JARQ 46 (2), 145 – 150 (2012) http://www.jircas.affrc.go.jp

REVIEW
Issues of Cost Recovery and Irrigation Management Transfer for Irrigation and Drainage in Egypt

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Abstract

Cost recovery and irrigation management transfer (IMT) for irrigation/drainage infrastructure is crucial for appropriate construction/reconstruction and operation and maintenance (O&M) of infrastructure under limited governmental funding. The concept of cost recovery and IMT remains a new one in Egypt and there are several issues to be resolved. The current status and issues of cost recovery and IMT, especially O&M cost, in Egypt are reviewed and analyzed based on World Bank's projects and JICA's experience. Firstly, the current transitional status was identified based on World Bank's projects, followed by identification of the remaining issues based on JICA's experiences and finally future directions to achieve cost recovery and IMT. Providing the required training to Government staff, staff of water users' associations (WUAs), and farmers is key to ensure they fully understand the concept and achieve the cost recovery and IMT.

Discipline: Irrigation, drainage and reclamation
Additional key words: operation and maintenance, water users' associations, water resources

Introduction

In most countries, both developed and developing, irrigation/drainage infrastructure has mainly been government-constructed. However, governmental budget constraints have resulted in an inability to provide the funds required for appropriate construction/reconstruction, and operation and maintenance (O&M) of irrigation/drainage infrastructure[3]. This has compelled governments to engage in cost recovery and irrigation management transfer (IMT) to reduce their own financial burden and achieve appropriate construction/reconstruction, and operation and maintenance (O&M) of irrigation/drainage infrastructure. Cost recovery is intended to make the beneficiaries, namely farmers, share the costs of the construction/reconstruction of irrigation/drainage infrastructure to some extent[4]. The IMT intends to transfer the responsibilities of O&M of irrigation/drainage infrastructure from the governments to water users' associations (WUAs), namely farmers' groups, and WUAs will collect necessary fund for O&M from farmers.

There are several documents reporting irrigation/drainage issues in Egypt. For example, Satoh (1991) reported on water usage of the River Nile from the perspective of water usage by volume[12]. Watanabe et al. (1994) reported on rice cultivation under an arid climate[15]. Takahashi (2004) reported on the activities of JICA's (Japan International cooperation Agency) Water Management Improvement Project[13]. Taruya (2006) reported on the operation of distributors in the Nile Delta[14]. However, almost no documents exist reporting on the details of cost recovery and IMT for irrigation/drainage in Egypt.

The Government of Egypt has also been promoting the cost recovery and IMT of irrigation and drainage infrastructure to some extent mainly to reduce its financial burden. Previously, the Government of Egypt provided generous funding for the cost of construction/reconstruction of irrigation/drainage infrastructure. Conversely, as government budgets decline, the Government has been requiring farmers to pay for construction/reconstruction and O&M of irrigation/drainage infrastructure[19]. Several donors such as the World Bank and JICA have been assisting the Government of Egypt to promote cost recovery and IMT by establishing and strengthening WUAs. The World Bank is the largest donor for promoting cost

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Received 25 May 2010; accepted 29 August 2011.

recovery and IMT in Egypt, and has publishes several documents about them based on the implementation of their projects.

In this study, the current status of cost recovery and O&M of the irrigation and drainage infrastructure in Egypt will be reviewed and issues which should be solved will be analyzed. The method used to implement the study is as follows: (i) firstly, the issues which have been already identified will be comprehensively integrated by reviewing the World Bank's project documents and other documents; (ii) secondly, the remaining issues which should henceforth be resolved will be identified based on the author's actual experiences as a JICA Expert and lessons learned from JICA's project, Water Management Improvement Project Phase 2; and (iii) finally, the author's proposals on how to address the remaining issues will be presented.

