FINANCING THE PLANNING AND DEVELOPMENT OF WATER RESOURCES

ENZO FANO AND MARCIA BREWSTER

This paper first examines the financial requirements for development of water resources in developing countries by 1990. Estimates of requirements for irrigation and drainage, community water supply and sanitation, hydropower, and assessment and planning are presented. In the second part of the paper some measures for mobilizing financial resources to meet indicated requirements are suggested. These include: choosing among available multilateral and bilateral assistance programmes at the international level; budgetary allocations and water pricing at the national level; and community participation at the local level.

Dans un premier temps, cet article étudie les exigences financières de la mise en valeur des ressources en eau dans les pays en développement jusqu'en 1990. Il fait l'évaluation de ces exigences dans les domaines de l'irrigation et du drainage, de l'approvisionnement en eau des communautés, de l'aménagement sanitaire, de l'hydroélectricité, de l'évaluation et de la planification. La deuxième partie du rapport présente des suggestions concernant la mobilisation de ces ressources financières pour répondre aux besoins susmentionnés. Celles-ci comprennent: les programmes d'assistance multilatérale et bilatérale au niveau international, les allocations budgétaires et la tarification d'eau au niveau national et la participation des communautés au niveau local.

Este artículo examina primeramente los requerimientos financieros para el desarrollo de los recursos hídricos en los países en desarrollo hasta 1990. Se incluyen los estimados para irrigación y drenaje, suministro de agua potable, saneamiento e hidroelectricidad, así como para la evaluación y planificación. En la segunda parte del artículo se sugieren algunas medidas para la movilización de recursos financieros destinados a cubrir estos requerimientos. Estas medidas incluyen: la selección entre programas de asistencia bilateral y multilateral, a nivel internacional; asignaciones presupuestales para los recursos hídricos y tarificación, a nivel nacional; y participación de las comunidades a nivel local.

1.0. Introduction

Since the United Nations Water Conference (1977), the water resources sector in developing countries has received considerably more attention than in earlier years. The Conference produced the Mar del Plata Action Plan which outlined specific activities that

Enzo Fano is Deputy Director and Marcia Brewster, Economic Affairs Officer in the Water Resources Branch of the Natural Resources and Energy Division, TCD, United Nations. The article is based on a paper prepared for the Fourth World Congress on Water Resources, International Water Resources Association, Buenos Aires, 3-11 September 1982.

Natural Resources Forum 6 (1982) 289–305.

governments in developing countries might perform in order to bring about systematic water resources development based on rational planning at the national level. Further attention was focussed on the water sector when the United Nations General Assembly launched the 'International Drinking Water Supply and Sanitation Decade' (1981-1990) on 10 November 1980. As water resources development and community water supply and sanitation have become major priorities on a global scale, the international community has devoted increasing quantities of its financial and technical resources to this sector.

The first part of this paper examines the financial requirements for meeting the objectives of the Mar del Plata Action Plan and the Drinking Water Supply and Sanitation Decade by 1990. Estimates of requirements for irrigation and drainage, community water supply and sanitation, hydropower, and assessment and planning are presented. These estimates were mainly developed by United Nations agencies for the United Nations Water Conference and the Drinking Water Supply and Sanitation Decade. Some of them have been revised.

The second part of the paper suggests some measures for mobilizing financial resources to meet indicated requirements. These measures include: choosing among available multilateral and bilateral assistance at the international level; budgetary allocations and water pricing at the national level; and community participation at the local level. The gap between requirements and availability of financial resources is briefly discussed.

The success of any development programme depends on the government's ability to set priorities and mobilize resources. If the government has determined water resources development to be a high priority, it will be essential for it to devise means of mobilizing finances in order to implement its plans and projects.

2.0. Estimated Level of Expenditures Required for Water Resources Development by 1990

In preparation for the United Nations Water Conference, many countries conducted surveys of their existing projects and facilities in the water resources sector. The results of these surveys were used by various United Nations agencies to estimate the overall manpower and financial requirements of developing countries for the development and conservation of their water resources. For example, the Food and Agriculture Organization (FAO) estimated the level of finance needed to improve existing irrigation and drainage facilities and construct new facilities in developing countries by 1990. The World Health Organization (WHO), in turn, used country estimates to determine the level of investment needed to supply everyone with accessible drinking water supply and sanitation by 1990. The World Bank has revised the estimates for water supply and sanitation and has estimated financial requirements for hydropower development in developing countries by the year 2000. Finally, the World Meteorological Organization (WMO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) prepared estimates of manpower and finance necessary to enable all developing countries to assess their water resources by 1990. Details of these estimates are given below.

