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Turkey

Concepts and Pr

DEVELOPMENT OF THE EUPHRATES BASIN IN TURKEY - A CASE STUDY

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THE BASIN

Geography

The Euphrates Basin occupies the eastern and southeastern part of Turkey. It cove area of 121,000 km^2 which is 16 percent of the total land area of Turkey. Elevations in vary from 326 to 4,436 meters above sea level. Mean basin elevation is 1,510 meters. topography is rather rugged and the mean slope is about 15 percent. Lands that are suit agriculture cover an area of 2.46 million hectares or 20 percent of the basin. Most of t is in high plateaus which are far above the main river channels.

Climate

The climate of the basin is of the continental type. From north to south there is a g transition from cold to hot continental climates. The mean annual temperatures vary fr (Erzurum) to 18.1°C (Urfa). Mean annual precipitation over the basin is 600 mm. The phical and timely variation of the precipitation is not uniform. The orography has mark on the areal distribution. Minimum and maximum annual precipitations change from 27(1,200 mm; sixty-six percent of the precipitation received by the northern part comes du six months of winter and spring. In the south it reaches eighty-five percent. A large pc precipitation of the upper basin occurs in the form of snow. Mean potential evapotranspi about 800 mm and varies between 580-1050 mm; fifty-five to sixty percent of evapotransp takes place during the three summer months.

Water Resources

The Euphrates River and tributaries drain the basin. Mean annual virgin runoff of t stream of the river furthest downstream in Turkey is 280 mm. Areal and timely distrib the runoff varies greatly. Maximum recorded annual discharge was 2.8 times that of th minimum recorded. Up to seventy percent of the river flow is received during the three months. The ratio of the average monthly maximum and minimum flows is about nine.

Potentialities

High river discharge and great difference in elevation provide an excellent opportun hydroelectric power development. The theoretical energy potential of the basin is appra 86.2 billion kwh (or 0.7 kwh per m^2 per year). Economically expoitable energy potentia estimated at forty billion kwh per year. This is forty-five percent of the Turkey's tota economic hydroelectric potential.

Of 2.40 million hectares of cultivable land potential 2.16 million hectares are suitable for irrigation considering climate, topography and soil. The irrigable land of the area is more than twenty-five percent of the total irrigable land potential of Turkey.

Because of the favorable topographic and hydrologic situation there is the possibility of developing the power and land potential in rather large blocks. Average powerplant size recommended by reconnaissance reports is about 100 Mw. The average size of each irrigation project is 23,000 hectares.

Population

The population living in the basin in 1965 was 3.6 million. The average rate of population increase during the last fifteen years was 26.5 per thousand. The majority live in small agricultural communities. The total number of villages in the basin is 5,300 and the average population of each village is 480. There are 69 towns and 12 cities having average populations of 5,700 and 53,000 respectively. There is an ever-growing rate of population movement toward urban centers within and outside the area. The ratio of urban population to rural population has increased from 0.26 in 1950 to 0.41 in 1965. That corresponds to an average increase of 3.1 percent per year in the rate of urbanization.

Economic Activities

The main economic activity of the basin is agriculture. According to the 1965 census 71 percent of the population is directly engaged in agricultural activities. The dominant forms of agriculture are dry agriculture of cereals in the relatively warmer plains and animal husbandary in the high, cool plateau. Irrigated agriculture, although a very old activity, is still of minor importance. Industry is basically dependent upon agriculture and mining.

The average per capita GNP was $240 in 1964. The distribution among various sectors of the economy is not uniform. GNP per capita in agriculture was $130, while this value was about $570 in industry and services.

Present Utilization

The present level of utilization of water and related resources is extremely low. Most of the land potential is exploited by extensive farming and by rather primitive animal husbandry. The average GNP per cultivated hectare is about $50. Dry agriculture is highly vulnerable to the vagaries of unreliable rainfall. During the 1961 drought, food and fodder had to be rushed in to minimize the grave consequences. Ten percent of the total economically irrigable land potential is inadequately irrigated. Present utilization of the enormous hydropower potential is negligible.

