

community. In time, the Egyptian Government introduced legislation (Law 12/1984) to recover, over a twenty-year period, the investment costs of field drainage without interest, beginning one year after project implementation. The amounts collected increased significantly from LE 2.6 million in 1987 to LE 11.5 million in 1994, representing about 86% of total amounts due. Plans to recover operational and maintenance costs through raising the land tax, however, were blocked by political and social opposition. Land tax assessments were not adjusted to actual land market values, collections tended to lag, and coverage of the land tax system remained restricted to owners of three feddans or more. In the final analysis, the present increase in land tax revenues is estimated to represent only about 10% of the actual operation and maintenance costs of the drainage system (World Bank, 1995).

While progress was made in cost recovery at the national level, EPADP remained entirely dependent on central Government budget allocations to cover local operational and investment expenditures (foreign loans are repaid by the Ministry of Finance). In general, The Egyptian Government has given high priority to the field drainage programme and has provided EPADP with funds to continue implementing the programme and to guarantee a minimum maintenance standard. Further and substantial financial support will be required not only to keep the network in operational condition but also to renew the older parts which have reached their normal expected lifetime. In view of the importance of land drainage, it may be expected that the Egyptian Government will provide such support.

At the organisational level, the longer-term effectiveness of the technical training effort is a point of concern. As in the case of research institutes, the assistance effort has focused primarily on the transfer of technical know-how, and in that respect EPADP's capability has structurally improved. Until recently, limited attention was given to overall institutional strengthening and to changes in the management environment in which EPADP operated and continues to operate. The main institutional issues that constrain EPADP's performance are rigid staffing and career development policies, complex internal management systems, and problems of co-operation and co-ordination with other government agencies. Although serious attention has been given to the question of maintenance or consolidation of technical capabilities, further progress in the sphere of human resources development appears to stagnate.

## 7 Fayoum Water Management

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### 7.1 Background

#### *Geographical and socio-economic profile*

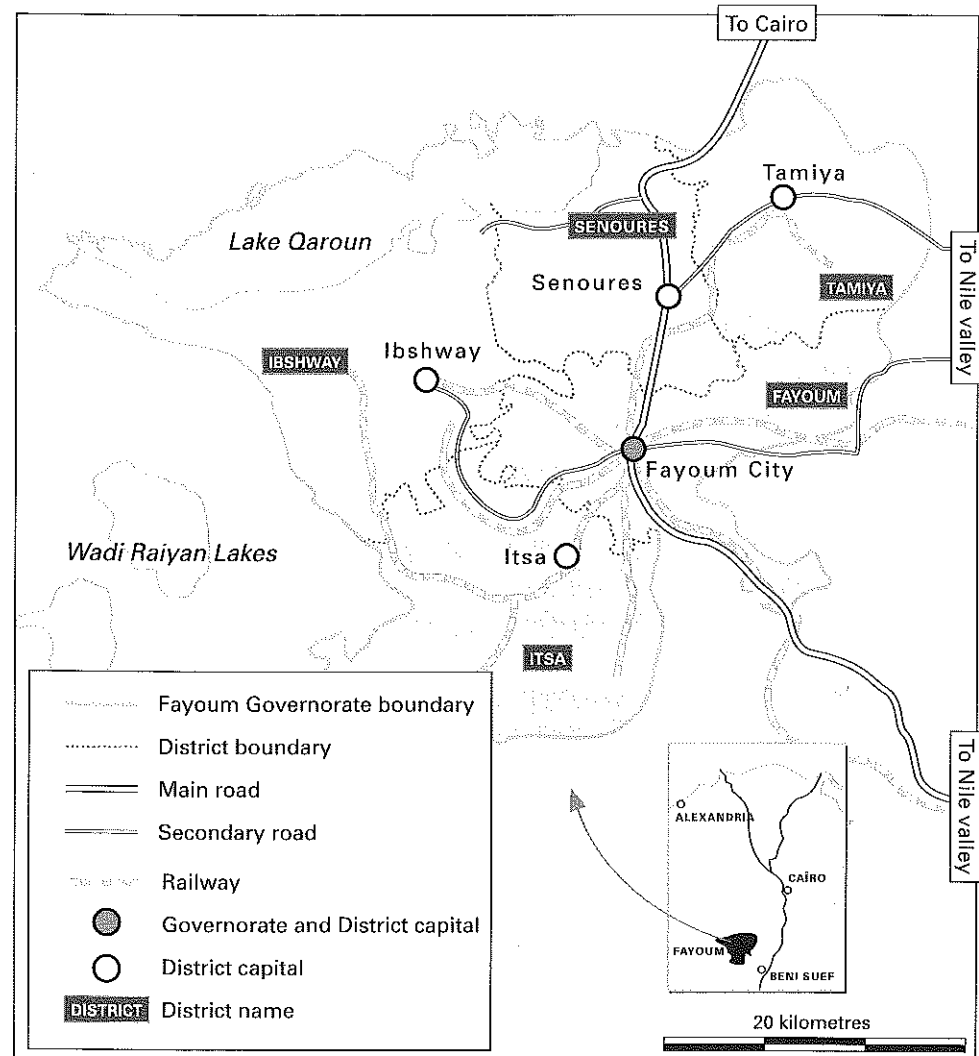
The Fayoum is a circular depression in the Egyptian Western Desert, 25 km west of the Nile and 90 km southwest of Cairo and encompassing three sub-basins: the Fayoum depression itself, the Wadi El-Raiyan and Wadi Muwellihi.

Of the three sub-basins, the major and only inhabited one is the Fayoum depression which measures roughly 45–50 km in diameter, starts at an elevation of 25 m (above sea level) at Lahoun, and spreads to the easterly and central areas of the depression as a more or less level tableland. Beyond these areas, the ground slopes away to the north to Lake Qaroun which forms the bottom of the basin, at an average level of 43–44 m below sea level.

The Wadi El-Raiyan sub-basin is a 15 km wide desert area, separated from the Fayoum to the north by a limestone ridge. With a maximum depth of 64 m below sea level, the area is used as a second, natural drainage outlet for the Fayoum depression. Since the opening of the drainage water tunnel in 1973, the lower areas of the depression have been progressively covered by two lakes.

The third sub-basin, Wadi Muwellihi, is a smaller, shallower and uninhabited desert depression, southwest of the El-Raiyan depression, with no particular function.

In 1986 (the latest National Census year), roughly 1.54 million people or 3.2% of the Egyptian population were registered as living in the Fayoum. Pre-census annual population growth rates of 3–4% are estimated to have fallen to 2.5%, bringing the 1996 population figure close to 1.88 million. Population is fairly evenly distributed among the five administrative districts (markaz); densities vary between 600–750/km<sup>2</sup> in the more rural districts of Tamiya and Itsa and 1,000–1,600/km<sup>2</sup> in Fayoum, Sinoures and Ibshway districts which have urban centres of 150–250,000 inhabitants (see Map 6).



Map 6 Fayoum Governorate

Agriculture is the backbone of the Fayoum economy. If not directly, almost any form of economic activity relates indirectly to the presence of an agricultural production sector with a history going back to the golden age of the Middle Kingdom (XIIth dynasty, ca. 2000 BC). Agricultural practice is very intensive. In the winter season (mid-October–April), wheat, berseem (Egyptian clover), beans and winter vegetables such as tomatoes and cabbage, are grown. Fodder maize, sorghum, rice, cotton, sunflower and vegetables (tomatoes and melons) are the most important crops in summer and mid-March–December Nili season. Aside from the ever-present groves of date palms, orchards or fruit trees form a characteristic component of Fayoum's production of perennial crops,

occupying some 7% of the total cultivated area which, up to the early 1990s, averaged 342,000 feddan (144,000 ha). Since then, the area is reported by the Fayoum Irrigation Department to have increased to 380,000 feddan (160,000 ha).

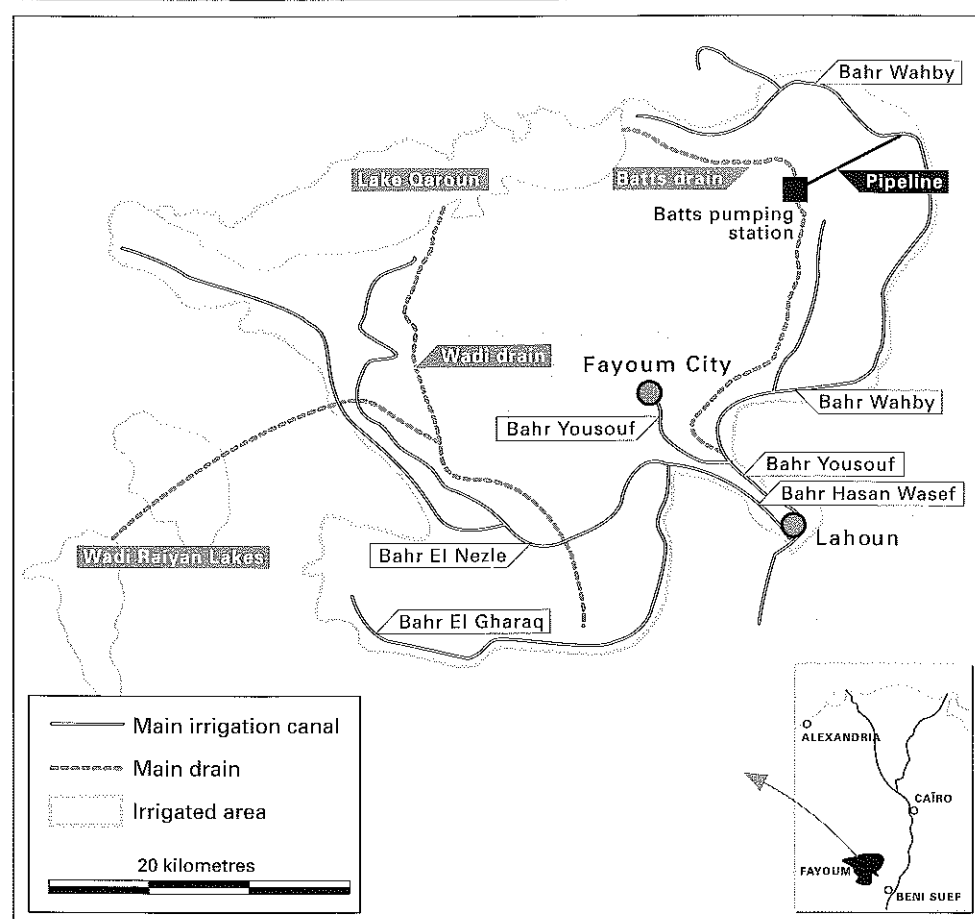
Roughly 90% of the cultivated land is owned by some 125,000 farming individuals or families. Land tenure and distribution is rather skewed: 10% of the 125,000 holders own 45% of the cultivated land while 90% share the remaining 55%. The last, smallholder group owns 1.5 feddan (0.6 ha) on average. Income from these farms is barely sufficient to cover the most basic needs and the vast majority of the smallholding families depend on external revenue sources (agro-processing and trading). The remaining 10% of the cultivated land is Government-owned or administered by the governmental Association of Agrarian Reform (Environmental, 1992).