Outline of the irrigation and drainage sector in Egypt

1. Agriculture

Agriculture is a key sector within the Egyptian Economy, employing about 23 percent of the labor force and accounting for around 14 percent of GDP and merchandise exports. The agricultural land base is around 3.3 million hectares. The holdings average is less than 0.8 hectare, one of the lowest in the world[20]. With the irrigation infrastructure, fertile land, and affluent sunshine, particularly in the Delta, the irrigated agriculture has the potential to achieve significant growth to feed the soaring population. Agricultural research is also very active, and the crop productivities are globally unrivaled.

2. Water resources

Egypt has, since time immemorial been described as the "gift of the river Nile", so it is unsurprising that management of water resources has been central to all aspects of national strategy. Its reliance on the Nile is reflected in the fact that 90 percent of the population live on 5 percent of the land area around the stem of the Nile River and the Delta[6]. The Nile waters are also shared by nine other upper riparian nations, all with growing water demands. From a fixed allocation of Nile river water of 55.5 million cubic meters a year, Egypt faces the strategic challenge of improving the productivity and sustainability of its water use, rather than increasing water supply[9]. Population growth has exacerbated the problem. Egypt has a per capita availability of renewable fresh water resources of 950 cubic meters per annum, which is lower than the regional average of 1,200 cubic meters per annum, and projected to decline further to 650 cubic meters per annum by 2017[9]. The water shortage is a serious issue in the Egyptian economy. Therefore, water use especially for irrigated agriculture should be made more efficient to meet the increased food demand from the increased population.

3. Irrigation and drainage

Agriculture in Egypt is almost entirely dependent on irrigation from the Nile given the lack of significant rainfall except for a narrow strip along the Mediterranean coast. The Mediterranean coast receives only about 200 millimeters of precipitation per year, which declines drastically still further moving southward. Cairo receives just over one centimeter of precipitation each year, while the areas south of Cairo receive only traces of rainfall[9]. The agricultural land base consists of old land in the Nile Valley and Delta, rain-fed areas, several oases, and lands reclaimed from the desert since 1952. The total irrigation area is about 3.3 million hectares[5]. As more than 95 percent of fresh water depends on the River Nile, more than 95 percent of agricultural land is irrigated, and the irrigation infrastructure has been constructed on more than 95 percent of agricultural land[9]. Construction of irrigation infrastructure without appropriate drainage infrastructure has resulted in problems of seriously high salinity and a high ground water table, hence the construction of drainage infrastructure to prevent these problems.

In Egypt, there are several levels of irrigation canals, namely main, secondary, tertiary, and on-farm level. The main canals take in fresh water from the River Nile, secondary canals from the main canals, and tertiary canals water from the secondary canals respectively. Tertiary canals are sometimes also known as branch canals, while on-farm canals are known as "mesqa" and "marwa". Mesqas are canals serving 142 to 710 hectares, and marwas are canals serving to 14.2 to 142 hectares[20].

Cost recovery and O&M based on World Bank projects

1. Main World Bank projects

The World Bank has been implementing projects of irrigation, drainage, and pumping station in Egypt. In this section, the issues of cost recovery and IMT which have been already identified will be comprehensively integrated by reviewing the World Bank's project documents and other related documents.

In this case, three projects will be analyzed, namely, Irrigation Improvement Project (IIP), Second National Drainage Project (SNDP), and Third Pumping Stations Rehabilitation Project (TPSRP).

The IIP has been implemented from 1994 to 2006 to reconstruct the deteriorated irrigation canals over about 100,000 hectares[16]. The SNDP was commenced in 2000 to construct tertiary and on-farm drainage infrastructure over about 330,000 hectares[18], while the TPSRP was implemented from 2000 to 2007 to reconstruct 77 pumping stations[17].

2. Proposed cost recovery and IMT about irrigation and drainage

Before IIP implementation, the World Bank and the Egyptian Government carried out a study of cost recovery and O&M, which can be divided into three phases[16]. The first involved making a rough estimate of the cost or reconstruction of irrigation canals and the cost of their O&M. The second phase analyzed farmers' financial ability to pay the cost of reconstruction and that of O&M, while the third phase analyzed the roles of the government and farmers in funding reconstruction and O&M.

