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Social dimension of the policy of the use of water

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SUMMARY - In irrigated agricultural areas where water supply pattern given by irrigation districts (policy maker) does not meet the water demand pattern desired by users to satisfy their crop water requirements, a conflict will arise both between irrigation districts and users and among the users themselves, since irrigation system is defined as a set of physical and social elements. These conflict can be explained through the structural-culture dimension. The structural-cultural is dominated by two main categories, the situations and actions. Situations are composed of the particular setting of the farmer, the culture of the area, and the social structures and processes surrounding the farmer. The actions are the actual and decisions made by the farmers. The factors making up the farmers situation then result in a set of behaviour patterns and decisions. The Egyptian experiences showed that conflicts between social dimension, which determine farmer irrigation behaviour, and policy maker represented by the MPWWR arises because of the differences between the design assumptions of water supply and the farmer demand which is controlled by social behaviour. It was observed that farmers prefer to irrigate at daytime from about 3:00 am to about 12:00 noon, where water supply pattern is assumed that farmers have to irrigate all 24 hours a day. During Islamic occasion -like month of Ramadan- where farmers are fasting, they started irrigation right after the mid-night meal until the early morning hours. Also, the weekly market day at each village affect the farmers irrigation behaviour. They prefer not to irrigate on that day to have a chance for crop marketing and to meet other traded purposes needed for their farm cultivation.

Key-words: Conflict, irrigation behaviour, social structure, water supply pattern, water demand pattern.

RESUME *- Dans les surfaces irriguées agricoles, où l'offre d'eau proposée par les offices d'irrigation n'est pas suffisante pour la demande d'eau désirée par les utilisateurs pour satisfaire les besoins de leur cultures, un conflit va surgir entre les offices d'irrigation et les utilisateurs d'un côté et entre les utilisateurs eux mêmes de l'autre côté. Puisque le système d'irrigation est défini comme un groupe d'éléments physiques et sociaux, ces conflits peuvent être expliqués par la dimension structurelle-culturelle. Cette dimension est dominée par deux aspects principaux, les situations et les actions. Les situations comprennent la culture de la région où le fermier s'installe, les structures et le cadre social environnant. Des facteurs qui constituent la situation du fermier résultent des schémas de comportement et de décisions. L'expérience Egyptienne montre que les conflits entre la dimension sociale, qui détermine le comportement du fermier vis-à-vis de l'irrigation, et les décideurs politiques représentés par MPWWR, surgissent à cause des différences entre les offres de l'eau planifiées et les demandes du fermier* *qui sont déterminées par son comportement social. On a constaté que le fermier préfère irriguer durant le jour entre 3h du matin et midi, tandis que le système d'irrigation planifié suppose qu'il va irriguer durant les 24 heures du jour. Durant quelques manifestations islamiques, comme le mois du Ramadan par exemple, les fermiers jeûnent et ne commencent l'irrigation que juste après le repas de minuit, jusqu'aux premières heures du jour. Aussi, les marchés hebdomadaires dans chaque village modifient le comportement des fermiers en matière d'irrigation. Ils préfèrent ne pas irriguer durant le jour pour avoir le temps d'acheter les produits nécessaires pour cultiver leur fermes.*

***Mots-clés**: conflit, comportement en matière d'irrigation, structure sociale, schéma de l'offre de l'eau, schéma de la demande en eau.*

INTRODUCTION

In irrigated agricultural area when the water supply pattern given by irrigation districts (as policy maker) does not meet the water demand pattern desired by users to satisfy their crop water requirements, a conflict will arise both between irrigation districts and users and among the users themselves. In Egypt, some of these conflicts were experienced before the construction of the High Aswan Dam (HAD), when summer water were insufficient to satisfy the users demands. As a result, some areas could not be planted with certain crops such as rice without permission of the Ministry of Public Works and Water Resources (MPWWR). Other lands were out of production during certain times of the year because the water supply could not meet all the demands of the cropped area.

The other type of conflict between users and the irrigation district is being experienced-after the construction of the HADespecially during the planting seasons and before and after winter closure periods. Reasons of such conflicts can be looked from both policy maker and farmers behaviour. This paper will present the social dimension and/or the structural cultural dimension or social organization which affect the policy of the use of water with respect to irrigation.

THE STRUCTURAL-CULTURAL DIMENSION

The structural-cultural dimension or social organization and the major focus of effort will involve around the irrigation behaviour of water users.

Irrigation can be defined as human intervention to modify the spatial or temporal distribution of water occurring in natural channels, depressions, drainage ways, or aquifers and to manipulate all or part of this water to improve production of agricultural crops or to enhance growth of other desirable uses. This definition emphasizes the importance of the actions of people in modifying a natural distribution of water. It also restricts consideration of the types of action to those that involve tapping and utilizing water that has been concentrated naturally before being exploited.

An irrigation system is then defined as a set of physical and social elements employed (i) to acquire water from a natural concentrated source (such as a natural channel, depression, drainage way, or aquifer) (ii) to facilitate and control the movement of the water from this source to fields or other areas devoted to the production of agricultural crops or other desirable uses; and (iii) to disperse the water into the root zone of these areas (Small et al., 1992).

The physical elements of an irrigation system (such as dams, canals, and control structures) are easily recognized and understood. But the equally important social elements are often overlooked and misunderstood because of their intangible nature. Without them, the physical elements cannot even come into being. These social elements can be categorized as institutions and social structure (Coward 1980). The concept of institutions refers to the rules governing social behaviour and defining relationships among the actors in the irrigation system.

Institutions, as rules, indicate expectations about social behaviour. However, actual patterns of behaviour usually differ in some degree from expectations. These actual patterns of behaviour constitute the social structure. Both institutions and social structure may be informal (as with implicit understanding about water rights, and with patterns of interaction among farmers sharing a common watercourse) or they may be highly structured and formal (as in legally defined water rights, bureaucratically organized irrigation departments, and chartered associations of water users).

