GIS for Support of Hydrologic and Hydraulic Modeling

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H&H Modeling
Using GIS to Solve Fluid Problems

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A little bit about us...

Kyle Morgan
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- 10 years of experience in GIS, 17 years experience in programming and IT-related disciplines
- GIS related travels include Greenland and Qatar

Sheng Tan
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- 18 years of experience in GIS
Entire Project Area = ~9,000 sq miles

Wood Rodgers’ extent = 2,500 sq miles

Of the 2,500 sq miles, 540 sq miles of streams are modeled

Over 17 terabytes of project-related data

*Central Valley Floodplain Evaluation and Delineation Program*
Some challenges faced…

• Large amounts of data
• Collaboration with sub-consultants
• Distributed internal work-force over 3 different office locations
• Maintain data quality and versions
• Different modeling platforms
1-Dimensional

HEC- RAS

Possible to do it with GeoRAS, but has it’s limitations

• Blending of multiple data sources for channel bottoms, new bathymetry, existing bathymetry, field survey, etc.

• Large amounts of data (e.g. DEMs)
1-Dimensional

**HEC-RAS**
1-Dimensional 

*HEC- RAS*
1-Dimensional HECK- RAS
1-Dimensional

HEC- RAS
1-Dimensional

HEC-RAS
1-Dimensional

**HEC- RAS**

Utilizing GIS and Esri’s tools instead allowed for...

A web based solution

Automated model input creation
1-Dimensional
HEC-RAS: web based solution
1-Dimensional

HEC-RAS: automated model input creation

Start Time: 04/12/2014 18:32:17 PM

Checking 3D Analyst availability
Setting environment settings
Checking workspace...
  * creating GDB at C:\common\DWR\TO34\Workspace.gdb
Processing...
  * GRS
    * exporting from SDE
    * stream centerline
    * banklines
    * cross Sections
  - creating 3D polyline
  - assigning bankline designation

Creating GeoRAS...
  * rivers
  * 2D cross sections
  * 3d cross sections
  * banklines
  * flowpath
  * calculating properties

Creating final output

End Time: 04/12/2014 18:34:46 PM
Processing Time: 2.5 minutes
2-Dimensional

FLO-2D / TUFLOW

2D Modeling requirements differ from 1D Modeling…

• Flow from HEC-RAS used as input in FLO2D grids

• Breaches from HEC-RAS need to be passed to FLO2D as variables
2-Dimensional
**FLO-2D / TUFLOW**

Utilizing GIS and Esri’s tools instead allowed for...

A web-based solution

Automated build environment
2-Dimensional

FLO-2D: web-based solution

Web-based DSS File upload tool
2-Dimensional

FLO-2D: web-based solution

Advanced status reports with graphing
2-Dimensional

FLO-2D: web-based solution

Simplified FLO-2D grid selection
2-Dimensional

**FLO-2D**: web-based solution

Integrated QC system
2-Dimensional

FLO-2D: automated build environment

Web-based initiator
2-Dimensional

FLO-2D: automated build environment

Email notifications
Extra Benefits using GIS

• Model data starts and ends in GIS
• Max floodplain can be determined in GIS
• Data can be converted and used in other software

Demo time!
Conclusion

• GIS can be used through the entire lifecycle of the project
• Requires proper planning
• Brunt of time shifts from middle and end of workflow to beginning
• Less rework and errors due to human element being removed
• Developing simple focused apps improved productivity

Questions?

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