In general, based on the study, the Government is responsible for funding reconstruction and O&M for main and secondary irrigation infrastructure. Conversely, farmers be responsible for funding O&M of tertiary and on-farm irrigation infrastructure.

Based on the study, the Irrigation and Drainage Law No. 12 of 1984 was amended to clarify and consolidate farmers' irrigation/drainage infrastructure. The Law clearly describes that the cost of reconstruction of tertiary and on-farm irrigation/drainage infrastructure should be fully collected from farmers over a 20 year period with no interest charged[1]. The cost of reconstruction of the tertiary and on-farm irrigation/drainage infrastructure can be collected with land tax[2]. The procedure of calculating the land tax to recover the cost of reconstruction of the tertiary and on-farm irrigation/drainage infrastructure is as follows. First, the Irrigation Improvement Sector or Drainage Authority of MWRI calculates the cost of reconstruction per hectare. Second, the Survey Authority confirms the land owners. Finally, the Ministry of Finance collects the cost for reconstruction as land tax.

In terms of irrigation, when first implementing IIP, the land tax that farmers should pay for the cost of reconstruction was calculated about 69.3 USD per hectare per year. Conversely, O&M cost of the tertiary and on-farm irrigation infrastructure was supposed to be collected directly and in full from farmers. The estimated amount payable by farmers for O&M was about 130 USD per hectare per year, and estimated as equal to about 15 to 25 percent of farmers' additional income with the reconstruction project[4].

Regarding drainage, when first implementing SNDP, the land tax was calculated at about 56.3 USD per hectare per year[18]. Conversely, the O&M cost of the tertiary and on-farm drainage infrastructure has not yet been clearly determined.

The collection rates of the land tax have been improved by adopting increased collecting fees payable from the Government to the collectors. The collection fee was raised from zero to 2.5 percent in 1989, and the collection rate was increased from 50 to 70 percent in 1991[20]. The land tax was only applied to those owning more than 2.1 hectares[11].

3. Proposed cost recovery and IMT about pumping stations

The Government has sole responsibility for the cost of reconstruction and the O&M cost of pumping stations in Egypt, which means it does not request any further contribution from farmers for the pumping stations[17]. The reasons are as follows. These pumping stations are installed on the main and secondary irrigation/drainage canals, and are considered public goods. It is difficult to evaluate the individual farmers' benefits from the large-scale pumping stations, which also require professional engineers and specific parts for O&M. Therefore, the Mechanical and Electrical Department of the MWRI is responsible for the reconstruction and O&M of the pumping stations.

4. Short summary

For irrigation/drainage, via the IIP and SNDP, the World Bank and Egyptian Government proposed that cost recovery and IMT be adopted. The costs of reconstruction and O&M of main and secondary irrigation/drainage infrastructure will be fully paid by the Government, while farmers should cover the cost of reconstruction of tertiary and on-farm irrigation/drainage infrastructure. The O&M cost for irrigation should be paid by farmers while that for drainage has not yet been clearly determined. The costs of reconstruction and O&M for pumping stations are fully covered by the Government.

Outstanding issues based on JICA's activities

1. Obstacles to cost recovery with Islamic law

One of the main obstacles for cost recovery is that under Islamic law, water is considered a free gift from the God of Allah. In Egypt in particular, water is considered a gift of both Allah and the Nile, as the River Nile is one of the blessings of Allah. Therefore, both the Government and farmers are very reluctant to establish water pricing for irrigation. For example, the International Irrigation Management Institute (IIMI) and Dutch Govern-

ment carried out studies on the potential for adopting water pricing, especially on rice cultivation in paddy fields, since this is considered as consuming excess irrigation water per hectare compared with other crops[7,10]. These studies were intended to adopt marker-based economic disincentives for rice cultivation in paddy fields, given the scarcity of available water in Egypt. However, Government did not intend to consider the possibility of market-based water pricing for rice cultivation in paddy fields, and refuses even now to use the 'water pricing', since this is seen as against Islamic law. Farmers also still consider irrigation water as a resource obtainable free of charge as a gift from Allah and have yet to fully understand the concept of cost recovery and charges for O&M.