Central to the notion of both institutions and social structure is the concept of a role, which connotes a set of expectations and tasks associated with a particular function (Coward 1980). A distinction must be made between roles and individuals. All individuals involved in irrigation play many roles simultaneously, but only those roles that are directly related to irrigation are included in our definition of an irrigation system. Specially, we make two important role distinctions. First, according to our definition, an irrigation system includes farmers acting in their role as irrigators, but excludes their parallel role in other aspects of crop husbandry. This distinction is necessary to establish a clear analytic separation between the irrigation system and the broader agricultural system of which irrigation is a part. Second, in the case of public authorities responsible for both irrigation activities and other services such as agricultural extension, only the roles played by authority staff members that are related directly to irrigation are considered to be part of the irrigation system.

System function boundaries

The definition of an irrigation system encompasses three relatively distinct water-related functions of the system: acquisition, distribution, and application. These functions provide the basis for establishing boundaries that divide an irrigation system into three corresponding subsystems.

The acquisition subsystem includes the physical and social elements associated with the capture of water from its source. The distribution subsystem includes elements associated with the movement of water in concentrated streams from the source to the edge of a field on which it is to be applied. In large systems, this subsystem typically incorporates many different social elements, including both the personnel of an irrigation agency and the irrigators. The application subsystem comprises those elements involved in applying the water to the soil. In this subsystem, the stream of water delivered by the distribution subsystem is dispersed throughout the root zone of agricultural fields. Typically, irrigators are the sole actors in the application subsystem.

Social basis

Irrigation systems comprise social as well as physical elements. As discussed in the section defining irrigation systems, these elements involve patterns of human interaction (social structure) governed by rules of interaction (institutions). To some extent, these interactions are geographically circumscribed, thereby providing an alternative basis for delineating the geographic extent of an irrigation system.

In some cases, social boundaries coincide, at least partially, with physical ones, as in subdivisions of an irrigation department whose areas of responsibility coincide with physically delineated irrigation systems. This is a common though not a universal practice. In Indonesia, for example, many operation and maintenance functions are carried out by units of public works departments organized by general administrative districts, irrespective of physical system boundaries. In Indonesia also, farmers often manage irrigation water distribution in smaller systems through social organizations based on village residential boundaries, which may cut across several physically defined systems.

Other complications arise from the use of social structure to define an irrigation system. First, in larger systems a single organization is seldom responsible for management from the source of water to the field. In some cases there are different government agencies responsible for abstracting water from its source and for conveying water to and distributing it within the command area. In almost all cases, farmers and groups of farmers are involved in the final stages of water allocation and application. Often also, there is a significant incongruency between the nominal area of responsibility of the public irrigation agency and its actual span of control. Usually, farmer control extends higher up in the system practice than it does in policy.

This creates particular problems in conjunction with the dynamic nature of irrigation systems. As the interface between different organizations shifts over time (that between an irrigation department and an irrigators' association, for example) a socially based definition of system boundaries shifts also, making comparisons over time difficult. Because social arrangement differ from local to local, comparisons among systems also problematic (Small et al., 1992).

Irrigation is a supremely social process. Some form of organization must exist in an irrigation system to provide even minimal operational efficiency. If there are two or more potential users of the water, collective action by those people must exist to manage the irrigation system. How people are organized or not organized will have a great effect on the management of that water. Defects in water delivery, application, use, and removal will often be associated with problems in the social organization of the irrigation system, including constraints on farmers and official decision making. Therefore, while the engineers and agronomists involved in a policy analysis examine the "tools" of irrigation, the social scientists must look at the "rules".

Human and natural resources as well as certain organizational procedures are needed to effectively manage an irrigation system. These resources and procedures, however, do not emerge on their own; people must first organize to create and maintain irrigation works. Water is only delivered effectively to a farmer's field-at the right time and in the right quantity-when people have organized to supply the water and maintain the delivery system. Some social arrangements must exist to manage the water.

By viewing an irrigation unit as a kind of organization, one can identify certain patterns of behaviour and social interaction. In diagnostic analysis, we study these patterned social relations and the organizational arrangement necessary to manage the water. We examine the social and cultural structures and relationships within and between the supplies and users of irrigation water.

In diagnostic analysis we must look at the patterned social web of relationships among people, organizations, and the environment. For instance, what are the relations among the farmers in an irrigation system and between the farmers and the irrigation agency? How do these relations and patterns of social behaviour and human interaction influence irrigation system management? We need to study how the physical irrigation technology is liked with the social organization of irrigation.

It is important to realize, however, that these patterns of behaviour which make up the social organization of irrigation can be either formal or informal. It is important in diagnostic analysis to examine both types of behaviour. Formal behaviour patterns are made up of written and explicit rules, penalties, regards, and values. These patterns of behaviour usually evolve into organizations such as an irrigation department or a farmers cooperative society. Informal patterns of behaviour usually contain unwritten and implicit rules, penalties, regards, and values; they often involve people in face-to-face relationships. Informal behaviour patterns might include a small group of farmers agreeing to clean a canal and share water or the same farmers meeting with irrigation officials to discuss water distribution.

FARMER IRRIGATION BEHAVIOR AND DECISION MAKING

A diagnostic analysis of an irrigation system should include a study of the factors which influence farmer behaviour. A sociologist working in the field needs to understand farmer irrigation behaviour and how the farmer makes decisions regarding irrigated agriculture. Mistakenly, we often do not study the farmers themselves, but merely the consequences of their behaviour, such as irrigation efficiencies and crop yields. By directly studying farmers' behaviour patterns and decision making, a richer and more detailed picture emerges of how an irrigation system operates and the possible constraints on that system.

One possible method of examining farmer behaviour and decision making involves dividing the farmer's social environment into situations and actions. Situations are composed of the particular setting of the farmer, the culture of the area, and the social structures and processes surrounding the farmer. The actions are the actual results and decisions made by the farmer. The factors making up the farmers' situation then results in a set of behaviour patterns and decisions (Lowder milk et al 1983).

The situation

The situation includes four major categories: the setting, the culture, the structure, and processes . These categories are then subdivided into a number of minor categories which serve as guides for developing specific variables which measured and thus evaluate the situation.

