



ISSUES AND APPROACHES IN COUPLING GIS TO IRRIGATION DISTRIBUTION AND SEEPAGE LOSS MODELS

By Yanbo Huang, Milton Henry, Dave Flahive
and Guy Fipps



Background

- Increasing application of GIS in Water Resources Management, including Irrigation.
- Primarily because of its ability to store, analyze and display spatial data.
- Hydraulic models have been available for some time. Not all GIS linked
- Issues and approaches in coupling models to GIS



Some Possible Approaches

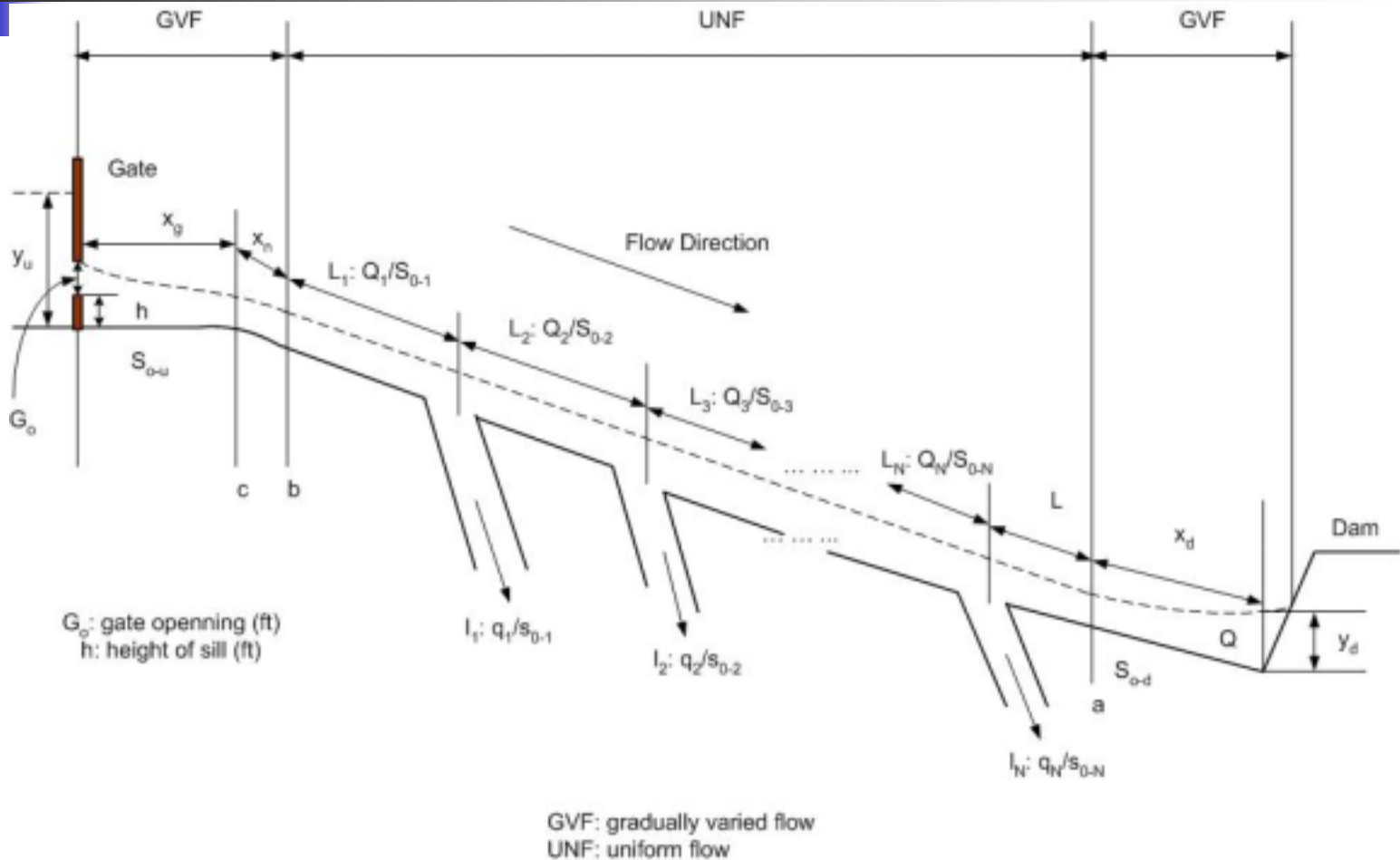
- Loosely coupled models
 - Closely coupled models
- Modeling using tools within GIS
- ❖ Coding from scratch or coupling to existing models
- Consider Web based