### The irrigation and drainage system

Agriculture in Fayoum is wholly dependent on irrigation, the water for which is diverted from the Nile into the Ibrahimiya Canal at Assiout. Some 80 km downstream of the Assiout Barrage, at Dairout, the water is further diverted into the Bahr Yousef. At El Lahoun, the entrance point of the Fayoum basin, part of the water is diverted into the Bahr Hassan Wasef, a canal dug in 1905 to supply the south-western part of the Fayoum depression. A few kilometres down the El Lahoun regulator, another part is diverted into the Bahr Wahby, serving the north-eastern part, while the balance is carried to Fayoum City from where it is further distributed in the central part of the depression (see Map 7).

The division of irrigation water over the main and lateral canals is done by regulators and stationary weirs. Unlike elsewhere in Egypt, irrigation is by gravity and formally there is no pumping, except in a few areas in the upstream part of the system where the land lies above the water level. The system is designed for a continuous supply of water (24 hours a day, 7 days a week) to the *mesqas*, which vary in size from 8–200 ha.

Together with some minor drains, two natural channels i.e. the Batts and Wadi discharge excess irrigation water (and urban effluent) into Lake Qaroun, the lowest point of the depression. In the early 1970s, when Fayoum's water balance started to deteriorate, a new drainage outlet was built to the Wadi El-Raiyan depression. Construction works included a 9 km long open channel and an 8 km long tunnel through the desert ridges. Since then, about 70% of the Fayoum drainage water discharges into Lake Qaroun and the remaining 30% into the Wadi El-Raiyan depression. The elevated part of the depression has a relatively well maintained and functioning open surface drainage system. EPADP



Map 7 Fayoum—irrigation and drainage system

chose to install covered field drainage in these areas first before tackling the more urgent drainage problems of the low-lying areas (planned for the coming years).

### *Water management*

In Fayoum, the agricultural land is subdivided into irrigation units or command areas, the real acreage of which is converted into apparent nominal acreage by multiplying the acreage of different types of crops with factors (parameters). The total irrigation water available for Fayoum is then allocated as much as possible in proportion to these nominal command areas.

Between 1900 and 1970 Fayoum's water balance was largely in equilibrium. The supply of irrigation water corresponded more or less with cropping and leaching requirements,

and saline drainage water flowing into Lake Qaroun was in equilibrium with the annual quantity of water evaporating from the Lake, keeping its level at 44 m below sea level.

In the 1970s, authorities found it increasingly difficult to balance water supply with estimated crop demand. Fayoum's annual water duty was raised to stimulate cropping intensification and to satisfy farmers' demands to grow more rice. Irrigation efficiency remained low, however, and much of the additional water ultimately drained into Lake Qaroun whose level started to raise at an alarming rate. Construction of the Wadi El-Raiyan tunnel diversion in 1973 offered only temporary relief. In dividing water over the Fayoum, the system's management continued to tolerate excess supply to command areas draining to the Wadi El-Raiyan depression. Another complicating factor was the informal reclamation of large tracts of land along the depression with no formal water rights but in need of substantial amounts of water. Persistently low irrigation efficiency and non-maintenance of the tunnel intake resulted in further extra drainage water discharges into Lake Qaroun. In the early 1990s, the winter period level of the Lake reached -43 m, causing substantial environmental problems along the Lake shores and neighbouring areas. By that time, overall irrigation efficiency (percentage of total supply which is evaporated by plants, before re-use) was as low as 50–55% (FID, 1996).

The unevenness of the geographical water distribution pattern is illustrated in Table 7.1 which shows the water supply/demand ratio of the main irrigation command areas in the period 1989–90.

Table 7.1 Fayoum—Water supply/demand ratio (in %) by main command areas

Command area	1989	1990
TOTAL FAYOUM	95	101
BAHR YOUSEF	83	90
– Bahr Wahby	97	100
– Rest Bahr Yousef	77	86
BAHR HASSAN WASEF	120	126
– Bahr Gharag	150	160
– Bahr Nezle	97	100

Source: Environmental Profile Fayoum Governorate, Egypt, 1992.

In addition to regional or geographical imbalances, seasonal ones also developed. About 60% of the total 2,250 million m<sup>3</sup> supplied annually to Fayoum was in the summer period covering only 80% of that season's needs. In winter, the water supply was sufficient but even then, relatively large tracts of land had to remain fallow. The planning of a seasonal supply/demand balance was complicated by: (i) structural deficiencies and low gradients of main irrigation canals; and (ii) changing cropping patterns, delays in planting, labour

shortages, untimely availability of seeds and fertilisers causing deviations from normal cropping conditions.

A string of factors further contributed to a gradual deterioration of Fayoum's irrigation system i.e.: (i) damage to weirs and unofficial extraction by farmers attempting to alleviate their own water shortages; (ii) excavations of canals by Public Excavation Companies causing changes in cross-sectional areas of channels; and (iii) infestation by aquatic weeds. Moreover, the Irrigation Department found difficulty in curbing unreasonable water demands by powerful farmers.

Also at the tertiary or *mesqa* level, irrigation efficiency remained low. In Fayoum, the gravity supply system allowed (and still allows) farmers to draw water at no cost. The lack of any incentive to conserve water lead to spillage, especially during the night. In many cases, tertiary canals were insufficient in capacity and in number to cover the respective command areas which consist of many small farm lots. Compulsory maintenance of irrigation and drainage channels was not enforced, causing less uniformity in water distribution with tail-end farmers receiving less than half of their allocation.

Under-irrigation of tail-end areas allowed salts to build-up, affecting crop yields even further. Systematic information on the actual situation with regard to soil salinity and alkalinity is missing, however. The only systematic information available is FAO's 1965 salinity map.

Over the years, farmers have adapted their cropping pattern to circumstances. In the head reaches, double cropping and large areas of rice are found. During the summer, farmers in the tail-ends either leave a large part of their fields fallow, or grow summer crops that consume less water (such as cotton, sorghum, olives). Another important development was the increasing re-use of drainage water. Over the years, the Fayoum Irrigation Department (FID) built a network of re-use pumping stations and gravity diversions allowing farmers in the tail-end areas to irrigate directly from drains. At the end of the 1980s, some 35% of total drainage flow was estimated to be re-used, eventually bringing overall irrigation efficiency to a more acceptable but still modest 65%.

In the wake of growing concern about soil degradation and salinisation problems (at least in certain parts of Fayoum), water resources planning and management authorities endeavoured to restore the area's geographical and seasonal water balance and, in the process, to increase overall irrigation efficiency.

## 7.2 Institutional framework

A large number of Egyptian Government agencies, authorities and organisations are involved in Egyptian irrigated agriculture in general. The complex institutional framework is reproduced at the level of Fayoum Governorate where the agencies are represented by regional or local offices. In total, some six Government institutions share responsibility for management, maintenance and development of the irrigation and drainage system. Overall co-ordination of water resources management lies with the Under-Secretary of State (USoS) of the Ministry of Public Works and Water Resources, acting as the Minister's representative.

### *Fayoum Irrigation Department (FID)*

The FID is responsible for all water management processes, including the planning of water demand and supply, and the daily steering of water flows. The Director General (DG) heads the Department, assisted by a Deputy DG, responsible for personnel and administrative affairs, and two Inspectors resp. for the East and for the West of the Fayoum. The Inspectors in turn supervise four and five Irrigation Districts respectively.

On the basis of water monitoring data and estimated water requirements, annual water supply plans are prepared by the DG's office and submitted to the MPWWR Under Secretary of State for final approval and follow-up at the central level. Such follow-up is often required because the actual operation of intakes to Fayoum is under the authority of the neighbouring Irrigation Department of Beni Suef, while planning of release to the Fayoum from Assiout is under administrative control of the MPWWR central office in Cairo and the Regional First Under-Secretary in Miniya. Following approval of the allocation plan, the Director General issues orders to the District Engineer offices on the division of water over the main canals and most important laterals. The Engineer supervises water distribution within his district and collects the daily registrations of water levels. He is also responsible for the maintenance of structures and canals, including weed control. He also has to deal with farming communities, to give penalties where necessary and generally to maintain the discipline of water distribution.

Over the years, the task of containing water management conflicts has become more and more complicated. While the majority of conflicts within the *mesqa* are solved by the community concerned, there is no clear and effective mechanism for conflict management at the level of secondary channels.

**Other MPWWR Departments**

Optimum water management is all but impossible without a properly functioning drainage system which evacuates excess salt from the top soil. The *Egyptian Public Authority for Drainage Projects (EPADP)* is responsible for the installation of all subsurface and open drains in Egypt, and over the years has developed its own network of regional offices. At the level of Fayoum, it has its own set of buildings, workshops and equipment, and operates under the ultimate authority of EPADP's Middle Egypt regional office at Miniya. In addition to planning and implementing all drainage-related works, EPADP has been responsible since 1991 for maintaining of the drainage system (up to the mesqa level).

The *Mechanical and Electrical Department (MED)* is responsible for the design, procurement, installation, operation and maintenance of all irrigation and drainage pumping facilities in Egypt. The Fayoum Inspectorate covers some ten pumping stations in its area.

The *Horizontal Expansion Department (HED)* is charged with the planning and implementation of the Government's ambitious policy of land reclamation. The Fayoum office is involved primarily in developing and executing plans for the reclamation of new land on the fringes of the Fayoum depression, mainly on the basis of drainage water re-use.

The *Irrigation Improvement Project (IIP) Inspectorate* supervises implementation of the USAID-financed Irrigation Improvement Project, designed to modernise and rehabilitate irrigation delivery to the farm and to remove existing production constraints. A significant IIP activity is to organise water users at the mesqa level to participate in the design and implementation of the project, to assume responsibility for operation and maintenance of the tertiary system and to repay the costs of *mesqa* improvements.

**Other governmental institutions**

Among the many other Governmental institutions involved in water resources planning, the *Ministry of Agriculture* is the most important. In Fayoum, the Ministry is represented by a General Director heading a large organisation (some 4,000 engineers) working in five agricultural districts. Through the Agricultural Co-operatives, Village Banks and Agrarian Reform Co-operatives, the Ministry has strong links with the farming community. These organisations are primarily concerned with the general social and economic position of their members, however, and play no major role in the water allocation process. Until the early 1990s, the Ministry took part in water resources planning insofar as it was responsible for establishing cropping patterns and cultivation plans for each cropping season.