The setting refers to the environment in which the social system is placed. There are many types of environments but the physical, institutional, and technological settings are important for our work. These are described as: (i) physical setting; comprises the physical environment and general demographic characteristics of the population living within a particular geographic area, (ii) institutional setting; comprises the different formal and informal organizations which affect an individual farmer or a group of farmers, and (iii) technology setting; describes the degree of the farmer's ability to control natural and social factors which operate as either incentives or disincentives as he attempts to reach his goals in farming.

Culture describes the patterned ways of thinking, feeling, and behaving in the social setting. Three general categories for examining culture are: (i) activities; those deeds and actions performed by the farmer, (ii) normative conditions; the rules governing relationship and socially acceptable as well as unacceptable activities, and (iii) values/beliefs/perceptions; those aspects of the culture which the farmers view as good or bad, as true or false, as to what exists and what does not exist.

Structure is that aspect of a social system which describes its form and sets boundaries for the interaction of its component parts. The structural dimensions are: (i) unranked parameters; unranked or nominal units within the social system which occupy specific positions in relation to each other are comparable rank, (ii) ranked parameters; units within the social system which occupy specific positions in relation to each other that are of different ranks, and (iii) capacity of position; the degree of power, prestige, and wealth associated with a unit in a social system.

Processes are long continued actions by individuals or organizations that create different social arrangements. The process of communication, for instance, through an extension program can change old farming habits so that farmers may increase their yields.

A study of the adequacy of important institutional services also might be conducted here. Are farmers served by a set of organizations which can reliably provide important services of high quality? Such services might include credit, transportation, seeds, fertilizer, pesticides, and extension advice. An analysis might be made of agricultural and irrigation bureaucracies to determine the quantity and quality of such inputs and services. We need to look at the knowledge, skills, and information sources of farmers to understand their decision making and its impact on the management of an irrigation system.

The actions

The results of all these factors which make up the farmer's situation is the actual decision making and irrigation behaviour of the farmer. As a result of the setting, culture, structure, and processes facing the farmer, how does he actually irrigate his fields? When and how much water does he apply to this crops?

A study of farmer behaviour and decision making should be a part of analysis. As the farmer is the basic building block of any irrigation system, a knowledge of how and why he acts in a certain way is very important. If we are to study the patterns of human behaviour which manage an irrigation system, it is also necessary to examine how those behaviour patterns and decisions come about.

Included in the different categories which describe the situation are many parameters which serve as a means for explaining a further specific type of behaviour. Such parameters serve as reference points which help explain the positions and relationships of the categories. Using these parameters, then, helps to explain why a farmer or a group of farmers act as they do.

SOCIAL DIMENTION BOUNDARIES

In the general category of setting, the parameters defining the physical setting are: the demographic characteristics of the area, the size of the area, the location of units within the area, the time frame involved, and the resource base of the community under study. These reference points describe the surrounding physical and demographic influences which will affect the individual's behaviour. The institutional reference points include four types of linkages or ties: (i) enabling linkages, which provide authority and resources to the farmer actor;

(ii) functional linkages, which supply physical inputs and services to the actor;(iii) normative linkages, which include aspects of a social system which share similar norms and values with the actor; and, (iv) diffuse linkages, which are informal linkages not included with the other types of linkages. A technological setting includes all the facilities a social system has which increases the members control of the environment. Therefore, the parameters describing the setting of the farmer place that farmer in a certain physical and institutional environment. The activities and relationships of the farmer are contained within that environment.

The dimension of those activities and relationships are further defined under the culture and structure categories. Within each sub-category under culture (activities; normative conditions; and values, beliefs, and perceptions) the major points of reference involve the unit, or the focus of study, and the unit's relationship with the institutional parameters affecting the unit. Another reference point would be the unit's relationship with other factors of the environment which are controlled by the unit. We will call these units subunits. For instance, if the focus of the study would be on a particular farm, the farm would be considered the unit with the individual fields in the farm as the subunits and organizations such as a bank or a Coop as the institutional linkage. If one wants to examine the exact relationship of the farmer (the unit manager) to all the existing institutional linkages (graduated and nominal), then the structural category of the farmers situation must be analyzed(Egypt Water Use and Management Project "EWUP",1980).

SOME EGYPTIAN EXPERIENCES

Egypt covers an area of slightly over one million km^2 of the arid belt of North Africa and Western Asia. The Nile Valley is composed of a flood plain about 18 km wide and bordered by flat terraces that are in many areas suitable for land reclamation; and the large Delta that is 150 km long and 220 km across at the coastline.

The Nile Delta with its associated Nile River Valley is one of the world's oldest agricultural area, having been under continuous cultivation for more than 5000 years. The total area cultivated is a bout 7.3 million feddans (3.067 Hectares).

Egypt's agriculture sector is unique that over 95% of its agricultural production is derived from irrigated land and its irrigation waters originate outside of its borders. Thus, reliable availability of irrigation water is a mandatory condition for agricultural development.

The total annual water use in Egypt was estimated at 59.2 billion m^3, of which agricultural use accounted for 84% and 16% for other uses.

The assumption of the policy

In Egypt, there is generally more water supplied by the irrigation districts to the farmers than what is used by farmers. Even through this pattern holds true on a large scale, there still exist shortages in parts of the system. The differences between the water supply and the farmer demand on that water is a result of design assumptions which do not correspond to what is actually happening on the farmers' fields. The assumptions are: (i) there will be a specified crop pattern for the area served by the canal and the average flow rate to be determined from the crop water requirements, soil type and the expected conveyance and on-farm losses; (ii) it will be the responsibility of the farmers to distribute water in branch canals among themselves; (iii) the flow will be rotational, certain days are on-days and the others are off-days; (iv) all the structures and the operation of the system are designed to meet the above assumptions with the least amount of communication between the administration and the farmers; (v) the distribution of water will be conducted with equity and fairness to all parties; (vi) farmers will irrigate both during the day and at night; (vii) pipe culverts with a specified head and determined diameter will be used for the control of water from distributary canal to branch canals; (viii) water will be lifted from branch canals to farmers' field; and (ix) water holding capacity of the soil is sufficient to meet the crop water requirements during the off-periods (Metawie; 1989).