There is a very limited market for the exchange of products. The lack of proper communication and transportation systems and the existing social attitudes of the people toward economic progress are among important reasons for the economic backwardness of the area.

NEED FOR WATER DEVELOPMENT

When properly developed, water is expected to remedy some existing and potential problems of the basin.

Water Supply

A large stretch of land extending between the main streams of Euphrates and Tigris rivers in the south does not have a steady water supply for drinking, household and animal watering

purposes. The number of villages subject to such a condition is more than a thousand. Large numbers of peasant families are forced, because of the lack of water, to carry on a semi-nomadic life. In the words of professor Baity "In other areas where rainfall occurs only sparsely or seasonally, the water to sustain life has to be carried on the heads, shoulders or by donkey-borne gasoline tins or goat skin bags-often for many, many miles. This is the customa system of supply... and it is a task which has traditionally fallen to women. It is not uncommo to find the women of the household using one-half to all their long working hours in this back-breaking, foot-bruising labour."

Irrigation

The development of agriculture in the basin, which is expected to make substantial contributions to the economy as a whole, is highly dependent upon water. There is practically no more land for the development of extensive agriculture. The present productivity of the agriculture is limited by the lack of a secure water supply. It is expected that by the proper development of irrigated agriculture many problems can be solved. Crop production can be stabilized against the maldistribution of the natural water supply. There is a growing market for the products of irrigated agriculture within and outside of the area. Irrigation development can absorb unemployed labor. The release of seasonally employed labor of extensive agricultu for non-farm employment will become possible. Savings from intensive agriculture which provides more output and return per worker can help in the formation of capital for industrial activities. The success of other innovations such as better seed, farming methods and equipme fertilizers and insecticides are dependent upon the introduction of irrigation. The provision of a stable water supply for animal watering purposes can greatly increase livestock production.

Power

The production of cheap and abundant hydropower is one of the essential stimulants for the establishment of basic industry within and outside of the basin. The development of industry will facilitate the establishment of a market economy and increase distribution of the national income.

PLANNING CONCEPTS AND HORIZONS

Change in Concepts

In the early days of water development in the basin the projects were considered as isolate and limited undertakings usually to serve a single purpose. The irrigation projects of Malatya and Erzincan are examples. It was realized that the basin should be considered as a unit for intergrated development. Transplanted ideas from Western countries were mainly responsible for the development of this concept.

When attempts were made to formulate development plans of the Euphrates with this concep several difficulties were encountered. It was difficult to isolate the basin from other parts of the country, since there were interconnections of physical, social and economic character. A basin plan could operate on the production side but not on consumption. It is a highly dangerous concept to regard the basin as a unit in consumption since products can be absorbed outside the basin. Finally the enormous technological changes that may take place in the near future may make that concept quite obsolete. Because of these considerations the planning of the water resources development of a basın requires planners to investigate not only a particular basin within a region but the surrounding area which may even extend beyond the national boundaries. Consequently the planning of the Euphrates basin had to be extended to a far broader context.

The Time Element in Planning

Two factors have greatly reduced the time span in which projects can be evaluated. Rapid and unexpected changes in technology as well as the rapid evolution of social and economic structure limit time projections to a few years. The relatively high interest rates prevailing in the Turkey reduce the present value of long term decisions to almost nothing.

Applied Methodology

For these reasons a special methodology of basin planning has been adopted. Projects of local concern which do not have significant influence on outside markets are undertaken independently after a review of the basinwide needs. The Hazar power project and the Sürgü Dam and irrigation project have been started by first considering the economy of a rather narrow area only.

Projects that may have substantial effect on the national economy are related to the national markets and financing. The Keban project which will be the backbone of the future power supply of Turkey's power network was decided upon after a through appraisal of the power market and alternative ways of supplying power to the system. Such a comprehensive study is greatly facilitated by the existence of an economic development plan for all the country (First Five Year Development Plan 1963-67).

OBJECTIVES OF DEVELOPMENT

The objectives of water resources development must be clearly stated in the early stages of planning because water development in itself is not a goal but a way of achieving national objectives. These objectives may also be achieved by other non-water approaches. For example if the increase of agricultural production is the objective it can be achieved by irrigation but it can be reached as well by introducing innovations in dry farming.

