

Building Bridges Between key Stakeholders in the Irrigation Sector: GAP-RDA's Management Operation and Maintenance Model

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1.0 Introduction

The Southeastern Anatolia Project (Güneydoğu Anadolu Projesi, GAP, Turkish acronym) is a multi-sectoral regional development programme for one of the least developed region of Turkey. It is based upon a Master Plan prepared in 1989, encompassing the sectors of agriculture, industry, transport, health and education etc. A long term programme has been initiated to implement major irrigation projects, seven of which are in the lower Euphrates sub-basin and six are in the Tigris sub-basin. Hence, a major component of the GAP will be the implementation of a series of large scale projects, commanding some 1.7 million hectares for irrigation.

The continued growth in irrigated area in the GAP region (215,000 hectares as of June 2001) increases the financial burden on the national budget and adds to the complexity of the management role of the state. Moreover, irrigated agriculture is deemed to be the foundation for sustainable development of the GAP region (Ünver, 1994). If it fails to perform up to the expectations, this would seriously weaken the economic base of the region and threaten the sustainability of the rapid development that has been taking place. It is now recognised that for the existing and proposed irrigation developments to be sustainable, the present levels of cost recovery must be increased and, in line with world-wide trends, encouragement must be given to greater devolution of management responsibility to water users. Against this background, the Government of Turkey, through the GAP Regional Development Administration (GAP-RDA), major agency for coordinating all development activities in the region, has commissioned the GAP Management, Operation and Maintenance Study (GAP MOM) in order to identify the most appropriate management model for large scale irrigation systems being brought into operation in the region.

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This study will scrutinise the overall MOM Project. It is divided into three main sections corresponding to three major phases that the MOM project has been through, since its inception in 1993. That is to say, the first part will deal with the definition and the major objectives of the project as well as the studies conducted to draw up the model for establishing the most appropriate institutional structure to manage and operate the irrigation facilities in order to achieve sustainable irrigated agriculture in the region. The second part will analyse the developments observed during the implementation of the MOM Project in three pilot areas. In the first and third pilot areas, namely the Fırat and Tahılalan Irrigation Districts, the project team focused on the activities to improve the technical and organisational capacity of existing irrigation districts. In the second pilot area (Kayacık Project), however, a participatory approach has been outlined and a brand new irrigation management organisation was proposed to be established. The third part will highlight the recent synergy between State Hydraulic Works (Devlet Su İşleri, Turkish acronym-DSİ) and GAP-RDA to carry out the activities related to the strengthening and support of the pilot area irrigation districts in terms of their management, operation and maintenance capabilities.

2.0 The Development of The GAP MOM Project: Phase I (1993-94)

2.1 The Need for MOM Project

Turkey has developed its present base of irrigated agriculture very rapidly over the past forty years, and in so doing, has established a valuable source of technical expertise which is applied in such large developments as GAP. The strengths of Turkey's irrigation management include: the technical competence of State Hydraulic Works (DSİ), central water agency in constructing and operating large dams, the experience of General Directorate of Rural Services (GDRS) for smaller works, the well established and capable agricultural research institutions operated by GDRS, Ministry of Agriculture and Rural Affairs (MARA) and the universities, an established structure of farmer training and extension services within MARA which could form the basis for training in the GAP region (see Appendix I). There are also examples of successful irrigation groups which are more effective than government agencies in carrying out equitable water sharing to farmers and achieving compliance with operating rules (Halcrow-Dolsar-RWC, 1994). On the other hand, some weaknesses of present arrangements include: lack of co-ordination between agencies in regard to project planning and budgeting, limited extension services available in many irrigation schemes, weaknesses in the farmer/extension/research linkage, ineffective water fee collection in DSİ projects, the crop area method of water

charging which encourages high water use, unsuitable irrigation methods and low water use efficiency in many schemes. DSI also has difficulties in delivering irrigation services to farmers at the tertiary level and enforcing legal means to prevent damage to canals. There is also a need to modernise the present law relating to surface water allocation and use and to make specific provision in the water laws for the establishment of effective water user groups.

Turkey has already invested in irrigation infrastructure for some 4 million hectares in the country as a whole and is currently engaged in another massive drive to bring 1.7 million hectares under irrigation in the GAP region. The operation and maintenance of the existing irrigation systems is already placing a severe strain on DSI and the national resources. The additional demands of the newly developed areas will become an excessive burden. The consequence will inevitably be that limited resources are required to be spread over a wider area, with a consequent fall in the standard of system management, operation and maintenance and the quality of technical support provided to the farmers. This, in turn, will result in falling levels of service, reduced efficiency of water use, increased salinity and drainage problems and lower crop production. As the farmers' ability to pay for the services reduces, so the quality of services falls further and the downward spiral continues. This can be reversed only by means of fundamental changes in the institutional structure, aimed at ensuring that the farmers' management ability is fully utilised and resources as a whole are used most effectively in order to maximise water use efficiency and crop production.