In spite of these assumptions, the users' demand pattern is dependent on socio-economic conditions and environmental factors. Among the first of these factors is that farmers prefer to irrigate during the day rather than at night because there are many pumps, and the area served by each pump is small so it is easier to manage irrigation during the day. At night, the temperature are low, women and children can't help, snakes and mosquitoes are prevalent, and visibility is poor. Additionally the crop pattern is dynamic in nature and is dependent on the farmer's decision on what to grow. Finally, due to limited communication between farmers and irrigation districts, a mistrust exists between both parties.

Empirical evidence has shown that the use of water is not consistent with the assumptions listed above. It has been observed and recorded that water levels drop dramatically during the daytime when most of the farmers prefer to irrigate, and water level increase during the night-time when farmers choose not to irrigate. The only communication between the government and the farmers occurs during time of water shortage at which time farmers put pressure on the administration to obtain more water.

The physical/social characteristics

The physical system contains different levels of distributary canals, branches and mesqas. These distributary and branches are operated on a seasonal rotation system. Two main types of water rotation schedules used in Egypt are as follows:

Two-turn rotation

- 4 days on and 4 days off (rice rotation)
- 7 days on and 7 days off (cotton rotation)

and

Three-turn rotation

- 4 days on and 8 days off (general crops/summer)
- 5 days on and 10 days off (general crops/winter)

The main summer crops are rice, cotton and maize in addition to vegetables. In winter the main crops are Egyptian clover (berseem), sugarbeets and wheat in addition to vegetables.

The basic cropping patterns are berseem-cotton, wheat-rice, berseem-maize, wheat-maize and berseem-rice, in addition to sugarcane. In most cases, rice lands are planted along canals or mesqas more than allocated. This rice planting increases pressure on the irrigation system, particularly during the puddling.

The setting; the demographic description along canals, branches and mesqas are different in the classification basis, number of farmers, area served, average farm size and institution services. On other hand farmers irrigation behaviour are different in water lifting methods. Some are lifting water directly from the distributary canal or its branches either by using saqias or diesel pump. Most of the saqias are owned and shared by a group of farmers with the exception of a few which are owned by single farmers with large holdings. Diesel pumps are either owned by single farmers or by groups of farmers or they are rented by farmers. Night irrigation is not popular to farmers for a variety of reasons,(i) cooler weather at night in winter, (ii) darkness; and (iii) increased number of insects out at night (Metawie, 1989).

CONFLICT BETWEEN SOCIAL AND POLICY DIMENTION

At present, the total water supply of Egypt is more than the total water demand. In the further, however, Egypt will face a deficit between the supply and the demand because of the rapid increase in population and the need to provide food for this population. By considering patterns of water supply and demand, it will be possible to determine periods when both deficits and surpluses exist. When these deficits occur, both farmers and MPWWR blame one another for the gap between supply and demand.

On the supply side, the MPWWR claims that the farmers don't irrigate at night when their water shares are spilling out to the drains and that the farmers complain and try to get additional water as compensation. On the demand side, farmers argue that they don't receive enough water. The MPWWR argues that the farmers continually ask for more water whether they receive their share or not. Both parties have pressures and obligations. Farmers have economic problems and the MPWWR officials have political pressures. Each party tries to blame the other for the shortage of water during the critical periods (Metawie and Ruff, 1987).

Since any system is designed to meet its objectives based upon certain assumptions, the system will perform efficiently only if those assumptions are well formulated and represent real world conditions and circumstances. The system will fail if the assumptions are not correct. The conditions of supply and demand were investigated to see where the gap exists between what is being done now by both parties and what might be done in the future by both of them.

Supply pattern versus demand patter

The supply pattern given by MPWWR in distributing water compared with the variable demand pattern used by farmers showed that farmers do not irrigate their crops on a continuous basis for 24 hours. They prefer to irrigate from about 3:00 am to about 12:00 noon (Figs.1 and 2).

The deficit or surplus amount of water can be seen by adding the supply pattern of the MPWWR to the demand of the farmers. Deficits in water are experienced between about 7:00 am and 12:00 noon in the morning as shown in (Fig.3) to the Om Sen branch canal. However, they are not true deficits because the storage in the canal is not included as supply water. The result of using this canal storage is a lowering of the canal water level.

Using shortage water results in a change in the deficit as shown in (Fig. 4). Comparing (Fig.3 with Fig.4) indicates the deficit decreased in magnitude and duration of time.

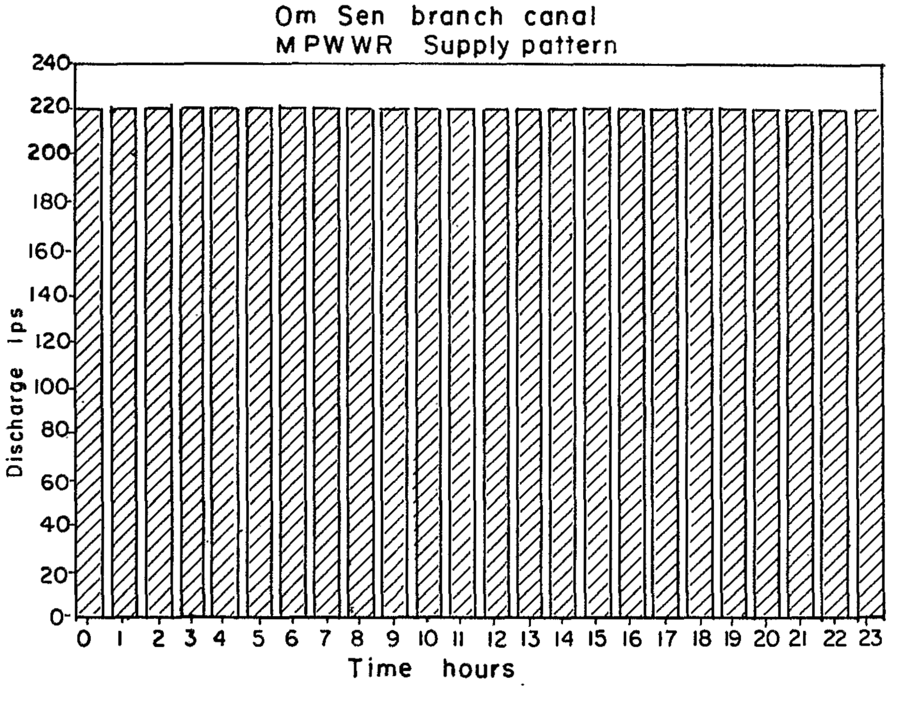

Fig. 1 - The water supply pattern of the (M P W W R) (Metawie, 1989)