Under the new economic reform policies of the 1990s, the central pricing and planning system was abolished and the Ministry concentrated on its more traditional task of supporting the agricultural community with technical and managerial advice. The bulk of irrigation and drainage channel maintenance works is contracted-out (by FID and EPADP respectively) to *Public Excavation Companies (PECs)* which have traditionally used draglines and suction dredgers for excavation. Until 1991, the companies operated under the Irrigation Public Sector Authority (IPSA) of MPWWR on the basis of two-year fixed-price contracts. In July 1991, the Authority was transformed into a public holding company pending a Government decision on privatisation.

**Farmers**

Until recently, Egyptian (and consequently Fayoum) farmers were basically told what to cultivate, where and at what price. Under the circumstances, there was little reason for them to participate in water resources planning and they were restricted to making the best use of water supplied. In contrast to other parts of Egypt where water generally has to be lifted by individual farmers from deep-lying canals onto their fields, in Fayoum there is an informal system of co-operation among farmers along one tertiary canal or *mesqa*. There are over 5,000 mesqas in Fayoum, varying in size from 20 to 500 feddan and in length from a few hundred meters to several kilometres. In principle, each farmer gets the full flow of the *mesqa* in turns and the time allocated to him is proportional to the relative size of his plot.

In practice, however, farmers do not always irrigate individually in turn but sometimes irrigate in groups or 'sell' or 'lend' their water rights to one another. As such, *mesqa* units have no formal status. Communication with the Irrigation or the Agricultural Department is either on a personal level or through the Agricultural and Irrigation Committees. Over the years, donor-funded projects in the water sector have raised the awareness of the importance of farmers' participation, of the need to strengthen water users' organisations and to improve the Government-user interface. In the field of drainage, a cost recovery arrangement was put in place and EPADP launched a series of initiatives aimed at creating farmers' organisations for maintaining the drainage system. Similarly, in the irrigation sector, initial experiments have been conducted to institutionalise cost recovery and farmer participation at the tertiary level (through establishing Water User Associations).

With particular reference to Fayoum, however, the most urgent need is to set-up a Government-user interface at the secondary level in order: (i) to deal better with the inequitable water distribution problems mentioned earlier; (ii) to improve the planning of



*Improved irrigation water distribution works in Fayoum*

changes in irrigation and drainage systems at the local level; and (iii) to gradually transfer financial responsibility for secondary system management.

### 7.3 Programme characteristics

The Netherlands involvement in Fayoum started in the late 1970s when the Advisory Panel on Land Drainage Project was established and started to monitor drainage flows. In the period 1978–80 the Netherlands requested a number of experts to visit Fayoum Governorate and appraise the relevance of a handful of project ideas. These reconnaissance missions saw possibilities for co-operation in the reclamation programme which aimed at opening-up the desert fringes to irrigation by re-using drainage water. The missions emphasised that the overall implications of re-using drainage water should first carefully be studied and the planning authorities provided with the necessary tools to appraise alternative water management options.

Discussions with the irrigation and drainage authorities lead to the formulation of two study proposals, one concerned directly with the construction of a series of re-use pumping stations in the Eastern part of the Fayoum depression, i.e. the *Fayoum Batts Pumping Station Project (FBPSP)* and the other with a water master planning study, the *Fayoum Water and Salt Balance Study (FWSBS)*. The first provided technical assistance and direct financial support for the design and construction of the Batts pumping station, the biggest re-use pumping station in Fayoum. The other was instrumental in setting-up a badly needed water monitoring network and in developing a set of (computer) models to assess the impact of different water management scenarios on the area's delicate water and salt balance. Fayoum planning and executive authorities were only marginally involved in the execution of these projects. The Pumping Station project came under the authority of the Ministry's central office in Cairo and the Drainage Research Institute was the executing agency for the water and salt balance study.

The follow-up *Fayoum Water Management and Drainage Improvement Project (FWMIDP)* was launched to support FID in its efforts to fight the area's basic water distribution problems and to increase irrigation efficiency at the farmers' level. Early in 1989, a second technical assistance project, the *Fayoum Weed Control Project (FWCP)*, was started to assist the Fayoum authorities in testing and setting up a comprehensive channel maintenance organisation. Both projects were put under the authority of the Fayoum Under-Secretary of State of MPWWR and worked in close collaboration with the Irrigation Department in charge of water distribution and channel maintenance. In 1993, a joint evaluation team recommended the extension and merger of the two projects into the on-going *Fayoum Water Management Project (FWMP)*.

Financial contributions by the Netherlands to the Fayoum water management and drainage sector for the period 1975–96 totalled some Dfl. 33 million. A breakdown by major component and time period is shown in Table 7.2.

**Table 7.2 Netherlands assistance to the Fayoum water sector, 1975–96 (in Dfl. 1,000)**

	TOTAL	1975–80	1981–85	1986–91	1992	1993	1994	1995	1996
Batts pumping station	6,848	0	0	5,901	679	141	34	93	0
Water & Salt Balance									
Study	1,655	0	1,103	642	0	0	0	0	0
Water & Drainage									
Improvement Pr.	5,675	0	0	2,894	1,549	996	236	0	0
Weed Control Project	7,454	0	0	4,951	1,081	1,331	91	0	0
Water Management									
Project	10,496	0	0	0	0	1,700	2,581	3,613	2,602
BAD programme	1,095	0	345	260	128	11	98	153	0
<b>TOTAL</b>	<b>33,222</b>	<b>0</b>	<b>1,358</b>	<b>14,748</b>	<b>3,437</b>	<b>4,179</b>	<b>3,040</b>	<b>3,858</b>	<b>2,602</b>

Source: DGIS.

The following section gives an analytical history of the assistance programme as it evolved over a twelve-year period from 1983 to 1996. The history includes an evaluative dimension, to serve as a basis for further analysis.

## 7.4 Implementation

### – *Fayoum Batts Pumping Station (FBPS) (1983–94)*

Apart from the Batts pumping station contribution, the Fayoum water management programme was supported through a series of technical assistance projects which basically provided resident manpower/short term consultancy support in the field of water management (55%), complemented with infrastructural investment (35%), formal training (5%) and daily operational costs (5%).

Plans for re-using drainage water in Egypt were conceived primarily by the UN-financed Master Plan for Water Resources Development and Use (1978–82). In 1981, at the request of MPWWR the DRI worked-out an investment proposal for the improvement of water distribution and use in the Fayoum area by building a series of re-use pumping stations on the main drains (Batts and Wadi). That proposal was reviewed by several reconnaissance missions which basically endorsed the idea of re-using drainage water but called for a more comprehensive appraisal of the (technical) options available. In 1981, the Netherlands pledged financial support for 'the implementation of a feasibility

study on the construction of pumping stations and related distribution systems for re-use of drainage water.' MPWWR did not really appreciate the idea of such a study because it saw no need for further technical/economic evaluation of alternative proposals. Discussions on the study's scope of work dragged on for more than a year.

The subsequent study period (March 1983–June 1984) was marked by a difficult working relationship between the Netherlands consultant (charged with the study), who criticised almost every aspect of the investment proposal, and MPWWR which defended it with vigour. The final proposal by the consultant was to build one main pumping station on the Batts drain at Tamiya with a 6.2 km pressure pipeline to Bahr Wahby irrigation channel and to redistribute the water by means of small irrigation pumps.

Apart from preventing a further rise of the water level in Lake Qaroun, the pumping station would provide complementary water to 23,000 feddan of old land affected by water shortages during peak demand periods and allow the reclamation of an extra 10,000 feddan. In November 1984, the Netherlands pledged a Dfl. 5.5 million loan covering the supply and installation cost of mechanical and electrical equipment for the station. The allocation included a budget for detailed design and supervision by a Dutch consultant. The local cost component (site preparation and civil construction work) was to be borne by MPWWR.

Implementation of the project was delayed, erratic, inefficient and crisis-prone. Rather than playing a watchful, supervisory role, the consultant (and Royal Netherlands Embassy staff) were constantly required to curb unexpected and unacceptable initiatives by MPWWR staff, to urge a return to the agreed scheme of things, and to apply pressure for movement in a consistent direction according to agreed plans. To give an overview of the problems encountered, the following are some of the more significant events:

- Detailed design and tendering process was delayed for almost a full year because of late payment of the expatriate consulting services;
- When the Dfl. 0.9 million supervision contract was to have become effective (October 1987), MPWWR announced to be responsible for supervision. Reformulation of the consultant's scope of work into a 'technical assistance project' took another year;
- MPWWR instructed the contractor to make a complete re-design of the pumping station 'to take the recommendations of a new geotechnical report, local constraints and desired modifications into account.' The re-design was contested by the consultant, resulting in further delay in construction;
- The construction period itself was characterised by continual disputes among the supervisor (MPWWR), the technical adviser (consultant) and the contractor with regard to new design changes and project execution modalities. When the pumping and electrical equipment arrived on site (in February 1989), the actual civil construction



*Improved manual weed control methods in Fayoum*

work had yet to start. Another factor that contributed to the delay was that the contract was at a fixed price; the project supervisor held to this clause despite unforeseen cost increases, late payment certification, design changes and inflation.

The Netherlands eventually concluded that the expatriate consultant team was too isolated to have any further impact and that control over project activities had to be the responsibility of MPWWR. The parties mutually agreed to terminate the advisory activities in June 1991.

The civil construction work and installation of the pumping equipment was completed without further involvement of the Netherlands. The station was eventually commissioned in October 1993, some three years behind schedule and ten years after initiating the feasibility study. In the course of 1994, some remaining technical assistance funds were spent on technical advice and training of the station's operational staff (some 20 in total). The assistance was too restricted to have any definite impact.

While the pumping station was eventually completed, the other major component of the investment scheme, i.e. the reclamation of some 10,000 feddan of new land, is still under implementation, while the installation of subsurface drainage in the adjacent old land, has yet to start.

*– Fayoum Water and Salt Balance Study (FWSBS) (1984–87)*

The Water and Salt Balance Study was one of the studies which the Advisory Panel had earmarked for financing in 1983. The Panel briefly discussed the overlap with DRI's drainage water Re-use Model exercise and eventually endorsed the proposal as a '*test case for the model to be developed by DRI for the Nile Delta.*' The DRI was in charge of the new study project with support from the FID (providing data and assistance in the installation of a water monitoring system) and expatriate experts.

The objective was to develop a water management model for the Fayoum Oasis that will enable the optimisation of the use of available water resources, i.e. irrigation water, drainage water, the Qaroun Lake and Wadi Raiyan depression.

