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**PROCEEDINGS  
OF THE NATIONAL  
WATER  
SYMPOSIUM**

AMMAN  
THE HASHEMITE KINGDOM  
OF JORDAN  
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**FOREWORD**

By

*H.R.H. Crown Prince Hassan*

Recent developments in various economic sectors as well as the large demographic changes have added to the significance of water, a very precious resource in Jordan. Our limited water supplies are facing competing demands from domestic, agricultural, industrial and other uses. This unbalanced situation is further aggravated by the fact that Jordan's population centres are not close to water resources.

It is against this background that the National Water Symposium was held in Amman from 19 - 22 March 1978. The importance attached to this gathering was signified by the opening address of His Majesty King Hussein. Several government institutions, regional and international organizations and private institutions and individuals attended this meeting and contributed in various ways in its deliberations and recommendations.

As Chairman of this Symposium, I had the opportunity of hearing the many and diverse points of view on this important subject. Following these serious discussions, I have become increasingly convinced that we in Jordan cannot afford to look at the water question in isolation, but from such areas as regional planning, housing and development of the various economic sectors. Similarly, I believe that the in situ use of water should be maximized. We cannot afford to keep bringing water over long distances to mushrooming communities established without careful consideration of resources and services needed to support them.

While this Symposium made several important recommendations, its real success lies in implementing them. Some of these recommendations may need further study or modification, but I believe they are, on the whole, realistic and feasible to implement.

In conclusion, I would like to express my deep appreciation for the efforts made by all who participated in making this Symposium a very useful one. In particular, I would like to thank Government and non-Government institutions responsible for organizing this meeting and the several specialists who gave us the benefit of their valuable expertise and knowledge. It is now up to us to make full use of this knowledge.

Mr. M. Bitoun

Yes, they did play. The wet years were not eliminated from the sequence. We tried to determine whether there were sequences which as a whole were representative of a long-term sequence, and we submitted the series to statistical tests. The result was that this sequence is representative of the long-term sequence. Therefore, we have no reason to eliminate those two years. So, the reservoir operation studies were made for three of those in succession. However, the wet years do not play an important role in the refilling of the reservoir for lower elevations as they do for the higher elevations. That is why I was pointing out that it might be more secure to wait few more years before going to elevation 190.

## PRESENT WATER LEGISLATION AND INSTITUTIONAL FRAMEWORK IN JORDAN

Y.F. NIMRY

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### I. INTRODUCTION

This paper is intended to give a quick review of the present legislation and of institutions involved in the water affairs in Jordan, with special stress on the major deficiencies and constraints of each.

Some effort is given also to delineate the general layout of one of the possible approaches through which Jordan can maintain a reasonable and well coordinated water policy which will maximize the life span and benefits of its limited water resources.

A discussion of the status, internal affairs, and capabilities of the present institutions was intentionally avoided. The whole theme of the paper is very much affected with the worries and concerns of every Jordanian about the future of domestic water supply requirements and how they can be met.

One obvious fact which is not fully treated in this paper is that though our water resources are very limited, the portion which is presently utilized is very minimal and limited. The major part, still not tapped, if properly handled can serve our increasing future needs for many years to come.

### II. PRESENT LEGISLATION AND INSTITUTIONS

In addition to the several water supply projects in some towns and villages where the water source and/or the distribution network is owned and controlled by the municipality board in accordance with the provisions of the Municipalities Law No. 29 of 1955, the water affairs on the regional and/or national level in Jordan are managed by the following four major institutions:

- (1) The Natural Resources Authority (NRA)
- (2) The Water Supply Corporation (WSC)
- (3) The Jordan Valley Authority (JVA)
- (4) The Amman Water & Sewerage Authority (AWSA)

These institutions are functioning by special laws and the following is a resume about each of them:

#### (1) The Natural Resources Authority (NRA)

It was founded in 1966 to integrate the East Ghor Canal Authority, the Central Water Authority and the Geological Survey and Bureau of Mines. It is now

functioning according to the Organization of Natural Resources Law No. 12 of 1968 and entrusted with the responsibility of:

- (1.1) Planning, designing, constructing, operating and maintaining water irrigation projects, developing and exploiting the same, and carrying out all relative works; settlement of disputes arising from the use of water resources located in the irrigation project areas, as well as soil surveying and classification, land reclamation to the extent deemed necessary, parcellation of these lands to farm units within the irrigation project areas entrusted to it, as well as developing agriculture, specifying crop pattern and applying the Government water policy in the irrigation project areas including the project area falling under the jurisdiction of the Authority, or developing this policy according to the conditions of these areas as to soil, climate and other technical considerations.
- (1.2) Establishing the water policy for the Kingdom and submitting the same to the Council of Ministers for approval, provided that the main objective of this policy shall be the preservation of the Kingdom's natural and political water rights as well as the development, preservation and maintenance of the Kingdom's water resources for utilizing in various purposes aiming at raising the economical social and health standards in the Kingdom.
- (1.3) Organizing and directing the construction of private and public artesian wells and exploring underground water resources by registering all owners of rigs, the groups who undertake the drilling of wells and the drilling equipment and also obtaining information about the drilling records and other data respecting the structure of the strata where water accumulates. No one is allowed to undertake drilling unless he is registered at the Authority."