2. Collection rates of cost recovery and Government subsidies

Although Law No. 12 clearly describes that the cost of the tertiary and on-farm irrigation/drainage infrastructure should be fully covered by farmers, the author, a JICA Expert, determined the following information on a personal basis. In actual fact, the Government has been covering about 50 – 55 percent of the cost of reconstruction, and farmers paying only 40 – 45 percent of the same. In addition, the actual collection rate is as low as 10 percent, while the collection rate of O&M cost for irrigation also remains very low. The Government covers almost 100 percent of the O&M cost for tertiary and on-farm drainage for two main reasons. (i) The first factor is the Government side. As cost recovery and IMT are still a new concept and it is a transitional period in Egypt, the Government kindly provides subsidies to ease the farmers' burden. (ii) The second factor is the farmers' side. The cost calculation based on Law No. 12 is higher than farmers expect, and the concepts of cost recovery and IMT are still not fully understood by farmers.

3. Deterioration of irrigation/drainage infrastructure

Irrigation/drainage infrastructure such as canals has become severely deteriorated in Egypt, mainly due to poor O&M by the Government. Without proper rehabilitation, Water Users' Associations (WUAs) do not accept the management transfer of irrigation/drainage infrastructure from the Government. Following the management transfer from the Government to WUAs without appropriate rehabilitation, WUAs will be responsible for rehabilitation and collecting necessary money from farmers. In this case, WUAs and farmers will not experience any benefits from the management transfer, given that their financial burden will increase.

4. Weakness of Water Users' Associations

The concept of WUAs is also still new in Egypt, despite the existence of the Irrigation and Drainage Law No. 12 of 1984. This Law No. 12 determines the roles and responsibility of tertiary-level WUAs in IMT and cost recovery in addition to the full cost recovery of construction/reconstruction of tertiary and on-farm irrigation/drainage infrastructure. The Law determines that tertiary-level WUAs have been the responsibility for O&M of tertiary and on-farm irrigation/drainage infrastructure, and includes collection of the necessary funds for O&M farmers[1].

However, WUAs staff and beneficiary farmers have not fully understood the concept. In actual fact, therefore, WUAs do not fully play their roles in implementing appropriate O&M and collecting fund from farmers, as determined by law. Therefore, JICA have been implementing two projects which establish and enhance WUAs and provide the necessary training to WUAs staff and farmers in IMT and cost recovery. These projects are (1) Water Management Improvement Project (WMIP) from 2000 to 2007, and (ii) Water Management Improvement Project – Phase II (WMIP2) from 2008 to 2012. These JICA projects strongly focus on the full participation of stakeholders including farmers, WUA staff, and MWRI staff at every stage of designing, planning, and implementation. In particular, the projects let farmers who are WUA members determine their own problems and solution methodologies via internal discussion, assisted by JICA experts. This is a bottom-up approach, and the JICA projects are highly evaluated and appreciated by MWRI. However, the number of project sites is limited due to budget constraints, hence the challenge of how to expand the success stories of the projects' participatory approach throughout all of Egypt.

5. Legal status of the Branch Canal Water Users' Associations

In addition, it is also important to strengthen branch-canal-level WUAs (BCWUAs) for IMT and cost recovery. In this case, the term branch canal means tertiary canal. The Government carried out a study of IMT at a branch-canal-level, including the establishment of BCWUAs in 2000[8]. In this study, the draft law for providing legal status to BCWUAs was proposed and remains under discussion in parliament, pending which BCWUAs remain without legal status for their activities, which means they face some problems. For example, they cannot open bank accounts and collect money for cost recovery and O&M from farmers.