The situation in Southeastern Anatolia is exacerbated by a general shortage of water in relation to the available area of irrigable land. At the same time many existing schemes suffer from high water losses in the distribution systems, much of which can be attributed to insufficient resources being available for maintenance. At the farm level, irrigation use is in any case not as efficient as it could be due to sub-optimal investment in land preparation at the implementation stage and only very limited availability of technical advice for the farmers on efficient irrigation methods. Such inefficient use of scarce resource is not only contrary to the primary objective of maximising agricultural production in an equitable manner but will also lead in time to degradation of land resources. Most of these difficulties arise from constraints inherent in the present institutional framework and can be effectively addressed only through a basic reform of the structure. During recent years great progress has been made with the planning, design and construction of major infrastructure and distribution works to deliver irrigation water to the GAP region. Therefore, it was felt necessary to identify the most suitable management, operation and maintenance arrangements so that the resources invested in irrigation development are utilised optimally so as to realise the full agricultural production potential of the GAP region and contribute effectively to overall

development of the region in terms of increased economic activity, population settlement and employment creation.

2.2 Objectives of the MOM Project

The major objective of the MOM Project is to provide an institutional and organisational framework within which the proposed management model can be replicated. Hence, the management model is required to satisfy the major study objectives like maximising net benefits as measured in terms of the value of total agricultural production versus costs of management, operation and maintenance of irrigation schemes, ensuring the financial and physical sustainability with respect to political, environmental, financial, social and physical factors. This also significantly relates to the institutional and legal environment to enable sustainability to be achieved. Moreover, the overall MOM model should be implementable and flexible, which requires that a model must be suitable for implementation in the short term and must have inherent flexibility for development into more effective models with time.

2.3 Definition of the MOM Model

In 1993, irrigation development was still in its initial stages and the authorities at GAP-RDA judged the appropriate moment to define the most suitable management model. The model was to take into account the economic, managerial, agronomic, social, legal and institutional factors affecting such a choice. Thus, the model description incorporated all issues and disciplines with detailed consideration of the following aspects (Ünver, 1994):

- Water distribution organisation and management procedures for different types of water supply systems.
- Institutional and organisational arrangements existing in the Turkish agricultural sector and their effectiveness and suitability for GAP.
- Regulatory and judicious considerations in relation to water supply management, water usage, land ownership and farmer organisations.
- Sociological considerations including social and family structures, labour patterns, farm practices, cultural preferences and differences, perceptions to irrigated farming, training requirements and the nature of suitable water user groups.
- Technical considerations including choice of canal or pipeline systems, water application methods, crop patterns and suitability, soils and topography, drainage needs, water resources availability and operation of large conveyance and distribution systems.

- Financial effects on farmers' budgets due to different crops, input costs including water charges, pricing and market policies.
- Economic considerations at national and regional levels.
- Political considerations such as population stabilisation, equity and development issues.
- Environmental aspects relating to water, soils and human health.

The GAP MOM study has been carried out under contract to GAP-RDA by a Halcrow-Dolsar Joint Venture between 1993-2000. The crucial work of formulating the MOM Model was undertaken in 1993-94 during Phase I of the Project. Hence, the study commenced in April 1993 and was undertaken by a team of 15 Turkish and 17 foreign consultants. The specialists were experienced in the fields of irrigation planning, management, engineering, operation and maintenance, agronomy, law, farmer extension and organisation, sociology, economics, data management, environment and training activities. The study included review of existing reports and data relating to water resources and agriculture, numerous discussions with government agencies, farmer organisations, individual farmers and other bodies involved in irrigated agriculture. The socio-economic study of the region included a survey of farmers in selected villages where irrigation was already practised or was likely in the near future. This survey was designed to ascertain the rural community's perception to irrigation, development and change, personnel needs and likely problems. The survey also provided information on social structures and attitudes to participation in local irrigation management. The results of the specialist studies were presented in a series of 23 technical discussion papers, which identified the important issues to be addressed in deciding the most appropriate MOM model (Halcrow-Dolsar-RWC, 1993-94).

2.4 The GAP MOM Project's Participatory Approach

During the stages of planning, design, operation and maintenance of the irrigation facilities constructed in Turkey, the comments and opinions of the person who eventually use such facilities are not referred to in general practice. Upon completion of the soil and water surveys, public establishments prepare planning reports and projects, then generally engage construction firms for construction, but do not deem it necessary to have active participation in the formation of the irrigation districts and also when the operation and maintenance stage has been adopted and implementation started.

GAP MOM Project has been aiming at realisation of the most efficient usage of soil and water resources in irrigated farming conditions in the GAP region. This can be achieved if users have the power to control the resources. Physical structures are complex and require extensive engineering services. All

steps must be taken in order to operate such complex structures in accordance with technical, economic and social criteria as well as ensure continuous development.

The GAP MOM Project will endeavour to expand on-farm implementation methods compatible with irrigated farming as well as to ensure efficient participation of the farmers in the operation, maintenance and management of irrigation facilities. Farmers shall be persuaded to take leading part in the planning and development of agricultural practices. It will not be possible for each user to take individual responsibility of the operation and maintenance services. But it is deemed necessary to make the farmers using water feel that they are well represented, their rights and benefits are protected and that they have a say, through the decisions to be issued by the management. The institutional body which is operating the irrigation facility should meet the requirements of the users and enable optimum use of the resources.

