrigation System	Establishment of Demonstration Farms	Designing the irrigation system and preparing irrigation schedule	Drawing of the irrigation system, and Table of irrigation schedule
	Technical Manual	Preparing technical manual regarding modern irrigation	Technical Manual
	Monitoring Activity	Collecting and analyzing data regarding irrigation and agricultural practices in demonstration farms	Monitoring sheet and monitoring report
Training	Training course preparation	Preparing training curriculum and teaching materials	Training curriculum and teaching materials
	Training course implementation	Conducting training courses for water extensionist and irrigation SMS	Training curriculum and teaching materials
	Training course evaluation	Preparing evaluation system and conducting training course evaluation	Pre-evaluation, final evaluation, examination and homework
	Training guideline	Preparing training guideline for trainers of water extensionists	Training guideline
Extension	Extension System	Establishment of training and extension system	Training curriculum, teaching materials, and extension manual
	Extension Materials	Preparing Extension Posters and Brochures	Posters and brochures
	Extension Method	Conducting model extension activities on modern irrigation and saving water	Activity Report
	Extension Manual	Preparing extension manual to conduct extension activities	Extension Manual

Counterpart training in Japan and study tour to the third country were also effectively conducted during the Project period, which are summarized as the following table.

Table 4.8.4 List of Counterpart Training in Japan and Study Tour to the Third Country

Category	Title of Training	Name of Counterpart	Employment Status	Duration
Training in Japan	Operation and Management of Irrigation Canal System	Nasr Koki	Irrigation Engineer, ANRR, GCSAR	July 4 - Dec 3, 2005
	Irrigation Management and Agricultural Extension in Japan	Bassam Al Husein	Irrigation Engineer, GCSAR	March 11 - April, 2006
		Yasser Muhammad	Irrigation Engineer, GCSAR, Hama	


Study Tour	Sustainable Management of Irrigation and Drainage Project	Firas Salloum	Irrigation Engineer, ANRR, GCSAR	June 20 - Nov 18, 2006
	Development of Efficient Irrigation Techniques and Extension	Dr. Majd Jamal	Director General, GCSAR	March 25 - March 31, 2007
		Dr. Awandis Arslan	Director, ANRR, GCSAR	
		Dr. Mohamad Abudallah	Director of Extension, MAAR	
	Irrigation Management and Agricultural Extension in Japan	Abdallah Khabbaz	Engineer, Extension Directorate	Oct 1 - Oct 28, 2007
		Bassam Al Bunni	Director, Human Resource D, Hama	
		Marwan Shikh Fattouh	Chief of Extension, Rural Damascus	
	Modern Irrigation in Jordan Valley	Firas Salloum	Irrigation Engineer, GCSAR	Dec 5 - 8, 2005
		Bassam Al Husein	Irrigation Engineer, GCSAR	
Abdallah Khabbaz		Engineer, Extension Dir.		
Observation of Modern Irrigation System in Greece		Firas Salloum	Irrigation Engineer, GCSAR	Oct 15 - Oct 22, 2007
		Bassam Al Husein	Irrigation Engineer, GCSAR	
		Ali Kaisi	Deputy Director, ANRR	
		Husein Ali Kottuma	Director, GCSAR, Daraa	
Dr. Abdelnaser Alomar	Director, GCSAR, Hama			

4.9 Systemization of Water-saving Modern Irrigation Promotion

Unless confronted with the hopeless situation that well exhausted completely, irrigation farmers are generally reluctant to introduce modern irrigation, much less saving-water. Once farmer's well has dried up due to over-exploitation, it cannot be recoverable. It is essential to do something before such critical situation arises. Applying efficient irrigation is a principal precaution of farmers against water exhaustion.

Reluctant farmers for efficient irrigation are not monochromic in their situation and intension, they can be categorized into several groups according to their reluctance. Project team simplified categories of irrigation farmers as follows based on the findings about attitudes of farmers through field investigation.

Table 4.9.1 Categorization of Farmers for Irrigation Modernization

Major category of irrigation farmers		Sub-category of irrigation farmers	Reluctancy against modern irrigation	Remarks
Advanced farmers	Farmers with modern irrigation equipment/techniques	Achieving full modern water-saving manner		Farmers can shift to the more advanced irrigated-agriculture
		Being under inefficient modern water-saving manner		Farmers still have scope of improving actions
Backward farmers	Farmers motivated to modern irrigation	Being in the attempt of adopting new method		Farmers want to hold confidence of modern irrigation
		Having no idea how to apply modern method		Farmers can proceed to modern irrigation if awareness is raised
		Being reluctant to take action of modernization		Farmers are without confidence for modern irrigation
Opposed farmers	Farmers discouraged for modern irrigation	Assuming the modernization/saving-water as disadvantage		Farmers are ignorant or mistrustful for modern irrigation
		Persisting present manner of traditional irrigation	Farmers have strong misbelieve as sustaining present water supply	

Taking the above-mentioned categorization of irrigation farmers into consideration, the

project team systemized the extension structure so as to effectively enlighten irrigation farmers to modern irrigation in accordance with their situation. The Project formulated extension structure comprehensively utilizing practicable extension methods developed within the Project as shown in Fig.4.9.1.

