**WaM-DaM/HydroShare Linkage**

**Design Documentation**

June 1, 2015

**Overall Goals**

1. Include a WaM-DaM database instance as a new Resource Type in HydroShare with appropriate metadata fields and capability to populate those fields automatically from the database instance.
2. Demonstrate a use case for the Wetland Water Management Model (SWAMPS) and it’s model data.

**Useful Resources**

HydroShare (release based):<http://beta.hydroshare.org/>

HydroShare (ongoing development updates) <http://dev.hydroshare.org/>

HydroShare on GitHub: https://github.com/hydroshare/

HydroShare Publicatons <http://hydroshare.cuahsi.org/publications>

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FROM Tian, May 14, 2015

I can provide some info for defining new resource. As for the API part, Pabitra knows better than me and probably he can help you with it.

**The following wiki pages are helpful to create a new resource type:**

\* create a new resource <https://github.com/hydroshare/hydroshare2/wiki/Add-new-resource-types-or-other-objects-that-persist-in-the-Hydroshare-database>

\* define resource extended metadata <https://github.com/hydroshare/hydroshare/wiki/Extending-Core-Metadata-Elements>

**The following links are example existing resource type,** I think it is better for you to look at the code to get a better understanding how to define the resource and define the resource related metadata.

\* time-serise resource <https://github.com/hydroshare/hydroshare/tree/develop/hs_app_timeseries>

\* netcdf resource <https://github.com/hydroshare/hydroshare/tree/develop/hs_app_netCDF>

\* raster resource <https://github.com/hydroshare/hydroshare/tree/develop/hs_geo_raster_resource>

\* model resource: <https://github.com/hydroshare/hydroshare/tree/develop/hs_modelinstance>

You can first look at these documents and code and we can discuss some questions in details after you come back.

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WaM-DaM

* Adel Abdallah, David E. Rosenberg (2014)."[WaM-DaM: A Data Model to Organize and Synthesize Water Management Data](http://www.engr.usu.edu/cee/faculty/derosenberg/documents/AbdallahRosenberg-iEMSs-Proceeding-2014%20Final.pdf)." International Environmental Modelling and Software Society (iEMSs) 7th Intl. Congress on Env. Modelling and Software, San Diego, CA, USA, Daniel P. Ames, Nigel W.T. Quinn and Andrea E. Rizzoli (Eds.)
* GitHub (on-going updates)

<https://github.com/amabdallah/WaM-DaM>

**Major Steps**

**0. Familiarize yourself with HydroShare**

* Register as a new HydroShare user at<http://beta.hydroshare.org/>
* Look around, see the current features including what resource types and models are currently supported and how
* Figure out how to post + share your SWAMPS model using the existing resource types

**ENDPOINT:** Verbal description of current HydroShare capabilities and current resource type to use to post the SWAMPS model

**1. Post SWAMPS model and data in HydroShare using an existing resource type**

* Define the required file types, formats, and metadata needed (so another HydroShare user can download and run the model)
* Create an instance of the resource

**ENDPOINT:** A webpage in HydroShare with the SWAMPS model and data which another HydroShare user can access to download and run the model

**2. SWAMPS=>WaMDaM**

* Describe how WaMDaM represents water management input data (as a nested hierarchy of generic model templates, object types, node and link object instances, attributes for the object instances, data types and associated metadata to describe multiple types of water management models and their required data).
* Conceptually map how to represent each SWAMPS model element and input data item (e.g., each inflow source, wetland unit, canal, etc. node and link object types there its associated data) in WaMDaM. Generally, start with the GAMS sets as these tend to represent model elements (called objects in WaMDaM). Every SWAMPS model element and input data item has to find a home in WaMDaM!!
* This mapping will follow similar mappings Adel has already done for other models (WEAP) and datasets and represents the template (how each and every SWAMPS model instance and scenario--whether for the Bird Refuge or other wetlands--will be represented in WaMDaM).

**ENDPOINT:** A two column table where column 1 lists each SWAMPS model input data element and column 2 shows how to represent the input data element in WaM-DaM.

**3. Physically Implement SWAMPS in WaMDaM**

* Create a set of template object types in a WaMDaM sqlLite database file for the SWAMPS model that reflect the conceptual mapping in Step #2.
* For each template object type (e.g., wetland unit), create object instances (e.g., units 1, 1A, 1B, etc.) and populate each instance with data from the existing SWAMPS .gdx file.
* Write a python script to automate the populating the data.

**ENDPOINT:** A sqlLite database file organized according to the WaMDaM specifications that is populated with data from the SWAMPS .gdx data file.

**4. WaMDaM in HydroShare**

* Specify the requirements and steps needed to add a WaMDaM sqlLite database file as a new resource type in HydroShare. Some potential requirements:
  + Resource type Name
  + File format type
  + Meta data describing select contents of the WaMDaM database file (what meta data?)
  + Others?

* Specify the features/capabilities HydroShare users will need when viewing a WaMDaM resource webpage
  + Access select metadata that is already embedded in the WaMDaM sqlLite database file
  + Others?

**ENDPOINT:** A design document that describes the requirements and steps needed to add a WaMDaM database file to HydroShare and the features/capabilities available to HydroShare users when viewing a WaMDaM resource.

**5. Implement WaMDaM in HydroShare**

* Script that guides a HydroShare user through the process to add a WaMDaM file to HydroShare
* Scripts that query the WaMDaM file and share data contained within the database file with HydroShare users.

**ENDPOINT:** A WaMDaM database file containing the SWAMPS model data shared as a WaMDaM resource in HydroShare. The page for the SWAMPS model data in HydroShare auto-populates select fields and metadata from the WaMDaM database file.