

4 Greater Himalayan Wetlands Inventory Information Management

Effective information management is a critical component of the GHWI process and emphasis is placed on the use of up-to-date spatial datasets, databases, and GIS technologies. An information management system, the 'Greater Himalayan Wetlands Information System' (GHWIS), has been developed by ICIMOD in collaboration with Wetlands International to enable the extraction, analysis, and management of information that has been collated or created for each level of inventory. ICIMOD is currently hosting a beta version of the system which can be installed on any computer and operated offline. In the following, we provide an outline of the user guidance describing the navigation and data uploading functions and services available in the system.

The system consists of three inter-related but distinct elements as follows:

1. The GHWI database – an interactive, user-friendly, relational database, which stores the actual inventory information for each of the levels proposed in the GHWI methodology (see also the data collection sheets in Annex 2)
2. Metadata entry and querying interfaces – these comprise records describing individual inventory datasets
3. Web mapping tool – an interactive map display and querying capability to access a pre-processed spatial database including maps and satellite imagery

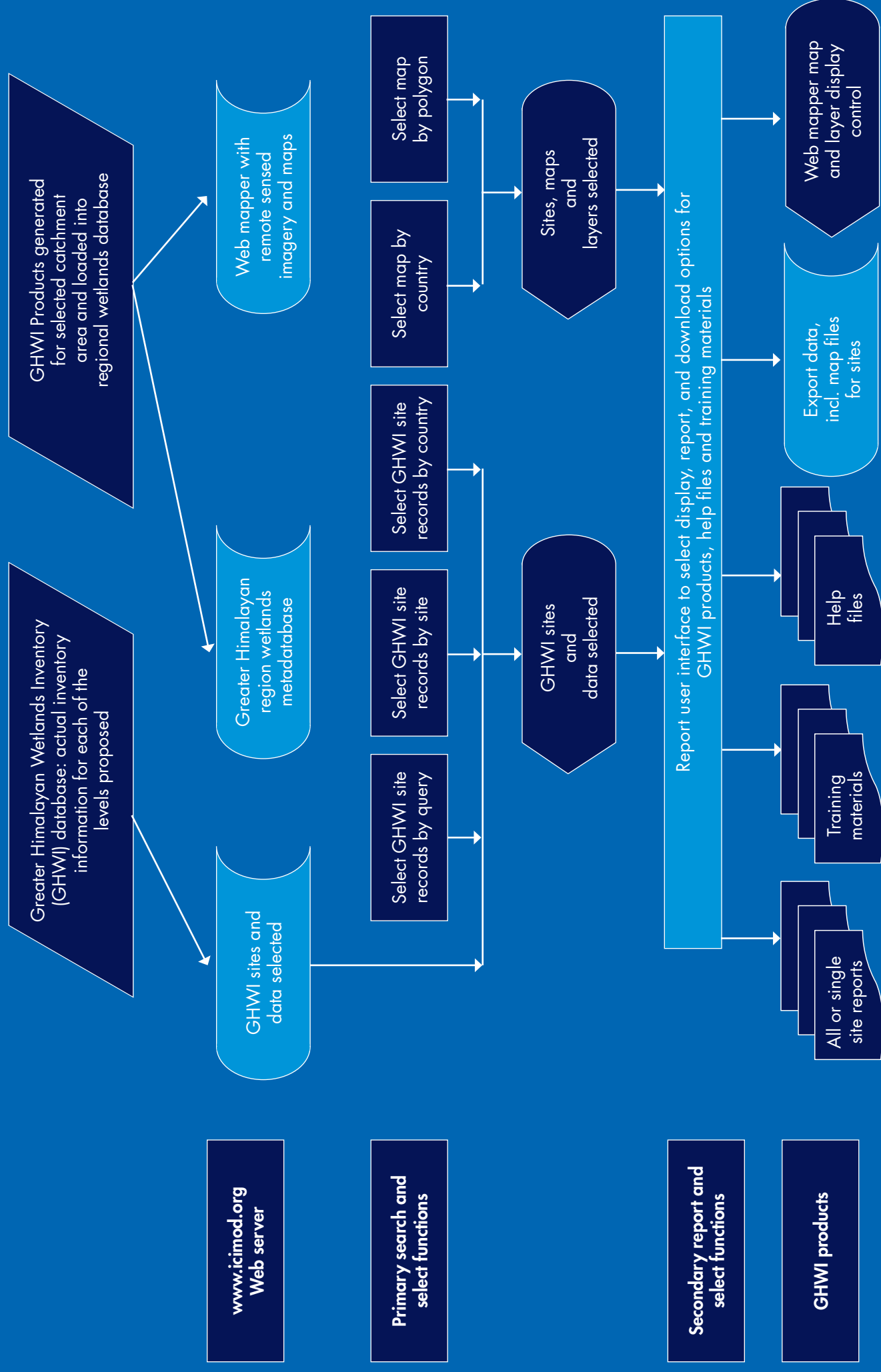
At its core, the information system is a computerised database engine with metadata entry and querying interfaces and GIS display and information retrieval capabilities. The wetlands inventory database is linked to the metadata database, and both databases are integrated with the web-mapping tool to serve derived map products. Figure 5 represents the data model showing the relationships between the inventory database, metadata, and web mapping subsystems. The main features of the GHWIS are as follows:

- GHWIS offers a tool to gather, extract, and manage information that provides information on wetlands in a systematic and scientific way.
- GHWIS follows the accepted approach of the Asian Wetland Inventory and Ramsar recommended metadatabase format modelled into FAO Geo-Network, an open source online spatial metadata management system.
- GHWIS emphasises the use of spatial datasets, satellite imagery, databases, and web mapping.
- GHWIS uses data prepared from earth observation, maps, and field observations for various levels of wetlands

The GHWIS will serve as the primary data management/storage/retrieval component of the GHWI and includes the following functionalities:

- A powerful querying capacity to allow customised query
- The ability to upload data from other formats and sources by regional partner agencies and organisations
- The ability to export/download data to other formats for further analysis
- Incorporation of a metadata component for each inventory and/or spatial dataset
- Structuring and storage of data in a hierarchical manner, defined by spatial scale and extent in line with GHWI methodology

Figure 5: Data model for the relationship between the GHWI database, metadata and web mapper tool



4.1 The Inventory Database

An extensive MySQL-based database has been designed to store the actual inventory information for each of the proposed levels. The GHWI data sheets described in Annex 2 identify the type and format of information that should be obtained and recorded for each level of the GHWI. A user-friendly password-protected interface has been developed for data access. Entry and management of inventory data at Level 1 (river basin) and 2 (sub-basin) can be done by a regional organisation such as ICIMOD, whereas Level 3 (wetland complex) and Level 4 (wetland habitats) can be the responsibility of the individual national agencies and organisations. The system is developed in such a way that Level 3 and Level 4 data can be hosted by individual countries and appropriate links can be provided from the regional database.

4.2 The Metadatabase

In order to ensure long-term management and efficient sharing of information and data, an interoperable metadata management system has been developed to store metadata on the GHWI datasets based on the metadatabase structure adopted by the Ramsar Convention. The metadata documented in the Ramsar format have been modelled into an FAO GeoNetwork platform that will be the foundation for data exchange and sharing in future. Metadata entry is password-protected. However, the user can access and/or download metadata through several options.

4.3 Interactive Web-mapping Tool

An interactive, GIS-based, dynamic web-system has been developed to visualise the complete wetland database. The system contains common GIS functions such as query, pan, zoom, and export. The system has been developed using the open source internet mapping software MapServer. The GHWI database is linked to the metadatabase, and both databases are integrated with the web mapping tool to serve derived map products. The interactive maps and available products are dynamic with respect to the level of options selected.

At present, the GHWIS (beta version) is hosted by ICIMOD and is accessible at (<http://www.ghwis.icimod.org:8081/wetlandsnew2/index.php>). A user's guide for the system is available under the help section. The system requires administrative authorisation for data management and data uploading in all three components. However, a general user can gain general information through the following procedures.

A river basin (Level 1) drop down list is available at all times. When a river basin is selected, the system zooms to fit the river basin in the mapper window and a list appears with available products for the selected river basin. Clicking on one of the products will show the specific map and, at the same time, a drop down list with Level 2 (sub-basin) information will appear. A link to the actual wetland inventory dataset (GHWI database) for that level will be provided.

When a sub-basin is selected (Level 2), a list with available products for that level will appear, as well as a drop down list with Level 3 information (wetland complexes) and a link to the Level 2 wetland inventory dataset (GHWI database). The same procedure is followed down to Level 4 (wetland habitat/site level). At Level 4, if the selected wetland habitat is a designated 'wetland of international importance' (Ramsar site), a link is provided to the data records of that site in the Ramsar sites database. While the entry and management of inventory and metadata will be the responsibility of the individual national agencies and organisations, maintenance and support will be provided by ICIMOD. Future development of the GHWIS will be managed by ICIMOD in consultation with partner agencies and organisations.