4.10 International Cooperation and Publicity Work

4.10.1 International Cooperation

(1) Conducting Training Course for Iraq Engineers

The Extension OJT (On-the-Job-Training) was carried out as a part of the “Capacity Development Program for the Water Management for Irrigated Farms in Iraq” under the cooperation of GCSAR and the Extension Directorate. Since the extension activities shall play a very important role for the Iraqi Irrigation Project, the training course focused on the two major topics; a) basic information of modern irrigation as the important subject of the extension activity, and b) effective extension method as the essential tool of dissemination. The outline of the training course is shown in the following table:

Table 4.10.1 Outline of the Training Course for Iraq Engineers

Item	Description
Target Group	1) Extension officers & cultivation experts from MOA (HQ and Karbala) 2) On-farm Irrigation engineers from MWR (HQ and Karbala)
Number of Trainees	Ten (10) consisting of eight(8) males and two(2) females
Subject of Training	Improvement of Extension Activities on Modern Irrigation
Achievements	The followings are the expected achievements by the trainees. (1) To understand basics on design, installation and maintenance of on-farm modern irrigation system (2) To understand the methods of data collection from farmers and data analysis (3) To learn the know-how on efficient information dissemination methods to farmers (4) To practice how to prepare an action plan
Training Method	Lecture, practice in lecture room and field practice at irrigation research station
Training Duration	2 weeks
Training Equipment / Materials	Video CD, Power point presentation, Tools and equipment for field practices, Stationeries, Example posters & brochures

The two-weeks training program for the extension OJT was prepared based on the training courses which were conducted for water extensionists in the DEITEX Project, with considering the request from the Iraqi side. The teaching materials which have been developed in the DEITEX Project were utilized with necessary modification by the Syrian counterparts, who took important role as trainers in this extension OJT. The teaching materials consisted of video CD, Power Point presentations, and extension posters & brochures related to modern irrigation and saving water.

The first week of the training was organized by GCSAR under the subject of "Design, Installation, Operation and Maintenance of Modern Irrigation System". The training curriculum consisted of name and function of irrigation equipment, basic knowledge on irrigation system design, installation and maintenance, field measurement of emitter discharge, practice on pipe fitting, visiting irrigation research station, and preparing irrigation schedule based on crop water requirement. The second week training focused on "Extension Methods on Modern Irrigation", by taking in charge of the Extension Directorate. The training activities included lectures and practices on role of water extensionist, kind of extension methods, how to conduct farmers' survey, cause & problem analysis on farmer's irrigation, and how to prepare extension materials.

This training course was effective not only to develop the Iraqi trainees' capacities on the targeted subjects, but also to improve the Syrian counterparts' abilities on conducting training course, which was considered as one of the TOT (Training of Trainers) activities for them. In addition, this experience was also valuable in terms of regional cooperation in this area. Since there are many similarities between Syria and Iraq in natural conditions, language, religion and culture, this kind of cooperation can be very significant. It is useful and effective to utilize the Syrian resources such as technology, information, and experience, for the development of Iraq.

(2) AOAD (Arab Organization for Agricultural Development)

"The Regional Project of Water Awareness in the Arab World" was organized by AOAD with two main project components that were information campaign and training programs. Information campaign includes preparation of video films, television films, posters, pamphlets and newsletters and implementation of lectures, seminars and scientific gatherings. While the training program is directed towards the agricultural sector only and its main aim is to change the traditional habit of water use through 3 stage programs. Since the main aims of this AOAD Project and the DEITEX Project seemed almost same and that was the efficient water use, the future possibility for the mutual cooperation in the field of national expert meeting, information campaign and the training of extensionists were discussed. The actual cooperation activities were, however, not executed during the current project period.

4.9.2 Publicity Work

In addition to the preparation and the distribution of posters and brochures related to

the promotion of water saving agriculture, the following publicity works were executed during the Project period.

(1) Home Page

Upon commencement of the Project, the home page of the Project was established as a part of JICA Technical Cooperation Projects Portal Site. Followings are the information about the home page.

Home Page Address: <http://project.jica.go.jp/syria/4425006E0/english/>

Major Components:

- Project Information
- Project Report
- Project News
- Related Information
- Link

(2) DEITEX Project News

In order to announce the activity of the DEITEX Project, DEITEX Project News was published irregularly about once per 3 – 4 months. Followings are the outline of the issues published.

- DEITEX Project News Vol.1 (April 2005): Introduction of DEITEX Project and Japanese Members of the Project Team
- DEITEX Project News Vol.2 (August 2005): Major Activities carried out during 1st field work and C/P Members in Central Level
- DEITEX Project News Vol.3 (December 2005): Major Activities carried out during Baseline Survey and C/P Members in Daraa
- DEITEX Project News Vol.4 (April 2006): Major Activities carried out during 2nd field work and C/P Members in Hama
- DEITEX Project News Vol.5 (June 2006): Outline of 1st Training Course and C/P Members in Rural Damascus
- DEITEX Project News Vol.6 (August 2006): Outline of 2nd Training Course, Opening Ceremony and DEITEX Logo Mark
- DEITEX Project News Vol.7 (October 2006): Outline of 3rd Training Course

(3) News Letter of JICA Syria Office

Some articles related to the DEITEX Project were released to the News Letter (Akhbar Qasion) published by JICA Syria Office. Followings are the outline of the issues published.