In the case of Euphrates Basin the objectives were not clearly stated. However from the criteria adopted in plan formulation one may deduct that maximization of total production is the aim. However this objective is not widely accepted by the agencies involved in water development and there have been frequent controversies over the plans which have been formulated. J. L. Fisher states appropriately, "The objective of development is to promote the achievement of the national objectives through the development of land, water, energy and minerals at least cost, on a sustaining basis, with a high multiplying effect on further economic development to encourage a wide and equitable sharing of cost to minimize or offset the difficulties of adjustments in particular regions and among particular groups."

BASIN PLANNING

Decision making in basin planning is subject to several constraints. Need for reliable and adequate data, urgency of the decision, the precaution of not disturbing the integrity of the overall development and the dynamic effects of time usually limit the implementation of the plan.

Since the formulation of a basin plan is a rather lengthy operation, it is desirable and it even may be necessary to put some phases of development into effect at an earlier date. By doing this, it becomes possible to realize some project benefits at an early date without seriously effecting the integrity of the final plan. Furthermore it provides a strong stimulant to the efficient continuation of the development efforts. Therefore it is not always advisable to wait for the formulation of "the best plan" which actually does not exist. Details should not be elaborated. Experience strongly indicates that only plans of the broadest design should be attempted. The planning should be considered as a continuing job. The plan should be formulated to contain independent units that may be implemented separately which may produce immediate benefits while preparing the ground for implementation of other units.

In the elaboration of the Euphrates development the foregoing principles have been applied to a great extent. A synthetic planning approach is employed. Separate units are formulated for optimal solutions and then recombined and revised to take care of the optimal combinations. Meanwhile some major structures which may fit into any possible development plan have been commissioned, such as the Keban Dam and Power Project. This approach has also facilitated the execution of several independent irrigation and power projects. As more refinement becomes possible, through the collection of more detailed data, further approximations to the final plan are being made. In formulating the plans and making decisions this philosophy is maintained. The decision with regard to what has to be done should be a decision of what can be done under the existing conditions and limitations. That philosophy, to the author, was the main reason for the smooth continuation of the evergrowing development efforts.

Elastic designs to provide the needed flexibility for meeting uncertainties have been preferred whenever possible. Surgu Dam, for example has been designed for a low elevation with provisions for easy heightening in the future when more information is gathered. Some of the irrigation canals were constructed with a large capacity, while some of the irrigation systems cover more area than can be irrigated with the water available at this time. The Hazar power project has been developed in stages.

A promising approach to basin planning is the use of programming models. There has been so far no application of these methods in Turkey. But in the light of their substantial benefits to decision making they may be used. The need for more data can partly be overcome by carrying out proper sensitivity analysis.

PROJECT FINANCING

Historical Development

There are several sources of project financing. During early periods, the development of projects were carried out by private concerns or by local organizations of water users. But as the size and scope of the water projects became larger private financing possibilities fell short. This fact has forced the government to gradually assume the main responsibility of project financing. However government policy in assuming the financial responsibility has gone so far that the potential contributions of the water users as well as private concerns to the financing of the project have not been used at all. Such an approach has eliminated the active participation of the water users and put them completely on the receiving end of the financing. It is apparent from past experience that water users and private concerns can substantially participate in project financing when their repayment ability is properly considered.

Participation of Water Users

The participation of the water users necessitates the establishment of adequately authorized water users organizations for which draft legislation has been proposed. This bill will provide incentives in the form of subsidies, tax exemptions, and long term credits. It is expected that through such measures the realization of project benefits and resulting sound repayment ability will be possible. Contributions of private concerns and water users organizations can be made in two ways. (a) The repayment of the annual project cost for power is easily made by including the annual cost in the price of the commodity. For water however it is not that easy since it is not being sold on volume basis because of other considerations. The present procedure provided by the law is so complicated that no project could start repayment of the capital cost even after two decades of operation. Attempts have been made to introduce a simple but fast operating repayment system. In some projects the water is sold to a group of farmers on volume basis. That approach has so far been found highly effective. (b) Several attempts have been made to impose a tax on agriculture. It was however not well received by the Parliament. A high tax on the land per hectare however is expected to provide a sound and important source of income while inducing higher yields per hectare, selecting the better farmers and discouraging improper land uses.

