West Delta Water Conservation and Irrigation Rehabilitation Programme, Egypt

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What is the problem?

Since the 1980-ties Egypt is expanding groundwater based agriculture on the desert plains west of the Nile delta, the West Delta area. A highly productive and economically important, export-oriented agriculture has developed, based on modern irrigation technology and advanced agricultural practices. However, the rate of groundwater exploitation far exceeds the rate of renewal, and thus is not sustainable. Groundwater is rapidly depleting and in some places already turning saline. In order to reverse the deteriorating situation, to save the economic potential (about US$ 500 million annually) and the many jobs in 'on' and 'off' farm activities, the Government of Egypt (GoE) has proposed the West Delta Water Conservation and Irrigation Rehabilitation Programme (WDWCIRP) to supply Nile water to the area. The GoE is planning to pump fresh Nile water from the Rosetta Nile branch into the project area and distribute it over 40,000 ha. of farmland in the West Delta area at full cost recovery.

Egypt's National Water Resources Management Plan is based on a strictly defined amount of available water, agreed upon among the Nile basin states. Within this limitation, the NWRP describes measures to save water in the existing water resources management system and to facilitate expansion of irrigation works in desert areas. Water saving measures include the ongoing urbanisation on farmland (thus saving on irrigation water), waste water treatment, shifts in the cropping pattern, and irrigation improvement projects. The WDWCIRP was one of the identified irrigation expansion works.

Which ecosystem services were considered and how?

The WDWCIRP started with a preliminary technical design providing a general framework on how to address the predictable future problems of groundwater availability. This preliminary study provided the basis for an SEA (Strategic Environmental Assessment) of the provisional plan, following an approach developed by the World Bank (Abdel-Dayem et al, 2004) called Drainframe. The SEA was integrated taking into account economic, social and environmental aspects, and strategic as it offers options for decision-making in early stages of planning (Slootweg et al, 2007). Valuation of ecosystem services focussed on the services linked to water resources in the area under influence of the major driver of change, i.e. transfer of water from the Nile to the West Delta desert area.

The preliminary study was based on a number of stakeholder workshops and interviews throughout the area. The focus was on identifying the needs and aspirations of farmers in the West Delta area. The SEA study has extended participation with other stakeholders who, based on an assessment of affected ecosystem services linked to surface and groundwater, could be identified as potentially affected by the investment programme.

A first round of qualitative analysis resulted in an overview of affected ecosystem services through the identification of main drivers of change:

- *Withdrawal of water from the Rosetta Nile branch* - The reduction of water availability downstream of the intake affects water supply to tens of thousands of smallholder farms, public water supply in Beheira Governorate and the city of Alexandria, the ecological status of coastal lagoons and their fisheries productivity.
- *Surface water supply to West Delta* - Transferring this water to the project area can lead to reduced exploitation of groundwater in the project area, but it can also lead to intensified agricultural exploitation by jointly using imported surface water and local groundwater. This results in complex groundwater level fluctuations in the aquifer underlying the entire West Delta.
- *Induced social and economic development* in the West Delta Region facilitated by a permanent supply of water.

How was this analysis undertaken?

Stakeholders in ecosystem services were invited in a workshop to make an assessment of the relative importance of the affected ecosystem services. This resulted in the identification of main issues. A second round of analysis included a comparison of alternative design concepts based on quantified impacts. Relations between interventions, the changes that were expected, their effects on ecosystem services, and the impact on societal values of these services were first described. These relations in most cases were modelled in simple mathematical equations. The team also took advantage of two existing computational models for simulation of water availability and yield relations in the Nile Delta, and for simulation of groundwater behaviour in the West Delta region. The results were presented and discussed in a second workshop with about 60 stakeholders from both private and public sectors.

The SEA exercise concentrated on the following main impacts expected to result from the considered alternatives in the study area:

- Net economic benefits of an average farm in the planning area (quantitative);
- Numbers of permanent and seasonal jobs in the planning area (quantitative);
- Impact on agricultural production in the downstream area of the Nile Delta (quantitative);
- Fishery benefits (semi-quantitative);
- Impact on drinking water availability (semi-quantitative).

Inputs necessary for this analysis

The SEA has been carried out over a period of three months. Time expenditure included hiring of three expatriate and two local consultants for one month each. Furthermore, farm surveys were carried out by local agricultural extension workers. The study was carried out in close collaboration with the persons responsible for project planning, at GoE and World Bank. The cost of the study was approximately US$ 80,000. As a result of good coordination, the study was fully integrated in the planning process, which did not experience any delays.
Data were obtained from project planning documents, government statistics, farm surveys, two computational ground and surface water models, with a number of additional field visits and on-farm interviews for verification. Two stakeholder workshops provided relevant

scoping information and discussion on the outcome of the study. The level of detail and reliability of information was sufficient to guide the planning process. Where links between hydrological changes and impacts were very difficult to quantify in economic terms, the impact description was limited to the identification of numbers of affected people. The subsequent detailed technical design was subject to a full-fledged ESIA, which could zoom in on a limited number of issues to provide more detailed information.

How was this information used to change/inform local/regional policy?

The use of SEA at the earliest possible stage of the planning process has guaranteed that environmental and social issues beyond the boundaries of the project area were incorporated in the design process. Very simple quantification techniques, in terms of net present value and benefit/cost ratio of investments at farm level, job creation, numbers of people negatively affected, and overall production losses in the Nile delta, provided strong arguments for decision makers to significantly reduce the scale of the initial pilot project. The diversion of water from relatively poor smallholder farmers in the Nile Delta to large investors in the West Delta poses equity problems unacceptable to stakeholders as well as government decision makers.

All experts and stakeholders agreed that water withdrawal from the Rosetta branch should be fully compensated by measures to save water in the entire irrigation system. Water quality in Rosetta branch and in the coastal lakes is under serious stress; agriculture in the Nile delta would face serious losses under reduced water availability, and public water supply to Alexandria is of such overwhelming importance and any reduction in water supply to Rosetta branch has to be avoided.

The National Water Resources Plan does not give a timetable yet of water saving measures and therefore does not provide any clues to the timing of water savings. It was decided that the WDWCIRP programme will have a phased approach, providing room to implement the water savings programme. Short-term measures can produce necessary first savings to allow for the first, relatively small WDWCIRP pilot project. Further water saving measures will provide room for further expansion of the WDWCIRP programme.

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