- Akhbar Qasion Vol.107 (12/2/2006): Special Edition Activity Report for DEITEX – Introduction, Training and Extension Activities
- Akhbar Qasion Vol.133 (30/7/2006): Activity Report for DEITEX – Establishment of Demonstration Farms
- Akhbar Qasion Vol.162 (5/2/2007): Special Edition Activity Report for DEITEX – Modern Irrigation Method to be promoted for Water Saving

(4) The Agriculture Magazine

Some articles related to the DEITEX Project were also released to “The Agriculture Magazine” quarterly published by the Extension Directorate of the Ministry of Agriculture and Agrarian Reform. Followings are the outline of the issues published and to be published.

- The Agriculture Magazine Vol.19 (2006): Introduction of DEITEX Project
- The Agriculture Magazine Vol.21 (2007): An article about Modern Irrigation System prepared by one of the trainee of the Project
- The Agriculture Magazine Vol.25 (2008) to be published: Water saving irrigation and the effect of modern irrigation system

5. Achievement and Evaluation of the Project

5.1 General Views of Advancement of Modern Irrigation in the Project Area

Modern irrigation is steadily expanding in Syria, while it has been less than government's provision. Affirmative tendency of spreading efficient irrigation could be observed by a circumstantial evidence of spreading of modern irrigation as shown in Fig.5.1.1.

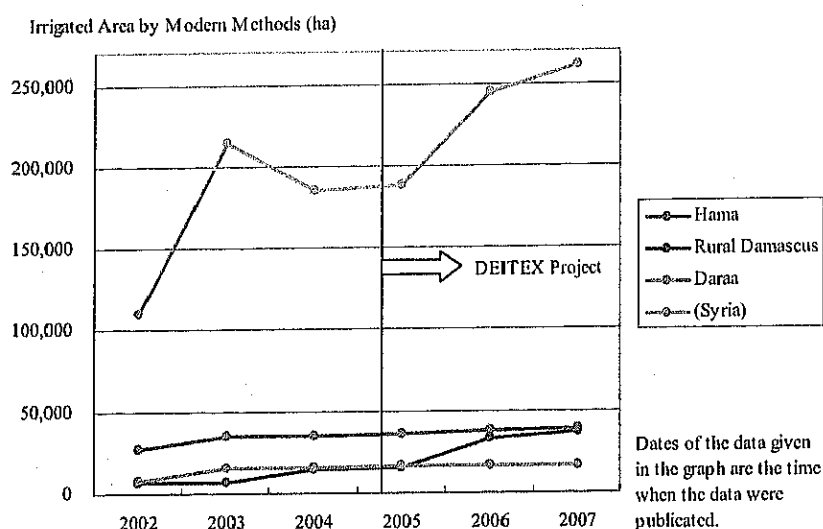


Fig.5.1.1 Change of Irrigated Area by Modern Irrigation Methods

Although Hama and Daraa seem to be made little progress since 2004, both governorates which are advanced regions for modern irrigation, come close upper limit of irrigation modernization. Change of the shares of each farmers' type categorized by the degree of their reluctance to irrigation modernization (see Clause 4.9), were analyzed as shown in Fig.5.1.2. According to the figures, it is obvious that Hama and Daraa are on the stage being focused on enhancing irrigation efficiency to the farmers who already introduced modern irrigation in any case.

5.2 Outline of the Project Evaluation

Prior to the termination of the DEITEX Project, final evaluation was carried out on November 2007. On the occasion of executing the terminal evaluation of the Project, JICA dispatched an evaluation team of which members and their schedule are briefed as follows:

Table 5.2.1 Members of the JICA Evaluation Team

Name	Job title in the Team	Occupation
Mr.TAMABAYASHI, Yosuke	Team Leader	Deputy Resident Representative, JICA Syria Office
Dr.NAKANO, Yoshisuke	Efficient Irrigation	Emeritus Professor of Kyusyu University
Dr.NAKABAYASHI, Kazuo	Training, Extension and Cultivation	Senior Advisor, JICA Jordan Office
Mr.YOKOI, Yukio	Cooperative Planning	Group Leader, Field Crop Based Farming Area Group, Rural Development Department, JICA Headquarters
Ms.MURAKAMI, Mayumi	Evaluation Management	Assistant Resident Representative, JICA Syria Office
Mr.MATSUMOTO, Akira	Evaluation and Analysis	President, A & M Consultant Inc.