2.5 MOM Model Institutional Framework

The irrigation system in the MOM model is defined as the entire set of interacting social, economic, biological and physical factors, objects and entities from the source of water through the conveyance system to the farm. This definition includes the central water supply agency, namely the State Hydraulic Works (DSİ), farmers and local farmer organisations as the main stakeholders whose interests must be reconciled to develop competent governance systems in the irrigation sector. GAP managers have identified gaps (shortcomings) between these stakeholders in terms of their correlative rights and responsibilities in the operation and management of the existing irrigation systems. In their contention, the main problem with the institutional structure is inadequate participation of water users. On the one hand, majority of the farmers are not aware of their rights and responsibilities in the irrigation districts. On the other, neither the organisation which distributes water, nor the department where irrigation charges must be paid, explains as to how and where collected charges are used. Major objective of the MOM model has been to provide an institutional and organisational framework based on a bottom-up participatory approach. Moreover, the crucial work of formulating the MOM model has been carried out in an interdisciplinary manner.

The irrigation water supply system can be considered in terms of its main components comprising of headworks, primary, secondary, and tertiary canals and on-farm canals and irrigation layout (see Appendix II). O & M requirements are not identical for each component so that a number of potential sub-models were devised, each appropriate to one or more component levels. Ten potential

sub-models were proposed which might be applicable to the GAP systems (Ocaklı and Bekisoğlu, 1994). Some of these bodies are already involved in irrigation management in Turkey, while others were suggested based on consultant's knowledge of other countries with appropriate adaptation to suit the conditions in Turkey. An assessment was made of relative strengths and weaknesses of each sub model as to how adequately it might meet the particular requirements of the GAP irrigation systems. The perceived strengths and weaknesses cover matters such as management structure, legal basis, flexibility, autonomy, cost effectiveness and degree of farmer involvement. Consequently, the preferred model was determined to include some of these main features. DSI's key role should be to concentrate on high level sectoral allocations and resource planning at the national level. This relates directly to the skills and expertise of DSI and is vital for use of the nation's water resources to be optimised. On a five to six year timescale, an autonomous Irrigation Authority is the higher level sub model which best meets the key criteria. The large private company also rates highly except with regard to early implementability and this might be the most appropriate agency in the longer term. The creation of an Irrigation Authority for the medium term would allow later divestiture to a self-financing private company as a logical development in line with world-wide trends. Regardless of which agency is responsible for water supply at the primary and secondary levels, a crucial element of the overall model for GAP is management of the lowest (or tertiary) level by full participatory Water User Groups. The preferred basic management model, therefore, comprises of following three elements:

- A Supplier of Bulk Water (DSI): Its functions would focus on integrated water resources planning and management of major hydraulic works.
- An Irrigation System Operating Body (the Irrigation Authority): This would be self-financing commercial authority answering to the (then) Ministry of Public Works and now Ministry of Energy and Natural Resources, to own, operate and maintain the primary and secondary delivery systems (conveyance and main canals), and to purchase bulk water from DSI for onward selling to the water user groups.
- Fully Participatory Water User Groups: These would act under the co-operative law, responsible for managing water services at the 'tertiary' level.

It was recognised that the total institutional framework required a mechanism to co-ordinate all the major organisations involved in the GAP irrigation development and this was proposed through the establishment of a high level coordinating body known as the GAP Co-ordination and Advisory Council on Irrigation Development (GAPCACID). This body would be convened by the GAP-RDA and would include representatives of three core

operating agencies, namely DSI, GDRS and Ministry of Agriculture along with the universities, provincial governments and major private sector organisations including farming bodies. A major role of GAPCACID would be the establishment of policies and priorities for future irrigation schemes and for the first time farmers would have the opportunity to make high level inputs to the planning process.

3.0 Refining and Testing of the GAP MOM Project: Phase II (1997-2000)

3.1 DSI's Accelerated Transfer Programme: Its Loopholes and Shortcomings

For a complex set of reasons the GAP MOM study was suspended in mid-1994, to re-start only in October 1997. Thus, the above model designed for participatory irrigation management in the GAP region could not be implemented. In the intervening period (1995-1997) under the government's Accelerated Transfer Programme, no less than 25 irrigation districts had been established by DSI in the region.

DSI has the primary task of management and operation of the irrigation systems including the collection of water fees and water delivery to farmers. However, by the Establishment Law Code 6,200 (1954) DSI is entitled to transfer the operation and maintenance (O & M) of irrigation systems to irrigation management organisations (IMOs) such as village administrations, municipalities, cooperatives, and irrigation districts (IDs). Thus, since the early 1960s, DSI had a programme to transfer O & M responsibility for secondary and tertiary canals to IMOs. However, until 1993, DSI was only able to transfer O & M irrigation systems of some 70,000 ha to various types of IMOs. This process gained momentum since 1993 and within eight years nearly 1.6 million ha irrigation schemes had been transferred to local administrations or to IDs, the innovative form of transfer used, where the irrigation scheme covers more than one local administrative unit (eg., village or municipality) (Kibaroglu, 1999).

Efforts to increase the amount of area surface water schemes transferred to IDs have been motivated by the poor performance in terms of cost recovery, equity, efficiency in O & M and repairs of the expanding systems of many large irrigation schemes by government agencies, specially the DSI. Key background conditions leading to the irrigation management transfer include: national budgetary crisis that led to severe limitations on financial allocations to DSI in general and to the O & M Department in particular, and progressive deterioration of the irrigation infrastructure due to the deferred maintenance. A World Bank supervision mission paid a visit to DSI in 1992 and facilitated the transfer process. The World Bank staff emphasised that if DSI transfers the

responsibility of operations, collection of fees particularly, of irrigation systems to IDs, the overall cost recovery system would function properly. Moreover, the World Bank team organised a Bank-sponsored study trips to Mexico and the United States where the DSİ staff accumulated useful knowledge pertaining to the irrigation management transfer to locally-controlled organisations.

