

## **Some comments on the report of Mr Ho Ta Khanh “Shortage of fresh water and necessity for storage facilities in the Mekong delta (M.D)”**

The report is a clear presentation of this key problem: it focuses on the need of fresh water and underlines the likely future of two rather new solutions: Construction of large off river reservoirs and large coastal reservoirs; they are thus commented below.

### **1) Large off river reservoirs**

Four questions seem the most important: technical and economical problems of dykes, pumping, leakage, resettlement.

- As the cost of the dykes is a very large part of the investment, this solution seems to be cost effective only for schemes of  $\text{km}^2$  or dozens  $\text{km}^2$ . The reservoir depth and dyke's height will probably be between 5 and 15 m and possibly raised in several phases. The storage of such reservoir may be at least  $10 \text{ hm}^3$  but the cost per  $\text{m}^3$  of water may be much lower for schemes of  $100 \text{ hm}^3$  i.e 3 or 4 km diameter. For a diameter of 1 km storing  $8 \text{ hm}^3$  the dyke length will be 3.1 km, i.e about  $250\,000 \text{ m}^3$  stored for 100 m of dyke. This ratio is close to the ratio of dozens of thousands small dams. The length of dykes will be for a 10 m deep reservoir 3-fold the reservoir diameter  $3 D$  and the storage about  $8 D^2$ .
- The design of dykes may be adapted to the construction methods and equipment. They may be closer to highways works and equipment than to traditional solutions for dams constructions or may be specific to these reservoirs. Optimization by tests could be made for first schemes. Advices from contractors may be useful.
- The pumping equipment may be standard existing equipment and the cost of pumping seems a small part of the total cost. Using wind energy may be cost efficient but using electricity or even fuel may be very acceptable.
- The problem of seepage applies to dykes and under dykes and to the bottom of the reservoir. The leakage through the bottom of the reservoir of traditional dams is much reduced during the first years of operation by the siltation of small materials from which the finest are above the largest, i.e a very efficient natural watertightness. For reservoirs off river a similar efficiency should be obtained: a solution may be to add to the pumped water during first years a content of very small materials.
- The resettlement for dozens  $\text{km}^2$  of off rivers reservoirs is a serious problem. The number of drowned houses may be limited but the area of cultivated fields will be important. A significant part of the investment should be foreseen for the resettlement. It should be compared with the problems of resettlement of many traditional dams on river and possibly lower.

### **2) Low coastal reservoirs**

A large part of the cost will be the cost of dykes at sea. It may be advisable to separate a breakwater built in first phasis from the impervious dyke built in calm water.

### **3) Additional comment**

The report underlines the reduced possibility of storing significant volumes of water in reservoirs along river Mekong branches. But it may be useful to build in some branches low head dams with possibly Pump Storage Plants for controlling the water level or adapting it by few metres. It may avoid salt water and raise the fresh water levels during the dry season avoiding quite any loss of fresh water at sea.