Evaluation of JICA Projects is used to be proceeded according to joint committee with Japanese and Syrian sides. JICA follows a management policy to jointly carry out project evaluation in partnership with Japanese and Syrian sides. As the Syrian Evaluation Team, Syrian Government nominated two well-known specialists as follows:

Table 5.2.2 Members of the Syrian Evaluation Team

Name	Job title in the Team	Occupation
Dr. SEIF, Wael	Team Leader/Irrigation	Professor, Faculty of Civil Engineering, Damascus University
Dr. ISMAIL, Iskandar	Extension	Professor, Faculty of Agriculture, Damascus University

The Joint evaluation team consisting of Japanese and Syrian teams, executed the final evaluation study in Syria at the time schedule below:

Table 5.2.3 Time Schedule of Final Evaluation Study

Date	Day	Activities	Itinerary
Nov.10, '07	Sat.	Departure from Japan	Japan → Damascus, Syria
Nov.11, '07	Sun.	Meeting with JICA Expert Team	Damascus
Nov.12, '07	Mon.	- The 1st Joint Evaluation Committee Meeting - Interview to C/P and JICA Expert Team	Damascus
Nov.13, '07	Tue.	Field Survey in Rural Damascus	Rural Damascus
Nov.14, '07	Wed.	Field Survey in Daraa	Daraa
Nov.15, '07	Thu.	Field Survey in Hama	Hama
Nov.16, '07	Fri.	Analysis of the Result of Questionnaire Survey	Damascus
Nov.17, '07	Sat.	Internal Meeting	Damascus
Nov.18, '07	Sun.	- Courtesy Call on concerned Organizations - Interview to C/P - Field Survey in Rural Damascus	Damascus, Rural Damascus
Nov.19, '07	Mon.	Field Survey in Daraa	Daraa
Nov.20, '07	Tue.	Field Survey in Aleppo	Aleppo
Nov.21, '07	Wed.	Field Survey in Raqqa	Raqqa
Nov.22, '07	Thu.	Field Survey in Hama	Hama
Nov.23, '07	Fri.	Internal Meeting of Joint Evaluation Team	Damascus
Nov.24, '07	Sat.	- Field Survey in Daraa - Internal Meeting	Damascus Daraa
Nov.25, '07	Sun.	Preparation of Evaluation Report	Damascus
Nov.26, '07	Mon.	The 2nd Joint Evaluation Committee Meeting	Damascus
Nov.27, '07	Tue.	The 3rd Joint Evaluation Committee Meeting	Damascus
Nov.28, '07	Wed.	The 4th Joint Evaluation Committee Meeting	Damascus
Nov.29, '07	Thu.	Steering Committee Meeting of the Project	Damascus
Nov.30, '07	Fri.	Leave for Japan	Syria → Japan

The evaluation study was started on November 10, 2007. After conducting series of discussions, investigation and inspection as scheduled in the study plan, it was completed on November, 2007.

5.3 Results of the Final Evaluation

5.3.1 Assessing Process in the Final Evaluation

In the first step of the evaluation, the evaluation team assessed the degree and prospects of achievement of project purpose and outputs based on the PDM. After that, the study was proceeded to the second step in which the implementing process was assessed and evaluated from the aspect of the project management. Then, the third step in which the evaluation team analyzed and evaluated the Project from the viewpoints of five evaluation criteria, namely, “Relevance”, “Effectiveness”, “Efficiency”, “Impact” and “Sustainability”. Finally, the evaluation team made the conclusion and recommendation of the Project, and also identified the lessons learnt from the Project.

5.3.2 Implementation Process and Obtained Outputs

It was identified that the Project activities were smoothly undertaken, and also properly managed during the Project period, with the good collaboration among the relevant authorities that the project counterparts belong to. And it was remarked that the Project implementation took place through the active participation by various stakeholders including extension workers in the Project areas with sophisticate manner and without any obstacles.

One of the biggest changes in terms of the institutional and government structure, new responsible organization for modern irrigation named DMIC has been established under the Syrian government initiative, and DMIC has joined as one of the important counterpart organizations for the Project. Meanwhile, the Japanese experts efficiently transferred the technical skills and knowledge to the Syrian counterparts, staffs concerned, and farmers. The relationship between the Japanese experts and the management team of the Project has been very friendly. Those led to the satisfaction of extension workers and farmers cooperating with the Project.

5.3.3 Achievement of Project Purpose

Through the investigation and analysis under the evaluation study, achievement of the project purpose was clarified by the prospected verifiable indicators as follows:

Table 5.3.1 Clarified Achievement of Project Purpose

Verifiable Indicators	Achievement (as of November 2007)
1) Total amount of irrigated water in the Project sites decreases to 10 – 20 % (of the same at the point before project starting) by the completion of the Project.	1) Water use reduction in average is 21 % while it varies over different crops and conditions with the range between –7 % (Potato in Hama) and 43 % (Pear in Rural Damascus) decreases. With cotton which has high water requirement, remarkable reduction was observed as 25 % (see Table 4.3.11).
2) Crop production in the Project sites remains at the same level as before the commencement of the Project.	2) The level of crop yield in average remains at the same level (approx. 100 %) while it varies over different crops and conditions with the range between –37 % (Pear in Rural Damascus) and 149 % (Eggplant in Daraa) increases. It is remarkable that with cotton in Hama, the yield increase by 26 % (see Table 4.3.11).
3) New responsible organization for modern irrigation is established.	3) Directorate of Modern Irrigation Conversion was established and is under operation.
4) Responsible governmental organizations become capable of promoting water saving modern irrigation.	4) As casting vote of managing extension activities on modern irrigation in local level was transferred from Directorate of Extension in the central government to the agricultural governorates, circumstance of holding extension activities for the extension workers was improved. Due to enhancement of such, extension activities like model field day became to be implemented by own management of extension workers.