Since 1973, when the Water Supply Corporation was detached from NRA, and 1977, when the Jordan Valley Authority was established, NRA has not been concerned with the domestic water supply problems in the country except for well drilling, and also has not been concerned with the water studies and irrigation schemes in the Rift Valley region up to the 300 meter level above the sea. At present, NRA, beside its functions outside the water sector, is effectively responsible for the following duties:

- a. All hydrological and hydrogeological data collecting in the country aside from the area under the jurisdiction of the Jordan Valley Authority.
- b. Drilling of water wells for exploratory and public purposes.
- c. Designing, constructing, operating and maintaining irrigation projects in the Plateau and Desert.
- d. Developing and maintaining of water springs, and Roman pools and cisterns.
- e. Designing, constructing, operating and maintaining earth dams for purposes of irrigation and groundwater recharge in the Plateau.
- f. Licensing and control of private water wells, water rigs and rig operators.

To achieve these objectives, NRA maintains two directories, one for water development and one for irrigation. It operates 16 water rigs (6 rotary and 10 percussion) and a national network of hydrometric and hydrometeorological stations for flood measurements, precipitation, temperature and humidity observations.

## (2) The Water Supply Corporation (WSC)

Prior to 1973, most of the functions of the present Water Supply Corporation came under the jurisdiction of the Natural Resources Authority. Due to the widely diversified and ever growing duties of NRA, including those related to the domestic water supply, and in view of interest of the Government to give special stress and attention to the water supply problems, it became obvious that the establishment of an agency of specialized nature and more power to act on the national level to meet the increasing demand for water supply in the country was deemed necessary. Accordingly, the Water Supply Corporation Law No. 56 of 1973 was passed and the affairs of domestic water supply were detached from NRA to become the responsibility of the Water Supply Corporation which

"is delegated to plan, design, construct, operate and maintain water supply projects for drinking purposes and domestic uses. To develop, purify, distribute water, sell water, drain water and undertake all works related thereto within the area of supply and the boundaries of supply. The Corporation will also be delegated to conduct the respective economical studies relating to sewerage and the water resources, and also to supervise the methods of making use of its, its drainage treatment upon the request of the Board of Directors."

To achieve these targets the Corporation is responsible for:

- (2.1) Drawing up a policy for water supply, the aim of which in the first degree is to improve the environment of the population in health, economy, and social life in the Kingdom and to submit this policy to the Cabinet for approval.
- (2.2) Through the Water Councils, providing to the cities, villages, tribes, bedouins, groups and the other civil and military institutions, water for drinking, domestic and industrial uses. Also to get rid of polluted water, flood water, and wastage and to make use of it most properly with a possibility that these services would include the layout of designs and specifications for the water and sewerage distribution systems and to supervise thereafter its execution by showing its costs and all other matters related to its operation and maintenance.
- (2.3) Cooperating with the Ministry of Health or any other concerned department in all matters concerning health aspects so that the water distributed to the consumer be suitable for use, the quality of which is to be in conformity with the approved specifications and measures, especially bacteriological and chemical. The same procedure applies to the treatment purification and drainage of water".

The Corporation presently is in charge of supplying water in bulk to 267 networks in towns and villages of which 248 are owned and operated by the Corporation. The Corporation maintains also 110 truck mounted water tanks and 25 desert pumping stations to meet emergency cases in drought seasons in the countryside and desert areas. The quantity of water supplied by the Corporation during 1977 totalled (12.6) million cubic meters (MCM) which is almost equivalent to 25% of the estimated amount supplied to communities and industries in Jordan at present.

The Corporation is currently engaged in the design and/or construction of several water supply and sewerage projects in many parts of the country, of these are the Qa'el-Disi-Aqaba water scheme and the Aqaba sewerage project. It is also supposed by 1985 to take over all water supply and sewerage projects operated by special agencies, such as the (AWSA) and some municipalities all over the country except those in the Jordan Valley region which fall under the jurisdiction of (JVA) and to operate and maintain them through water councils. To meet its objectives, the Corporation presently maintains the following main departments and offices:

- A department for planning and design.
- A department for construction.
- A department for operation and maintenance.
- A demartment for administration and accounts.
- A regional office in every Governorate as a transitional stage towards the water councils.

### **(3) The Jordan Valley Authority (JVA)**

As a part of the Three Years Development Plan of 1973/75, a package deal for the rehabilitation of the Jordan Valley region was put into implementation with special stress on irrigation schemes. The Job as such was delegated at that time to the Jordan Valley Commission.

In 1977, the Jordan Valley Development Law No. 18 was passed and came into effect, according to which the Jordan Valley Authority was established to be entrusted with the responsibility of developing the Jordan Valley economically and socially and carry out all works necessary for the achievement of this goal including among others:

- “(3.1) The carrying out of studies required for the evaluation of the water resources including hydrological, hydrogeological and geological studies, drilling of exploratory wells and the establishment of observation stations.
- (3.2) The planning, design, construction, operations and maintenance of irrigation projects, hydropower stations, wells, pumping stations, reservoirs and water delivery and distribution networks, also surface and subsurface drainage works.
- (3.3) Settlement of disputes arising from the use of water resources.
- (3.4) Organize and direct the construction of private and public wells.
- (3.5) Planning, design and construction of domestic water supply projects including distribution networks”.