Auto-Financing

Auto-financing of water development, although seemingly very attractive, is not a likelihood, at least in the near future, because the investment requirements of an emerging water economy will be far beyond the potential repayment ability based on present production.

International Financing

International financing will probably continue to be the main source of financing for many years. Various international financing organizations have been extending substantial aid to water development. However those funds are always likely to fall short since the demand for financing is far greater than the supply of funds. It is therefore necessary to introduce new sources of financing. A possible source may be from private money lenders in international financing who generally lend money to developing countries through the World Bank (IBRD). They receive an interest of five to six percent approximately half of which is taxed by the government of the private money lender as income tax. In other words the interest paid by a developing country to a private lender is shared by the money lender and his country. If developed countries exempt loans to developing countries from income tax it can bring a substantial increase to capital market. At the same time the rate of interest to developing countries may be somewhat reduced.

INSTITUTIONAL ASPECTS

Development of water resources introduces a change in the present economy that requires the formulation and administration of plans and programs as well the mobilization of a wide variety of resources and efforts. It has been repeatedly observed that even masterly designed plans cannot be made successful if they are not properly administered. Primary obstacles to not fully realizing the goals of development have been political and administrative rather than technical and economic. Problems that have been faced and solutions that have been tried with much or little success are discussed below:

Centralization of Planning Authority

The direct product of development of water resources involves two basic elements of the economy. It relates to the exploitation of water resource and it supplies water and power to the markets of the country. Development planning must, therefore, consider both aspects. That is especially true for hydropower which can be transmitted and marketed at considerable distances. Economic utilization of the resources can be achieved if directly related resources and markets are found and planned in a single perspective. This can be realized if and when the authority for planning is concentrated within an appropriate department of the government. That can be done either by coordination and/or integration.

There have been several approaches to the treatment of this problem. In the more developed countries where there is a long organizational tradition, coordination is generally preferred. In emerging economies integration is considered more effective. In the case of Turkey a mixture of the above two has been simultaneously applied. First the management of the water resources has been completely vested upon a single agency (DSI). Power planning and marketing agencies were autonomous departments for a long time. They were related to the Ministry of Industry while DSI was under the Ministry of Public Works. In 1964 a new Ministry (Ministry of Power and Natural Resources) was established to bring all the agencies related to water resource development under the same umbrella. That attempt would have been completely successful had not another ministry (Ministry of Village Affairs) been established. In spite of this deviation from integration there is a marked improvement in the overall resource planning. However there is still much to be done with respect to agricultural development activities and village administration. Because of different agencies trying to achieve similar purposes almost exactly parallel organizations have been established. This trend may have very adverse consequences since it duplicates many services, introduces wasteful utilization of the presently short technical staff, develops a strong trend toward centralization which greatly effects the speed of decision and action-limiting organizational efficiency.

Functional Departmentalization

The delegation of authority and divisions of responsibilities within an agency have also undergone a simultaneous evolution. In the beginning all the services were concentrated in the headquarters because of a limited number of technical personnel at that time. Then observing the difficulty of carrying out the activities this way, regional offices were established. They were at first mainly for the purpose of construction administration and later extended to cover other activities (survey, planning and operation). During the late fifties it was decided that high quality work carried on by western standards was beyond the capacity of regional offices. Then a trend towards centralizing technical services again started. That continued up to 1963 when it was observed that the efficiency of the work by the central staff was not up to expectanc and, many things can not be performed in central offices. Consequently regional planning agencies were established. The one which was established for the planning of the Euphrates Basin has been so successful that it stimulated the establishment of other basin planning agenci The present trend in functional departmentalization has the following highlights. (a) Headquart offices are responsible for the development of the standards and work procedures, the overall planning and follow-up of activities, the performance of specialized technical services that can not be properly performed by regional offices. (b) Regional offices are fully authorized for the implementation of all the activities within the general plan of operation and in accordance with the established standards and procedure. (c) Organizations to perform a certain function (planning, construction, even operation and maintenance) at the field level are being considered as mobile organizations, having rather flexible organizational set-ups to suit varying condition (d) In order to increase administrative competence special attention is being exercised to train the technical personnel to perform administrative functions, on modern principles of management. (e) The personnel system is unified and designed on continuing education and training principles. As a result of the foregoing improvements and innovations the water and land management organizations operating within the Euphrates Basin are considered to be, by many foreign experts, among the most efficient.