5.3.4 Achievement of Overall Goal

While there is uncertain on possibility of overall goal achievement at the current stage, it is expected that the Overall goal will be accomplished, if the efficient irrigation techniques developed in the Project are widely spread by means of the continuous efforts by government organizations concerned.

The national monitoring indicates that “Modern irrigation method” which is defined as the installation of sprinkler or drip irrigation equipment, are gradually adopted over the country. It should be noted, however, that the appropriate soft components should be associated with such installation of proper equipment in order to achieve the efficient water use.

5.3.5 Evaluation Results based on the Five Criteria

Through the final evaluation study, the Project was evaluated in terms of the five criteria of “Relevance”, “Effectiveness”, “Efficiency”, “Impact” and “Sustainability” as follows:

Table 5.3.3 Summary of Project Evaluation in terms of Five Criteria

Principal Criteria	Subjects	Results of the Evaluation
Relevance	Consistency with the Syrian Government Policy	Saving irrigation water, the direction of the project is due in line with the national priorities. The objective of the Project is in line with "the 10 th Five-Year Plan of National Development" which has been started from the year of 2006, and also agricultural development policy in Syria. The Syrian government has been encouraging and urgently accelerating to change the present conventional much water-consuming irrigation to a modern irrigation in order to conserve scarce water resources.
	Consistency with the Japanese Aid Policy	The Country study conducted by JICA in terms of Japan' Official Development Assistance to Syria, states that management and effective use of water resources is one of the highest priorities of the Japanese aid policy. This Project has been currently stated at one of the core program called "Water Resources Management and Effective Use" in the rolling plan for Syria in JICA. As the Project exactly focuses on that, it can be determined that the Project is consistent with the Syrian government and also Japanese aid policy.
	Needs of Beneficiaries	Effective water use in irrigated agriculture is essential for farmers' needs. Particularly the farmers who had introduced irrigation equipment before the Project started, they did not know how to save water with relevant techniques and information. Furthermore, the Project approach and concept were appropriate in line with the farmers' needs. Thus, the Project is relevant in line with such beneficiaries' demands.
	Identification and Selection of Target Group	In this Project, officials from various counterpart organizations involved in water saving activities and extension agents in the village level were considered as the "target group". In additions, the farmers in the targeted Provinces were as an ultimate target group of the Project. To promote efficient irrigation techniques and extension in Syria, the Project covered from central to local level, and worked on the necessary organizations and departments to cooperate together. Therefore, it is relevant of the identification and selection of the group in the Project. In particular, extension workers are front line who contact with farmers closely, therefore their capacity development was very effective and efficient in order to achieve the project purpose.
	Relevance of Project Planning	More than 60% of irrigation water amount in Syria is extracted from underground, then, the Project was focused on such groundwater areas and properly selected the Project areas based on the baseline survey. The demonstration farms were carefully chosen as good representatives place with certain circumstance, like agricultural and water situation. At the initial stage of the Project, the need assessment such as baseline survey was conducted to grasp farmers' needs and their problems, and the results reflected into the Project component and detail activities, therefore through such careful and detail study, it was relevant and all the activities were set up with practical and applicable considerations to extension workers and farmers.
Effectiveness	General Views in effectiveness	The Project was carried out on schedule and the Project has attained project purpose. Therefore, the effectiveness of the Project is considered to be high. The questionnaire survey revealed that the Project was enabling to achieve irrigation water saving on farm level through the extension activities provided to farmers, in the comparison with the experimental fields in research stations. And also it was revealed that the Project could manage to train extension workers, and deliver them the necessary information in the scope of efficient irrigation and optimal use of water resources. Most activities have been implemented as scheduled, and each Output has contributed to the achievement of the Project purpose. It was concluded that the Project is expected to successfully achieve in general.