Beside the above functions of the JVA provided for in Law. No. 18 of 1977 the following provisions are to be noted:

#### **“Article 5-A**

Inspite of the provisions of any other law, the Authority is fully authorized to implement all of the Valley Development projects specified in Art. (3) of this law and to carry out all works required for their implementation in accordance with the provisions of this law regardless of whether these projects, in accordance with the provisions of any law, resolution or other arrangement, are within the jurisdiction of a ministry or department or other governmental agency or located within the boundaries of a city, village or local council.

#### **“Article 6-A**

Without prejudice to the provisions of item (B) of this article, the Authority shall hand over the projects entrusted to it in accordance with the provisions of this law, excluding the water resources development and irrigation projects, after completion to the appropriate ministries, departments, governmental agencies and other organizations including minicipal, local and village councils”.

Though the Authority is newly established, it is already engaged in the construction of some big irrigation projects, dams and water supply projects such as the extension of the East Ghor Canal Project, the Zarqa Triangle Irrigation Project, the Maqarin Dam...etc.

On the organizational level, its development is not yet complete and for the time being its staff is limited to what it inherited from the Jordan Valley Commission, the Natural Resources Authority and the Jordan River Tributaries Regional Corporation. Most of the current projects under its jurisdiction are implemented through contractors and/or consultants.

### **(4) The Amman Water and Sewerage Authority (AWSA)**

Prior to 1973, the water affairs within Amman Municipality area used to be managed by a water department of a dependent nature as part of the central setup of the Municipality and attached directly to the Municipality Board. It used to operate by force of several by-laws and regulations which used to be issued from time to time whenever the need may arise.

Due to the rapid growth of Amman in area, population and standard of living, the demand on water increased sharply in a comparatively short period; accordingly the job of supplying water to the City became much bigger than the capacity of a sub-department operating without a comprehensive and modern legal umbrella.

Once this was realized, the Government passed the Amman Water and Sewerage Law No. 19 of 1973 which recently has been replaced by the Amman Water and Sewerage Authority Law No. 48 of 1977 according to which the

Amman Water and Sewerage Authority is operating now. It is entrusted with the following duties and responsibilities:

- (4.1) To ensure the supply and distribution of sufficient quantities of water to meet the needs of the population dwelling within the Authority's area.
- (4.2) To protect such water from pollution and to impose restrictions on its use, and to pass instructions for taking water samples for necessary analysis.
- (4.3) To prevent waste of water and pass pertinent instructions on the use of water.
- (4.4) To ensure the drainage of sewage effluents, surface water, and storm water by sanitary scientific methods, and to obtain the maximum possible benefit out of it.
- (4.5) To foresee, plan, and execute general schemes for water and sewerage in order to meet further needs.
- (4.6) To locate the boundaries of the Water Basin subject to the approval of the Council of Ministers.
- (4.7) To locate restricted areas to protect the Water Basin and the Recharge Areas with the approval of the Ministry of Urban and Rural Affairs and the Natural Resources Authority.
- (4.8) To limit and restrict the use of water and prevent or restrict the extraction of water within the Authority's area. The limitation or restriction of water extraction should be subject to the approval of the Natural Resources Authority whenever it is related to the Water Basin.
- (4.9) Supplying water to the consumer within the existing potentialities, and keeping the quality of supplied water - up to the house connection point - according to the defined standard for domestic uses.
- (4.10) The drainage of sewage that enters the sewerage network.
- (4.11) Ensuring the normal drainage of surface water and storm water through suitable sewers."

The Authority as such is bound with the Lord Mayor of Amman and it is an autonomous and corporate body administered by a Board of Directors chaired by the Mayor.

Due to the fact that the Amman Municipal city area is not excluded from the area under the jurisdiction of the Water Supply Corporation by virtue of its law, it is assumed then that the Amman Authority is to be sooner or later detached from the Lord Mayor of Amman and attached to the Water Supply Corporation to function as the Water Council of Amman area.

AWSA pumps its water to supply Amman from 24 producing wells and two springs. The 1977 average pumping yield is 2500 CM/hour or the equivalent of 17.5 MCM/year.

According to statistical analysis, Amman city water requirements in 1978 will be about 20 MCM/year. A main AWSA water project to face the increasing future demand is to bring about 12 MCM/year of water from King Talal Dam.

The main departments within the Authority are:

- a. Administration
- b. Finance
- c. Engineering
- d. Water
- e. Sewerage
- f. Sewage Treatment

### III. DEFICIENCIES AND CONSTRAINTS

Considering the present situation in the water sector in view of the functions and responsibilities of the different institutions operating in this sector, their governing legislation, and the past experience and grievances in regard to domestic water supply from which the country suffers occasionally, we can pin point several deficiencies and constraints which can be grouped under two major topics, i.e.:

1. Legal
2. Organizational and Financial

Among the legal deficiencies the most outstanding is the fact that none of the operating institutions is legally in charge of:

- (1.1) The formulation and processing of the national water policy.
- (1.2) The overall control of the national water resources and acquisition of the data base deemed necessary for the formulation and updating of policy decisions.