Future directions

1. Cope with Islamic law

Under Islamic law, water is considered as a gift free of charge from Allah. However, conveying and distributing irrigation water from the River Nile to each farm requires irrigation infrastructure such as canals and O&M, for which costs for construction/reconstruction and O&M inevitably incurred. These costs should be identified based on the concept that water is free of charge. For irrigation in desert areas such as Egypt in particular, in comparison with rainfall harvesting, artificial infrastructure and its O&M are required, the costing for which is definitely different than from a gift from Allah. This difference of concepts should be fully understood by the Government, WUAs and farmers, for which a thorough and detailed explanation are required. The JICA projects WMIP and WMIP2 have been providing the necessary training for MWRI staff, WUAs staff, and farmers and the stakeholders' understanding has been gradually achieved step by step. Similar training should be provided to ensure stakeholders fully understand the necessity of IMT and cost recovery.

2. Rehabilitation of irrigation/drainage infrastructure

Before transferring management from the Government to WUAs, irrigation/drainage infrastructure having deteriorated should be appropriately rehabilitated – a task for which the Government should originally be responsible. However, as the Government is reluctant to do so, JICA's project WMIP2 has been proposing joint repair works and providing the necessary materials to rehabilitate canals such as cement and sand. Government staff, WUA staff, and farmers jointly repair deteriorated concrete linings of irrigation canals by themselves with the provided materials, which not only serves to repair canals having deteriorated, but also ensures the responsible stakeholders remain aware of the O&M of canals. In case of the Government's reluctance, such joint activities should be continuously carried out with JICA Experts' assistance.

3. Collection rates of cost recovery and Government subsidies

Government subsidies should be gradually reduced to achieve full cost recovery and more training should be provided to MWRI staff, WUAs staff, and farmers to ensure they are fully aware of the concepts of cost recovery and management transfer. In addition, in order to give the farmers an incentive and motivation to pay for the full cost recovery and O&M, they need to fully understand the benefits of IMT. For example, with full farmers' participation for IMT, equitable water distribution, increased crop yields and farmers' income, conflict resolution would be achieved. In Egypt in particular, given the scarcity of irrigation water during the summer irrigation peak period, the benefits of equitable water distribution with IMT should be fully understood by farmers.

4. Strengthening Water Users' Associations

Providing training, not only to WUAs and farmers but also to the MWRI staff, is required to expand the success stories and lessons learned from JICA projects throughout the whole of Egypt. Irrigation Advisory Services (IAS) of the MWRI are in charge of establishing and strengthening WUAs. Additional training of trainers (TOT) should also be provided continuously to strengthen the IAS staff's capability to provide appropriate training to WUAs staff and farmers for strengthening WUAs. dx

5. Legal status of Branch Canal Water Users' Associations

Having legal status is required for BCWUAs to fully implement their activities, hence parliament should pass a draft law as soon as possible. However, if farmers do not accept the management transfer from the Government to BCWUAs, politicians do not want to pass such a draft law in parliament for fear of losing farmers' political support. Providing the necessary training for farmers to accept the concept of management transfer and recognize its benefits is required. In addition, without the law for BCWUAs, a ministerial decree is required to tentatively establish legal status for BCWUAs. Such a tentative procedure should be fully understood by the MWRI staff.

6. Short summary

To achieve the abovementioned future directions, capacity building is essential. Based on JICA projects' success stories and the lessons learned, additional and appropriate training should be provided to the MWRI staff, WUAs staff, and farmers to achieve efficient and effective cost recovery and IMT.

Conclusions

In this paper, the current status of cost recovery and IMT of irrigation/drainage infrastructure in Egypt were reviewed; based mainly on the World Bank's related projects and JICA's experiences. In Egypt, cost recovery and IMT remain at a nascent stage. However, JICA projects

include success stories and lessons learned. Providing the necessary training to Government staff, WUAs staff, and farmers based on JICA's experiences and the author's proposed future directions would assist Egypt to achieve real cost recovery and IMT.