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	Good Collaboration between Various Organizations	The linkage between various organizations positively encouraged the achievement of the Project purpose. For example, the experiences obtained through the management of demonstration farms were effectively utilized for training and extension activities. Also the experiences obtained through the Project activities were effectively utilized for the preparation of technical manuals. Those harmonized collaboration gave all promoting factor for the Project.
	Support by Extension Workers and Government Strategy	The extension workers of support/extension units who have been assigned at the Project sites made great efforts to collaborate and participate actively for the Project implementation. The government policy on encouraging modern irrigation have enhanced to assure the importance of the saving water in irrigation and to support obviously this Project. This fact was confirmed through the establishment of new department concerned with executing techniques of modern irrigation.
	Timing and Circumstance of Project Starts	It was very good timing and circumstance of this Project starts, because it is quite reasonable on time for not only government initiatives to saving water in order to secure water resources, but also the rapid introduction of modern irrigation such as sprinkler irrigation, and furthermore, the most farmers faced the depression of ground water resource in recent years. Therefore, saving irrigation water was urgent tasks for both government and farmers. Then, the Project is adequately and properly implemented on right time.
	Negative Influence Caused by Drought	Serious drought has affected negatively in some Project areas and also has influenced to the data collection on site, however, the climate change including such natural hazards was beyond the Project control.
	Number of Demonstration Farms Targeted and Difficulties of Farmers' mind Change	The questionnaire and interview results show that the number of demonstration farms were not sufficient to cover the diversified in crops, soil, and irrigation method introduced by farmers. In additions, to manage the irrigated land properly, it is constraint not only to purchase necessary irrigation equipment by financial reasons, but also to change the farmers' mentality and attitude.
Efficiency	Efficiency of Project Inputs	The Project was efficient of planned inputs. The inputs by both Japanese and Syrian side were mostly adequate and sufficient in terms of the volume as well as of the quality to produce the intended outputs. All inputs allocated to the Project have been fully utilized for project implementation as well as optimal use of time. All those inputs brought a successful project without losing time or wasting resources.
	Efficiency of Human Resource Inputs	Japanese experts have played core roles of technical transfer and at the same time, they have taken coordinating and supervising role in order to mutual relationship with Syrian counterparts and also other related organization staff. The Syrian counterparts have been assigned as scheduled in spite of some change and transfer, and their qualification, ability and motivation were quite high, and they have contributed to attain the necessary activities' completion.
	Efficiency of Equipment Inputs	All the equipment was appropriately provided. The provided equipment has been effectively used in the various aspects of three project activities: a) establishing of efficient water saving irrigation techniques, b) training for irrigation engineers and extension workers, and c) providing extension service to the farmers. There is no any problem of maintenance.
	Efficiency of Budget Inputs	Both sides on Japan and Syrian government have properly provided the necessary budget designed in the Project. The necessary budget and supports was fairly given by the counterpart organizations and related organizations, except for occasional shortage of fuel expense for cars.
	Efficiency of Training Inputs	The training was conducted, in countries selected on demands. The total number of the Syrian trainees was eighteen (18); 10 sent to Japan, 5 to Greece, and 3 to Jordan. Especially, all counterpart personnel who participated in the training course in Japan made great contribution to the Project. The experience has brought the skills and information, furthermore, the additional effect to deepen their understanding of the Project implementation and improve their motivation for the Project.

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	Efficiency between Activities and Inputs	According to the planned activities in training and extension, each activity has been undertaken efficiently and good results were realized. For instance, the Subject Matter Specialist (SMS) trainees were selected carefully from the ex-trainees of Water Extensionist (WE) course, and they were represented from targeted Project areas. Once the SMS trainees returned to their organizations, it is expected that they will play the importance roles hereafter. Some questionnaire respondents stated that the training duration was not long enough, and they requested some more training courses, more related courses, and some brochures delivery for effective extension.
	Project Management	The Steering committee was timely and effectively held in appropriate stages, which promoted mutual understanding of the Project achievement among related organizations. For instance, in the third steering committee held in January 2007, the member of the committee reached the agreement that DMIC joins the counterpart alliance of the Project as a counterpart organization.
	Linkage with other Related Human Resources and Organizations	Japanese volunteers have been dispatched related to the agricultural research centers within the Project areas. They had played vital roles to build local linkage and also human relationship.
Impact	Direct impact coursed by the Project	It is too early to judge the Project impacts in this stage, however, the positive impacts were observed. The Overall goal of the Project, "Water use efficiency is improved, and water loss is reduced in the farmers' fields of project areas" was not evaluated at this stage due to the difficulty of collecting data sufficiently on the surrounding area. It is required to take time to derive visible certain impacts through the farmers' practice in the field. However, it is remarkable accomplishment that the Project has contributed to the basis on the efficient water use in the Project sites and also surrounding areas through the extensions and dissemination of modern irrigation techniques. By the office/field interviews and questionnaire survey conducted during the terminal evaluation, the evaluation team observed that the training and extension activities' outcomes have been expanded into the areas outside of the demonstration farms through field-day or dissemination of information by district extension officers. And also, the evaluation team observed some positive changes and influences.
	Establishment of New Organization	DMIC was established in MAAR to achieve the modern irrigation conversion program (2006 – 2015) in 2006. The Project assisted to establish and build up the organization capacity, particularly supported for the staff training. The training was effective as institutional development of such newly established directorate, which will be a good driving-force to introduce and promote modern irrigation system at farmers' fields.
	Confidence and Experience by the Project Counterparts	The Project counterparts became gradually confident to make any training plan and undertake extension activities in the Project, and as the Project planned, the counterparts became capable to make other training plan and successfully accomplish, such as training for Iraq engineers.
	Farmers' awareness on Saving Water and Benefit in the Field	Following the advice from the Project counterparts and extension workers, some farmers came to be aware of the importance of efficient water use, and enjoying the cost savings and resultant income increase. In detail, they were benefited from saving diesel oil consumption, labor cost, fertilizer's use and increasing the yield in some cases in the Project areas. Furthermore, the Demonstration farmers of the Project have been welcome of many visitors not only the Project planned, but also the other courses' trainees and surrounding farmers who were very interested in getting information on water saving modern irrigation techniques. They also came to be aware of the importance of efficient water use.
	Utilization of the Project Productions	The production by the Project such as leaflet and manual has been utilized by other organization. Initiated by ANRR, the leaflet which explained the necessity and advantage on saving water and the loan program to introduce modern irrigation was prepared and delivered to the nationwide.