2.1. Irrigation and drainage

The Food and Agriculture Organization of the United Nations (FAO), in its report to the United Nations Water Conference held in 1977 (E/CONF. 70/11), estimated investment requirements for irrigation and drainage improvements, as well as for new irrigation in 90 developing countries (excluding China) to be of the order of $98.0 billion for the period 1975-1990 (at 1975 prices), envisaging a phased programme involving yearly investments of $5.6 billion for the first 10 years and $8.0 billion for the subsequent five years. A 1981 FAO study ('Agriculture: Toward 2000') estimates that between 1980 and 2000, a total investment for new irrigation and improvements of $231.4 billion (at 1975 prices) will be needed or approximately $434 billion in 1980 prices. Furthermore, costs for flood control and drainage would amount to about $18 billion over the same 20 year period (at 1980 prices). Annual investment requirements the sector are estimated at $11.0 billion in the 1980s (at 1975 prices) or about $20.7 billion at 1980 prices; thus, there has been a quantitive jump in the recent estimates when compared to those which preceded the United Nations Water Conference.

In its 1977 report FAO had estimated that improvements on existing main and on-farm systems for the supply, distribution and application of irrigation water would be needed for some 45 million hectares in developing market economies by 1990, while drainage improvements should extend to 52 million ha. Furthermore, within the programme envisaged up to 1990, the area for new irrigation development was estimated at 22 million ha. in the developing countries. The high cost of developing new works (estimated at approximately $4,500 per ha. at 1980 prices) reflects the general need to exploit more difficult and expensive land and water resources than those which have been developed in the past. It also incorporates drainage works, land preparation and other essential inputs whose costs were so often ignored in earlier schemes.

Rising costs of development as well as improvement of existing schemes give serious cause for concern. However, many countries still have a large potential for lower cost irrigation. Consideration must thus be given to the possibility of decreasing costs by developing national facilities, skills and materials and by introducing phased development, proceeding with initial small scale, low cost schemes which can later be integrated into major schemes as national capabilities are developed.

2.2. Drinking water supply and sanitation

If the major goal of the International Drinking Water Supply and Sanitation Decade (1981–1990), that of providing clean drinking water and sanitation facilities to all by 1990, is to be met, it is estimated that an additional 2,500 million people would have to recieve water and/or sanitation services during the Decade, including some 250 million for whom service would have to be improved.

In their report on community water supply submitted to the United Nations Water Conference, WHO and the World Bank estimated that $US 132.40 billion (in 1977 dollars) would be required in construction costs to meet the goal of adequate water supply and sanitation for all by 1990, or $8.87 billion per year. Additional funds would be needed to establish the administrative and managerial infrastructure to operate and maintain the new services.

The World Bank has more recently estimated that, unless the current emphasis on sewerage and on individual house connexions in water supply were to change, the total cost of meeting the goal could be as high as $600 billion by 1990 (in 1978 dollars). By choosing suitable technologies for both the urban and rural subsectors and by providing a wider mix of service levels, the Bank feels that this cost might, however, be brought down to $300 billion or less ($380 billion at 1980 prices). Thus, investment requirements may vary considerably with the choice of technology and the mix of services provided to the people. For example, substantial reductions are possible in the water supply subsector by using a suitable mix of services involving individual house connexions and community standposts and handpumps.

By adopting cost-reducing measures such as providing standposts rather than house connections, a greater percentage of people could be reached in a given time, or a large portion of the population could be served sooner. The main reason for adopting basic levels of service would be to attain the social goal of providing a minimum level of service to the whole population as quickly as possible.

The estimate of $300 billion by 1990 would thus imply the provision of basic systems using appropriate technology which would satisfy health requirements. Although this figure only provides a rough order of magnitude of investment needs, it does indicate that the objective of drinking water and sanitation for all by 1990 presupposes an annual rate of investment of something approaching $30 billion (at 1978 prices), or somewhere between four and five times higher than the estimated investment level of 1979.

Expenditures of such magnitude will necessarily have to be shared among a variety of sources. In particular, government budgetary resources will have to be supplemented by contributions from the community in cash and kind, since bilateral and multilateral contributions are estimated to amount to only some 20 to 30 per cent of the required total. Measures for mobilizing financial resources will be discussed in Section 3.0.

2.3. Hydroelectric power

The World Bank, in its report *Energy in the Developing Countries* (August 1980) has estimated that a total investment of $176 billion in 1980 prices will be required for development of hydropower resources in developing countries from 1981-1990. Average annual investment needed to achieve this target would be $16.4 billion from 1981-1985 and $18.8 billion from 1985-1990. If costs for transmission and distribution of energy are excluded, the investment required for hydropower generation is $10.8 billion per annum for the first five years and $12.4 billion per annum for the last five years of the decade.