Private Organizations

Development of private construction industry in Turkey has also been a difficult problem. The private sector has a tremendous potential for undertaking construction activities, planning and design activities. There has been a growing trend to improve and develop the private sector in order to utilize this potential. Initially the initiative was provided by adjusting the administration of construction within the provisions of existing legislation to establish a more attractive climate. Although that has brought some improvements, it has been noticed that the existing law, being based on the old and outmoded concepts, will not permit any radical change. There is a draft bill in the Parliament which was prepared based on experience gained and on the modern concepts. Formation of large private engineering and construction firms is encouraged by enlarging the size of projects included in a single contract. Feasibility studies and designs of independent units are being gradually turned over to private firms.

Water Users Organizations

As mentioned above the formation of authorized quasi-public water users organizations wil be possible after the enactment of the Water District Law. It is expected that these districts will be a great help in the operation of water systems as well as for the financing and repaymen of the project cost. These districts are also considered valuable in establishing and maintainin an active and efficient relationship between users and project organizations.

Staffing

The staffing of public as well private organizations has been and still is a serious problem. For specialist services foreign assistance was helpful especially in the early stages of development efforts. However it may worthwhile to mention that provision of single experts to cover special narrow fields of activities did not work well even when the experts were highly qualified

frequently observed that the extension of technical assistance in the form of a team of experts erably from a highly qualified consulting firm) will provide better, cheaper and more comensive training while producing work of practical value.

Development of Local Personnel

It must be realized that foreign technicians even the best ones, can not fully replace the personnel. Because of this, extensive programs in the form of "training abroad" and elopment courses" as well as "training on the job" have been carried on. In developing subssional staff vocational training has been effectively used. Moreover technicians and subssionals having adequate training and experience have been used as instructors for the ing of newly recruited personnel. In offices where this system has been applied properly ome years there has been a real multiplying effect." In the course of a decade the staff two regional offices covering the basin has increased fourfold. In the early stages of ing the emphasis was placed on quantity of personnel. The present motto of training is ed as "High quality personnel in lesser numbers is always better than low quality personnel gh numbers." Standardization of many routine engineering and other related services has antially increased the efficiency of the staff.

COMPLEMENTARY ACTIVITIES

Water control infrastructure is the means to the production of water and power. Unless ate measures are taken, the consumption and use of the products derived from water structure imposes a serious and difficult problem. The experience gained in many developuntries indicate that the failure of many enthusiastic schemes can be greatly attributed to glect of complementary activities that would enable users to consume the products in a essive and healthy way. The main reasons for this neglect are the lack of a comprehensive nent approach and the reluctance of involved individuals to whom complementary ties do not appeal. This was true because of the difficult problems and because of less nal satisfaction with the results achieved. Everybody has a liking and appreciation for which produces some material results such as a gigantic dam, a large canal, a big power- etc. Very few people are aware of the fact that all those major structures are destined "white elephants" unless such modest jobs as farmer training, extension services, credit gements, marketing and processing systems, better water and land management, etc. roperly carried on.