When NRA was established in 1966, the concept stressed in its law was to formulate a central body acting on the national level to deal among others with water affairs of the country, their development, utilization, management and control, and to be capable of delineating the national water policy, priorities, and allocations for different purposes in view of the availability of resources and trends of demand and growth.

This concept is no more in effect due to the fact the more recent laws which have been passed since 1973 superseded NRA Law No. 12 of 1968. The provision of this law which stated that NRA "is responsible for establishing the water policy for the Kingdom and submitting the same to the Council of Ministers for approval" effectively has no meaning at present. The ground for its application is no longer valid, especially as it relates to data acquisition and control of resources all over the country, since the laws of the other institutions gave absolute powers for them to define their own water policies, investigate and acquire data and resources, without provision to coordinate or get a prior approval from a central coordinating agency.

In time, this situation will become more difficult and with the trend at present being to force development plans into regional packages in Amman, Irbid, Aqaba and other regions along the same line now being implemented in the Jordan Valley region, the process of water control and acquisition of a data base on a national level will be decentralized more and more. We will be approaching a stage where the decision makers have to deal with conflicting interests and sometimes may make conflicting decision without having the means to define priorities and allocations of water resources properly.

It is believed that we have not yet drifted too deeply into this situation and the chance is still there to recover the situation before it collapses. It is good to see that the Government and all concerned national institutions are realizing that the achievement of the national development targets is very much dependent on well coordinated policies for the utilization of the country's scarce water resources. This realization was in fact the motive behind this National Water Symposium; and it was very well demonstrated when the Government made the formulation of the national water master plan and of a water resources policy one of the major objectives of the 1976-1980 Five Year Plan for Economic and Social Development.

The first attempt to define such policy was initiated by NRA in 1976 in collaboration with the German Technical Aid. The result of this attempt was the National Water Master Plan which was briefed by Dr. Frantz of Agrar and Hydrotechnik on the first day of this Symposium.

In the synopsis of the Plan it is described as "the first approach to the formulation of a coordinated water allocation policy for Jordan. The constraints originating from the existing data base have been noted. Nevertheless, the most urgent policy decision can be based on it, as long as the documentation remains the subject of a systematic updating work. The conclusions may have to be modified in due course, and there might then have to be a corresponding adaptation of policy decisions".

This assumes that there should be a consolidated legislative and institutional system with a continuous and systematic feed of information maintained so the Plan can be kept always up to date. This would also serve to provide a capability for formulating and recommending the adaptation of policy decisions and, after such decisions had been made, to enforce them and see that all involved parts of the system are operating in harmony with this policy.

Such a consolidated system does not exist and there are no provision for it in the present legislation though many people think that Law No. 12 of 1968 provided for it.

Somebody might think that the approach to overcome this deficiency and get to a consolidated legislative and institutional system is to pool all institutions and get under one management. This is not realistic or even practically possible and it is believed that no matter how many institutions are operating in the water sector by virtue of special laws, consolidation and policy adherence can be maintained by having what we can call here the Water Act which would provide for the following:

- a. The establishment of a water board capable of processing and formulating the water budget and policy for the Kingdom and having means to conduct water studies and investigation.

- b. Such law should supersede every other law in matters related to the allocation and control of water resources and any party whether public or private should get a license or permission from the water board whenever it wants to utilize a water source or drill a water well or build a dam or anything which might have an impact, major or minor, on the water balance of the country.
- c. All parties whether public or private having access for water or utilizing it in bulk for any purpose should report regularly their consumption to the board and they should maintain meters and records for this purpose.
- d. No agency would be allowed to license any new industrial, urban, or agricultural project that requires water in any part of the country without the approval of the board.

The necessary measures should be taken also to amend the existing laws to be in line with concept of the proposed Act.

Consideration should be given to development of the existing NRA and its Law to make the role of the water board with the necessary enabling act. This subject will be treated more thoroughly in the following sections of this paper.

2. Among the organizational and financial constraints, the most outstanding ones are:

- (2.1) The lack of coordination which is very much interrelated to the legislative deficiencies discussed hereinabove; this will be overcome automatically once the legal umbrella for a consolidated system is maintained.
- (2.2) The centralized management, where everything in the institution all over the country has to be run from the headquarters in Amman, even minor day to day things. The staff of the district departments or offices have no independent authority but are only operators, nothing else. Such a situation in some of our water institutions puts a heavy burden on the top management, decreases the efficiency of the agency, and acts as retarding and demotivating factor. In time it becomes detrimental, especially when the responsibilities of the institution grow bigger and more widely spread.
- (2.3) The conflict between diversified functions such as in the case of NRA, where originally it was intended, in relation to water, to be mainly research, investigation and controlling agency. For these purposes it acquired some drill rigs for exploratory purposes. Though there is no mention in its law that it should offer drilling service, we find now that such service is becoming its major function and very little time and effort is spared for water studies.
- (2.4) Lack of finance. This constraint is traditional and applies to all development sectors in the same magnitude but in the water fields, its consequences could be extremely detrimental, especially in relation to drinking and domestic water supply. We all know that a community can live without paved streets, but it cannot live without water. Without extensive elaboration on it we should realize that we could have avoided



the water shortages which Amman and Irbid suffered from during the past four years if enough allocations had been made in the appropriate time. We are still on the safe side when it comes to water resources and the shortages suffered are in fact due to the absence of the necessary facilities to bring this water to where it is needed.