Approximately 50 per cent of the world's hydropower potential is in the developing countries, totalling about 1,200 gigawatts, of which only 10 per cent has been developed. Given the large increases in oil prices, many hydro sites which were previously uneconomical have become attractive. Developing countries are increasingly taking up hydro surveys and feasibility studies in order to exploit these possibilities, but given the long lead time for such projects the results during the present decade are likely to be modest. Nevertheless, the World Bank has projected that about 100 gW of hydro capacity will be added in some 60 developing countries by 1990.

Because of the long lead time required to bring hydro electricity and other domestic sources of energy into production, investments must be expanded as soon as possible if import requirements for fuel in the late 1980s and 1990s are to be kept within feasible limits. Energy production is capital intensive, and in all countries careful choices have to be made among potential sources of capital and energy to ensure that available capital (both domestic and external) is deployed so as to maximize economic benefits. Technologies are changing rapidly in response to the high price of oil so that assessments of technical feasibility and economic returns will have to be kept under constant review.

Lending for electric power generation from the World Bank and other donors is increasingly emphasizing hydro power plants. In fiscal year 1980 alone, the World Bank financed 4,847 MW of new hydropower capacity, as much as in the previous four years.

2.4. Assessment, planning and project identification

No water resources planning or development, be it for purposes of irrigation, community water supply, hydro power, or industry, is possible without an assessment of the quantity and quality of water available. The nature of the assessment depends on the stage of planning or execution of the water resources project, but a continuous basic collection of data is necessary for all types of assessment or planning activities.

In the report prepared jointly by WMO and UNESCO entitled 'Assessment of water resources: networks, surveys, services and related facilities; present status and requirements by 2000' (E/CONF. 70/14 for the United Nations Water Conference), the financial requirements as of 1976 to enable all developing countries to assess their water resources by the year 2000 are put at $8.98 billion ($14.6 billion at 1980 prices) or approximately $400 million per year ($650 million at 1980 prices). These estimates are based on the establishment of networks of hydrological observing stations and related services at a certain minimum density level in all developing countries.

Aside from the financial resources required to set up a hydrological data collection network, which can be quantified, planning in the water resources sector will have to be improved qualitatively in most developing countries to ensure the selection of integrated and well-defined programmes which take external factors, such as the environment, into account. The financing that is made available for water resources development, from scarce internal and external resources, depends on the availability of well-defined projects, on the degree of priority assigned to these projects in the water sector itself and, within the overall planning system, vis-a-vis projects in other sectors of the economy.

2.5. Estimated magnitude of financial requirements

The estimates for investments required in developing countries by 1990 for the development of irrigation, community water supply and sanitation, hydropower and assessment, as outlined above, are summarized in the table below.

The total of these figures may not accurately represent actual requirements in the water sector as a whole, particularly since in many cases figures would be for multipurpose projects. As a gross measure of the order of magnitude of investment requirements involved in the development of water resources, however, these figures are probably

SECTOR	Total financial requirements, 1981–1990 (million $US, 1980, prices)[a]	Annual financial requirements (million US$, 1980 prices)	
		1981–1985	1986–1990
Irrigation and drainage	207,000	20,700	20,700
Water supply & Sanitation	380,000	38,000	38,000
Hydropower	115,900	10,800	12,400
Assessment and planning	6,500	650	650
Total	709,400	70,150	71,750

[a] Estimates converted to 1980 prices by using the World Consumer Price Index from International Monetary Fund, *International Financial Statistics* (Washington, DC, IMF, various issues).

sufficiently indicative, especially since expenditures for water development in several other sectors were not included, which may offset the advantages noted above.

An annual amount of over $70 billion (1980 prices) during the decade can therefore be used as a rough estimate of the annual capital requirements for the development of water resources in developing countries. This is approximately 3.4 per cent of the total gross domestic product of the developing countries in 1980 (estimated by the World Bank at 1978 prices in its *World Development Report, 1981*, Table 2.11, and converted to 1980 prices).

The level of foreign exchange requirements for the above programme is not evident. In the case of water for irrigation and drainage, the ratio of foreign exchange to total investment requirements was estimated at about 50 per cent at the United Nations World Food Conference in 1974 (E/CONF.65/4, Chap.3, Table 5). If it is assumed that the ratio will hold true for the revised cost estimates, then the annual foreign exchange requirements for water for agriculture will be of the order of $10.4 billion for the period 1981-1990. In the same manner, foreign exchange requirements for hydropower generation are also estimated at about 50 per cent of total investment (Baum, 1977), and hence could also be estimated at about $5.4 billion per year until 1985, at which point they would reach about $6.2 billion.

If the foreign exchange requirements are estimated at 25 per cent for community water supply and sanitation, and for water resources assessment, the total foreign exchange requirements for the sector would be in the neighbourhood of $25 billion per annum. If we assume that, as was the case in the generation of electric power (Friedman, 1976), 80 per cent of the foreign exchange requirements would come from foreign capital flows, and that the bulk of these resources would come from international and bilateral sources rather than from private sources, the annual level of foreign exchange to be supplied by international and bilateral organizations would be about $20 billion at the outset, or 29 per cent of the total. It is conceivable, however, that at later stages of development the amount of foreign exchange requirements relative to the total investment requirement may decrease as the capability of developing countries to produce their own capital goods and to use local raw materials expands.