Almost from the outset it was clear that the project document had been over-optimistic regarding the implementation schedule. Recruitment of expatriate expertise, delegation of DRI and FID staff and procurement of equipment took one year. Moreover, the effort of establishing a basic irrigation and drainage water monitoring network had been under-estimated to such an extent that little time was left for developing and testing the 'water-and-salt balance' simulation model.

Towards the end of project implementation, the supervising Advisory Panel noted that '*the project was understaffed and needed to be extended in order to continue data collection and data processing, expand the monitoring network and train FID staff.*' The Panel's extension proposal was critically reviewed by the Netherlands Embassy which denounced the lack of commitment to the project and the '*desperate working situation*'. That assessment was not shared by the backstopping agency. The Netherlands acknowledged implementation problems but approved the slightly amended extension proposal.

By the end of 1986, the new project deadline, the 'physical' objectives of the project had broadly been achieved. A basic irrigation and drainage water monitoring network, consisting of 45 measurement points had been established. The goal of developing the much advocated Fayoum Water and Salt Balance planning model was only partly accomplished. The Salt Balance component was ultimately dropped and attention was focused on the Water Balance Model only. This in itself was an important achievement that enabled water resource planners to evaluate the impact of various water management scenarios involving the re-use of drainage water in the Fayoum depression. The model was used to simulate five water management alternatives involving different volumes of re-used drainage water. Study results were reported in five reports to the Advisory Panel, 24 technical notes and two consultancy mission reports.



Although the monitoring network was in place and the water model designed, this was largely a donor activity. Neither DRI nor FID were in a position to take over. The Advisory Panel, therefore, invited the expatriate project staff to formulate a follow-up proposal to 'consolidate the results of the study and to elaborate on some important conclusions.' As no agreement was reached on a follow-up project proposal, project activities were suspended in December 1987. Identification and formulation of a follow-up project took almost three years.

– *Fayoum Water Management and Drainage Improvement Project (FWMDIP) (1989–93)*

In retrospect, the identification and formulation was inefficient and dominated by differences of opinion within the Netherlands donor community. The period was marked by controversy between the Advisory Panel/DGIS on the one hand, favouring widening and deepening of Netherlands involvement in the Fayoum irrigation sector, and the water sector specialist at RNE on the other who argued against such involvement. One of the specialist's main arguments was that, at the FID level, there were two major USAID financed programmes already dealing with water distribution problems, i.e. the Structural Replacement Project covering the rehabilitation of major infrastructural works and the (mesqa) Irrigation Improvement Project. The FWMDIP was approved and implementation started in 1989. Its objective was 'to strengthen the institutional capacity and capabilities of the Fayoum Irrigation Department (FID) in order to improve the irrigation and drainage system in Fayoum which would lead to: (i) increased crop production, (ii) increased equity through a more uniform distribution of irrigation water to all farmers, including those at the tail end of the canals, (iii) reduction and rehabilitation of water logged and salt affected areas.'

The project's institutional framework was controversial. To secure the backing of national level authorities, MPWWR was earmarked as executing agency while the actual target organisation, FID, was earmarked as implementing agency. In practice, however, the project execution office was established under the authority of the MPWWR in Fayoum and FID, the actual target organisation, carried no responsibility for implementation.

The programme of activities included upgrading the monitoring system set up under the previous Water and Salt Balance Study, the planning and execution of a series of infrastructural works to improve water distribution at the primary and secondary canal levels, and the establishment of two pilot areas for testing further water distribution and drainage improvement programmes at the tertiary/farmer level. Three project units were formed to take up the programme of activities: a Monitoring Unit, a Water Distribution Unit and a Pilot Area Unit.

The *Monitoring Unit's* local staff were trained on-the-job in flow measurement, the installation of automatic water level recorders, the collection and processing of data and the preparation of monitoring reports. In time, all mechanical recorders were replaced by electronic types. By the end of 1990, a weekly reporting routine had been introduced which provided USoS with regular and reliable information on the water distribution pattern. No further work was done on the Water and Salt Balance model.

The *Water Distribution Unit* started by making a complete survey of all main irrigation and drainage canals in the Fayoum. As the survey data became available, the expatriate team advised and supported the Unit in the execution of a number of hydrological studies and the identification of a series of activities to improve water distribution in the main canals. Those activities varied from the re-design of head regulators and the re-shaping of weirs and secondary intake structures, to the assessment of canal seepage and required lining. Major rehabilitation works, such as the re-excavation of main canals and the partial reconstruction of major structures, were paid for by the Structural Replacement Programme (SRP) financed by USAID. Minor but urgent construction work was financed from project funds. At the end of the project period less than 25% of the budget had been spent, confirming earlier suspicions that FID's implementation capability would indeed be largely absorbed by the Structural Replacement Project.

The *Pilot Area Unit* concentrated on on-farm studies and on improvement in water distribution and drainage in pilot areas. On the whole, the implementation record of this component was disappointing. Within FID no direct need was felt for research on farm level irrigation because a similar experiment was already being carried out, funded through the USAID-financed Irrigation Improvement Project. By the end of the period no reporting on the pilot area testing programme was made. A preliminary report confirmed that the scope for further irrigation efficiency improvements at the tertiary/farm level was relatively small (10% or less) compared to the main distribution system (seven or eight times as much).

The *institutional development* objective was basically pursued through rather technically-oriented on-the-job training, supplemented by formal training programmes. In addition, a series of study tours was organised to several water boards in the Netherlands.

The 1992 evaluation mission concluded that project activities had largely been carried out in agreement with the project document but, 'because of its "engineering" environment, the project had focused mainly on the technical irrigation and drainage system, thereby limiting its attention for other (important) aspects' (den Tuinder, 1992). The latter remark referred to the lack of attention for, or involvement of, the beneficiaries of irrigation, i.e. the farmers. The mission also criticised the lack of co-operation with the Agricultural

Department in expanding the monitoring data base with data on land use and cropping patterns. The plea was made for the Monitoring Unit to be transferred from the USoS office to FID to guarantee sustainability. On the pilot areas testing programme, the mission commented that the project design did not provide for an integrated approach towards improvement of the water management at the tertiary level, and that better use could have been made of similar activities carried out elsewhere in Fayoum and Egypt (under the Irrigation Improvement Project).

– *Fayoum Weed Control Project (FWCP) (1989–93)*

The weed control project was the result of the selection of Fayoum Governorate as a concentration area for Netherlands development aid in 1986. In this context, the Netherlands fielded a Rural Development Project identification mission in 1986 to ‘*review activities and institutions related to rural development in Fayoum and prepare a proposal for a programme of action*’ (Mehrabet et al., 1986). The mission advised that improvement of mechanical weed control in the irrigation and drainage network be supported.

A subsequent formulation mission proposed to set-up a dredging and weed control programme which would address problems of normal maintenance and also the rehabilitation of the channel system. Important aspects of the project design were only superficially discussed with the parties involved. The institutional framework was superficially identified and little account was taken of the experiences and findings of the previous Weed Control Project and the World Bank-supported Channel Maintenance Project. Eventually, the Netherlands decided to have the proposal screened by another consultant. The screening exercise scaled down the equipment budget (from Dfl. 7.6 to Dfl. 5.3 million) but again the consultant paid little attention to project design issues or to the implementation framework.

The main objectives of the project were: (i) to develop and introduce new mechanical weed control methods in main and secondary irrigation channels and drains in Fayoum; (ii) to develop and introduce manual (and mechanical) methods suitable for maintaining irrigation channels and drains at the tertiary/mesqa level; and (iii) to rehabilitate degraded irrigation and drainage channels.

The project budget had a Dfl. 1 million consultancy component. The Dfl. 1 million equipment budget covered the cost of procuring vehicles, office equipment and a large inventory of heavy maintenance equipment. For the purpose of the project, a special weed control unit was set up under the authority of MPWWR Under-Secretary of State. Ibshaway District was selected as a pilot area for the testing programme.

From the outset it was evident that the allocated two-years implementation period was unrealistically short. Progress depended mainly on the input of expatriate staff as counterpart staff was limited to two junior engineers. In addition, the lack of suitable maintenance facility was realised at a late stage and plans had to be drawn-up for a new workshop. The greatest setback was caused by delays in procuring the experimental equipment. Problems with ordering, customs clearance, transport to site and recruitment of operators accumulated to such an extent that the May–October 1989 ‘maintenance window’ period for carrying out the first tests was missed. In the process, the equipment list was completely reviewed: a number of larger machines were replaced by other that were ‘more adequate in the Fayoum situation’.

In 1990, a joint review mission concluded that the project was still at the stage of testing, data collection and surveying, and that it had made unsatisfactory progress with regard to institutionalisation and manpower development. At the end of the official implementation time, some 40% of the original budget had not been disbursed. On the recommendation of the review mission, the project was extended by 18 months up to December 1992.

During this period the project team succeeded in establishing a computerised data bank giving detailed information on the condition of canals, drains and service roads in Ibshaway District and, in less detailed form, in the whole of Fayoum. The testing programme was completed and demonstrated that the proposed mechanical weed control by mowing buckets was technically feasible in the smaller channels. In time, the Ibshaway maintenance and repair shop was completed, but the maintenance unit covered only half the District’s annual needs due to insufficient local funds. At the tertiary canal level, several improved handtools were developed and tested to lessen physical effort and to reduce contact with water and water-borne diseases.

At the institutional level, there was continuing uncertainty regarding the organisation responsible for the weed control operations. At the heart of this problem was the lack of a clear Government policy that specified the future role of the private sector and the Irrigation Department. Pending a final decision, the project continued to operate as a separate organisational unit under MPWRR, with no prospect of becoming fully integrated into the regular schedule of FID activities or, for that matter, in the private contractor sector (as an alternative). Also at the tertiary level, there was no clear institutional framework for implementing manual weed control.

A 1992 external evaluation confirmed that the project had achieved satisfactory results from a technical point of view but that the institutional dimensions of improved weed control still had insufficiently been addressed. The mission recommended that the Weed Control and Water Management projects both be extended with at least three years, under

one integrated project. The formulation process, which involved a series of workshops in which all interested parties participated, lasted almost 18 months. An interim phase was used to bridge the period and to complete several of the activities from the previous extension phase.

— *Fayoum Water Management Project (FWMP) (1993–98)*

The immediate objective of FWMP was: 'to increase agricultural production of mostly small and sometimes marginal farmers in a number of districts in Fayoum by making better use of its agricultural potential. This will be achieved by implementing equity in water distribution, by integrated development at mesqa level and by establishing a balanced agricultural and water resources policy, agreed by all concerned parties.'

