Information Management System – Management and Feedback Instrument

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In the management process, all-round information on a controllable object is the foundation for successful operation. It is impossible to maintain any machine or mechanism, construction or production process without information on its current status, available resources, interrelations of its components etc. It is also important to know the future needs and to be ready to meet future requirements to avoid failures in operation.

Much more information needs to be provided when we deal with water management. Mistakes in water management threaten not only to damage sufficient water supply but also to cause floods, droughts, and diseases, loss of crop yield, famine and many other hardships and even disasters. Nevertheless, a well thought-out information management system (IMS) should be the backbone of IWRM under all the diversity of interrelations with the outer world. Lets us look at Figure 1 given in the preface. We see all-round links of water resources, on the one hand, with different factors and effects, which are far from complete presentation, but, on the other hand, with impacts of outer and inner factors on state, regime, available resources, and quality of water and all water-related aspects. It is understandable that it is quite difficult to establish the information management system including directly all necessary entities due to the need to set data of both temporal and spatial measurements. Therefore, in the process of establishing the information management system (IMS) for IWRM it is necessary to stick to specific rules and principles. An attempt to formulate these rules and principles are made below.

1. The IMS is formed as a structured storage in which data is arranged in major data sets of thematic information. The following data sets, most often, are represented: “Water - Resources”, “Water - Consumption”, “Social Environment”, “Land Resources”, “The Environment – Biodiversity & Bio-Productivity”, “Climate”, “Infrastructure”, “Hydropower”, “Irrigation & Drainage”, “Water Supply”, “Industry”, “Micro-Economy” and so on. A series of data sets may be different depending on the specific character of IWRM.

2. The IMS is built up for three time periods: retrospective, current information, and outlook. A retrospective series length depends on the set of planned tasks of management and analyses. It is recommended to include all hydrological and climatic data over the whole length of existing series of observations, since forecast, recurrence assessment or calculating the probability of emergencies provide more reliable results if there is longer series of observations. It is important to have additional series of observations related to the status of land resources, vegetation cover, and soil fertility, however, taking into account more smooth changes of their characteristics, it is not necessary to store in the IMS data of each year, but, for example, to store averaged data over each 5-year period or even decade, if series of observations are long enough. It is desirable to have the socio-economic indicators, at least, over last 25-30 years, since the length of retrospective series specifies the reliability of socio-economic analysis and forecasts. Taking into consideration the long period of implementing water management projects, their efficiency assessment for prospect should be made on the basis of retrospective series of

observations, the length of which exceeds the planned period, at least, one and a half or two times.

3. Current time series for a planned year, usually, have daily intervals, but in some cases one-hour intervals may be required. After certain time, these daily data series can be either annihilated or aggregated and archived. Retrospective or long-term time series can consist of the series of 10-day or monthly average data.

4. Spatial location of objects is contained in the IMS in the form of GIS thematic layers (Geographic Information System) that allows to set position data in absolute coordinates and to link IWRM interacting components over area or linearly, and this is very important for solving many practical tasks of management and planning. For example, only with a help of the GIS, the detailing of forming snowmelt runoff depending on land gradients, soils, precipitation etc. is possible. Information on soil conditions, hydro-geological cross-sections, crop patterns and other components is the reliable basis for calculating water requirements of irrigated areas. The GIS allows to link return water formation with an area affected by the drainage network and with water supply over this area, as well as to set the source zones of different pollutants.

5. A set of models that allows analyzing various operational and emergency situations and making forecasts should be provided for in the frame of IMS. A legislative base of planning, operational management together with O&M regulations and rules of controlling different functional components should be a special part of the IMS. This part of the IMS is included into the database (DB)

6. Various data and indicators necessary for solving IWRM operational and long-term tasks related to developing information data sets, mentioned in Para 1, and the GIS (Para 4) should be specified by managers of the IMS in co-ordination with technologists and governmental bodies.

Establishing the Information Management System provides for the following target activities:

- Establishing database on all operational processes, including annual and long-term planning and operational water supply and distribution;
- Water quality monitoring and management;
- Analyzing and adjustment of the water management process;
- Providing the transparency of water management and trust among water users;
- Assistance to water users in economical water consumption and achieving its potential productivity;
- Preparing the analytical reports for improving management methods and informing decision makers and stakeholders; and

- Assessment of current trends and adjustment of the water use strategy; and so on.

In Central Asia, the first steps in establishing the IMS for IWRM were done. In particular, under financial assistance of Swiss Development Cooperation, the regional information system CAREWIB, which serves stakeholders in the Aral Sea basin at the interstate level, was created by SIC ICWC's specialists. Another example of the established IMS aimed at servicing stakeholders at the levels of irrigation canal, WUA, and selected farmers is the IMS of the IWRM-Fergana Project that contains the database for pilot irrigation canals. Finally, the IMS aimed at long-term planning and improving water management practice, by example of water management in Chirchik River Basin (sub-basin of the Syr Darya River) was established in the frame of the RIVERTWIN Project. Detailed description of above projects can be found at website: www.cawater-info.net.