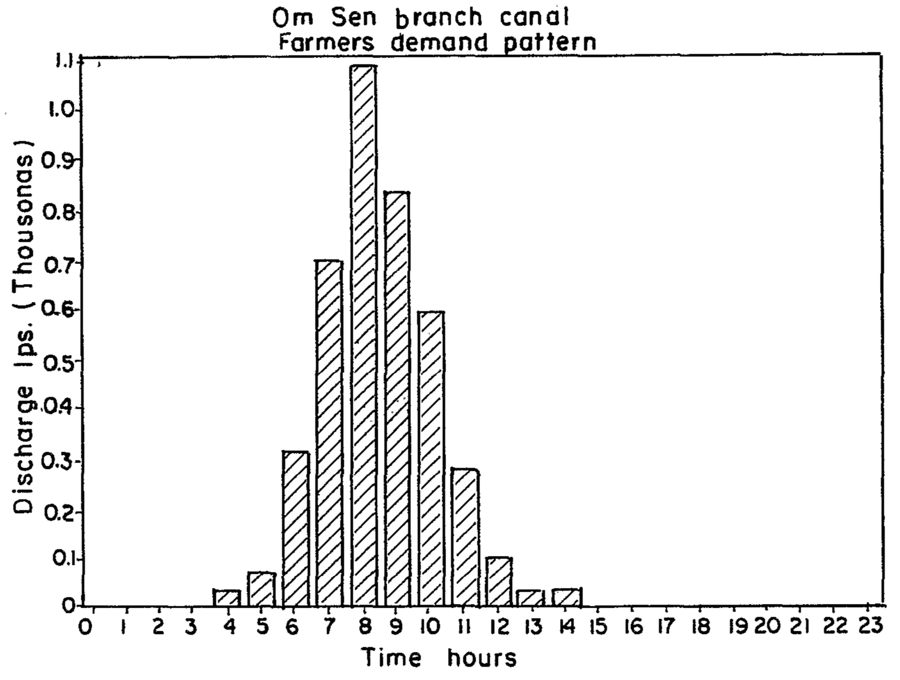

***Fig. 2** - Water demand pattern of farmers the Om Sen canal (Metawie, 1989)*

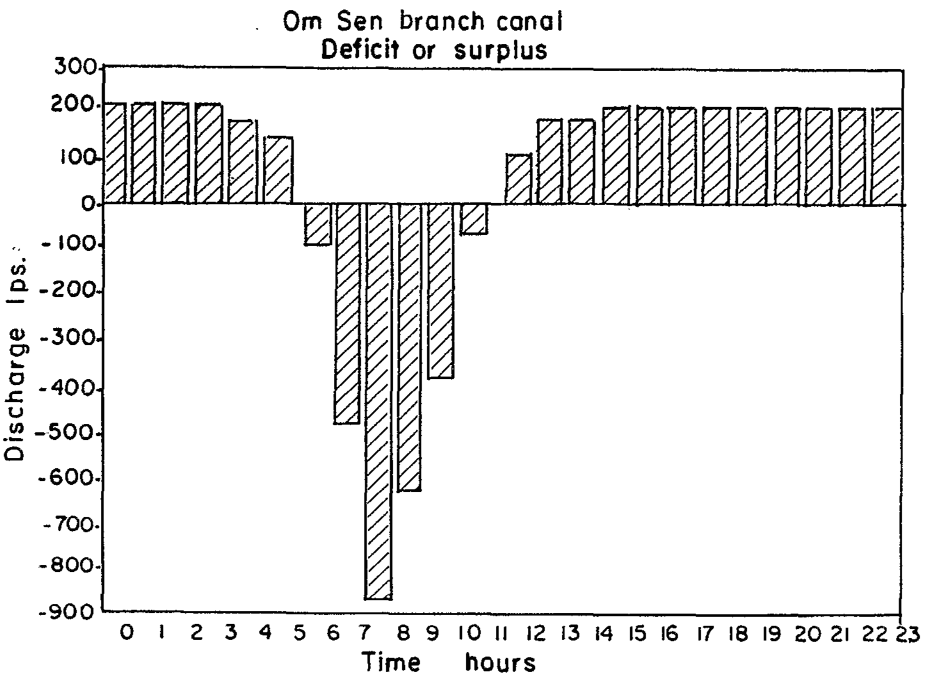

***Fig 3** - Daily pattern of surplus and deficit water combining (M P W W R) delivery and farmers demands (Metavie, 1989)*