That objective would basically be achieved by: (i) further strengthening of FID's capability in efficiently and effectively managing the scarce water resources for the Fayoum basin and (ii) establishing a cost effective package of mechanical, manual and biological weed control methods and institutionalisation within the Irrigation Department and possibly in other privatised, agencies.

The project team was expanded to seven expatriates and one local expert with backstopping consulting services. Progress reports refer to a relatively smooth implementation.

The *monitoring unit* (renamed Follow-up and Planning Office), continued to monitor irrigation and drainage water quantities and quality. Further steps were also taken to integrate the newly-installed USAID-financed telemetric monitoring system into the existing (manual) system. Data accessibility was improved by publishing weekly and monthly monitoring reports. Good progress was also made in updating and improving the inventory and storage of basic irrigation and drainage network information, the land owners and water rights register and the (re)production of maps and design drawings.

The *Water Balance Model* was put back on the agenda. In 1994 the Salt Balance component was added to enhance the model's use as a basic planning tool. The former expatriate team leader was subsequently invited to assist the FWMP/Fayoum Governorate in formulating a water development policy for the Fayoum depression.

The project team continued to assist the Irrigation Department in preparing detailed designs, construction drawings, bills of quantities and tender/contract documents for urgently required *system rehabilitation/* works. The construction of sixteen new gates concluded a five year effort to rebuild and improve Fayoum's main irrigation water distribution system.

The *weed control* section continued the formulation of a cost-effective mechanical, manual and biological weed control programme. The weed control data base was completed in 1996. The practice of preparing regular mechanical weed control yearplans was introduced. Arrangements had been made with two excavation companies to test new mechanical techniques under actual field conditions. Those field tests were only partially successful. While one company performed very well, the other failed to meet its contractual obligations. Field experiments with manual weed control were less than satisfactory. Experiments with Local Council contracting were abandoned following the announcement that such contracting had no proper legal basis. At the level of the Public Excavation Companies, some progress was made in organising manual weed control operations, but the project's initiative to provide each district in Fayoum with ten sets of improved hand tools evoked little response. Following the ban on the use of chemicals, the project launched a series of biological weed control experiments with grass carp. Further field testing and stocking experiments (with farmer involvement) are needed to confirm the first encouraging experimental results.

Following unsuccessful attempts to formulate and introduce an integrated water management concept at the *mesqa* level, a phased strategy was carved out by the project team to increase farmers' participation in water management at the level of secondary canals and develop a methodology for improved soil and water management involving the (complete or partial) transfer of responsibilities from the Fayoum Irrigation Department to farmer organisations. Taking due account of the limitations of other (donor-financed) farmer-participation exercises, the project opted for testing two alternatives fitting in existing Egyptian water legislation i.e., the establishment of a 'federated Water User Associations' (Water Boards) composed of farmers' representatives only and the creation of joint committees, composed of farmers' representatives and Government officials. Several pre-investigations formed the basis for selecting two pilot (command) areas of roughly 2,000 ha each to try out the two farmer participation models mentioned. The pilot area experiments evoked enthusiastic response but more time and a larger geographical coverage is needed to draw final conclusions.

## 7.5 Assessment

### *Results*

The basic objective of Netherlands-financed support to the Fayoum water management sector was to assist the Governorate of Fayoum, more particularly the FID to improve the operational aspects of irrigation and drainage management in order to increase water-use efficiency and, consequently, agricultural production and farm income. The support

included investments for the Batts pumping station and technical assistance for improved water management.

The main overt justification to support the Batts Pumping Station Project was that it would provide water to a newly to be reclaimed area and be better planned and implemented than other pumping stations built previously by the Egyptian Government. Although implementation was delayed and more plagued with problems than it need have been, the eventual outcome was satisfactory. Since September 1993 the pumping station has been kept in good operational condition and is functioning satisfactorily. With an installed capacity of 4.6 m<sup>3</sup>/s, the station operates at a reasonable level of efficiency during the summer period March–August only when 2.5–3.5 m<sup>3</sup>/s of Batts drainage water is recycled into the Bahr Wahby. During the rest of the year, when water demand is lower, average discharge drops to 1–1.5 m<sup>3</sup>/s.

Pending completion of the planned 10,000 feddan land reclamation scheme, the recycled water is currently used by some 400–500 farmers in the old land down-stream reaches of the Bahr Wahby command area and an unknown number in the neighbouring newly reclaimed land with a total area of approx. 7,000 feddan. In the short term, the pumping station is instrumental in solving at least part of the area's recurrent water shortage problems and in raising cropping intensity. Cropping intensities, yields and/or farm income are not monitored, however, thus preventing a more quantitative evaluation of project impact.

The respective projects addressed the technical aspects of inequity in water distribution in the main system, by: (i) establishing a well functioning monitoring system and building a mathematical water management model; (ii) rectifying major bottlenecks in the distribution network; (iii) introducing improved methods of mechanical and manual weed control and; (iv) carrying out on-farm studies and testing of integrated water management techniques in selected pilot areas.

In the process, a massive number of technical reports, documents, maps and data bases were produced, containing valuable basic information on Fayoum's irrigation and drainage infrastructure and development potential.

While the monitoring network provides essential information for the time adjustment of water flows in the main distributaries, the Fayoum Operational Water Management model simulates and evaluates the water and salt management of the Fayoum irrigation system. As such, it is a valuable instrument with which to assess the impact of alternative water management options. Regrettably, the model only captures the physical impact of management options (in terms of m<sup>3</sup> of water) and not their financial/economic impact, thus reflecting the technical orientation of the assistance effort.

Assuming that the rehabilitation and repair of damaged structures was required in any case, sensible use has been made of project funds for the construction of works which also served to demonstrate new construction concepts (such as the assembly of pre-fabricated elements). Since the completion of High Aswan Dam the maintenance of irrigation and drainage channels has been mainly a question of weed control. Following the unsuccessful attempt to set up a channel maintenance organisation at the national level (Aquatic Weed Control Project), intervention at the Fayoum regional level has helped to develop modern channel maintenance planning and programming techniques and to introduce (on a pilot scale) technically-sustainable mechanical, biological and manual maintenance technologies. However, there is uncertainty about the organisation responsible for future weed control operations, largely due to the lack of a clear government policy about the role of the private sector.

Reflecting its technical orientation, until very recently, the programme paid insufficient attention to the institutional dimension of Fayoum's water distribution problems. This component was put on the co-operation agenda in 1994 when a comprehensive plan of operations was formulated to strengthen water users organisations and establish a proper Government-user interface at the intermediate (secondary) level. Rather than trying to formulate farmer participation strategies and a prior definition of objectives and means, the plan opted for a process approach which would first increase awareness of the benefits of farmer participation in water management.

In retrospect, the strategy to focus first on primary and secondary distribution problems was justified. Water user groups can only be expected to co-operate in the equitable distribution of water, maintenance of the on-farm system and payment for irrigation services when water delivery meets their needs and they have some control over its water delivery schedule. In the context of the country's history of centralised water management, the Water Board/Joint Committee experiments were highly relevant and instrumental in raising the Government's awareness of the benefits of increased farmer participation.

Information on the impact of the assistance programme at the farmer level is rather thin. At the level of Fayoum, water balance figures for the period 1988–95 suggest that, the overall irrigation efficiency increased from 65% in 1988 to some 73% in 1995.

On the basis of available figures and discussions with parties concerned, it is concluded that distribution imbalances still persist and much (if not all) of the gains in irrigation efficiency have been realised through increased re-use. This impression is corroborated by continuing high drainage losses to the Wadi El-Raiyan depression (constant over the period) and by reports of continuing water shortages in the Bahr Wahby command area. The difficulty in addressing the area's basic water balance problems is also reflected in

**Table 7.3 Fayoum—Overall water balance 1988–95**

Year	Total supply (million m <sup>3</sup> )	Discharge to Lake Qaroun (million m <sup>3</sup> )	Discharge to Wadi El Raiyan (million m <sup>3</sup> )	Total drainage (million m <sup>3</sup> )	Irrigation efficiency (%)
1988	2,340	575	251	826	65
1989	2,343	515	251	765	67
1990	2,468	495	213	708	71
1991	2,159	448	261	709	67
1992	2,182	390	240	625	71
1993	2,216	362	268	630	72
1994	2,265	385	273	658	71
1995	2,330	380	249	629	73

Source: unpublished data, Fayoum Irrigation Department.

the increasing number of (recent) project reports and advices on how to make optimum use of excess drainage water.

The reduced drainage flow to Lake Qaroun allowed Fayoum's water management authorities to keep the level of the Lake under control and thus avoid further environmental damage. The benefits of increased irrigation efficiency accrued mainly to tail-end farmers in the Bahr Wahby command area but, in the absence of systematic baseline or any other form of field survey data, the (economic) impact was not and/or cannot be quantified.

At the level of Fayoum, nearly any form of intervention in water management has an environmental dimension. Because the hydrological system is closed, re-distributing water and/or recycling drainage water not only has direct repercussions on land utilisation but also on Qaroun and Wadi Raiyan Lakes which are natural habitats of local fauna and flora. In developing a Water and Salt Balance Model and introducing the integrated water management concept, the project raised environmental awareness of the water resources planning staff and provided them with basic tools to assess eventual environmental impact of different water management options. In this respect, it is difficult to understand why an environmental assessment component was not more explicitly incorporated in project design; if not to enhance FID/MPWWR's own capabilities in the field of environmental assessment then at least to develop a routine to have such assessment done by external parties and integrate it in the regular water resources planning process.

Meanwhile, in Fayoum environmental problems are on the rise. While crop damage has been probably small until now, the prospect of persisting water management problems and continued (if not expanding) re-use is a source of serious concern; certainly in the light of recent findings indicating that continued use of present quality irrigation water,

without proper leaching practices, may seriously affect the agricultural production base within five–ten years. Another major environmental concern is the rapidly deteriorating salt balance of Lake Qaroun which is expected to destroy its fishing potential within the next decade. Also on this account, the programme's record is mixed in as far as it identified the contours of a salt management policy but has been rather ineffective (as yet) in initiating follow-up action to cope with the impending problem, either in the form of further studies or in the form of infrastructural investments.

### *Efficiency*

In general, technical assistance needs have been inadequately identified and formulated. None of the project documents contained a comprehensive review (at entrance) of available manpower resources, staff levels of education and experience, and training needs. In the absence of a comprehensive review of available manpower and own financial resources, the relative size of respective assistance packages was somehow arbitrarily determined.

The allocation of funds for training and equipment support was generally decided on an ad-hoc basis during the inception phase or even later. Reflecting the rather technical orientation of the respective projects, none of the project proposals was backed-up by a socio-economic cost–benefit analysis.