(2.5) Lack of manpower. To this constraint we can relate a lot of other things such as weak planning, low grade skills, shortage of staff, etc. Though Jordan is rich and very proud of its human resources and the Jordanians are very well known for their high calibre we do suffer from the lack of manpower because we are paying a tax in the form of brain drain on being a non-oil producing country. Our friends and brothers should realize that all of our institutions are functioning as training centres for all kinds of jobs needed in the area without anybody contributing to that except Jordan.

During the past few years, NRA lost more than 75 of its best drillers, 100 hydrologists, hydrogeologists, geophysicists, drilling engineers, chemists and civil engineers and more than 300 mechanics, electricians, welders, blacksmiths, carpenters, and fitters. The same is happening with the Water Supply Corporation; from July 1977 till January 1978, 125 of its staff quit. The same thing goes in in the JVA and AWSA and in every public and private agency in Jordan. Everybody is considering importing skills and manual labour.

This situation should be remedied, otherwise we shall come to a standstill.

Except for the above deficiencies and constraints plus some other minor ones, the overall trend in our water legislative and institutional framework is not bad and with some careful amendments and modifications they can be put along the proper track to cope with the requirements of the country.

#### IV. FUTURE OUTLOOK

Water is a basic national resource which is very essential for the human life as well as for animal life, agriculture and industry.

In an arid to semi-arid country like Jordan with very limited water potential and with its only access to the sea for desalinization comparatively far from the densely populated areas, it seems that the only choice we have to maximize the life of our limited water resources and to avoid national water shortages or hazards in the long run is to apply a wise management and well coordinated policy of tapping and utilizing such resources.

Before trying to delineate the general layout of such complex managerial process, it is worthwhile to envisage first the main relevant features of Jordan and how they will change seven years from now, in view of the development process affecting our community at present.

In 1985 the population will be around 3.5 millions, with more than one third of them situated in Amman Greater Area, about one quarter in Irbid District, another one

third in the Balqa, Karak, Ma'an and Aqaba areas, with the balance which would not exceed 3% of the total population spread over the desert area which is about 85% of the Jordan territory.

New regional development authorities having similar responsibilities and powers to those of (JVA) will be established in Amman, Irbid, Aqaba regions and may be in other parts of the country. The present borders of the Governorates may have to be amended to coincide with the borders of the development regions. New major industries shall become operational such as the potash, the fertilizers, the new phosphate mines at Zarqa, Wadi el-Abyad and Sheidia. A consideration for retorting the oilshale deposits might be given which would require lot of water for cooling purposes, and many other projects shall be initiated which would have a great bearing on the water balance of the country, over and above the per capita water needs which will be appreciably increased due to the expected improvements in the standard of living. The requirements for drinking and domestic water supply will be sharply increased which indicates the importance of a well coordinated water resources strategy to allow and satisfy the domestic water supply in first priority. Requirements are estimated to be about 190 MCM/year in 1985 and 300 MCM/year in the year 2000. Present requirements are 50 MCM/year.

With these most probable expectations and development trends it will be perilous situation if we leave the control and management of our water resources fragmented so that every institution or authority can have free access to acquire the water resources within the area under its jurisdiction without any serious consideration to the national priorities or proper coordination with other authorities through a coordinating national agency who have a full view and knowledge of the water strategy and priorities of the country.

In a situation like this where there are multi institutions involved in the utilization of water resources, achievement of the national goals requires a consolidated legislative and institutional system to secure the enforcement of the national water strategy. This will avoid conflicting interests and decisions, and maintain an updated and comprehensive data base to help the process of policy decisions.

Such a managerial process can theoretically be carried out in many different ways, where any of them may satisfy the objective. However, to achieve the optimum results, the process implemented should be planned with utmost care.

In view of the outstanding facts and most effective development theories and trends in Jordan at present, it is believed that a satisfactory arrangement can be achieved if the process is carried out on three levels of responsibility tied together in a pyramidal setup (Diagram 1) by means of the water act in the following manner:

Level No. 1, or the higher level, is that of policy and decision makers, which in our opinion should be the Council of Ministers.

Level No. 2, is the planning and coordinating board or the water board in which all the functional institutions in the water field are represented in its board of directors, so they can participate jointly and effectively in the role of delineating strategies and policy decisions and proposing them to the Council of Ministers for ratification. This