The above very rough estimates of the order of magnitude of annual investment requirements for water resources development do not explicitly include any provision for the recurring costs of operation and maintenance of the projects. The general trend

so far has to be to allocate financial resources to the construction of new schemes, rather than to commit funds to the support of maintenance and repair of existing installations. In many cases, it is simply assumed that the local community will cover the costs of O & M. If this is the case, it must be communicated to the local group in order to gain their acceptance before the project is completed. The O & M costs may be a significant expenditure at the local level, and projects must be planned with that in mind. Furthermore, the estimates do not generally include costs for training local manpower to operate and maintain the projects. These two elements could, however, constitute a bottleneck which would slow down progress and effectively decrease the actual demand for external financing.

3.0. Major Sources of Finance

According to the estimates presented above, yearly investment requirements for developing countries in the water resources sector currently amount to some $70 billion, of which up to $20 billion might be expected to come from external sources. For the water supply and sanitation sector alone, UNICEF estimates that 20 per cent of capital investment costs come from external contributions, 40 per cent from government budgets, and 40 per cent from the communities, the latter contributing in cash, labour and kind. Clearly, the type of action which can be taken by developing countries will depend on the extent to which they can assign a growing share of their budgets and local resources to investment in water resources development and the extent to which they would be able to allocate to such programmes the amounts of foreign exchange required. Moreover, it will be the government's responsibility to mobilize funds from external sources. Some means to mobilize local and external financial resources will be examined below.

3.1. External contributions

The international community is a very important source of capital for development, either through international organizations or through bilateral programmes, and will continue to play a pivotal role in the financing of water resources development, which does not attract significant amounts of private foreign capital. Some recent figures on external assistance to the water resources sector in developing countries are given below.

These figures, some of which are only rough approximations, indicate that in the last few years between $5 and $6 billion per year in external assistance was probably available from the major international sources. The figures below may underestimate the level of commitments, as many sources were not included, since their contributions to the water sector could not be estimated. Furthermore, many of the estimates are only of loans to the water supply and sanitation sector, rather than to all projects with a water supply component. On the other hand, actual disbursements would have been much lower than commitments, so perhaps the figures do indicate the order of magnitude of assistance actually provided.

This section of the paper provides a general idea of the capabilities and procedures of various international donors, as well as a breakdown of assistance provided to water resources projects.

Source	Level of commitments (million $US)
World Bank and IDA (1980)	2,840
African Development Bank Group (1978)	59
Asian Development Bank (1979)	359
Inter-American Development Bank (1981)	888
International Fund for Agricultural Development (average)	150
UN Capital Development Fund (1980)	8
European Development Fund (average)	24
OPEC country speical funds (average)	160
UNDP (average)	40
World Food Programme (average)	80
UNICEF (1980)	53
OECD bilateral (1979)	550

A. International banks

Within the United Nations system of organizations, the World Bank is the major source of loans and credits for a variety of development activities. World Bank loans for water resources development are channelled through the World Bank itself and through the International Development Association (IDA). The Bank normally makes medium- or long-term loans at relatively low rates of interest, the principal repayments beginning at the end of a grace period.

In fiscal year 1980 World Bank Group loans solely to irrigation projects amounted to $1.43 billion, falling to $1.23 billion in fiscal year 1981. However, loans to the agriculture and rural development sector rose from $3.4 to $3.6 billion over the same period. Loans to hydropower projects have risen sharply from an average of $239 million during fiscal years 1977-1979 to $783 million in fiscal year 1980 and $864 million in fiscal year 1981. Since the World Bank expects that hydropower will supply an increasing proportion of total energy needs in the 1980s and 1990s, it is likely that its loans to the hydropower sector will continue to increase.

As for the water supply and sanitation sector, World Bank and IDA loans reached a peak of more than $1.0 billion in fiscal year 1979, 43 per cent of total external financing for water supply and sanitation in the developing countries for that year, and three times the average lending to the sector over the previous five years. It was expected that the Bank would commit an average of $700 million per annum to the sector from 1980-1983, or about 34 to 35 per cent of total external financing. In fiscal year 1980, however, total lending for water supply and sanitation projects reached only $631 million and in fiscal year 1981 loans amounted to $535 million. The decline in actual disbursements during these two years was primarily a result of the postponement in implementation of certain projects and does not imply a reduction in the commitments originally envisaged.

At the regional level, the African Development Bank, the Asian Development Bank and the Inter-American Development Bank play an important role in the development of water resources. As in the case of the World Bank, the regional banks channel their financing through conventional and concessional loans.