The increased sharing of recurrent costs is an important, if not the most important, constituent of project ownership. The various assistance budgets have invariably covered recurrent costs of the project establishment and (part of) those of the respective host organisation. Agreements did not contain phasing-out arrangements of recurrent cost financing, including those project components such as the monitoring and weed control programmes which have been supported since the mid-1980s.

Project objectives have been formulated in general terms. Project activities have been broken down into major categories of activity, but until recently, no logical framework type of analysis has been made describing immediate objectives, concrete outputs, indicators of achievement and risks, that might affect execution of the programme. On instigation of the Netherlands, formulation documents have been corrected in the Inception Reports. While there was a rationale for such an approach in the first stages of the programme, there was little justification for it in later phases when the organisational framework and manpower/infrastructural requirements were better known. A more in-depth study of the performance of the target organisations might have revealed the overriding importance of institutional bottlenecks preventing the recipient organisations from making optimum use of the assistance offered.

Following completion of the Water and Salt Balance project, the Egyptian and Netherlands Governments agreed to put the assistance programme (physically and administratively) under the authority of the MPWWR USoS office. While it is extremely important to secure the political and administrative backing of the highest Government authority (in the field of water management), that decision was not consistent with the intended philosophy of the aid effort which was to provide assistance to Fayoum Irrigation Department staff in making changes which they themselves initiated and owned. Although they worked closely *with* FID, the projects never worked *in* FID. The difference is fundamental and has repercussions in terms of organisational and financial sustainability. The issue is particularly thorny with respect to the monitoring programme, a basic FID activity. In hindsight, the project and programme design should have put the FID 'in the driver seat' with political and administrative support from the USoS office.

In general, project implementation has been characterised by excellent working relations between expatriate and local consultants and the staffs of recipient organisations. Training activities have addressed a wide range of relevant subjects. Intermediate internal and external evaluations have shown high course attendance rates and considerable motivation to learn. The acquisition of modern computer, communication and measuring equipment enhanced the quality and efficiency of the assistance effort and of FID ability to deal more efficiently with its water management and channel maintenance responsibilities.

The project monitoring effort has been unsatisfactory. Since inception, the programme was overseen by the Advisory Panel which had relatively little expertise in the field of water management. By and large, monitoring tools in the form of specific and objectively verifiable measures of changes or results were not operationalised. The Panel formulated (generally positive) statements on project performance and advised the Netherlands Government to extend financial support. The RNE's monitoring role is difficult to assess. Apart from written summary endorsements of workplans and progress reports, most programme implementation problems were discussed orally with the parties concerned.

Co-ordination with other programmes and organisations was problematic. The Advisory Panel did not discuss the interventions of other donors in Fayoum at any depth. As a result, project interventions were conceived and implemented largely in isolation of other donor-funded interventions elsewhere in the country or in Fayoum such as the USAID Irrigation Management Project, the World Bank Channel Maintenance Project and the IFAD/GTZ financed agricultural development projects in Fayoum. Within the Netherlands-funded water sector programme, the Water and Salt Balance Model building effort largely overlapped with the Re-use mathematical modelling exercise (discussed

in Chapter 4), producing two instruments for water resources planning with different operating systems and characteristics. It is also not clear why the Seila drainage pilot study was not incorporated into the DRI's on-going Pilot Areas drainage research programme.

Apart from the mid-term evaluation of the Weed Control Project in 1990, the Fayoum water management programme was evaluated once by an external mission i.e. in 1992. Fundamental remarks were then made regarding project sustainability, and a comprehensive analysis was made of the institutional context in which the programme operated. The follow-up was unsatisfactory insofar as the project design was not basically amended and time-bound self-reliance objectives for the subsequent phase were not addressed.

### *Sustainability*

The longer-term organisational and financial sustainability of the 10-year aid effort is a point of concern. On several occasions, including the last 1992 evaluation mission, it was pointed out that both the water management and weed control components were insufficiently integrated into the Irrigation Department, the most important target organisation of the assistance programme. While there was said to be a basic understanding of the process of integration, no real progress has since been made and both components have continued to function as separate operational units under the authority of the MPWWR USoS office.

FWMP focused mainly on the technical aspects of irrigation improvement with limited attention being given to institutional and financial/economic aspects. In general, project interventions were not framed in a mutually-agreed longer term organisational development plan with pre-determined targets for organisational and financial self-sufficiency.

Despite the availability of information on FID's manpower and management problems, no objectives related to institutional development were stated in project documents. The organisations capability to retain trained staff and mobilise sufficient funds for recurrent cost/renewal financing of their basic office infrastructure, has yet to be tested.

In the longer run, high salinity of the drainage water (3-4 times higher than Bahr Wahby irrigation water) is a serious problem. While benefiting the farming community in the short term, there are two basic reasons why increased re-use of drainage water is a less than desirable longer term option to improve overall irrigation efficiency (and farm income) in Fayoum. First, re-use involves the pumping of water and absorbs scarce financial

resources, either from the Government or from the farming community (when charged for pumping costs). Second, and perhaps more importantly, it calls for sophisticated water management skills to deal with the ever-threatening problem of salinisation and environmental pollution.

Present initiatives to tackle the institutional dimension of Fayoum's persisting water distribution problems, involving farmers in water management planning and execution process, represent a major step forward towards more sustainable agricultural production in the longer term. The new concept has to be tested on a wider scale.

## ANNEXES

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Annex 1 Comment of the Egyptian Ministry of  
Public Works and Water Resources

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Ministry of Public Works & Water Resources - Egypt

Minister's Office



Cairo, 16 Aug 1998

Att.: H.E. Mr. R. H. Loudon  
Ambassador of Royal Netherlands  
Cairo - Egypt

Subject: Evaluation Report on Netherlands Support To  
Water Management & Drainage, 1975 - 1996.

Dear Excellency,

I've received your kind letter of April 21, 1998 which with a copy of the above mentioned report was attached.

Going through the report I am pleased to indicate that some changes and corrections have been considered, but I still feel that some other important questions made earlier by the Ministry of Public Works & Water Resources were missed or not considered.

Over the past two decades, the effective Dutch contribution to improve irrigated agriculture, land drainage, and water management have resulted in considerable improvement of both the hard and soft parts of the system. Unfortunately such impacts are not selected enough in the report.

For that reason our Ministry have prepared a report assessing the Dutch contribution towards the improvement of irrigated agriculture in Egypt. I would suggest that you kindly if possible attach a copy of it to the evaluation report.

I believe we should be fair as Egyptian officials to the Dutch Tax payers, whom we appreciate very much, as an effective contributors to the sustainable irrigated agriculture development in Egypt.

Finally I would take this chance to thank on behalf of our staff in the Ministry, your excellency and your staff at the Embassy.

*With my best wishes and regards,*

Yours Sincerely,  
*Mahmoud Abu-Zeid*  
Dr. Mahmūd Abu-Zeid  
Minister of Public Works  
and Water Resources  
Cairo, Egypt

ADVISORY PANEL PROJECT ON WATER MANAGEMENT & DRAINAGE

THE IMPACT OF EGYPT-NETHERLANDS COOPERATION ON THE  
WATER SECTOR IN EGYPT

IBRAHIM M. ELASSIOUTI  
CONSULTANT ENGINEER

March 1998

SUMMARY

Netherlands Support of the Water Sector: An Overview

For more than twenty years of development cooperation between Egypt and Netherlands in the water sector, five major programs have been channeled, under the umbrella of the Advisory Panel Project, namely: the water research program, drainage sector support program, Fayoum water sector program, water quality monitoring program and strengthening water planning program. The support varied in intensity, type and duration for various activities.

Under the Technical Assistance Agreement, a panel of high-level experts from Egypt and the Netherlands was established in 1975 the Advisory Panel for Land Drainage is the oldest and best known project under the Egyptian-Dutch Bilateral Program of Cooperation. Initially set up to advise the Egyptian Public Authority for Drainage Projects (EPADP) and the Drainage Research Institute, the Panel gradually became involved in formulating and supervising of a number of projects, thereby involving into an umbrella organization that encompasses all Egyptian-Dutch activities in the drainage sector.

The Panel subsequently broadened its area of concern, becoming an advisory body to the Ministry of Public Works and Water Resources (MPWWR) on the management of water resources. In 1991 its extended mandate was matched by its new name of Advisory Panel on Land Drainage and Drainage Related Water Management, and thereby full recognition was given to the need for a more integrated approach to land and water development issues in Egypt. The main objective of the Panel was to contribute to the policy planning and policy implementation of MPWWR by advising the Ministry and its implementing agencies on drainage research and technology and related water management. The Panel

addressed new topics such as fresh-water storage, quality control of surface water and groundwater and the environmental aspects of water management policies in general.

At present the name of the Project became 'Advisory Panel Project on Water Management and Drainage' (APP). The starting date was September 1996 and the completion date of the project will be September 2000. The main objective of APP is in an advisory capacity to assist MPWWR in carrying out its responsibilities with regard to managing the quantity and quality of Egypt's water resources more efficiently.

Although the Panel's mandate has expanded over the years, the core of its original terms of reference has remained unchanged: To exchange the accumulated knowledge and experience in the field of land drainage between Egypt and the Netherlands, aiming at the improvement of drainage conditions, the reduction of salinity hazards, and the optimization of Egypt's water use in general.

Under the water research program five of the twelve institutes of the National Water Research Center have participated: the Drainage Research Institute (DRI), the Research Institute of Groundwater (RIGW), the Maintenance Research Institute (MRI), the Hydraulic Research Institute (HRI) and the Environment and Climate Research Institute (ECRI).

The support provided to the Egyptian Public Authority for Drainage Projects (EPADP) since 1976 was instrumental in training substantial numbers of Junior and Senior engineers' personnel. Until recently the focus was on the transfer of technical know-how. In early 1990s EPADP addressed certain institutional constraints and made a beginning with formulating a long-term manpower development plan.

Netherlands support to the Fayoum Water Management Sector was intended to assist the Fayoum Irrigation Department to improve the operational aspects of irrigation and drainage management, with a view to increasing water use efficiency and, consequently, agricultural production and farm income. The Netherlands involvement in the Fayoum goes back to the late 1970s when support was given to the Batts reuse pumping station project and the water and salt balance study. In the second half of 1980s, another two projects were launched: The Water Management and Drainage Improvement Project and the Weed Control Project. The former addressed the basic water distribution problems and irrigation efficiency of the Fayoum irrigation system. The Weed Control Project was meant to assist the Fayoum water sector in testing and setting up a comprehensive irrigation channel maintenance organization. The two projects were merged in 1993 and continued the activities under the ongoing Fayoum Water Management Project.