Working examples at Texas A&M

- Irrigation water distribution model for Open Canal Network (part of effort to develop a combined open channel and pipe network distribution model)
- Seepage loss model using Spatial Analyst tool (as part of Rehab. Analysis)

Distribution Model - Generic Layout of Canal Network

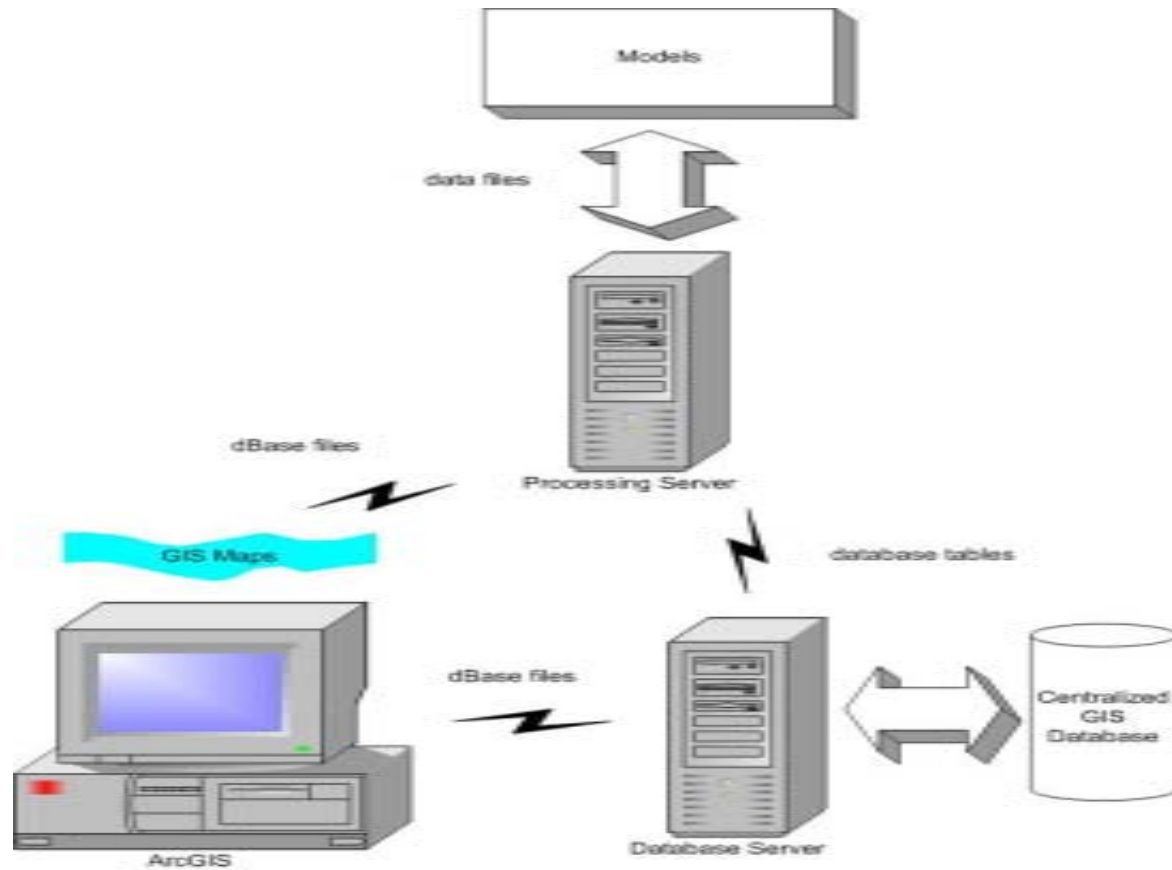




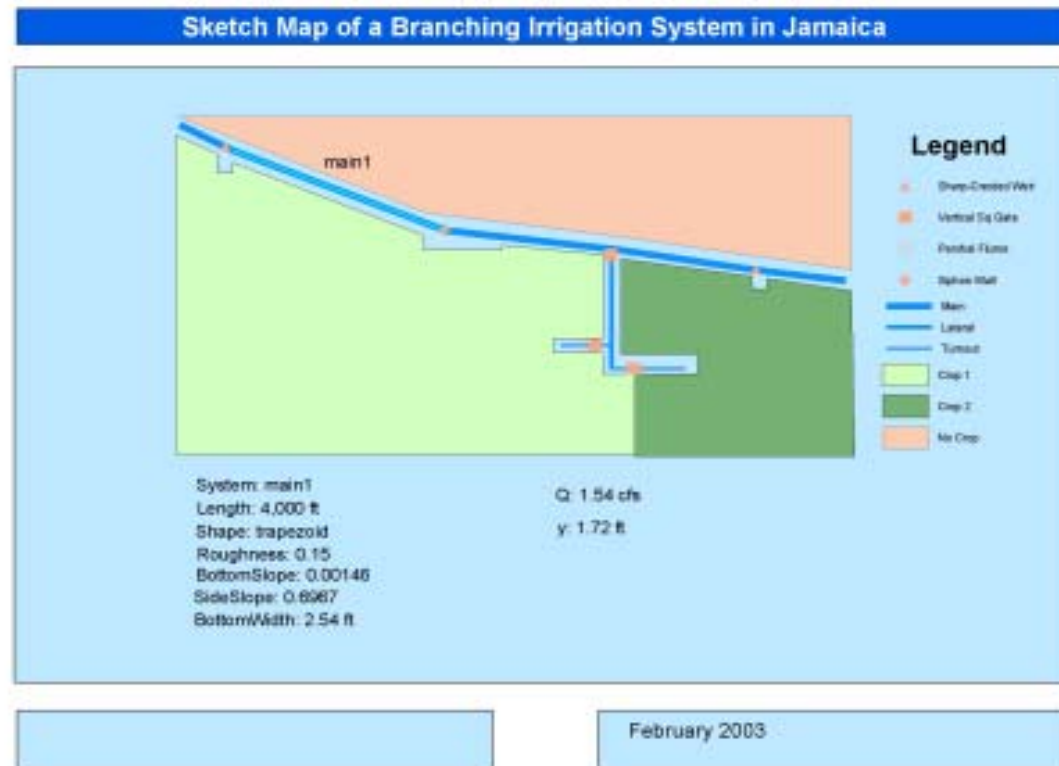
GIS parallel to model components

- Polygons: Irrigated fields
 - Lines: Irrigation network
 - Point : Structures
-
- ✓ Model coding from scratch