Power Marketing

the case of Euphrates Basin there has been some experience on how to accelerate mption development. So far as power is concerned there has not been any basic problem er marketing to a market which has not yet been satisfied. With the development of the energy potential it was realized that power consumption can be a major problem. Legis- and organizational measures are now under way to improve the power production and ting conditions in the country. There is a bill in the Parliament for integration of all lated power agencies under a single autonomous administration. Even the distribution power to the final consumer will be a responsibility of this agency. There have been read arguments and conflicts about the scope and authority of this agency. The ipalities of large towns are strongly opposed to the integration of their distribution ns and power administrations within the scheme, since the sale of power has been an tant source of income for them. Another argument was raised by the water agencies lates to the exploitation of the hydropower potential. It was claimed that the planning er development cannot tolerate fragmentation of planning authority. The present draft me compromise solutions to these problems. In spite of the above difficulties the ption of hydroelectric power has been generally to the satisfaction even of the most istic. In other words Turkish experience has proven the well known motto once more r develops its own market."

Water Marketing for Agriculture

The introduction of irrigation requires far-reaching changes not only in the techniques but in the social and economic structure of the agrarian society. Generally speaking Euphrates Basin irrigation developments have been more successful than other projects in Turkey, because (a) there was a rather well established irrigation culture especially in the semi-arid plains; (b) most of the projects were planned to shift from scattered type of irrigation which was already in existence to more intensive irrigation; (c) markets for irrigated agriculture have been, to a certain extent, already established; (d) increase of returns due to improved irrigation was substantial.

In areas where these factors were not significant, development did not progress along contemplated lines. Several handicaps could be seen such as (a) farmers were somewhat bound by tradition; (b) they did not use proper agricultural methods; (c) most farmers were not courageous enough to take risks; (d) initial funds were usually lacking; (e) there was very limited provision of auxiliary services; (f) they insisted on poorly farmed subsistence crops.

Various measures have been and are still being tried. They may be put into two broad groups. Close supervision of farm operations worked well for small scale operations when there were no other limiting factors. When the areas and resulting staff requirements grow rapidly, these small operations failed. The approach of rewarding successful farmers has worked well, when there existed (or developed) favorable climate. In case of the Euphrates Basin the agricultural revolution ignited by the sugar factories is a good example to illustrate the potential hidden in properly managed incentives. During 1954-56 four sugar plants were established in various climatic regions of the basin. The average annual capacity of each plant was about 100 to 120,000 tons of sugar beet. That corresponds roughly to a total annual plantation area of 24,000 hectares which, when compared with the total land potential of the basin, is very small indeed. When factories went into operation starting from 1956 they could not obtain enough sugar to run at full capacity. The yields were so poor that many of the farmers were thinking seriously of not planting sugar beet any more. Because of that sugar beet had to be grown and transported from very long distances. To many of the politicians and even to a quite number of technicians, sugar factories were a complete failure.

However from 1958 on very careful, patient extension work designed and implemented by the sugar factory administrations was undertaken. Within the large sugar growing areas, technicians having special training in agriculture have worked with farmers, hand in hand, to introduce several innovations to make sugar beet growing successful. Fertilizers have been introduced, better farm implements were provided, farming methods were improved, local irrigation projects by small pumps were developed by the hundreds. This operation was adequately financed by sugar factories through the farmers cooperatives. The technicians operating the scheme had pioneer spirit to increase the output of their factories. Factories provided a stable market for the product. The increase of the yield did not affect the price. Consequently farmers have been rewarded amply by substential increase of their income. On this fertile ground of development an enormous transformation, with chain reaction, took place in the rather short period five to seven years. Yields per unit area have been more than tripled. Beside fully utilizing the capacity of state irrigation projects, private concerns have developed hundreds of small irrigation projects. The use of fertilizers and better implements are firmly established. The transformation of the sugar beet agriculture has made deep impressions and introduced basic changes to the agriculture of other crops that have been grown in the area for a long time.