The Egyptian authorities, being aware of the adverse effects which industrial, urban and agricultural development pose on Egypt's fragile environment, launched in 1992 the Egyptian Environmental Action Plan. The plan put emphasis on high priority projects in the field of integrated management of the water resources system. The following five projects were recommended:

- Monitoring and analysis of Nile water quality;
- Monitoring and analysis of drainage water quality;
- Environmental management of groundwater resources;
- Design of a national water quality monitoring networks; and
- Strengthening of the MPWWR's Planning Sector.

Except for the first project, the Netherlands Government financed the other four projects. The main objective of 'Monitoring and Analysis of Drainage Water Quality' is to establish an integrated monitoring network of drainage water pollution control enabling the planning sector of MPWWR and decision-makers in irrigation directorates to ensure the availability of water of sufficient quality in order to:

- Determine the possibilities of reusing drainage water to meet the increasing demands; and
- Contribute to environmental protection.

The 'Environmental Management of Groundwater Resources Project' was mobilized in January 1994. The overall objective of the project is to contribute to a more efficient management of Egypt's groundwater resource in strong relation to environmental protection and leading to sustainable groundwater development. The main project programs and its objectives are summarized as follows:

- Technical assistance to RIGW research activities focusing on three programs:
- Water Quality Monitoring.
- Artificial Recharge program.
- Site Studies and Special studies program.
- Organizational strengthening program.

The overall goal of 'Design of an Integrated National Water Quality' Monitoring Network in Egypt' project is to contribute to the improvement of water quality management in Egypt. The objective of the project itself can be summarized as follows:

- To design an integrated national water quality monitoring network, serving as an umbrella for the water quality network, already existing or under construction at NRI,

- DRI and RIGW and other institutions; and
- To study the institutional aspects of integration and coordination and to present the design and study results to the concerned Egyptian authorities for discussion and acceptance.

In the formulation of the project 'Strengthening the planning Sector' (SPS-Project), a two phased approach was followed. The first phase was devoted to the actual strengthening and training of the Planning Sector personnel and the second to the development of a National Water Resources Plan (NWRP). The first phase of the SPS-project is now well underway and is scheduled to be completed early 1998. The second phase has been formulated to focus on the development of a National Water Resources Plan (NWRP) and the related instrument planning with the assistance of the Government of the Netherlands.

Two new projects are now under appraisal: 'Regional Integrated Water Management for Aswan Governorate', and 'Establishment of Water Boards at Secondary Canal Level'. The long-term objective of the first project is to provide proper tools for the sustainable development of the Aswan Governorate. The short objectives include: identification of available water resources, development of short-term and long-term water allocation scenarios and estimate their economic return, and development of a system framework for integrated water management.

In the second project, the objectives of establishment of effective Local Water Boards would: create a solid basis for the formulation, and subsequent implementation, of water management strategies and plans, improve the planning mechanism, and enable the district engineers to operate in a truly professional and efficient way.

### **Impacts and Achievements**

Projects emerged from Egypt-Netherlands cooperation program in the water sector have helped to improve the sustainable development of Egypt's water resources. Over time, Technical Assistance played and continues to play a pivotal role in the transfer of technology and knowledge as they are applied to land drainage, salinity control and integrated water management.

Three major projects were implemented under the Dutch technical and financial assistant with EPADP of which two mainly consisted of introduction of drainage machinery and equipment plus modern techniques to speed up subsurface system implementation (East Bahr soft. Drainage). The objective of the third project (DEMP) was to train EPADP's staff in better planning, design and mechanized lying of subsurface drainage system.

The support provided to the five research institutes (DRI, RIGW, MRI, HRI, ECRI), contributed to the establishment and technical strength of these organizations and to the development of valuable research capacities in the water sector. In terms of technical know-how, the institutes became the leading national research authorities in their respective fields. The researchers also gained stature in the international scientific community and developed a valuable network of international contacts.

The research effort brought a wealth of data on groundwater potential, hydrogeological maps and groundwater development plans. The setting-up and maintaining of a monitoring network on drainage water quantity and quality was also an important achievement. Results of the research have been published in an impressive number of publications and contributions to international conferences. At the policy level, the research has raised the government's awareness of groundwater resources and of the potential for reusing drainage water.

In Fayoum the emphasis shifted from separate technical research and model building to broader management issues with integration of irrigation, weed control and drainage aspects, including reuse of drainage water. Lately, experiments start with water user associations and farmer participation and data collection on socio-economic aspects of water distribution and agriculture.

The support to the Planning Sector of the MPWWR (SPS-project) was instrumental in its institutional strengthening and manpower development. It provided the Planning Sector with the knowledge and tools that will enable the MPWWR to develop policies and long-term strategies for water resources. The main themes in the activities of the SPS-project were water resource planning, water quality management, and institutional aspects of water resources planning and training of the staff of the Water Resources Planning Group in these aspects. Most of these objectives have been achieved.

In conclusion, the Egyptian-Netherlands Cooperation support for the Water Sector was innovative in several respects: the development of mathematical models to assess the impact of water management scenarios, the new hydrographic survey and data processing techniques, and the use of movable bed and computer models for hydraulic research. The modified drainage design research, the introduction of new mechanical and biological weed control methods and grass carp technology, the experiments with water users associations and water boards in Fayoum as an instrument for farmer participation in organization and maintenance were also innovative in the Egyptian context. Over the years, the focus of research has evolved from drainage to the reuse of drainage water and, subsequently to integrated water management and environmental aspects.

### Gaps and Constraints

The Netherlands strategy of supporting the Egyptian drainage and water resources management sector was to improve the performance of key organizations operating in the sector. The assistance was relatively strong with regard to its economic self-reliance. However, individual projects did not recognize the institutional environments as well as essential external conditions influencing project success. The strategy rather lately came to recognize the critical importance of institutional constraints and the need to address the root causes of underutilization of the existing human and financial capacities and capabilities in the Egyptian community in general and the water sector in particular.

Design of projects dominated by scientific and technical engineering community with limited attention for management administrative and financial/economic aspects—the need for nontechnical generic skills was recognized at a late stage. Farmer's participation, cost recovery and other issues that have recently received attention by MPWWR in their search for better sustainability have marginally been addressed by Fayoum Water Management Project (FWMP).

The shift to integrated water management and water quality support concurred with shifts in Government of Netherlands and Government of Egypt policies regarding water management and environmental protection. Some of the project suffered moderate to severe implementation problems, which resulted in delayed execution: some of these problems were specific to individual projects. On the Egyptian side, the most common constraint was the difficulty in obtaining or in recruiting qualified engineers and technicians. On the Netherlands side, contracting and formal approval procedure caused unnecessary delay.

Coordination with other programs and organization was not as it should be. At the level of the Panel, project intervention with other donors in water management sector and overlapping with other projects were rarely discussed at depth. To some extent, the lack of formal coordination was mitigated by informal contacts of project staff at the field level.

Because of the training and institutional strengthening efforts of Drainage Executive Management Project (DEMP), EPADP today has a good number of technically qualified staff to implement and supervise drainage execution. Still turnover of skilled and qualified staff is high due to higher salary payments in the Private sector further, because of promotion of staff within EPADP or MPWWR. Especially, the DEMP senior staff training has suffered a large turnover, which is mainly due to retirement. Sustainability of the Training Center is considered good; the center today plays a key role in strengthening of staff capabilities. Its facilities and equipment are kept in good order without external

support. The Center recurrent costs are entirely borne by regular EPADP budgets and actual costs per trainee are considered low, if compared with alternatives.

Consultation of women in environmental and water resources projects is essential because women are often the first to be affected by problems of environmental degradation and pollution and by scarcity of water resources. In view of socio-economic and cultural circumstances in Egypt, gender issues are not yet considered of primary importance by decision-makers. Although gender issues are important in the planning and implementation of water projects in order to achieve sustainability, a Gender Assessment Study (GAS) was never requested in any of the phases (formulation appraisal or inception) of Netherlands support projects in water sector. It would be useful to carry out a gender study for future projects.

### Lessons Learned

The Egypt–Netherlands Cooperation Program in the MPWWR water sector will continue to play a pivotal role in the transfer of technology and knowledge as they are applied to Egypt's water resources management. In the future, concern about environmental and social impacts will add dimensions to water development. As the concept of 'Integrated Resources Management' gains more momentum, the complex issues of interrelationships of irrigation, drainage, crops, water quality, soil and water conservation will become dominant in the provision of technical assistance. The combination of these factors will affect the way and means as well as the scope and the role played by technical assistance in transfer of technology.

Some important lessons can be drawn for future considerations:

- Develop the indigenous capabilities in the main areas of the water sector including training and management,  
In order to achieve this target one should look beyond the immediate needs of a specific project to the overall national requirements over a much longer time frame. Local capabilities should be assisted, to the extent possible to attain the level needed to meet national requirements.
- Enhance the role of the private sector in delivering the services related to irrigation and drainage with the ultimate goal of attaining a viable industry capable of serving the national development.  
Complete privatization is a sensitive issue in the water sector, however some form or another exists already and what is needed is to encourage the expansion by removal of the constraints and bottlenecks.

- Involve the beneficiaries in all aspects of planning, implementation, operation and maintenance of irrigation and drainage systems.  
This will increase their commitment to maintain the system and to make the additional necessary investment to reap the full benefits. Their participation will justify their financial contribution to repay the capital and recurrent cost with out resentment. Farmers organization and user associations are good institutions to work with to get an organized presentation. National consultants and staff can play essential role in this respect.
- Pay greater attention to environmental and social impact of irrigation and drainage works from the outset.  
These issues and the techniques to deal with them should be developed and applied without exception. Awareness and sensitivity of the professionals to these aspects should be brought to the same level as other engineering and technical qualifications.
- Emphasize the importance of carrying out the research and development work at the national level.  
Experimentation at the project level should be an integral part of the project itself in order to provide a vehicle to test and verify hypothesis ideas and techniques and their performance under local conditions. Specific resources allocation and efforts are to be designated for this task.
- In real application, knowledge transfer, is one of the most vulnerable aspects of development for the following reasons:
  - It is the least understood by the consultant providing technical assistance.
  - It has the least visibility among other project components.
  - It has the least defined work packages of the terms of reference and work plans as well.
  - It is the first to be cut off the program when budget constraints are faced and savings are needed.

### **Future Considerations**

It will be the task of the APP to address the main issues with regard to the water resources of Egypt. These issues are not mutually exclusive; in fact, they are often interrelated. Also, some of these issues are already visible, but significantly more important and complex in the next century than they are at present. Furthermore, these issues cannot be listed in any order of priority since their importance and relevance may well differ over time.