GIS Data Input and Output



Model Output

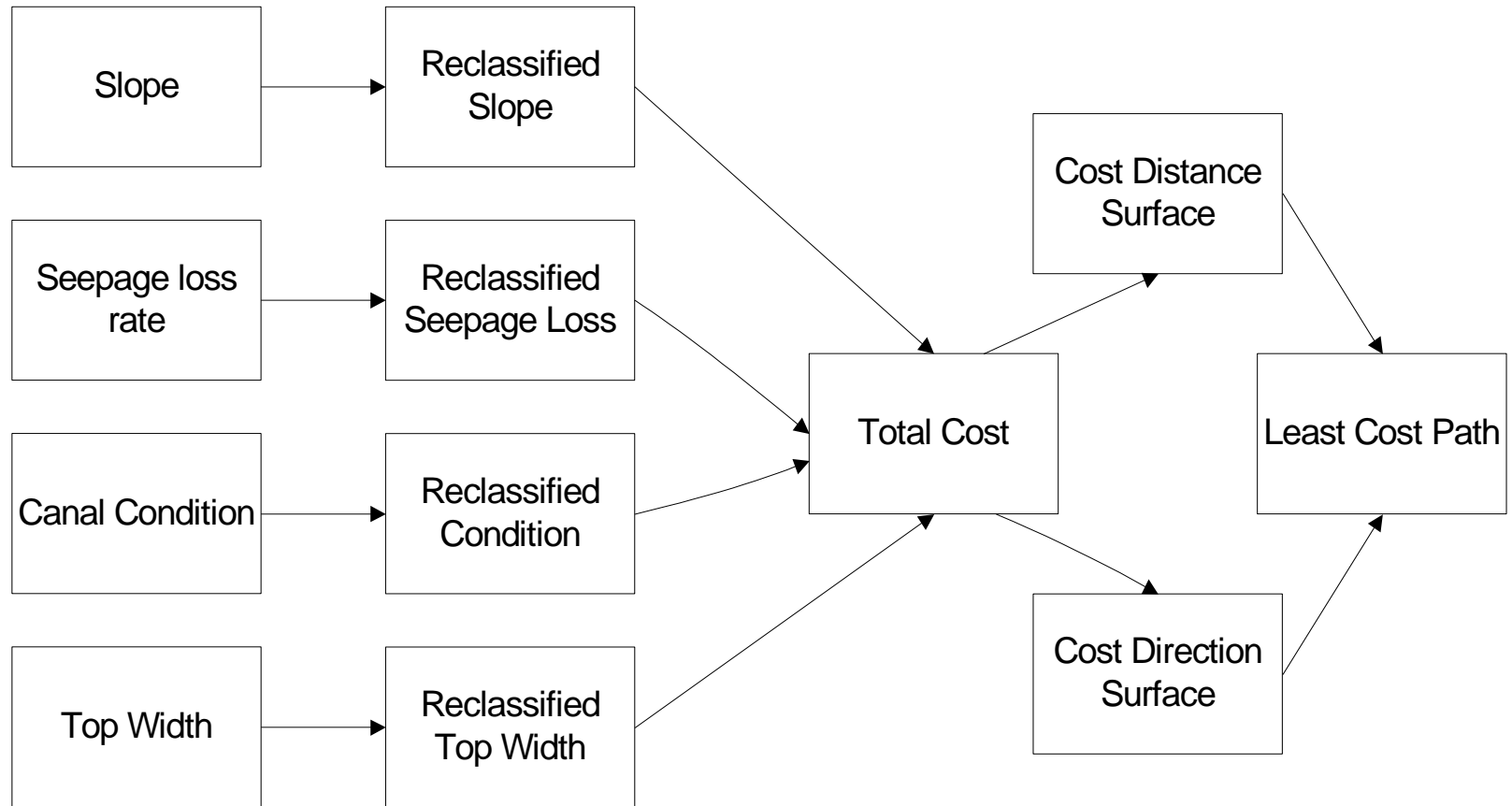




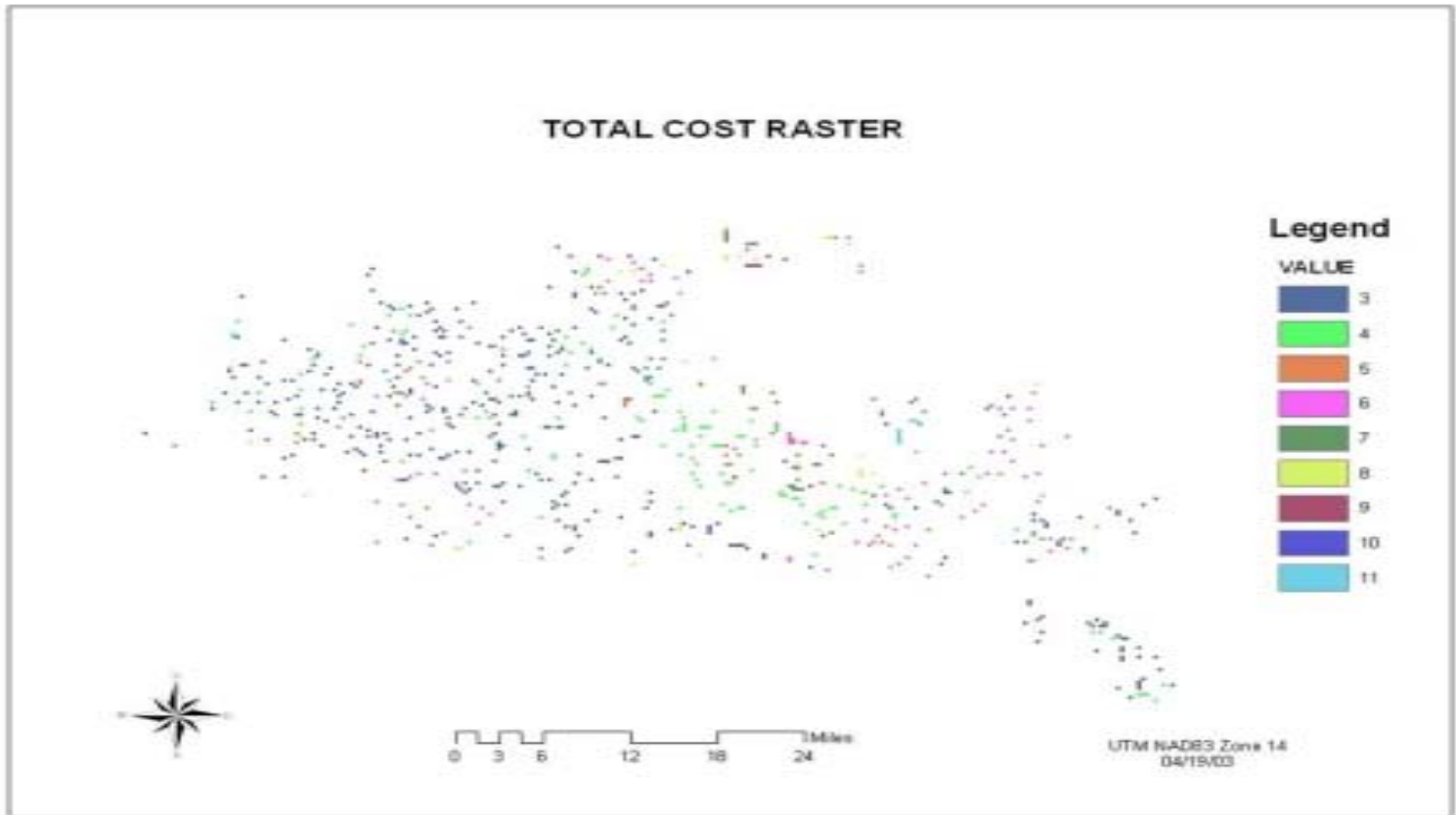
Modeling using GIS Tools

- Using Spatial Analyst tool to create the least cost path from source to outlet.
- Factors considered: slope, seepage loss rate, canal condition and top width

Least cost path analysis (Spat. An.)



Total Cost Raster



Least Cost Path





Issues and Challenges

- ✓ Integration with existing hydraulic models
- ✓ Data availability and data quality
- ✓ User considerations
- ✓ Cost of data, hardware and software
- ✓ Availability of skills
- ✓ Integration with other spatial technologies



Concluding remarks

- ❑ In coupling GIS to irrigation models, issues and challenges should be fully assessed as part of model development.
- ❑ We expect the Internet to play an integral role in model development in the future.

THANK YOU