The African Development Bank offers long-term low-interest loans as well as interest-free loans under its African Development Fund. By 1978 the cumulative total of loan commitments from the bank group had reached $1,380 million, of which approximately 13.6 per cent or $187.6 million had been destined for water supply and sanitation projects. In 1978 commitments from the African Development Bank Group to the water sector reached $59 million. Generally, African Development Bank loans are designed to finance up to 65 per cent of the total cost of a project, and they normally cover the foreign exchange component in part or in full. Of the water sector projects approved in 1978, financing by the bank group amounted to about 42.5 per cent of the total costs of the projects.

Up until 1980 the Asian Development Bank had disbursed loans amounting to $5.65 billion from its ordinary capital resources, of which 25.5 per cent was allocated to water supply and sanitation and irrigation projects. From 1977 to 1980, reflecting the greater priority given to water resources in recent years, approximately 28 per cent of total loan commitments (amounting to $4.7 billion) were made to the water sectors. Commitments to all water sectors reached $359 million in 1979. Lending to the water supply and sanitation sector alone rose from $84.8 million in 1977 to $223.4 million in 1980.

The Inter-American Development Bank (IDB) makes low-interest loans from its ordinary interregional capital and concessionary loans from its Fund for Special Operations. From 1961 to 1981 the IDB allocated to water resources projects a total of $6.5 billion in loans from its various sources, an average of 30.6 per cent of the total loans granted by the Bank. In 1981 a total of $888 million in loans was allocated to water, of which 21 per cent were for water supply and sewerage, 25 per cent for irrigation and 54 per cent for hydroelectric power. The bulk of the resources was allocated from the Fund for Special Operations and other sources, which bear lower rates of interest.

Since the 1960s the IDB has played a key role in financing water supply and sanitation projects in Latin America through its Fund for Special Operations and the Social Progress Trust Fund. During the decade of the 1960s, IDB provided about 28 per cent of the financing for urban sanitation in the region, over 70 per cent of the total external financing available, and 16 per cent of the investment in rural sanitation, virtually all of the external financing in the sector. The total cost of water and sewerage projects from 1960 to 1980 amounted to almost $3.4 billion, with the IDB contributions close to $1.6 billion, or 47 per cent of total investment (Alfaro. 1981). Loans to the sector reached a peak of $201.3 million in 1977 and averaged $146 million per year from 1978 to 1981.

Furthermore, the European Investment Bank has given assistance to some of the developing countries in Europe and to certain developing countries in Africa for the development of their water resources.

B. International development funds

The International Fund for Agricultural Development (IFAD), established in December 1977, had by 1981 provided or approved about $1,260 million in loans and grants which are used for projects directly benefitting small farmers and the rural poor in 76 developing countries. It is expected that its irrigation-related activities will have an increasingly important impact on the development of water resources in rural areas.

IFAD focusses on problems of food production in the poorest sections of the rural population in the poorest nations. In 1982 IFAD will require payments from developed and developing countries of $650 million to cover the agreed $450 million programme of new loans and grants, as well as the $200 million in projects already approved pending the availability of funds.

Since its target groups are primarily the poorer small farmers, IFAD generally receives projects with a relatively large local cost component, and is prepared to provide foreign exchange for the financing of a part of the local cost component. It also considers for inclusion as project costs the incremental operating costs arising during the project implementation.

The United Nations Capital Development Fund finances projects in the form of grants to the least developed nations. An interesting factor of the Fund's grants is that projects that are expected to produce revenue are also expected to repay the grant at the ongoing rate of interest in the country concerned. Repayments are fed back into domestic revolving funds. The Fund concentrates its efforts on meeting the needs of the poorest people in the world's poorest countries. Emphasis is given by the Fund to community involvement, the local population participating in all project phases. Within this context, the improvement of rural water supplies and sanitation plays an important role in the Fund's activities. In fact, 31 per cent of the Fund's total commitments has been allocated for this purpose. Approximately $2.6 million was spent for water supply and sanitation projects in 1977, rising to $8.5 million in 1980.

Regional development funds which have shown considerable interest in water resources development are the Arab Fund for Economic and Social Development, the Kuwait Fund for Arab Economic Development, the Saudi Development Fund and the Arab Bank for Economic Development in Africa. Since their inception, these programmes have given a great deal of importance to rural development and, within this framework, to water supply problems.

In addition, the Fund for International Development of the Organization of Petroleum Exporting Countries (OPEC) lends programme support to certain developing countries which are eligible for loans on the basis of their *per capita* income, resource gap, current account position and dependence on energy imports. As of December 1977, the Fund had signed loan agreements amounting to $17.3 million in foreign currency for use in connexion with water resources, of which 65 per cent were for hydropower development, 25 per cent for water supply and 10 per cent for irrigation. The Fund has also given assistance in the form of loans in local currency amounting to $11 million in the water sector.