The Irrigation Districts in Turkey have been established through the existing local government structures. ID is not a product of any grass-roots movement or organisation. DSİ staff was the major initiator and executor of the transfer programme. There were intensive negotiations between the agency (DSİ) and the local communities including the representatives from the local governments concerning the terms of transfer. Hence, there are presently three main types of organisations involved in the management, operation and maintenance of the GAP irrigation schemes, extending from the primary water source down to the farm level, namely:

- DSİ managing the bulk water supplies and the main supply canals and controlling the distribution water to the IDs,
- Irrigation Districts managing the secondary systems and controlling the distribution water in the heads of the tertiary hydraulic units,
- Informally organised groups of irrigators controlling water distribution to individual farmers within the tertiary hydraulic units.

The establishment, membership, management, and rights and obligations of Irrigation Districts are governed by three principal legal instruments: the Municipality Law No. 1580 of 1930, the Transfer Agreement between DSİ and ID, and the Statute of the ID. In addition, for the Harran plain (the command area of Atatürk barrage), an annual Protocol of Water Distribution confers certain obligations and rights on DSİ and IDs in the matters of water scheduling.

IDs are established under Municipality Law, the use of which appears to have been dictated by administrative convenience rather than its appropriateness to managing relatively complex irrigation and drainage systems. As IDs are based on existing local administration, a large number of them could be formed quickly, but there has been no direct involvement of irrigators in the transfer process. IDs have a very short period to establish them before starting operations and they lack the necessary technical and managerial skill (Halcrow-Dolsar-RWC, 2000).

The Statute is the document establishing the ID as a corporate body. IDs operate directly under the Statute, and have not developed formal internal regulations or written procedures for management and conduct of their meetings or sanctions, despite the fact that the Statute requires that such regulations are prepared and approved by the Governor's office. Model regulations are not available from DSİ.

The Transfer Agreement, prepared by DSI, sets out the rights and responsibilities of the ID and DSI. The Transfer Agreement specifies parties to the agreement, the irrigation facilities O & M instructions to ID. The Agreement does not specify in detail irrigation, drainage and service facilities transferred, and no inventory or condition report is made at transfer. IDs have not been provided with system specifications or performance, detailed drawings, maps or O & M manuals. As a result IDs are unclear as to their duties, for example, they do not consider to have a responsibility for drainage. The O & M and sharing of costs of systems providing services for more than one ID are not defined. The transfer is silent on water entitlement and the conditions under which DSI might reduce or withdraw supply.

ID, which is established under municipal laws, has three main governing bodies: the Council, Chairman and the Board. The Council, typically with 30 to 50 members, consists of mayors and village administrators (Muhtar, in Turkish) as 'natural members' and a number of 'selected members', who are chosen by natural members. DSI is an observer member. The Board has typically seven members. The General Secretary and Accountant are Board members and either Council or the Board members elect the remainder from Council members. The Chairman is regarded as a separate administrative organ of the ID and has specific duties, which include representing the ID, preparing budgets, implementing Council and Board decisions, acting as paymaster and conduct Board meetings. The ID must employ a General Secretary, who must be an agriculture engineering graduate and who has no specific duties other than to undertake the services of the ID under directions of the Chairman. The ID must employ an Accountant who is responsible for preparing budgets, accounting, revenue collection and payments. ID generally also employs Water Distributors, on a seasonal basis, usually between ten and twenty are required. Some IDs employ an O & M Technician to supervise fieldwork. Maintenance is undertaken with daily hired labour, if at all. Recruitment of staff is not transparent, and depends on the decision of the Chairman, who often favours relatives (Halcrow-Dolsar-RWC, 2000).

Kurdish, Turkish, Turkoman, Arabic and Assyrian communities in the GAP region have similar social organisations, with a tribal structure based on a nomadic history, to which local institutions and state apparatus conform. Settled agriculture is the main economic activity, but urban growth is rapid. Tribal culture affects village and farmer associations, land ownership and tenure relationships, whilst tribal chiefs maintain their power through land ownership and political activity. Where the landowners of an ID belong to different ethnic groups there may be divisions within the Council and Board. The dominant

group will occupy the posts of Chairman and Board members, thus excluding the rest from ID affairs.

The ID Council based on Muhtars, does not represent the irrigator, whose only recourse is through elections for the post of Muhtar every five years. As a result the ID does not look after the interests of the majority of its customers. The Chairman and Board members, who are usually large landowners, can and do favour themselves and other individuals, with exemptions from paying water charges or extra water supplies, and tend to try to reduce water charges to below sustainable levels. Some training support has been given to ID accountants through seminars run by DSİ but there is no adequate system to identify training needs and support ID staff who require it. This is an ongoing need as accountancy staff is periodically replaced. DSİ provides some support to General Secretaries through annual workshops and seminars but there is no formal training programme, working manuals or sets of procedures available for new staff. As a result, ID practices vary widely and standards of management vary from good to very poor. Where there are no standard procedures, it is difficult to identify and correct poor practices.

