**Water Resiliency Assessment Tool (WRAST)**

**Building Water Resource Management (WRM) tools that would allow installations to better manage water resources through the use of GIS and Remote Sensing**

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With the challenge of supporting a soldier’s mission, it is more important than ever to make sure that an installation’s water supply is safe and secure. There has not been much thought to water supply or availability, because most military installations were constructed during a time when the water supply was sufficient for mission sustainability.

In order to accurately evaluate the current and future water needs for an installation’s mission, there is a need to:

1. Design a plan to assess available water supplies and demands on post,
2. Design a water quality monitoring network,
3. Design a drought monitoring and warning system,
4. Incorporate climate change scenarios into work (NMSU WRRI most likely can help here),
5. Be able to assess flood damage,
6. Examine existing wastewater and storm water treatment systems and develop ideas for enhancement, and
7. Be able to forecast water demand.

At present, an existing GIS-based tool for Water Resource Management for DoD installations does not exist. There are numerous consequences for not having a robust WRM Tool, such as poor resource planning and a lack of understanding of current or future water resources.

Water Resiliency Assessment Tool (WRAST), a GIS-based tool, deploying the use of Remote Sensing and other relevant technologies, would prove useful in flood plain management, hydrologic modeling, storing and serving spatial information, watershed delineation, water quality assessment and planning, and constructing ground water simulation models that can be connected with time series data. Some of the most important applications of a GIS-based tool include water utilities mapping and modeling, facilities management, work-order management, and supporting numerous short- and long-term planning efforts.

One of the strengths of a GIS-based tool is the ability to perform several modeling techniques in a toolbox of hydrologic modeling tools. These hydrology tools can be used to model the flow of water across a surface, and useful products of this work include:

1. Understanding drainage systems,
2. Exploring digital elevation models (DEM),
3. Deriving runoff characteristics,
4. Creating a depressionless DEM,
5. Creating watersheds, and
6. Hydrological analysis sample applications

Water resource managers are currently using GIS technologies to analyze and visualize hydrologic data that can be used for tasks that include assessing water quality, estimating water availability, planning flood prevention, understanding the natural environment, and managing water resources.

One such GIS-based technology that can perform hydrologic modeling is Esri’s Arc Hydro. Arc Hydro is the starting point for any water resource analysis. The tool has the ability to:

1. Create basemaps and GIS data that support your simulations and use hydrologic (soil type, land-use, vegetation), topographic (area, slope), and topologic (relationship, network) information,
2. Incorporate human-made structures into stream networks to develop an integrated data and ­ modeling environment for asset management and hydrologic modeling support,
3. Inspect project data to reveal ­conditions that might be overlooked (e.g., slope or soil changes),
4. Integrate spatial and temporal data, such as Remote Sensing Imagery,
5. Develop data inputs for external hydrologic and hydraulic models, and
6. Display simulation results on a map and integrate the results with other GIS analyses, such as vehicle routing and impact analyses.

GIS and remote sensing technologies can be combined to create a tool that can be used in the field of Water Resource Management to allocate surface and sub-surface water in an optimal fashion that is installation specific. The remote sensing data that are acquired can be processed within a GIS environment in order to obtain the wanted results.

A few observations in writing this up:

1. A need exists to develop robust and current GIS datasets for installation infrastructure.
2. Project staff will need to be proficient in ArcGIS, especially in the use of Arc Hydro and the Hydrology toolbox.
3. Project staff will need to have experience in processing remotely sensed imagery.
4. Project staff will need to know how to process the data within ArcGIS to create a robust GIS-based WRM tool.

References

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