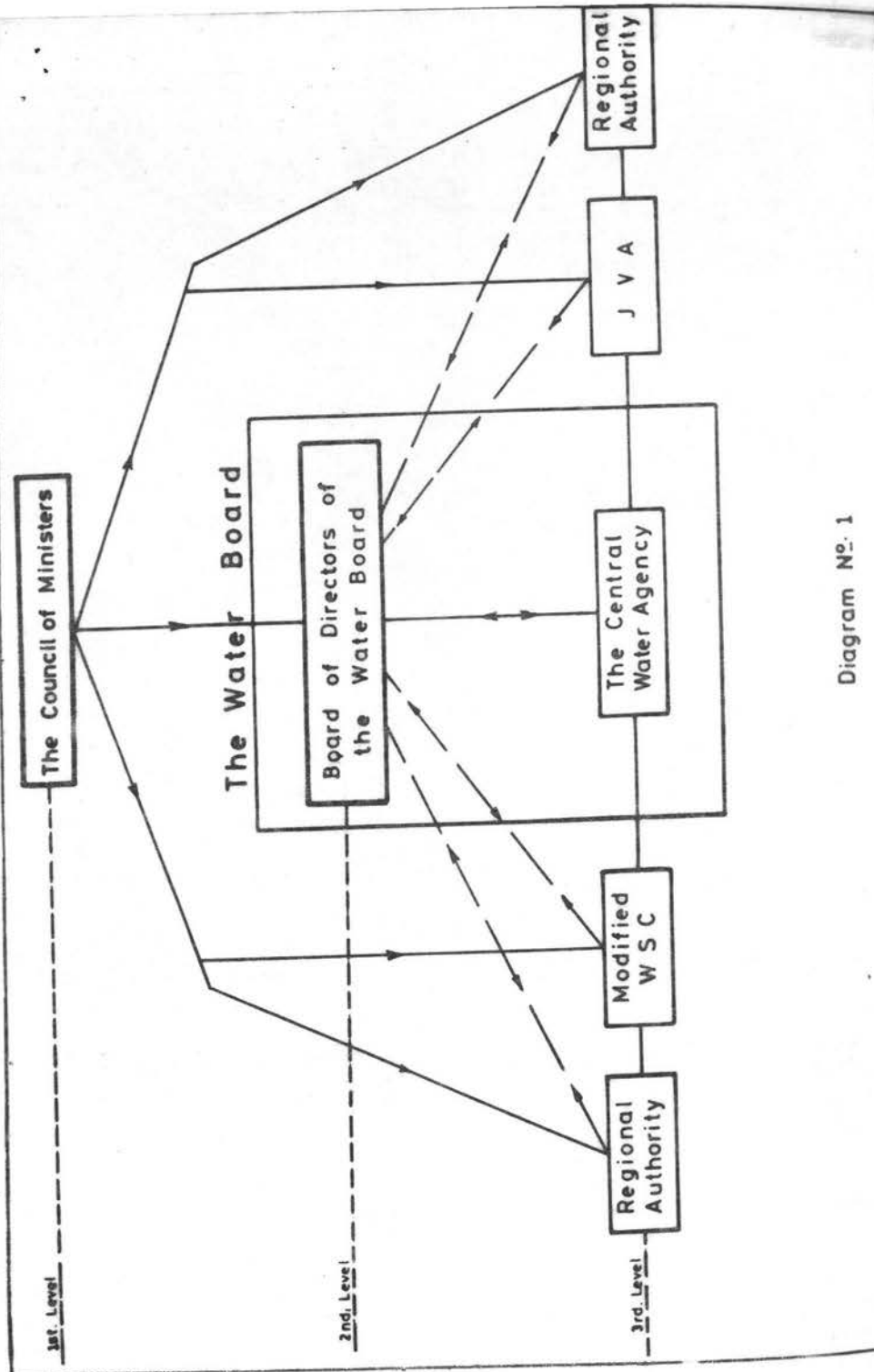


Diagram No. 1

board should supervise a specialised agency which is acting on the third level and is directly responsible to the water board. It would process and formulate the water policy and water budget for the Kingdom and have the power and means to acquire the water data base, conduct studies and investigation as may be necessary and to act as the agency to satisfy the major requirements of the Water Act summarized in section (3) of this paper.

Level No. 3 is the institutional network which includes the above agency, a modified version of the present Water Supply Corporation, the (JVA) and the regional authorities of Amman, Irbid, Aqaba regions...etc.

The whole system is supposed to be governed and coordinated by the Water Act proposed earlier beside the special laws of every individual institution which should be amended or modified to meet and become consistent with the objectives of the Water Act.

The organization of Natural Resources Law No. 12 of 1968 can be restated and modified to become the proposed Water Act and provide for NRA to take the role of the proposed agency which is supposed to be the active agency of the Water Board and entrusted to look after the implementation of the Water Act.

Such a modified NRA beside being responsible for the processing and formulation of policy decision for the consideration and approval of the water board and the Council of Ministers respectively, is supposed also to conduct water studies in those parts of the country not under the jurisdiction of any other regional authority. A provision should be made in the Water Act to allow similar studies needed by the regional authorities to be either conducted by the modified NRA or delegated to the authorities to conduct them directly, subject to the condition that all data and informations resulting from studies should be the property of NRA.

To secure that the future setup of NRA or its substitute will operate efficiently to meet the objectives of the Water Act in the best possible manner, some side issues which do not fall within the scope of this paper, should be treated concomitantly. These issues are:

- The viability of detaching the Geological Survey and Bureau of Mines and the Petroleum Department from NRA.
- The viability of detaching the job of drilling and pumping tests of water wells from NRA and transferring it to a mixed public-private firms to offer such services to both the public and the private sectors.
- Releasing NRA from the responsibility of operating and maintaining the irrigation projects in the Plateau.

All of these issues, together with some other minor issues should be treated in the course of formulating the proposed Water Act.