Hence, the lack of clearly defined operational guidelines and insufficient numbers of adequately trained staff within the organisations, has led to poor coordination and inefficient management and implementation of operations and maintenance at all levels in the system. This has resulted in an unreliable and poor delivery of services to the end user, the farmer. The current process of establishing and handing over ID results in poor ID performance, with very considerable long-term risks and economic costs. The potential benefits from introducing good O & M into new irrigation schemes at an early stage are very large and the cost of doing so small. The IDs need to be properly trained before taking over the system, be provided with adequate support through O & M guidelines, systems, manuals, be properly supervised during the initial seasons, and be subject to performance monitoring. Due to lack of resources, DSİ is not undertaking its obligations under the Transfer Agreement. Indeed, DSİ has problems providing even the resources required to operate irrigation systems under their own management. The process of establishing an ID needs to start at the design stage and continue for at least two irrigation seasons after the system is transferred. The complete process would take at least five years.

3.2 The Implementation of the GAP MOM Project: Selection of the Pilot Areas

In January 1997, GAP-RDA requested a proposal for revised consultancy services so that the MOM study could restart. Since the completion of the first Phase of the GAP MOM Project, new irrigated areas had been completed and Irrigation Districts had been formed. The second Phase of the MOM Project has

had to take these recent developments into consideration. The study focus had progressed to cover issues of tertiary and on-farm water management, infrastructure rehabilitation and maintenance, demonstration and training, monitoring of water efficiency and agronomic data, implementation of trials, training and demonstrations for 2 to 3 pilot areas, the review of the legal status of IDs, their contractual obligations under the transfer agreements and issues of water rights. The principal activities undertaken in the 12 months following project restart in October 1997 were:

- Pilot Area I selection (Firat Irrigation District).
- Project awareness campaigns in Pilot Area I.
- Preliminary review of water charge policy, the legal structure and environmental monitoring.
- Establishment and operation of drip irrigation and gated pipe technology demonstrations in Pilot Area I.
- Pilot Area II selection (Kayacık Project, September 1998).

The Pilot Areas were chosen to provide two avenues of investigation:

- The study of the operation and maintenance methods, procedures and management in an existing irrigation district. Circumstances dictated that any irrigation district chosen as a Pilot Area would be a young organisation, there being no mature examples of such organisations in GAP. The study would, therefore, provide an ideal opportunity for highlighting the problems and opportunities for these organisations in what are generally considered to be critical early years of experience.
- Study of the irrigation district establishment process. This would be carried out through observation and trials in an area where no irrigation was in operation but where an irrigation management organisation would be needed in the very near future. Specifically, the study was to look at the possibility of greater irrigator involvement in the irrigation system development, if possible as early as design stage.

The work and progress of the first year presented GAP MOM with a clearer picture of the economic and technical operating environment of the irrigation districts. In particular, the study of issues of water management at a tertiary level was reliant on operational procedures at secondary and main system level, and they could not be studied in isolation. Clarification of operational performance higher upstream in the irrigation system was, therefore, needed. On the other hand, the outcome of the first year's analysis was to refocus Phase II objectives on the Irrigation District, on its management procedures and on the broader institutional and legal arrangements required as a foundation for improved management. At the same time, the focus of support to improved water management and maintenance within the Firat ID Pilot Area

broadened to include co-operation with DSİ in achieving improved water scheduling and operational procedures for the main canal system. In short, the programme in Phase II envisaged the following objectives and activities for the project:

- Development of implementation plans and institutional arrangements for MOM approach for sustainable community managed irrigation systems.
- Formulation and testing of MOM procedures and institutional arrangements in an existing ID pilot area.
- Formulation and testing of MOM procedures and institutional arrangements for establishment and development of an irrigation management organisation in a new irrigation pilot area.

3.3 Improvement of the Existing Irrigation Districts: Fırat Irrigation District & Tahılalan Irrigation District -Pilot Area I & III

GAP MOM project consisted of the stages of identification, implementation and monitoring. At the second stage of the project, some modifications were introduced as a result of emerging needs and the project was divided into two parts: 1) improvement in the organisational structure of existing irrigation unions and preparation of programmes for efficient water utilisation; 2) conduct of relevant activities, including those pertaining to organisation in areas which were yet to be brought under irrigation. Since 1997, the project has been implemented in three pilot areas. Pilot Area I has been selected as Fırat Irrigation District in Harran Plain. GAP-RDA formed a consultant team consisted of eight agricultural engineers to advice, train farmers and form water user groups. Twenty-four on farm demonstrations have been established to test and show different irrigation systems and methods to farmers. Pilot Area II is in Kayacık Irrigation Scheme in Gaziantep province where no irrigation organisation yet exists. Water user group formation activities are under way and intensive farmer training is the major activity in that area. Tahılalan Irrigation District located at the mouth of the main irrigation canal (Urfa Main Canal) was selected as the third pilot area. The reason for this selection was to exert an indirect influence on the other nearby irrigation unions so as to have an overall control on the main canal.