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	Establishment of New Methodology of Training and Extension in the Field Level	Such as field-day, practical demonstration and extensions manual, all those training and extension activities introduced through the Project were new method in Syria for the trainers and extension workers as well as farmers, and they welcomed such practical methodology and approach. The Project represented as a "pilot" or "model" project in Syria in the sense of good field practice regarding to efficient irrigation.
	Launch of New Training Course	One good example, new technical training course on water saving modern irrigation was launched at governorate level by DMIC. In this training course, some trainers were the ex-trainees of the Project participated, and they gave the lectures by utilizing the teaching materials of the Project.
Sustainability	Sustainability in Technical Aspects	Prospect of sustainability is high in terms of technical, policy and financial aspects. The counterparts and ex-trainees are now capable to carry out duties such as training plan implementation, and also undertake effective extension activities, because their knowledge have been upgraded and they have become more confident in applying the Project's activities than before the Project started. Meanwhile, the Demonstration farmers have acquired their knowledge and skills. The counterparts can carry on their duties related to the Project by themselves, however ex-trainees still need some technical consultation. The teaching materials and training guidelines developed by the Project are useful to support future training activities by the counterparts. Therefore, the Project could accomplish and reserve the practical training, extension techniques and methods which are easily applied into the farm. The position of current counterparts shall be stable and secured without changing their roles and/or shifting their working places. The equipment provided by the Project will be maintained well and fully utilized even after the Project.
	Sustainability in Policy Aspects	It is certain the Syrian government will provide continuous supports to promote efficient irrigation techniques and extension in order to conserve scarce water resources and to achieve government goal according to the national policy. Therefore, as much as strong support by government, all the counterpart organizations will be able to sustain and provide necessary assistance to the farmers who are eager to install/manage modern irrigation properly.
	Sustainability in Institutional Aspects	Each organization involved in the Project has its own mandatory role to promote modern irrigation system. Under such relevant role, it is more likely that the Project outcomes will be maintained. As described above, it is most likely that each organization will be able to sustain and provide continuous duties and the Project activities so far regarding technical capability as well as managerial capacity. However, giving the importance of institutional sustainability and water saving issues, the following should be tackled; 1) how to coordinate continuously among different organizations and central/local level structure, and to define and confirm the administrative and organizational structure under the reform of MAAR 2) secure the training & extension staff and strengthen their capacity building on the staffs' belonging organization, and 3) how to promote and support farmers who are interested to introduce modern irrigation.
	Sustainability in Financial Aspects	It is sustainable to secure the budget to the Project activities such as water saving training. To secure the budget and financial sustainability, it is necessary to commit by government for continuous supports in efficient irrigation. In addition, it is necessary to pay attention to maintain the training system built by the Project, special care shall be given to the ex-trainees so that they can effectively display their skills and knowledge of modern irrigation.

5.4 Conclusion and Recommendation of the Final Evaluation

5.4.1 Conclusion Given by the Final Evaluation Study Team

The evaluation study concluded that the Project purpose shown in the PDM will be achieved by the end of the Project period.

- The Project activities have been satisfactorily implemented without any major or critical problems with good collaboration among the Syrian relevant organizations and with appropriate support of Japanese experts, and
- since it is most likely that the Project will achieve its objectives successfully by the end of the planned period, it is concluded that the Project will be completed on March 31st, 2008 as originally scheduled.

5.4.2 Recommendation Given by the Final Evaluation Study Team

While much ambitious to the success of the Project, for attaining the overall goal, furthermore, several subjects were pointed out and recommended by the Joint Evaluation Team. Recommended items are categorized into two groups of “subjects to be completed by the end of the Project” and “subjects to be accomplished after the Project”. Furthermore, the issues categorized within the later group could be also classified into two types, namely, “subjects directly related to the success of the Project” and “subjects concerned to the future circumstances of the Project”. The recommendation is summarized as follows:

Table 5.4.1 Recommendation Given by the Final Evaluation Study Team

Large category	Small category	Subject title	Contents	Remarks
Subjects to be completed by the end of the Project	Subjects directly related to the success of the Project	Finalization of training and extension materials	Completion and delivery of technical manual and other extension & training materials	Section 7.1.1 in the Terminal Evaluation Report
		Analysis of efficient irrigation techniques	1) quantitative and qualitative analysis of efficient irrigation techniques 2) fundamental analysis of cost/benefit of efficient irrigation techniques	Section 7.1.2 of the Report
		Problem identification and strategy formulation for promotion of efficient irrigation techniques	1) confirmation of the mandates of relevant organizations and their coordination 2) organizing the national task force in order to ensure sustainable execution of SMS training 3) identification of problems in using wells for irrigation	Section 7.1.3 of the Report

