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Sheng

IMIS

**A. Static/lookup Tables**

1. Basins, catchments, rivers, lakes, reservoirs, intakes, irrigation systems, canals, collector, irrigators, wells, hydroposts, water quality monitoring posts, and etc are available in the respective attribute tables of the WOC Geodatabase. Galina should help by providing them in Excel sheets for the IMIS developer so they can import them in the IMIS. Please make sure providing the units for length, area, latitude and longitude, flow rate, water supply volume, and etc with the attribute excel sheets.
2. WUAs (WUA\_Code, WUA\_Name\_Eng, WUA\_Name\_Rus, WUA\_Service\_Area, … plus CanalCode). Data are available from the billing system set up for LK. Note, use 8-digit code from the billing system for WUA\_Code.
3. Oblasts (OVK\_Code, OVK\_Name\_Eng, OVK\_Name\_Rus, OVK\_Arae … plus CC\_Code)
4. Rayons (RVK\_Code, RVK\_Name\_Eng, RVK\_Rus, RVK\_Area, … plus OVK\_Code)

Suggestions for the Static Relational Tables

|  |  |  |
| --- | --- | --- |
| Table | Primary Key | Foreign Key |
| Basin | BZ\_Code | CountryCode |
| Catchment | CCode | BZ\_Code |
| River | RCode | CCode |
| Irrigation | ICode | BZ\_Code |
| Lake | LCode | BZ\_Code |
| Reservoir | RCode | BZ\_Code |
| Canal | CanalCode | RCode |
| Collector | CollectorCode | RCode or ICode |
| Hydromet hydropost | HPCode | RCode or CanalCode |
| Oblast | OVKCode | BZ\_Code |
| Rayon | RVKCode | OVK\_Code |
| WUA | WUA\_Code | ICode and RVKCode |
| WUA hydropost | WHP\_Code | WUA\_Code |

**B. Time-series/Dynamic Tables**

1) Supply Side

* Computed average daily inflow at each main canal intake (Qms, volume/day) = Average hourly water level per day, computed average hourly flow per day (water level multiplied by the calibrated rating equation) and total volume per day (average hourly flow per day multiplied by 24 hours). Note, only hourly water levels per day and/or two water observation levels per day are the only data input for this.
* Computed average daily inflow at each WUA intake (Qwua, volume/day) = Average hourly water level per day, computed average hourly flow per day and total volume/per day. Note, only hourly water levels per day and/or two water observation levels per day are the only data input for this.
* Aggregate water supplies by volume for: (1) All the WUAs in each irrigation system by 10 days, month, vegetation period, and year; (2) each irrigation system (intake from water sources) by 10 days and vegetation period, and year. These are calculated fields in IMIS.
* Water supply targets (Qtarget) set by the basin irrigation office for each WUA by10-day (input data) and vegetation periods (calculated field), and year (calculated field).

2) Demand Side

* Water demand/request for each WUA by volume plus data on WUA ID, planned crops, and planned crop areas for each vegetation season. All input data to IMIS.
* Aggregate water requests (volume) for all WUAs in each irrigation system by 10-day and vegetation periods, and year. All calculated fields.

Suggestions for the Dynamic Relational Tables

|  |  |  |
| --- | --- | --- |
| Table | Primary Key | Foreign Key |
| Qms | RCode | ICode or CCode |
| Qwua | ICode | RVK\_Code |
| Qtarget | WUA\_Code | RVK\_Code |
| Qrequest | WUA\_Code | RVK\_Code |

**C. Technical Analysis**

1) Relative Water Supply

**RWS** is a well-established measure of the amount of water supplied to an area. It consists of the measured volume of water supplied to a defined area divided by the crop-specific water demand arising from that area (its ET or evapotranspiration). Due to lack of data for calculating the ET, the crop norms are used in Tajikistan. In the IMIS, each WUA computes the crop water requirements using the norms and planned crop areas and submit the total seasonal water requirement/water request as a single figure to the ALRI basin office.

RWS thus measures water supply to an area, standardized for the area to be covered, the mix of crops to be grown, and the climate conditions of the locale represented by the crop norms. A RWS value of 1.0 would be exactly enough water to meet the ET needs of the crops when delivered to their roots. A value of 2.0 would indicate a supply of twice as much water as the crops need. Because of unavoidable losses in delivery and management, desired values of RWS are generally more than 1.0 and less than 1.5.

The IMIS will compute the RWS for each vegetation season for each of the WUA in a basin area (i.e., 26 WUAs in lower Kofarnihon basin). After baseline RWS values are computed for each of the WUAs, a basin-wide band of standard desired RWS values will be set by the ALRI basin office for each year. The ALRI basin office working with the WUAs will then attempts to provide measured volumes of water supply to each WUA that just meet the request. In subsequent years, measured RWS values from each WUA will be compared with this band (i.e., 1.0-1.5) and the fraction of WUAs whose RWS falls within the band will be counted. Annual targets for the ALRI would then consist of the number of WUAs with RWS values that fall within the desired range.

2) Implied Efficiency

By comparing the computed WUA water request and the target value set by the ALRI basin office for each WUA, one can estimate the “Implied Efficiency” (IE) of the basin office in meeting its water needs. Implied Efficiencies are the values that would have to be applied to the crop water requirements computed by ALRI, not include any hard-wired system efficiency factor, to produce the “target values” actually assigned to each WUA. For example, the calculated IE for WUA (1) is 0.42 and 1.17 for WUA2. This means that only 42 % of the water targeted for WUA (1) is intended to meet crop water requirements, while the remainder is to account for losses and other uses. In WUA (2), on the other hand, the target is 17% lower than the water request, implying that water from other sources is being used to supplement canal water.

* RWS (x) = Measured water delivered to WUA (x) divided by the water request/demand of WUA (x) divided by the WUA (x) total crop area. In lower Kofarnihon, x will be 1 to 26.

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* IE for WUA (x) = WUA (x) requests divided by water supply targets set by the ALRI basin office for WUA (x) for the vegetation period.

3) Irrigation System Delivery Efficiency

Irrigation system delivery efficiency (ISDE (y)) consists of the measured volume of water supplied to all WUAs within the service area of Irrigation System (y) divided by total water intake from a river and/or other sources to Irrigation System (y) for a specific period.

* Irrigation system delivery efficiency (ISDE (y)) = Water delivered to all WUAs within Irrigation System (y) divided by total water intake from a river and/or other sources to Irrigation System (y) for a specific period such as 10-day and/or vegetation periods. In lower Kofarnihon basin, y will be 1 to 10.