The GAP MOM Project has been using the Fırat Irrigation District in the Harran Plain as the first pilot area where about 600 farmers within 16 villages collaborate as to how the management, operation and maintenance practices of these organisations can be improved. Fırat ID manages the irrigation systems at the head (upstream) of the Urfa Main Canal whereas the Tahılalan ID (Pilot Area III) is operating the tail (downstream) of the Canal. Starting first at the

Firat ID and supplemented by the works in the third pilot area, namely Tahılalan ID, MOM Project managers have tried to improve the operational practices (water scheduling, rotations and distributions) of these two critical IDs on the Main Canal.

The review, undertaken in 1998, of water management and distribution practices within Firat ID clearly demonstrated the need for improvements to the existing operational procedures. For the 1999 irrigation season, a number of specific activities were, therefore, planned and implemented by GAP MOM together with DSİ and ID staff, to demonstrate the benefits from introduction of such improvements.¹ Hence, the MOM project has monitored canal and drain flows during the early part of 1999 irrigation season and checked the locations where system capacity was a reported concern. Simple water allocation and distribution procedures had been developed and tested. The rules dictated the discharges to be delivered by the bulk supplier (DSİ) to each of the off-takes managed by the irrigation districts based on estimated crop water demands. For the peak season period, the distribution methodology was proportional, based on gross irrigated area. Work is also currently in hand within the pilot area to test water distribution planning tools that would allow the farmers in the secondary and tertiary systems to plan rotation schedules and allocate the water received and then distributed by the district equitably amongst themselves. The project has used these early studies and trials to develop Irrigation District Operation and Maintenance Manuals. These would, if replicated among all the districts on the scheme, provide the basic tools and rules for managing the system. The lack of such a comprehensive set of instructions has so far been a tremendous demoralising hindrance to the technical staff of the districts.

Important impacts and lessons learnt from the introduction of the improved operational procedures at DSİ level include: increased understanding and awareness at all levels of staff about the requirements for main canal operation; in the current absence of an O & M Manual for the Urfa Main Canal, *the Urfa Main Canal Operating Requirements-Technical Note, May 1999* helped to provide a valuable reference document for operation purposes; use of operational schematics clearly led to improved co-ordination between DSİ and Firat ID for implementation of secondary canal scheduling; the results of the overall flow measurement monitoring in Firat ID clearly demonstrated that it is possible to manage and distribute flows in accordance with planned schedules and Protocol agreements for water sharing between IDs. On the other hand, at ID level, Firat ID O & M staff clearly benefited from the knowledge that there was a water plan for the whole irrigation season; water distributors required substantial training and assistance to implement planned water scheduling procedure, although basic concepts and use of operational schematics was

understood and appreciated; results from tertiary water management trials demonstrated that controlled distribution of water down to the farmer level produced an 11% saving in water use during the peak season and highly positive feedback from the farmers; use of calibrated canalet method for flow measurement was satisfactory and understood by water distributors; overall water use efficiencies were at acceptable levels (80-86%) in the peak season months of July and August, reducing to around 50-60% at other times.²

Maintenance of the infrastructure assets is a key function that any Irrigation Management Organisation has to undertake, if it is to use that infrastructure to deliver a satisfactory and agreed level of service to its customers. Failure to maintain the assets will result in the unexpected breakdown in the delivery of the service with adverse consequences for those operating or using downstream services. Hence, the Irrigation District Operation & Maintenance Manual has been prepared by the Project team. However, its implementation is currently hindered somewhat by the belief of ID management that GAP irrigation systems are young and that maintenance expenditure need not be very high. However, this situation will rapidly change as the assets with shorter design lives deteriorate and the guidance and supervision of ID maintenance activity would be increased. Eventually, supervision and regulation of irrigation management organisations will be required to ensure that they are spending sensibly on asset maintenance and renewal. The use of a maintenance register has been recommended. The register is a simple database of maintenance jobs that are pending at any one time. It is subdivided by geographical location within a system and according to the asset type, for instance canalet, road or canal system structure. Routine inspections on a daily, monthly or annual basis are described. The reporting procedure is provided in the O & M manual which is designed to ensure that the correct details and information are collected including location, type of work, scope of work with indicative material and labour quantities and also the classification of the work and its priority. Young irrigation management organisations in GAP, with staff of limited experience, will require extensive training, assistance and supervision in maintenance work. This requirement will probably increase as more pipe systems are installed, where 95% of the assets are underground and hidden from view. Training is required in the procedures and administrative methods and also in the technology used. Access of irrigation management organisations to research and development outputs of other organisations should be facilitated and guidelines on best practices developed.

Concurrently with O & M Manual, an Administrative Management Manual is also being developed that brings together the relevant methods and procedures required under the laws that govern the irrigation districts. The manual outlines a comprehensive information system that includes accountancy practice, purchasing procedures, administration of maintenance works and

systems for water charge collection. The need for sensible strategic planning by the districts is also covered and a system of Annual Work Plans and Five Year Plans is being developed that will allow districts to manage their finances effectively, carry forward savings and develop the services required of them by their members. The procedure outlined is the embryonic form of an asset management process that can be developed further as the organisations gain experience and capability. The Administrative Management Manual forms the basis for training of new irrigation management organisation staff when they are established. By introducing standard procedures, which can be tested and adapted over the next few years, many of the current problems found in current IDs can be avoided.