Although complete figures are not available, it is estimated that the OPEC countries are currently lending a total of about $160 million per year to developing countries for water supply and sanitation projects. Almost half of this is from the Arab Fund and nearly one-fifth from the Kuwait Fund.

Moreover, the European Development Fund has had an active programme for the financing of water resources development projects in developing countries. Its total commitment towards the water supply and sanitation sector for the period 1961-1975 exceeded $180 million, of which one-third was for the rural sector. The indicative programme for 1976-1980 is on the order of $120 million, of which 40 per cent is for

rural water supply. Finally, the Organization of American States has also been engaged in technical assistance activities in developing countries.

C. Other sources of external financial assistance

(i) The United Nations system of organizations

The United Nations Development Programme (UNDP) provides the bulk of the financial resources, on a grant basis, for pre-investment technical assistance to developing countries. According to UNDP classifications, its total assistance to projects in the "land and water" sector from 1972 to 1980 amounted to $215.2 million, out of total expenditures of $3,420 million. The UNDP contribution amounts to about 43 per cent of the total costs of its projects in the land and water sector, with governments contributing the rest. Average expenditure by UNDP in the water resources sector is estimated at about $40 million per annum for 1977 to 1980, or about 8 to 10 per cent of its total expenditures. In 1980 its expenditures on projects in the water supply and sanitation sector reached $22.6 million, and in the "land and water" sector $31 million, out of total UNDP expenditures of $612 million in that year.

Under country programme procedures, UNDP assistance and funds are allocated in accordance with the priorities assigned by governments to various sectors and projects. The governments participate in the projects through counterpart contributions in cash or kind.

The World Food Programme also gives assistance to projects involving water development, including irrigation and drainage, flood control, erosion control, watershed management and drinking water supply in rural areas. In these projects, food granted by the Programme takes the place of wages to a greater or lesser extent, thus reducing the cost of the labour component. It is estimated that on average some 27 per cent of resources committed by the Programme to development projects (approximately $300 million per year) is devoted to water and land development.

The United Nations Children's Fund (UNICEF) provides assistance in the area of rural water supply within the context of child and family welfare. Assistance is largely provided to developing countries for the supply of equipment and material, as well as for logistic and other project support. Most of this financial assistance is in the form of grants in equipment and personnel, with a minor portion in cash grants for training and other purposes. Total expenditure by UNICEF on water supply and sanitation in 1977 was about $18 million, or about 15 per cent of the over-all expenditure. This rose to $53 million in 1980, and plans are to reach $75 million in 1983. As is the case with UNDP, recipient countries are expected to participate in the project through counterpart contributions.

Other agencies within the United Nations system which provide technical assistance to the water resources sector, but are not financing agencies, include UNESCO, WHO, FAO and WMO.

(ii) Bilateral assistance from member countries of OECD[1]

The bilateral assistance programmes of industrialized countries also play an important role in financing projects for the development of water resources. Many of them also give priority to community water supply projects. For example, financial assistance for water supply and sanitation from government members of the Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD) was estimated at $226.5 million for 1975, rising to $550 million in 1979, about 23 per cent of the global total. Some governments are now providing support on a grant basis to the least developed countries, and some provide assistance only to projects in the rural sector.

3.2. National level contributions

As mentioned previously, the major share of investment in water resources will have to come from the developing countries themselves. This domestic investment requirement was estimated at $50 billion per year in Section 2. Actual investment for water resources in developing countries in recent years cannot be estimated. However, the World Bank has estimated that in the water supply and sanitation sector alone, overall annual investment available has been of the order of 40 per cent of the required $30 billion per year (over $2 billion from external sources, and somewhat less than $10 billion from the developing countries themselves). It is probable that investments generated from the national budgets of developing countries for the water resources sector as a whole amounted to at least $15-20 billion annually during the early 1980s. To bring about more than doubling of that investment will not be easy, however, especially in the poorer countries. Not only will priorities have to be revised at the national level, but also at the local level, where community contributions will have to be mobilized.

A. National budget

At the national level, progress towards meeting the goals of water resources development will be determined by the rate at which the developing countries can mobilize internal and external resources and the rate at which they are able to increase their capabilities to absorb and benefit from this rapidly increasing influx of investment. The national government is the focal point for mobilizing revenues from the local level, for allocating a portion of its budget for planning and assessment, and for appealing to international donors for assistance.

The required financing might be obtained from the national budget if there were a major reorganization of priorities, but this would be at the expense of other sectors of the economy. If investment requirements for solving other pressing problems such as energy (other than hydro power), food production and industrial growth are taken into account, a reordering of priorities may not be possible on a massive scale. As a first step, governments might set up hydrological networks and national planning mechanisms, since it is unlikely that community resources could be mobilized for such purposes.