Summary of the Experience

The experience gained in the area may be summarized in this way: The incentives have so far worked well. They must be incorporated into any agricultural development plan involving the change from the extensive to intensive system of crop growing. However it may not be adequate to include only incentives in the plan. As it has been repeatedly observed, incentives may need to be reinforced by some pressure. It is believed that the application of direct pressure (compulsion) may be successful in increasing the size of the cultivation area and

adapting some innovations. However better farming which is the essence of intensive agriculture can not be achieved by direct pressure. Some indirect pressure must be introduced which will reward the successful farmer. As has been observed in some other countries such an indirect pressure can be introduced in the form of a substantial tax levied on the irrigated land after the development period is completed. This tax should be assessed on an irrigable hectare basis and should have a constant rate. This kind of tax is expected to have the following advantages: (a) induces higher yields per hectare; (b) it selects the better farmer while heavily punishing the poor farmer and absentee landlord; (c) it provides an important source of income. The success of the taxation plan as well as incentives is closely related to land registration. It is therefore prudent, at an early date in development, to start a program to settle this lengthy and troublesome land registration problem.

INTERNATIONAL COOPERATION

International cooperation in water development involves two distrinct types of cooperation: economic and financial cooperation between donor and recipient countries and technical and/or economic cooperation among those countries within a river basin. The former cooperation seems to be the backbone of economic aid extended by many aid-giving countries. Although the funds allocated for the purpose look enormous, they are made inadequate by the immense demands of development.

Generally speaking cooperation between the countries within an international river basin is indispensable to resolve conflicts and to increase economic efficiency of resource utilization. On an international river the work constructed in one country may advantageously or adversely effect the other(s). The development of the projects downstream may necessitate the construction of some works in an upstream country.

The settlement of the international water disputes cannot be made according to international law. Such law does not and cannot exist. It becomes therefore the responsibility of the concerned countries to develop a solution to their own problems. This is usually a delicate task since it is an operation of finding a point of compromise for many diverging claims and demands which normally have their origin in controversies other than the one under discussion. These other controversies may even involve issues which may be regarded, by involved countries, as issues pertaining to national prestige. Under such difficult conditions speculative attempts to resolve all these conflicts in a single negotiation are bound to completely fail. International river basins in conflict, in Asia, Latin America and Middle East confirm the above conclusion.

However those failures should not be considered as indications of the impossibility of cooperation in international basins. The Turkish experience gained on its international rivers with the USSR and Greece suggests that by a carefully planned sequential approach to the problem, constructive and successful cooperation can be achieved. It is believed that the following stages in sequence can offer a solution to the problem.

a) Basin countries should agree to isolate the discussion on a specific river basin from other controversies.
b) A permanent joint technical committee having the following duties and responsibilities should be established:
   - The collection of basic physical, economic and social data
   - Elaboration of some alternative plans for the maximum human benefit within the frame of respecting and safeguarding national interests and providing mutual satisfaction
c) Political negotiations can then be based upon the above plans and carried on simultaneously
d) During development, periodic reviews of the agreed plan and measures of flexibility shall be introduced whenever necessary.

Attempts at international cooperation in the Euphrates Basin have followed so far the above procedure. The results obtained are good enough to make one hopeful.

CONCLUSION

The Euphrates Basin in Turkey with its large potential and wide involvements can be regarded as a case where various aspects of water resources development are manifest, where a number of problems have been faced and solutions sought.

The development in the basin is on the march. Following the principles stated above a flexible master plan has been developed. It contains major as well as minor structures to develop the basin potential. Eighty dams, sixty-six hydropower plants, sixty-eight irrigation systems are proposed for the production of 24 billion kwh of electric energy and for the irrigation of 1.6 million hectares of land. Some major units are already under construction, Keban Dam, Surgu Dam, Medik Dam and Cip Dam will all be completed in the course of the coming years. Other major structures such as a second high dam on the Euphrates, power and irrigation dams in the upper basin are included in the Second Five Year Plan (1968-1972). Several irrigation systems at Erzurum, Erzincan, Malatya, Elazig and Muş provinces will also be completed during the same period. Meanwhile the organizations operating within the basin are being improved and expanded qualitatively and quantitatively. The final consumer of the products of the basin is more conscious of the importance and the value of the services. It is anticipated that the basin will, in the near future, witness increased economic development. Many problems even more complicated and difficult than the ones faced can be expected. They must be recognized, analysed and brought to appropriate solutions. Those problems and difficulties however, we consider as signs of the vitality and dynamism of the project. If they are not there then this means that the motivation and the driving force of development will have been dissipated.

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