During the implementation of the GAP MOM project (1998-2001), a series of demonstration areas have been established in the Firat and Tahılalan ID with a goal to familiarise the farmers with modern irrigation technologies and appropriate cropping patterns. Practical on-farm training and demonstrations have been carried out with the direct involvement of the farmers. 'Drip irrigation' and 'gated pipe' are determined as the basic modern irrigation methods. As mentioned earlier, GAP MOM Project established twenty-four demonstration areas in the Firat Irrigation District in 1998; 13 drip irrigation covering 200 decar and 11 gated pipe installations covering 99 decar. Demonstrations were intended to include precision land levelling to improve the evenness of irrigation applications, which should also improve yield rates. Irrigation scheduling was based on tensiometers at 300, 600 and 900 mm depths, depending upon the crops but were not accepted by farmers and replaced for drip systems, by irrigation water requirement calculated by GAP MOM staff on a ten-day basis. Irrigation applications were monitored in detail and few demonstrations were irrigated according to recommendations. The lack of understanding of soil water processes is a constraint to the uptake of the drip irrigation technology. The training required for gated pipe systems was minimal, the systems were well received and few problems arose. Spares and service were locally available. In contrast, for drip systems, farmers were reluctant to take initiative and individual training and implementation support were required.

3.4 Establishment and Support of the Irrigation Management Organisations: Kayacık Project-Pilot Area II

GAP MOM has developed a participatory Scheme Development Programme for formation of new irrigation management organisations. The programme was initiated in the Kayacık Pilot Area, but only the first five steps could be tested in the time available, due to delays in land consolidation, construction of irrigation facilities and lack of clear policy for operation of the

complex pumped main canal system, which meant the O & M functions for Kayacık irrigation management organisation could not be specified. The complete programme would require a minimum of five years from initial design to completion.

During the (partial) implementation of the Scheme Development Programme in Kayacık Project Area, GAP MOM was assisted by staff of DSİ, MARA, GDRS and GAP-RDA. Reconnaissance visits started in November 1998 and an Awareness Campaign, supported by a brochure, was conducted in all five main villages of the Kayacık Pilot Area to inform landowners about the programme. Baseline surveys were conducted and the *Socio-economic Baseline Survey Report in February 1999* was issued. 27 farmers undertook a four-day Study Tour in March 1999, covering irrigation technology and irrigated agriculture. A series of village meetings were held to identify agricultural problems and resulted in agreement to establish demonstrations of wheat varieties.

Design Committees were established in each of the five villages for which DSİ, GDRS and the GAP MOM Project agreed on a joint design programme. GDRS participated in awareness meetings for land consolidation and the new field layout was incorporated in the distribution system design. Scheme Development Programme which has been developed and partially field tested in the Kayacık Pilot Area entails five consecutive phases:

Phase I	Preparation and Data Collection
Phase II	Planning and Design
Phase III	Group Formation
Phase IV	Construction and Group Strengthening
Phase V	Follow-up Support

Each phase is sub-divided into a number of separate steps. The objective of the Scheme Development Programme is the creation of a sustainable irrigation system through the active involvement of communities in the planning, design, construction, operation and maintenance of the irrigation, drainage and associated facilities constructed by DSİ, GDRS or any other agency. The programme is intended to allow the future irrigators in an irrigation scheme to be fully involved in the process of scheme design and development, in order to ensure the 'ownership' of the scheme by the community, which will improve scheme O & M. The process starts at the design stage and must continue into the implementation phase for as long as is required to ensure that the irrigation management organisation has fully adopted the required process and developed its skills. The process relies on co-operation of agencies and on the long-term involvement of the community development and irrigation management specialists. The Scheme Development Programme requires scheme members to:

- participate in the planning design,

- supervise construction,
- form the irrigation management organisation,
- take over operation and maintenance of the irrigation drainage and associated facilities.

The programme has not been fully tested in Turkey but is based on successful practice elsewhere. It will require further local development. The process described in Appendix III need not be followed in exact detail, in fact, testing of alternatives is recommended, but it is the strong belief of the GAP MOM team that some similar process is of utmost importance in the GAP region, if serious and imminent irrigation management procedures are to be developed.³

4.0 Inter-Agency Co-ordination Between DSİ and GAP-RDA: Phase III (2000-2001)

4.1 Continuation of the Activities in the Pilot Areas

GAP MOM study, which has been carried out under contract to GAP-RDA by a Halcrow-Dolsar Joint Venture commenced in April 1993 and terminated in January 2000. During February-June 2000, GAP-RDA and DSİ held a series of meetings concerning the continuation of the Project. Hence, in June 2000, a Bilateral Protocol was signed between these two leading agencies regarding the implementation of the MOM Project. According to this Protocol, a Supervision Committee is formed composed of 16 members. It is led by two coordinators, one from DSİ and the other from GAP-RDA. In addition, 6 experts each represent GAP-RDA and DSİ. Chief of the GAP MOM Project Team along with the Chairmen of the Fırat and Tahılalan ID equally participate in that Committee. Furthermore, from the Kayacık Project Area farmers send a representative from their region that they all agree upon. Although the Protocol is signed solely between DSİ and GAP-RDA, the two parties agree that other institutions involved in irrigation such as GDRS, MARA etc. could also be invited to the Supervision Committee meetings, which are held three times a year. The activities which are to be carried out under the protocol and which the Supervision Committee would monitor are stated as follows:

- Operation and Maintenance:

GAP MOM O & M activities in Fırat and Tahılalan ID would continue as planned.