The Water Supply Corporation Law No. 56 of 1973, should be also amended so that the Corporation, beside being responsible for formulating the domestic and industrial water supply policy in the Kingdom, becomes responsible only for the planning,

design, construction, operation and maintenance of water supply and sewerage projects in those areas not under the jurisdiction of any regional authority working with a capacity similar to JVA.

Whenever a new authority is established in any region, such projects under the control of WSC in this region should be handed over to the newly established authority.

This in fact assumes that the concept of the local water councils provided for in the Water Supply Corporation Law No. 56 of 1973, should be eliminated. It also assumes that AWSA shall become in the future a part of the Amman Regional Authority.

Due to the fact that the priority and importance of domestic water supply in any water policy will be outstanding, it is recommended that the Jordan Government should consider the possibility of linking up the whole country or most of it, as may be applicable, with one or more national water conveyors for domestic supply requirements.

Another consideration should be given also for the establishment of a bank for the supply of traditional equipment and materials not locally manufactured and usually needed for water supply projects to avoid prolonged interruption of service caused by sudden breakdowns and late deliveries which we occasionally suffer from.

If we can introduce such ancillary measures to implement our water projects, operate them properly and efficiently, and make the individuals as well as our national institutional network operate within the proposed consolidated system and abide with it, so that nobody can acquire a water source unless his need for it is justified in view of the national allocations and priorities, we can then eliminate cases where persons owning rich water wells within the municipality areas of some of our major cities and towns are draining the national aquifers for their own interest, while the inhabitants in these cities and towns are thirsty.

We also would not see aquifers like the one of Dhuleil committed and mined for irrigation when it could have offered a better alternative than King Talal Dam to meet Amman water needs.

Such problems which we are now facing because of the absence of a national water policy and a lack of coordination and control, with an overall look to the future economic and social development of the country, should guide those who will formulate and define the means by which we will handle our water affair in the future.

## V. BIBLIOGRAPHY

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## DISCUSSION

Mr. M. Bitoun (U.S.A.)

[would like to probe little more the speaker's thinking with regard to water rights, if I may. If I understand it correctly, you are proposing to abolish all existing water rights. Is that correct?

Mr. Y. Nimry

I never really mentioned this point in the paper, but it might be one of the issues to be considered on the long run.

Mr. M. Bitoun (U.S.A.)

This is one of the most difficult things to do, and very few countries have done it, although it can be done. It certainly requires enlightening policy on the part of the decision makers, but it can be done. If you should do it, and put in the hands of the water board the responsibility of reallocating the water resources, then I would suggest that you give some thought to not making this reallocation permanent, because in ten or twenty years from now you would end up again with the situation whereby the water resources will have been allocated on the basis of today's needs, but not of the future needs. Instead then of making reallocation of water rights, what the water board could do is to give licences which are renewable. The advantage of renewing licences is that the water rights can be reduced from year to year, or whatever, so as to force or encourage the users to apply new technologies. The other advantage is that the needs and reallocation of resources, in a few years from now, might be different, and then through the process of relicencing, you can reallocate resources as you will see fit.

Mr. Y. Nimri

I do agree with Mr. Bitoun's ideas, and I don't think there is any mention of reallocation of resources in the paper. What is proposed in the paper is that we should allocate the resources which are not yet committed, in view of the present and future needs and priorities of the country.

Mr. A. Alagappan (U.N.)

The diagnosis in the paper is admirable and accurate. As for the proposed solutions, just for the sake of argument and the experience of other countries, one wonders whether they will fully come up to expectations. Will not the proposed board be judge and jury at the same time? Will not the representatives of user agencies, by their rank and effectiveness, lend weight to their own mandates? It is to be hoped that the secretariat, servicing the board, would perhaps be more detached, and a clear demarcation can be developed between planning function and their execution function. The other point is that the planning function, the specialists in the universities and in the private sector should also be called upon to participate.

**Mr. Y. Nimri**

It is true that the board of directors of the water board should not represent only the senior people in the different agencies and authorities dealing directly with water affairs, but also Ministers, experienced technical people from universities and other specialized agencies have to participate in the role of planning and coordination.

**Mr. S. Remington (U.S.A.)**

I'd like to commend Mr. Nimry on a very well thought-up paper. The thing that concerns me is about something he said in the paper concerning the lack of manpower, and he goes on saying that, during the past few years, N.R.A. lost more than 75 of its best drillers, 100 hydrologists, hydrogeologists, geophysicists, chemists and civil engineers and more than 300 mechanics, electricians, welders, blacksmiths, carpenters and fitters. To me it's pretty obvious that what is wrong here is that we don't have any manpower to collect the data that we really need. Well, I understand that most of these people have gone to other Arab countries where, of course, the pay is higher. So, how do you overcome something like this? You have to give them some incentives to stay. I think the most important incentive that anybody needs is to have a feeling of job accomplishment and the respect of his colleagues. Well, how do you get this? You have to train them. You have to have some some inducement to make them go to field. For instance any one who collects data should also be required to evaluate that data, and I think if he can do these things he can see the job through from beginning to end. He's got to have an adequate salary. He's got to have adequate management backstaffing.

**Mr. Y. Nimri**

Incentives for people working in the water sector are very important. I cannot really claim that the incentives offered at present are to the standard where people can be tempted to stay. Jordan, with its limited financial resources, cannot compete with the neighbouring countries in terms of salaries and incentives.