Main issues to be considered:

- Threatening Scarcity of the Available Quantity of Surface Water.
- Sound Exploitation of the Limited Groundwater Resources.
- Competition of Water Resources.
- Need for Improved Water Management.
- Improved Drainage.
- Improved Irrigation.
- Quality of the Water Resources and Reuse of Drainage Water.
- Institutional Framework.
- Women in Development.
- Future Netherlands Financial Support.

## Annex 2 The Policy and Operations Evaluation Department (IOB)

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The Policy and Operations Evaluation Department, also known by its Dutch acronym IOB or Inspectie Ontwikkelingssamenwerking en Beleidsevaluatie, is responsible for conducting evaluations of Netherlands foreign policy.

IOB is part of the Ministry of Foreign Affairs. It is an independent unit which reports directly to the Minister concerned, who then submits the studies to Parliament. The Department was established in 1977, with a mandate that was restricted to the evaluation of aid programmes. Following reassessment of the Netherlands foreign policy in 1996, however, the mandate of the unit was broadened to include other fields of foreign policy.

From 1977 to the mid-1980s, IOB's emphasis was on individual project evaluations, the status of which was then confidential. During this period about 250 evaluation reports were produced.

Since the mid-1980s, emphasis has shifted from individual project evaluations to comprehensive thematic studies, focusing on policies and modalities of implementation and covering sectors, themes or programmes. The duration of these thematic studies averages two to three years. External independent experts participate in the various phases of the research, under responsibility of the Evaluation Department. Increasingly, institutions or experts in recipient countries are invited to participate in the fieldwork. A reference group consisting of independent experts and Ministry staff is appointed for each study, and advises on the methodology and approach of the evaluation.

The final reports, based on various field and desk studies, are written by IOB's own staff and published under its responsibility. They are discussed with the Permanent Committee on Foreign Affairs with respect to follow-up actions, and are also given wide distribution. Examples of recent thematic studies include: Evaluation and Monitoring, Inter-institutional Cooperation in Higher Education, Humanitarian Aid to Somalia, Environment and Development Cooperation, and Fertiliser Aid.

In 1994 studies were published on the Netherlands country programmes in India, Mali and Tanzania. In 1995, similar studies were initiated on the programmes in Bangladesh, Bolivia and Egypt. These latest studies also gave attention to non-aid bilateral relations between those countries and the Netherlands, in accordance with IOB's new mandate. Authorities in recipient countries are kept abreast of the progress of the evaluation and are invited to comment on draft reports.

Increasingly, IOB participates in multi-donor evaluations. Examples of this include the evaluation of: Rural Small-scale Industrial Enterprises (UNDP, ILO, UNIDO), the World Food Programme, the European Union Programme Food Aid, and Emergency Assistance to Rwanda.

## Annex 3 Evaluation study workplan

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### 1 Background

The present evaluation report on the Egypt–Netherlands Assistance Programme in the Drainage, Water Research and Water Management Sector is part of the overall Country Programme Evaluation exercise carried out by the Policy and Operations Evaluation Department of the Netherlands Ministry of Foreign Affairs. The sector was chosen because of its importance for the Egyptian economy and the country's future development. Apart from this, the sector programme absorbed a substantial part of the total aid flow. In current prices, the total contribution amounted to some Dfl. 159 million, representing 20% of total aid disbursements.

### 2 Objective

The objective of the evaluation is to assess the policy relevance, effectiveness, efficiency and sustainability of the Netherlands assistance against the background of the sector's main problems. In addition, the evaluation attempts to draw lessons to provide DGIS and other responsible authorities with information to guide future policy.

The following set of key questions are addressed:

- What are the main characteristics of the drainage, water research and water management sector in Egypt and which changes occurred in the sector over the past decades?
- What are the main features of government policy for the sector?
- What was the Netherlands assistance policy for the sector and how did this policy relate to the sector's main problems, the Egyptian government's policy and the activities of other donors?
- Which projects and programmes were supported by the Netherlands and what were the results of this support?
- How efficient was the support organised and carried out?
- How sustainable are the results of the Netherlands' assistance and which factors influence sustainability?

### 3 Evaluation methodology

#### *Delimitation*

The evaluation covers a period of roughly 20 years, starting in 1975 when the programme was initiated and ending in December 1996 when the desk and field research programme was completed. For analytical and practical reasons, the sectoral coverage was restricted to projects executed under the authority of the Egyptian Ministry of Public Works and Water Resources. Projects in the drinking water and sanitation sector, carried out under the authority of the Ministry of Housing, New Communities Construction and Public Utilities, are reviewed under a separate chapter in the Country Evaluation Study.

The evaluation covers all projects supported in the sector during the period under review. Part of these projects were included in the field study; others were reviewed on the basis of desk research. The activities included in the field study covered 80% of total disbursements for the sector.

#### *Evaluation criteria*

In view of the objective of the study operations have been analysed from four perspectives:

*Policy relevance.* Determine whether the goals of the co-operation programme were consistent with country and sectoral assistance strategies and whether the design was appropriate in terms of the Netherlands development aid goals of increasing economic self-reliance, alleviating poverty, conserving the environment and improving the position of women.

*Effectiveness.* Review what have been the programme's effects and compare them with its goals, whether physical, financial, institutional or policy related. To the extent possible, longer-term effects on people, policies and domestic capacities are assessed to determine what lasting contributions DGIS has made to the country's development.

*Efficiency.* Assessment of outcomes in relation to inputs, looking at costs, implementation times and the performance of organisations concerned in the various phases of the project cycle: preparation (identification, formulation and design, and appraisal), implementation, and monitoring and evaluation.

*Sustainability.* Assessment of the potential to maintain the achievements of development aid generated or expected to be generated in the respective operational plans (f.i. in terms of financial viability, appropriateness of technology and institutional capability to retain achievements).

#### *Research approach*

The study is founded upon a variety of sources. At first, extensive desk reviews were made of DGIS archives containing a massive amount of project correspondence, internal memoranda and financial records. Analysis of project identification and formulation reports, appraisal documents, progress reports of executing agencies and consultants, and monitoring and evaluation reports provided first insight into the performance record of individual projects and systemic project implementation issues. Extensive reviews were also made of available literature on Egypt's drainage, irrigation and water management sector and relevant documents produced by other donors. A list of most relevant project documents and publications is attached in Annex 3.

Parallel to the desk research, a first round of interviews was arranged with a large number of Government officials, consultants and experts in the Netherlands and Egypt, directly or indirectly involved in identification, formulation, implementation, monitoring and evaluation of individual projects or the programme as such.

On the basis of the desk study and complementary interviews with parties in the Netherlands, a series of position papers was prepared retracing the implementation record of individual projects and identifying the need for further, more detailed study.

For analytical purposes, activities were grouped under four major headings, i.e. (i) general support to the drainage and water management sector through the Advisory Panel for Land Drainage Project; (ii) assistance to the drainage and water research sector; (iii) assistance to the Egyptian Public Authority for Drainage Projects, the authority charged with construction and maintenance of the national field drainage network; and (iv) the water management assistance programme in Fayoum Governorate, the concentration area of the Netherlands development co-operation programme.

The position papers served as a basis for formulating a field study programme in Egypt. The field study concentrated on the two main research institutes supported under the programme i.e. the Drainage Research Institute (DRI) and the Research Institute for Groundwater (RIGW), on the assistance to the drainage executing agency EPADP, and on the Fayoum water management assistance programme. The study was contracted out to an independent team of Netherlands and Egyptian consultants. Terms of reference and the position paper constituted the basis for the work plan drafted by the consultants and discussed in a two-day workshop in Cairo.

The field study included visits to the main organisations under the Ministry of Public Works and Water Resources involved in the co-operation programme and discussions with consultants. In addition, the evaluation team visited project sites, more especially



in Fayoum Governorate and had extensive discussions with farmers by means of both individual interviews and group meetings.

The consultants report was discussed in the Advisory Groups in Egypt and the Netherlands and relevant sections were sent to the recipient organisations for comment.

The remaining part of the assistance programme (Channel Maintenance Research Institute, Hydraulics Research Institute and the Advisory Panel on Land Drainage) was analysed on the basis of project files supplemented with interviews by IOB of recipient organisations, consultants and other donor agencies including the World Bank. A member of the IOB team visited the World Bank Headquarters at Washington to discuss projects in the sector with World Bank staff.

The draft IOB report was again subject of discussions in the Advisory Groups in Egypt and the Netherlands and relevant sections were once more presented for comment to institutions and consultants concerned. Thereafter, the report was redrafted, taking into account these comments.

#### **4 Study participants**

The task managers and principal authors of this study are Dr Jan Sterkenburg, staff member of the Policy and Operations Evaluation Department, Ministry of Foreign Affairs and Mr Roland Rodts, independent consultant. Valuable computational and desk research assistance was provided by Mr Karel Jungheim, Mr Anton Jansen and Mrs Hannelore Schledorn.

The field study was undertaken by a joint Netherlands–Egyptian team of consultants headed by Mr Ad Hordijk (Matrix Consultants) and further composed of Mr Tamme van der Zee (Netherlands Government Service for Land and Water Use) and Mrs Ahmed Gaber, A. Bazaraa, M. Hamzawi, Eman Imam and Y. Zahran (Chemonics Egypt).

Comprehensive, constructive and thought-provoking written and/or oral comments were received from the Netherlands and Egyptian Advisory Group of experts which convened on three occasions in resp. the Hague and Cairo.

The Egyptian Advisory Group consisted of Amb. Rafik Salah El Din Hassan (Chairman of the meetings and Secretary of State of the Ministry of International Co-operation), Prof. Dr Maaly Kamal Guimei (University of Alexandria), Dr Mrs Heba Nassar (Cairo University), Mr Ibrahim Elassiouti (independent consultant) and Dr Samir Youssef (American

University). The meetings were also attended by staff members of the Development Co-operation Section of the Royal Netherlands Embassy in Cairo.

The meetings of the Netherlands Advisory Group were chaired by Drs H.I. von Metzsch (Head Operations and Policy Review Unit, Ministry of Foreign Affairs). The Group further included Dr Tony Allan (School of Oriental and African Studies, University of London), Dr M.S. El-Namaki (Maastricht School of Management), Dr Lucas Horst (Agricultural University of Wageningen), Mrs Marileen van der Most-van Spijk (independent consultant) and Mr Gerben de Jong and Mrs Louise Anten (resp. Head of the Middle East and Egypt desk of the Ministry of Foreign Affairs).

Last but not least, the authors benefited from extensive discussions with and comments from a large number of organisations and individuals involved in the identification, formulation, implementation, monitoring and evaluation of the programme both in the Netherlands and in Egypt.

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