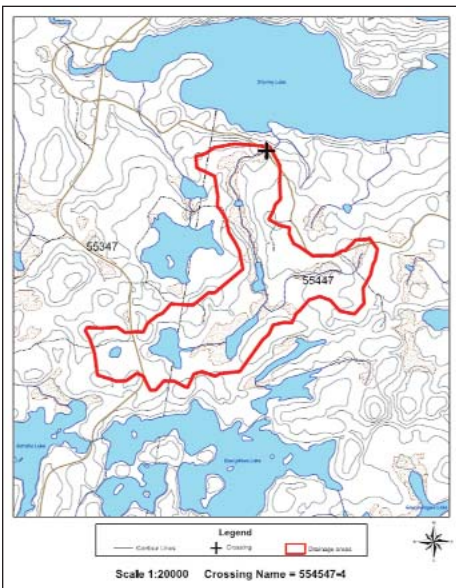


Domtar uses GIS to automate water crossing calculations



Domtar Corporation is the largest integrated producer of uncoated freesheet paper and one of the largest manufacturers of papergrade market pulp in North America. The company designs, manufactures, markets, and distributes a wide range of business, commercial printing, and publication papers as well as technical and specialty papers with numerous recognized brands including First Choice, Domtar Microprint, Windsor Offset, and Cougar. Domtar features a full line of environmentally and socially responsible papers known as Domtar Earth Choice. The company owns and operates Domtar Distribution Group, an extensive network of strategically-located paper distribution facilities and manages over 15 million hectares of forest lands, of which half fall within the province of Ontario.



PDF map created by the Water crossing calculation tool.

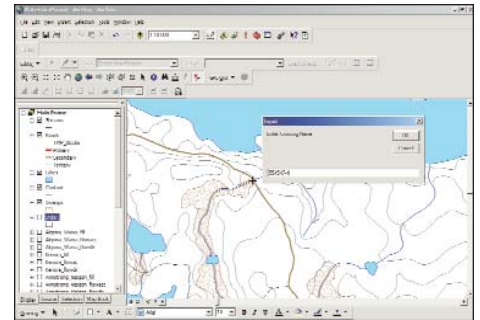
Accessing forest resources in Northern Ontario to produce these papers quite often results in the expense of building roads. Since streams are in abundance at many locations where forest operations are to occur, forest companies have little or no choice but to build a number of access roads that cross these streams. Where a road crosses a stream, in-depth planning must occur to determine the proper type of crossing (i.e., culvert(s) or bridge) and proper size of crossing to be installed.

Prior to using GIS, Forest Operations staff

determined the drainage basin associated with each corresponding water crossing based on 1:50,000 scale maps. They used a dot grid overlay to determine the area of each corresponding drainage basin and associated area of lake and swamps. This information was used within a formula to determine the proper size and type of crossing. Next, they produced a paper map and included it along with the necessary paper work, showing the location of the proposed water crossing and its associated drainage basin. Depending on the location of a water crossing, the size of the drainage basin, and the experience of the person doing the calculations, it took anywhere from one hour to several hours to complete calculations.

Using GIS as the framework, Domtar set out to improve the accuracy and timeliness of their road building activities and created an application using both ArcObjects and the Spatial Analyst extension that automates the process of performing water crossing calculations. By clicking on a proposed crossing location, the application determines the associated drainage basin by analyzing raster layer data from Ontario Ministry of Natural Resources (OMNR) including hydrologically corrected DEMs (Digital Elevation Model), flow accumulation, and flow direction in conjunction with Domtar's forest resources data. The resulting information is then populated in an Excel spreadsheet to predict crossing type and size, and a page layout in ArcMap is exported to a PDF map. Shapefiles of drainage basins and crossing location results can be produced for future analysis.

The process of determining the most suitable drainage basin and associated water crossing is now completed with much more accuracy. By utilizing GIS in conjunction with the water crossing application, Domtar has been able to capture data at a scale of 1:20,000 or better. They have also been able to quickly test different scenarios when identifying preferred crossing locations. For every proposed location to build a major road, they often have several locations to choose from. The GIS helps analysts consider factors such as topography, geology, and proximity to harvest blocks. The water crossing tool allows them to easily check to see what culvert sizes are required at each location. By knowing what culvert size is required at each location, they are now planning and constructing roads more effectively, and



Water crossing calculation tool.

have significantly reduced their operating costs by being able to select smaller water crossings to build forest access roads.

It has been two years now and the application has undergone a number of improvements. Water crossing calculations now take as little as 10 to 20 minutes per crossing to process. This is a significant improvement over the old manual approach which usually took at least an hour to perform the same calculations, resulting in a 75% increase in productivity. An important benefit of the tool is that they can perform calculations on multiple crossings using batch processing. With the click of a button, the Forester or Forest Technician is free to perform other duties while the computer does all the work.

Future Plans

Eventually Domtar would like to provide this service to other forestry users by hosting the application on a GIS server, and making it available via the Internet. They expect that the application will be popular with a number of forestry companies within Ontario who still use a manual approach to calculating water crossings.

"We hope to make this tool available to other forest companies, and are confident that it will increase their operational efficiencies and reduce costs while at the same time minimize their impact on fish habitat and water quality," said Paul Tremblay, Manager of Information Technology, Domtar Corporation.

Domtar Corporation
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