However, the Government is very much aware of this problem, and is working seriously on some sort of an arrangement whereby the situation could be eased.

**Mr. A. Kilani (N.R.A.)**

Referring to Page 243, I have a question to ask. After detaching the Geological Survey, Bureau of Mines, drilling and pumping test sections, do I understand that the future function of N.R.A. will be only as a consulting agency for water problems in the country?

**Mr. Y. Nimri**

I'm afraid I didn't recommend to detach the Geological Survey and Bureau of Mines from N.R.A. In fact, it is recommended that we should consider whether it is viable to keep both together or to detach them from each other. Concerning the detachment

drilling and pumping test sections from N.R.A., and creating some sort of a mixed public-private firm, I think that this could be quite a constructive idea, particularly as far as incentives are concerned. In Jordan, as elsewhere, the efficiency of government agencies is generally below the efficiency of private firms which work on purely profit and loss account.

**Mr. R. Raikes (U.K.)**

I have two comments to make on an excellent paper. First, I would like to support and add to what Mr. Remington said with which I fully agree that there should be, if possible, some built-in safeguard to ensure the continuity of hydrological observations.

The present cutback is not simply because of lack of incentives and so on, but because the experience elsewhere, and indeed in the past in Jordan, has shown that hydrological services are generally prime candidates for cutting back as soon as there is any financial stress. Missing years of data can never be satisfactorily replaced. I am talking primarily about surface hydrology, rainfall and climatic data network. The second point is that it is also essential to ensure that the organizational changes do not have repercussions on data collection, storage and publication at the mid-technical level.

**Mr. H. Underhill (F.A.O.)**

The problem of the brain drain is very real one, and has been brought out by a number of speakers. The fact that the Government cannot afford the same salaries that these people can get elsewhere is just a fact. I think that this problem is one that you have to live with. You've got to keep hiring more and more people, and let some of them go, because in fact even though it is a loss to the service, it is also a benefit to Jordan, if they go to other countries. That is one point, and I think related to that is the point made by Mr. Remington of giving a sort of esprit de corps, a sort of morale in the service. That starts with training, because once they've had training, they feel that they are special and different from other people. Again, I think, even in publications, the names of the people who collected and processed the data should be published. These are all little things, but they do contribute to a job satisfaction, and they don't cost anything. So, I do believe that this problem of brain drain can be solved on these non-monetary attractions, because you certainly can't compete, as Mr. Nimry has said, moneywise.

**Mr. Y. Nimry**

The remarks made by Mr. Raikes and Mr. Underhill are quite valid and constructive. However, I really feel that unless the Government enforces some sort of legal arrangements limiting the brain drain, we would continue suffering from this problem.

**Dr. O. Joudeh (J.V.A.)**

Water rights in Jordan have not yet been clearly defined. Priority in use seems to

have been the only criterion adopted to define water rights in Jordan. I believe that well-established water rights, based not only on priority but also on putting the right in a beneficial use, is essential for economic development and for proper management and planning of water resources.

**Mr. Y. Nimry**

It is true that water rights and control on water resources in general are not really very well defined in our present legislation. Clear provisions for this purpose should be contained in any new water act to be introduced.

**Mr. J.C. Glukmann (France)**

I have some comments and may be one or two questions. You are indicating in your future outlooks that you envisaged the decentralization of responsibilities by the creation of regional authorities along with the existing water institutions. I might ask why all these authorities. I would suggest that a study be made of the possibility of creating a private water company, or a semi-public and private water company, as you were referring in the public-private drilling company. Then my question is would it not be more efficient, resourceful, flexible and dependable to have private company in the water sector than a governmental body?

**Mr. Y. Nimry**

First I'd like to answer your last questions. In fact, drilling is a service which presently is practiced by both governmental and private sectors in Jordan. But the water board or the supreme water council, as recommended, should lay down policies and make decisions which would have a bearing on the nation as a whole. I don't think such decisions can be left to private firms.

Going back to your first question on why we should have all these authorities, the question is justified, because these authorities as such in fact do not deal only with water. The Jordan Valley Authority, for example, is an authority dealing with road building, school building, urbanization, and all development projects, in addition to water and irrigation. So, water as such, or the responsibility of handling water problems in the Jordan Valley region, is only one part of the functions of the Authority.

**Mr. J.C. Glukmann (France)**

I would like to clarify that the supreme water council I referred to is not intended to be a private affair, but it is a governmental body, which would be in charge of research, planning and budgeting. Then it would go down to the private firm or company. My country, for instance, is divided into two water companies, and I don't think even in drought period we have water problems.

**H.R.H. Crown Prince Hassan**

I think that what should be clear also is that in France, after the programme of

Amenagement du Territoire, or regionalization, the concept of first centralizing and then decentralizing authority has been long established. It would be, I think, repetitive but necessary to say at this junction, that we have not yet centralized to the point of being able to decentralize, or delegate authority. Certainly, when this delegation of authority comes, not only does one hope it would be specialized in the water field, but also, and I think this is something that should be emphasized in the recommendations, dove-tailed or linked with regional planning process. I think that this paper has probably had more reaction and discussion than the length of the paper itself. Certainly I'd like to thank Mr. Nimry for his contribution.