- Development of Effective Water Usage Patterns:

Demonstration areas which have been established in the Fırat and Tahılalan ID with a goal to familiarise the farmers with modern irrigation technologies and appropriate cropping patterns would continue with the financial support of GAP-RDA. Technical personnel training on irrigation,

drainage, water management, O & M, extension, general agricultural practices would continue by the joint initiatives of the two organisations. GAP MOM Project Team would continue to collect data for monitoring and evaluation.

- Irrigation System Management:

It is intended that the Scheme Development Programme, which has been partially carried out in the Kayacık Pilot Area, could be finalised with the active support of two organisations. Hence, GAP-RDA requested from its partner DSİ to give priority to constructing irrigation facilities and commence irrigation in that region. The two parties agreed to form irrigation groups with an objective to manage, operate and maintain the tertiary distribution systems in an equitable and effective way. Hence, Irrigation Groups (IGs) are decided to be formed in the Tahılalan Pilot Area. Initial technical visits to the area were undertaken during October-November, 2000. During visits all concerned farmers were informed about the significance of establishing IG. Both chairman and local administrative authorities such as the Governor have showed keen interest in forming such water user groups at the tertiary level.

4.2 Selection of the Fourth Pilot Area: Dicle-Kralkızı Project

The Protocol signed between DSİ and GAP-RDA envisages selecting a new Pilot Area, where irrigation would commence in the year 2001, to conduct Scheme Development Programme including the formation of IMO, namely ID and IG. Hence, Dicle-Kralkızı Project is determined as the fourth Pilot Area at the Supervision Committee meeting in October 2000. A MOM Project office has been opened in Diyarbakır Province to conduct the activities in the fourth Pilot Project Area. Activities related to the Scheme Development Programme commenced in April 2001. GAP MOM Project team paid initial visits to the scheme area to carry out a rapid assessment of the area and communities. Thus, a series of information meetings have been conducted in eight villages to inform all concerned farmers about the objectives of the programme. Meanwhile, a general meeting was held at the DSİ Regional Directorate to inform the village administrators and related public institutions and private corporations. Systematic collection of baseline data through group interviews and discussions has not started yet. However, a brief secondary information was gathered indicating the household numbers, population, school and health centre status, water supply and rainfed and irrigated areas in the villages. Yet, DSİ authorities declared that due to the difficulties they face in the installation of pumps, (irrigation) water could reach the Pilot Project Area in 2002 at the earliest. In the meantime, GAP MOM Project Team would carry on the Scheme Development Programme. Thus, Awareness Campaigns are being conducted through village meetings with an aim to learn more about the problems and needs of the farmers. Farmers are also encouraged to derive their own solutions to their problems.

Equally, the expected role and responsibilities of farmers will be clarified during such meetings. Design Committees are being formed composed of five to ten farmers. Moreover, IGs are also being formed for the equitable and effective management, operation and maintenance of the tertiary units.

5.0 Conclusion

The role of irrigation management transfer in reducing the financial burden on government as well as in improving water use efficiency and equity through farmers' involvement has been very well recognised by the Turkish government since the early 1990s. Hence, DSI, the central water agency, has managed to transfer the management, operation and maintenance of the irrigation systems at secondary and tertiary levels to the local administrations or to irrigation districts. However, the speed and sudden nature of the transfer process that was followed by DSI, allowed little opportunity to farmers to assimilate themselves with the new institutional setting. Especially, in the GAP region, where there was little experience of irrigated agriculture and of irrigation management, both DSI and GAP-RDA officials encountered notable problems relating to the management and operation of the irrigation systems during and after the transfers. Thus, along with the DSI irrigation management transfer activities, which have taken place country wide, GAP-RDA officials in consultation with concerned institutions have worked on a model, called MOM model, to identify the most suitable management, operation and maintenance arrangements so that the resources invested in irrigation development in the region are utilised optimally. Even though the model has only been implemented in few pilot schemes, the advantages of the model in terms of creating or supporting viable irrigation management organisations has been widely acknowledged.

Recent experience in the GAP region has shown that the participatory approach of developing the irrigation management organisations at the lower level of the irrigation system is the correct approach. The lack of experience of irrigated agriculture means that early involvement of the beneficiaries in the design and development process is required if constraints and bottlenecks to the rapid programme of development are to be avoided. In this regard, the institutionalised co-operation between key government agencies, namely DSI and GAP-RDA along with GDRS and MARA under the June 2001 Protocol, facilitates better functioning of the existing irrigation management organisations as well as the creation of new ones with a bottom-up approach through the Scheme Development Programme.

Notes

1. Based on interviews by author, conducted with MOM Project staff, namely Fatih Yıldız and Nesrin Baysan (agricultural engineers and prominent members of GAP-RDA MOM Team) regarding the developments in the Phase II of the Project in the three Pilot Areas, May- June 2001.
2. Based on author's interview with Şahin Bekisoğlu who was the Chief of the MOM Project Team during 1997-99.
3. The programme is described in detail in the Procedure Manual of Group Formation Organisers on Scheme Development Programme, May 1999, GAP-RDA, Ankara.

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