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Subjects to be Accomplished after the Project	Subjects directly related to the success of the Project	Promotion of further training and extension activities	<ol style="list-style-type: none"> 1) training of SMS of irrigation 2) technical support on how to maintain the introduced modern irrigation equipment 3) collaboration work on promotion of efficient irrigation techniques 4) Formulation of an action plan by extension units and supporting units to effectively use of the project outcomes 5) Expansion of the project activities to other districts in R.Damascus, Daraa and Hama governorates, furthermore, to other governorates 	Section 7.2.1 of the Report
	Subjects concerned to the future circumstances of the Project	Promotion of further applied research	<ol style="list-style-type: none"> 1) Formulation of action plan of applied research to promote further efficient water use nationwide 2) Establishment of wider link of information exchange and cooperation between organizations concerned 	Section 7.2.2 of the Report
		Integrated approach for efficient water use	<ol style="list-style-type: none"> 1) Promotion of efficient water use in terms of underground water resources in broader context 2) Water-saving efforts by improving surface irrigation 3) Water-saving efforts by agronomy aspects 4) Environmental issues such as salt accumulation and spillage of fertilizer and chemicals 	Section 7.2.3 of the Report
		Enhancement of introducing modern irrigation equipment through the loan program	<ol style="list-style-type: none"> 1) technical guidance of operation and maintenance of the equipment for the farmers 2) clarification of the mandates of relevant organizations concerned for promotion of modern irrigation equipment 	Section 7.2.4 of the Report

The Terminal Evaluation Report which describes above-mentioned study results, was explained and agreed at the “Steering Committee Meeting for the Terminal Evaluation Report for the DEITEX Project” held on 29 November, 2007. According to the agreement on the report between the Terminal Evaluation Study Team and the Steering Committee, the minutes of meeting was signed by the Resident Representative of JICA Syria Office and the Project Director of the DEITEX Project.

In the response to the recommendation of the terminal evaluation study, the Project Team accomplished the subjects of the recommendation categorized within the “subjects to be completed by the end of the Project” by the termination of the Project.

5.5 Post-hoc Activities after the Final Evaluation Study

After the termination of the final evaluation study, the Project Team accomplished remaining duties including subjects of the recommendations, which are to be completed by the end of the Project. In addition to those, most important subject concerned to the recommendation of “Promotion of further training and extension activities” were arranged by the end of the Project, through holding a series of meeting and discussions.

The outcomes on the additional activities are described in Chapter 7.

Furthermore, recommendations of “Subjects to be Accomplished after the Project” were also appropriately dealt with. On the basis of the agreement signed between the Resident Representative of JICA Syria Office and the General Director of GCSAR on 29 November 2007, Syrian side confirmed their determination to pursue the recommendations in future at the occasion of the final Steering Committee meeting.

6. By-products on Special Subjects

6.1 General View of Irrigated Agriculture in Syria

6.1.1 Problems of Quantifying Consumed Irrigation Water

Spatial distribution of water resources and those quantities of available water is generally subject to hydrological conditions. On the basis of the hydrological limitation, supply and demand of water is urged at the unit of river basin. In Syria, Ministry of Irrigation is responsible for managing water resources and controlling water use at every river-basin which are divided into 7 hydrological zones. Salient features of the river basins in Syria are shown below:

Table 6.1.1 Salient Features of River Basins in Syria

Name of Basin	Basin Area (km ²)	Surface Water Resources (MCM)	Ground Water Resources (MCM)	Total Available for Use* (MCM)
Costal	5,049	1,246	622	1,257
Orontes	21,624	666	964	1,831
Yarmouk	6,742	88	131	272
Barada & Awaj	8,630	12	490	1,277
Aleppo	9,129	315	640	1,371
Euphrates (& Tigris)	63,219	6,818	2,494	9,981
Steppe (Al Badia)	70,787	49	54	70
Total	185,180	9,194	5,395	16,058

Source: Verela-Ortega, 2002

* : Those are included with "Domestic & Industrial waste water" and "Agricultural drainage" etc.

Water sector that supervises water resources, works out their management in basin-wise. In contrast, agriculture and irrigation sectors which is the major water user, handle their management in administrative district-wise by governorates. Due to this disorder in the unit of management, demands and supplies in water are not easy to urge at the same stance. Also data of each sector is difficult to directly compare with.

In order to discuss about demands and supplies in water, data for water demand/supply are essential at the same spatial zoning. However, data of water for the supply side are available in river-basin-wise only, while data of water for the demand side are obtainable in governorate-wise in Syria. Even for the data of irrigation water use, exact quantity of irrigated water is not recognizable.

Table 6.1.2 shows a matrix of figures in water composing with two axes of governorates and river-basins. "Question marks" within the table indicate the factors unknown.