References

1. Arab Republic of Egypt (1984) Law No.12 of 1984 concerning irrigation and drainage. Arab Republic of Egypt, Cairo.
2. Hopkins, N. (1995) The Rule of Law and the Rule of Water. American University in Cairo, Cairo, 173–186.
3. Kitamura, K. (2008) Issues of Water Users' Associations for sustainable irrigation and drainage in Central Asia. *JARQ*, **42**(3), 203–210.
4. Kitamura, K. & Nakaya, T. (2010) Case study on application of asset management of irrigation infrastructure for rice production in Australia. *JARQ*, **44**(1), 45–51.
5. Ministry of Agriculture and Land Reclamation (2009) Sustainable Agricultural Development Strategy 2030. Ministry of Agriculture and Land Reclamation, Cairo, pp.217.
6. Ministry of Economic Development (2007) The sixth five-year plan for economic development. Ministry of Economic Development, Cairo, pp.197.
7. Ministry of Water Resources and Irrigation, Egypt, Planning Sector, and Ministry of Foreign Affairs, the Netherlands Directorate General for International Cooperation (2000) National Water Resources Plan for Egypt, towards crop-based water charges - Suggestions for a restart -. NWRP Technical Report No.11, Cairo, pp.60.
8. Ministry of Water Resources and Irrigation (2001) MWRI Policy on Irrigation Management Transfer, Report No.47. Ministry of Water Resources and Irrigation, Cairo, pp.27.
9. Ministry of Water Resources and Irrigation (2005) National Water Resources Plan 2017. Ministry of Water Resources and Irrigation, Cairo, 1–1, C–21.
10. Perry, C.J. (1996) Alternative approaches to cost sharing for water service to agriculture in Egypt. International Irrigation Management Institute, Colombo, pp.15.
11. Said, R. (1993) The River Nile: Geology, Hydrology, and Utilization. Pergamon Press. Oxford, pp.332.
12. Satoh, M. (1991) Water Usage of the River Nile in Egypt. *J. Jpn. Soc. Irrig. Drain. Reclam. Eng.*, **59**(11), 93–98. [In Japanese].
13. Takahashi, A. (2004) Establishment process and current status of water users' associations in Egypt. *Water and Soil*, **136**, 24–31 [In Japanese].
14. Taruya, H. et al. (2006) Investigation report on the operation of distributors in the Nile Delta. *Tech. Rep. Natl. Inst. Rural Eng.*, **204**, 263–272 [In Japanese].
15. Watanabe, T. et al. (1994) Rice production in the Nile Delta in Egypt. *J. Jpn. Soc. Irrig. Drain. Reclam. Eng.*, **62**(2), 7–12 [In Japanese].
16. World Bank (1994) Staff appraisal report, Arab Republic of Egypt. Irrigation Improvement Project, World Bank, Washington D.C. pp.105.
17. World Bank (1998) Project appraisal document on a Proposed Loan of US$120.0 Million to the Arab Republic of Egypt for a Third Pumping Stations Rehabilitation Project. World Bank, Washington D.C., pp.105.
18. World Bank (2000) Project appraisal document on a Proposed Loan in the Amount of US$50.0 Million Equivalent to the Arab Republic of Egypt for a Second National Drainage Project, World Bank, Washington D.C., pp.128.
19. World Bank (2005) Cost-effectiveness and equity in Egypt's water sector. Egypt Public Expenditure Review, World Bank, Washington D.C., pp.26.
20. World Bank (2007) Implementation completion and results report on a loan IBRD-38320 & Credit IDA-26720 in the amount of US$26.7 million & SDR 35.7 million (Total US$ 80.0 million equivalent) to the Arab republic of Egypt for an irrigation improvement project. World Bank, Washington D.C., pp.68.