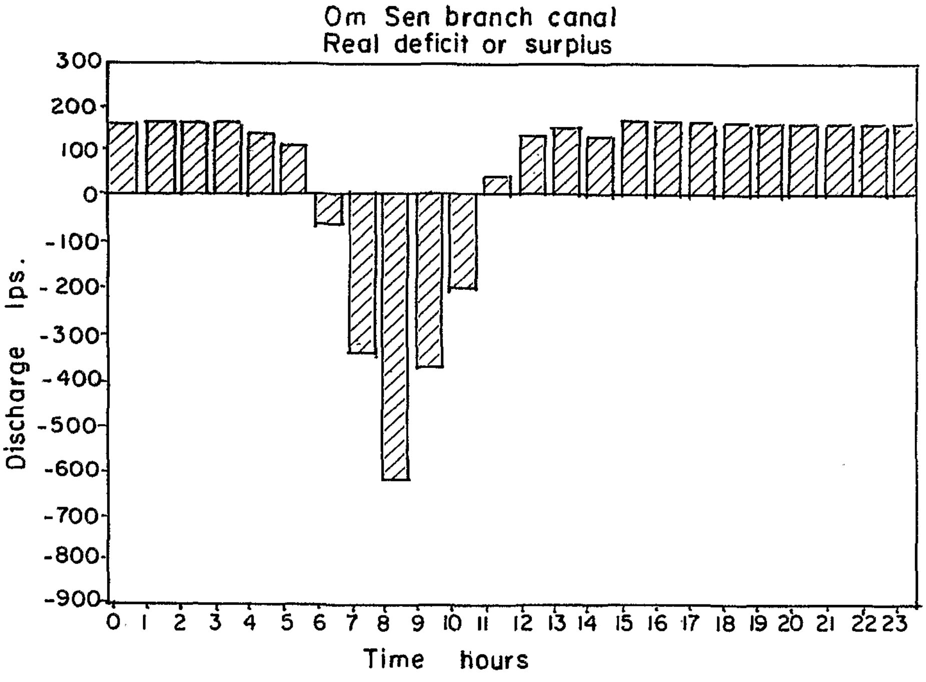

Fig.4 *- Deficit and surplus water pattern taking into consideration the canal water storage*

The maximum deficit decreased from 864 lps to 620 lps and no deficit exists after 11:00 am; a change of one hour. The total storage in the canal is only about 10 percent of the total of water required daily (typically the storage ratio of most Egyptian canals).

Looking to (Fig. 4) it demonstrates graphically and vividly the problem that is experienced by Egyptian farmers. Even if the water stored in the canal is used for irrigation, there is still a deficiency in water during the morning. This is a classic problem of water supply and demand where the suppliers and users are not communicating but are proceeding independently (Metawie 1989).

Farmers irrigation behaviour on a saqia and on a mesqa

The water demands change from one irrigation to another because of differing water requirements of alternative crops throughout the season. The actual demand patterns of a group of five farmers mutually using a saqia have been observed. The demands are based upon the number of operating hours of the saqia per each hour of the day during the on-rotation period. The crop cultivated by the farmers is cotton. The five farmers sharing the saqia irrigate at different times while there is water in the canal. They irrigated their cotton crop eight times during 1981 summer season between March and August.

Irrigation patterns for cotton crops raised by the five farmers are shown in (Figs 5 and 6) for periods during the summer season. The patterns show the total number of hours that the saqia was operated by all farmers during the on-rotation period. (Fig.7) gives the total of all irrigation periods during the season for cotton (Egypt Water Use & Management Project, EWUP 1984).

The observed irrigation pattern at Om Sen canal of the month of July 1981, where rice plant is growing (Figs.8 and 9) indicated that during the first irrigation period farmers irrigate at each hour of the day due to the high demand for the preplanting irrigation. The same thing happens during the fourth irrigation due to the shortage of water in the canal and because this is another peak of demand period where rice transplanting is taking place by other farmers (Metawie et al.1983).

Generally, farmers prefer to irrigate between 3 am and 12 noon. They don't like to irrigate at night because it is too dark. They don't like to irrigate in the afternoon because it is too hot. This temporal distribution pattern is evident from the irrigation patterns shown in (Figs.6,7,8,9 and 10).

The minimum number of saqia units operating on an off-rotation day in the month of July is presented by (Fig.9). Although water was not supposed to be available on this day, it was still pumped from the canal. Water is available because of leakage of the gates, illegal means, or from compensation.

The farmers use patterns for the month of July, 1981, which correspond to Ramadan 1401, the Islamic month of fasting is presented by (Figs.8, 9, and 10). During Ramadan, eating is forbidden during the day light hours, and the final meal is taken around 2:00 am This indicates that almost after this meal, the farmers began to irrigate and are resting during the afternoon.

Besides Ramadan, other factors have an influence on the farmers' irrigation patterns. For example, during the weekly market day at each village, farmers have an opportunity to market their crop and animal products (Metawie et al., 1983). Observations by the Kafr el Sheikh Team from the Egyptian Water Use and Management Project revealed that few farmers irrigate on market day. Urban and industrial factors also affect the water available for irrigation requirements.

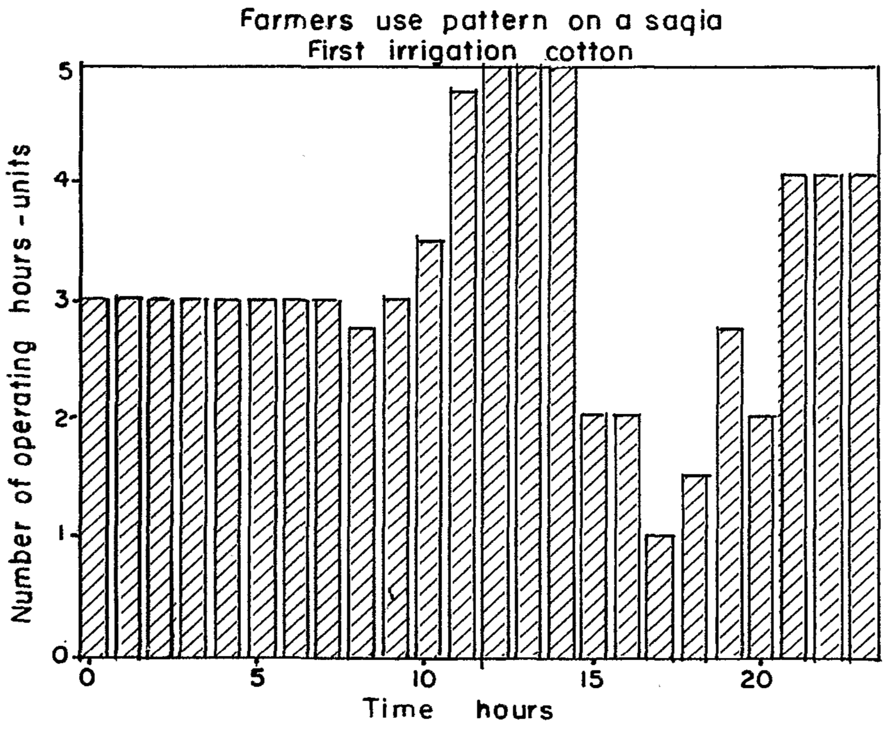

Fig. 5 - Irrigation pattern during on rotation period for first irrigation of Cotton (Metawie, 1989)