To demonstrate financial viability of proposed projects, countries may wish to undertake water tariff studies and to identify and use new sources of financing, such as special taxes, bonds, revolving funds and private donations, in addition to the traditional arrangements of government appropriation, water tariffs, external loans and community contributions. The international and regional banks are increasingly turning to co-financing of water projects, with investment from official sources, the private sector and non-governmental organizations, particularly in the middle income countries. Some means to increase revenue from domestic sources to help finance water resources development will be discussed below.

B. Cost recovery measures

Water can no longer be considered a free good in nature (perhaps with very minor exceptions), and even though it may be supplied free of charge to the consumer, that does not mean that it is free of charge to society as a whole, but only that the incidence of its cost has been shifted away from the consumer.

Insofar as a policy of imposing water charges on consumers is possible, it is an efficient way to discourage excessive consumption, promote conservation and recover government investments. If properly implemented, pricing policies could avoid a waste of resources on excessively large water supply systems and help to encourage local systems which the consumers consider beneficial. The willingness of consumers to pay for water demonstrates the importance assigned by them to certain projects and may enhance their ability to secure additional financing from government and international sources.

Some of the most common methods of assessing charges on irrigation water, for example, are: payment per unit of land, payment per crop grown, payment per season, fixed rate per farmer, payment according to distance from source and payment per benefits received (i.e. a land betterment tax). Any of these methods will contribute to the government's investment recovery and any one of them should be sufficient to cover at least the costs of operation and maintenance. It must be assumed that the farmer benefits from a reliable water supply and that his income will rise. Thus, it is logical that a portion of the increase be returned to the government.

Because the people in rural areas who would benefit from an irrigation and water supply system may be very poor, in many cases governments disregard efficiency criteria in favour of certain social and equity objectives. In such cases, the various criteria and objectives can be reconciled by supplying water free of charge or at a minimum cost compatible with local conditions up to a certain amount related to the population's vital needs, and by establishing a charge system for amounts in excess of that minimum. In fact, experience shows that a well-designed water charge system that makes it possible to bring water to certain areas will provide water at lower costs than those paid by populations that have to rely on local vendors.

Other methods of cost recovery for multipurpose projects used by many governments are cost sharing and cross-subsidies. Cost sharing involves the payment of taxes on benefits by all who receive them, those who use the water for navigation, fishing, recreation and power, as well as irrigation and water supply. Cost sharing induces local groups to select socially efficient projects since, if all users are paying a fair share, they will have no incentive to overdevelop the project.

Cross subsidies imply that one sector (for example, power) pays more than its fair share, thereby subsidizing another sector (for example, irrigation). This is not considered as satisfactory as cost sharing, since the subsidy would not encourage conservation by irrigators.

In several developing countries, funds raised through a progressive water tariff in the urban areas are now used to subsidize the services provided to the urban poor, and, where possible, to subsidize the construction of rural systems as well. Financially non-viable systems imply a perpetual subsidy to those already receiving a service, with the needy not benefiting from these government expenditures.

In those national drinking water supply and sanitation programmes where recipient rural communities have been mobilized, the potential beneficiaries have usually been able to raise locally part of the investment costs in cash or kind. With some back-up support, they can also undertake a substantial part of the recurrent expenditures for operation and maintenance themselves. Such local-level contributions will be discussed in the next section.

4.0. Mobilization of Community Resources

If we assume that the higher estimates for external assistance are available at present ($6 billion per year) and that the higher estimates for domestic investment in water resources is being made by developing countries ($20 billion per year), there would still be a shortfall of about $44 billion in annual requirements for development of the water resources sector. Therefore, it is essential that governments increasingly investigate avenues of mobilizing local financing to pay for the local projects which will be beneficial to the community.

In many cases communities are willing to contribute in cash or kind to local water supply or irrigation projects, when the benefits can be clearly demonstrated. In many of the poorest rural and urban fringe areas of the developing world, people perceive water supply to be their most pressing need. It is the people's top priority, although it may not be that of the government; therefore, it is unlikely that development programmes will succeed without their contributions.

The support of the people will be particularly important for the financing of small-scale local projects, for which it may be difficult to obtain external or national funding. The benefits of such projects must be demonstrated to the people at the local level in order to obtain their support. In the beginning the government may have to extend credit facilities or help to finance the required institutions at the local level. The government may also create public works projects which will provide water supply and create employment during the slack season. However, in the final analysis little significant progress can be made without the direct involvement of communities in water resources development.

The importance of involving the community in preparing, operating, maintaining and financing local projects cannot be overemphasized. The current emphasis on mobilizing community resources stems partly from the inability of past programmes to reach large numbers of people rapidly or to operate and maintain facilities. Government

financial and manpower resources have been inadequate to reach local levels and serve the urban and rural poor. Isolated programmes that have been attempted have often depended too much on the central government, have not had adequate follow through and have fallen into disrepair.