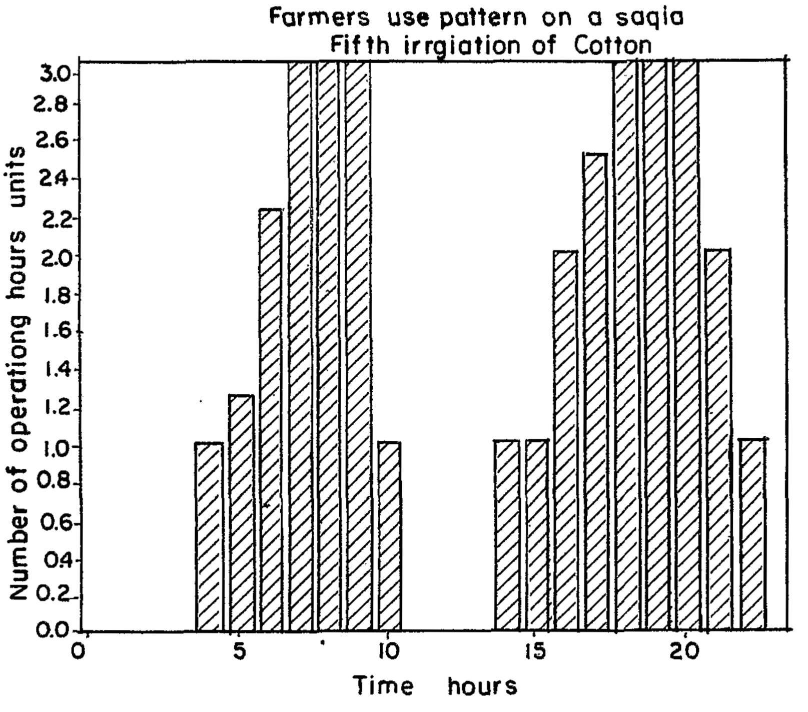

Fig. 6 - Irrigation pattern during on rotation period for fifth irrigation of Cotton (Metawie, 1989)

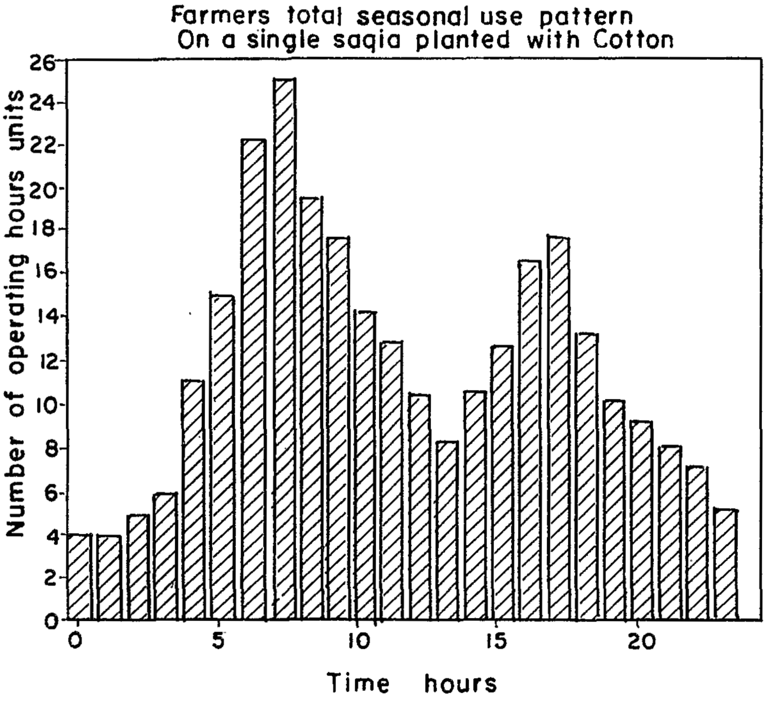

Fig. 7 - Seasonal Irrigation pattern for Cotton (Metawie, 1989)

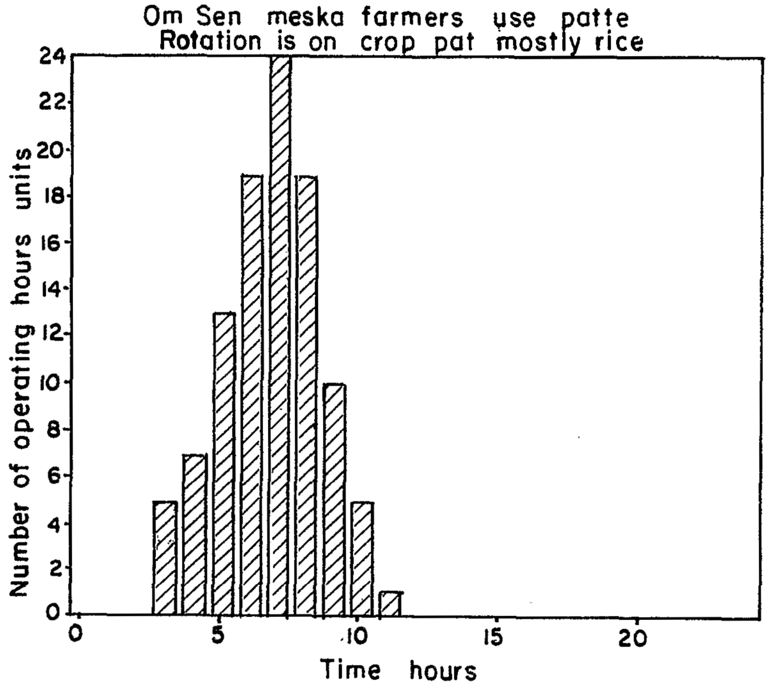

Fig. 8 - Irrigation pattern for crops consisting mainly of Rice during one rotation period in July, 1981 (Metawie, 1989)

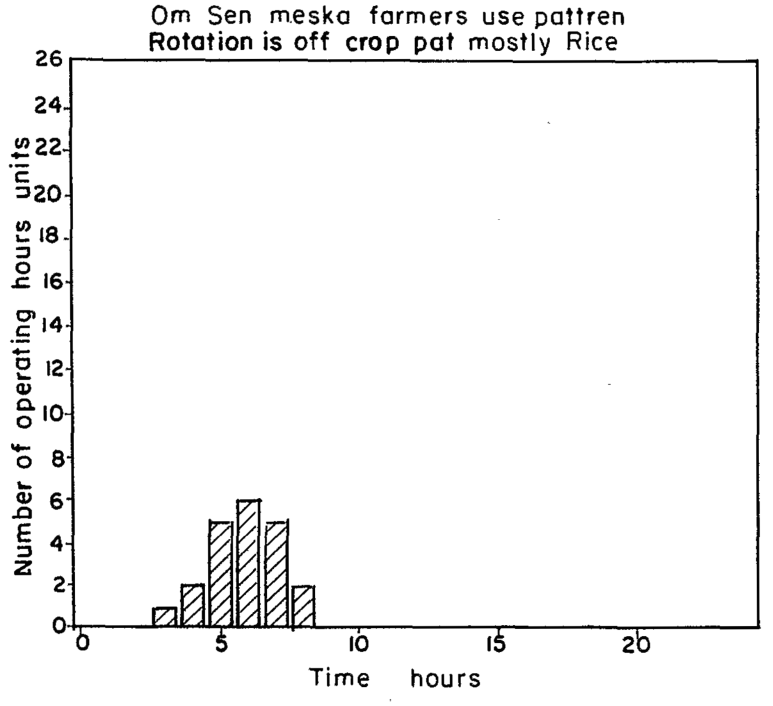

Fig 9 - Irrigation pattern for crops consisting mainly of Rice during one off rotation period in July, 1981 (Metawie, 1989)

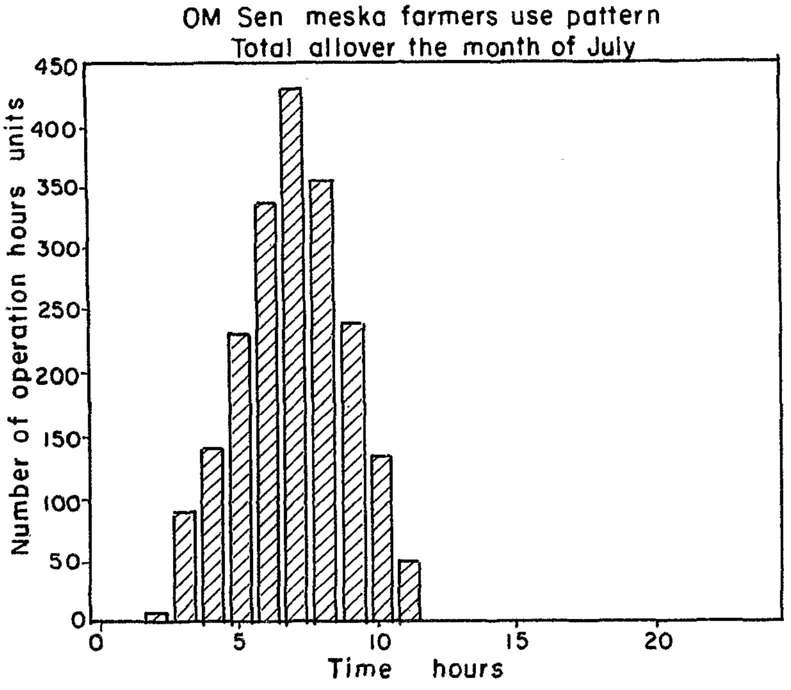

***Fig.10** - Irrigation pattern for month of Jule, 1981 on the Om Sen canal (Metawie, 1989)*

CONCLUSION REMARKS

In irrigated agricultural areas when the water supply pattern given by irrigation districts (policy maker) does not meet the water demand pattern desired by users to satisfy their crop water requirements, a conflict will arise both between irrigation districts and users and among the users themselves.

This paper presents the social dimension and/or the structure-cultural dimension (which affect the policy of the use of water) and some Egyptian experiences which reflect the social conflict arises between users (farmers) and the Ministry of Public Works and Water Resources (MPWWR) as policy maker.

Irrigation system is defined as a set of physical and social elements. The physical elements such as dams, canals and control structures are easily recognized and understood. But operational of such elements needs a set of assumption. The social elements are categorized as institutions and social structure. The concept institutions refers to the rules governing social behaviour and defining relationship among the actors in the irrigation system. These relationships are defined as farmer behaviour and decision making and divided into situations and actions. Situations are composed of the particular setting of the farmer, the culture of the area, and the social structures and processes surrounding the farmer. The actions are the actual results and decisions made by the farmer. The factors making up the farmers situation then result in a set of behaviour patterns and decisions.

The Egyptian experiences indicated that according to the farmer's situation and actions and the MPWWR assumptions there were many conflicts between both sides. It was indicated that farmers prefer to irrigate on day time than night, the religious occasions affect their decision of irrigation, when to irrigate, the local market day is not a preferable day for irrigation, specific day hours is more accepted for irrigating a specific crop than others, and water lifting devices governing the decision of irrigation.

It was also noticed that the policy assumptions setted by the MPWWR were rigid and did not flexible enough to meet farmers behaviour. These results indicates how much the social dimension of the policy affects the use of water.

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