Local organizations and community development agencies can assist the rural people to gain access to water through small-scale irrigation and water supply projects. However, for successful implementation, individual members of the community themselves must participate in making decisions about the appropriate type of project and methods for implementation, finance and upkeep. Basic decisions must, generally speaking, be taken by governments, but their implementation, if it is to be effective, must be delegated to the lowest possible level, since only at that level can the immediate needs of individual farmers find full expression.

Consumers should be closely involved in setting objectives, in detailed planning, in execution, maintenance and evaluation. A plan that has been put before the people is less likely to contain hidden pitfalls and, with local co-operation, project implementation will run much more smoothly and effectively.

The labour content for construction as well as for the operation and maintenance of small rural water supply and sanitation schemes can be very high. Self-help or food for work labour can make a major contribution if methods of working and supervision can be simplified and delegated. With simple, cheap schemes, local contributions are greater. A method for using community cash and kind contributions to cover both construction and operation and maintenance costs has to be accepted as part of rural programme reorientation. In the case of community water supply and sanitation facilities, local groups can make an indirect contribution through public hygiene education, community diagnoses and monitoring of community programmes.

If the decisions for developing water resources in a country are to be carried through, a national movement is called for - to explain the objectives, criteria and methods of implementation of the water supply programme. If consumers are sufficiently aware of the benefits to be derived from a programme in terms of improved health and income, they should be willing to contribute to its succesful implementation. No such programme, affecting as it does the daily lives of people, can hope for success without their active participation.

5.0. Conclusion

In considering the financial requirements for water resources development within the context of the over-all economic development needs of developing countries, the conclusion that an effective solution to the problem can only be brought about through major increases in the overall flow of development financing appears to be an inescapable one. Whether or not international institutions and bilateral donors will substantially increase their development assistance is a matter for speculation and outside the purview of the present paper. However, some measures which might be taken at the international, national and community levels, which have been discussed above, will be reiterated here.

At the international level, increased emphasis should be given to the water sector to reflect the concern expressed by countries at the United Nations Water Conference and at the launching of the International Drinking Water Supply and Sanitation Decade. Financing institutions and bilateral donors will continue to act as catalysts in introducing new water resources programmes and planning techniques. In the present situation many financing institutions feel that additional financing could be made available should viable projects present themselves. Thus, one of the most urgent tasks faced by the international community in assisting developing countries in the development of their water resources lies in securing the adequacy of their technical and administrative infrastructure for water resources assessment, project identification and definition, as well as for the establishment of priorities for the financing of such projects. Furthermore, innovative methods of financing should be explored, including co-financing by the international banks with official, non-governmental and private sector sources at the national level and community organizations at the local level. Finally, a strengthening of co-ordination among financing agencies both at the international and bilateral level in the establishment and implementation of specific projects also appears to be desireable. A greater flow of information on the availability of projects that require financing would assist the international agencies in selection and co-ordination.

At the national level, a systematic approach to water resources development to ensure a steady flow of well-identified projects reflecting national priorities is necessary. This requires an adequate national infrastructure and a related level of activity for over-all water resources assessment and identification of projects, as well as a system for ranking such projects under national priorities for both internal and international financing. Development of water resources commensurate with the targets and goals of the Mar del Plata Action Plan requires above all that governments assign to water resources programmes and projects a high priority in relation to other types of development activities. It also requires from governments the ability to translate high priority plans into effectively implemented projects, and thus to launch a concerted attack on bottlenecks which lead to a low capital absorption capacity.

At the local level, financial contributions may be mobilized for projects of benefit to the community through water pricing mechanisms, a strengthening of credit institutions and assessments by community organizations for projects chosen by the community. In the latter case, the government would show its good will by matching local contributions for well-defined projects in the water sector. Furthermore, labour contributions should be forthcoming for beneficial projects, at least for operation and maintenance, if not for construction. Labour-intensive public works commissioned by the government would reduce unemployment in the slack season, raise incomes in rural areas and provide needed infrastructure. The financial outlay for water resources projects might be reduced if workers were paid with food or if self-help or mutual assistance programmes were initiated.

Although it is doubtful that the required financial resources outlined in section 2 will be forthcoming in the near future, the developing countries will be able to assume an increasingly greater proportion of responsibility and costs as they gain experience in planning and implementing projects. It is to be hoped that the foreign exchange and foreign assistance components can be reduced over the present decade. With better

planning and project formulation, bottlenecks may be overcome and financing used more effectively. It might be expected that by 1990 local level organizations would be able to take major responsibility for operation, repair and maintenance of the majority of small-scale projects initiated during the decade.

Note

1. OECD membership comprises the members of the European Economic Community plus Australia, Austria, Canada, Finland, Iceland, Japan, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey and the United States of America.

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