Exsys Case Study

Environmentally Sensitive Channel and Bank Protection Measures

Salix Applied Earthcare

Environmentally sensitive transportation waterways and streams require protective measures to prevent destructive erosion, scour, and lateral migration. Relatively little guidance had been developed to help practitioners apply adequate environmentally protection measures. Salix Applied Earthcare used Exsys Corvid® to develop a knowledge automation expert system named Greenbank to address this need. The system incorporates selection criteria, design guidelines, and a compilation of resolutions. The research team conducted an extensive literature review and evaluation of commonly used environmentally sensitive techniques. 44 channel and bank protection procedures were identified and incorporated into the Exsys Corvid system, which recommends the best techniques for particular situations.

Greenbank is an extensive rule-based selection software program developed for use by the D.O.T. and consulting engineers. The governing rules relate the strengths and weaknesses (hydraulic, geotechnical and environmental) of each technique to the relevant site conditions and project constraints. The selection system updates an earlier expert system known as ENDOW (Environmental Design of Waterways) developed at the U.S. Army Engineer Waterways Experiment Station. The new Exsys Corvid built system allowed the development of a tailor-made, interactive decision-making tool that is both web-based and delivered stand-alone on a CD.

The Greenbank system asks the user to provide information about the proposed project. Specific aquatic habitat requirements are taken into account in a systematic manner. The user is asked to specify environmental resources or aquatic attributes of importance from a list of 11 possibilities. Based on the initial responses, the system then asks for more specific information about environmental issues. After analyzing that input, the user is asked to characterize the erosion problem. If the user is uncertain about the nature of the erosion at his or her site, links are provided with text and photos to help the user identify the dominant erosion processes. In the case of erosion or scour by stream flow, the user can also input hydraulic criteria (i.e., design velocity and boundary shear stress), which allows Greenbank to compare these criteria with available published allowable values.

The Greenbank expert system then assigns a score to each of the 44 techniques based on overall feasibility. This score takes into account suitability for a particular type of erosion problem, spatial location of the problem, environmental attributes specified as important, and price the user is willing to pay. The best techniques are then output to the user, who may elect to change any or all their previous responses to obtain new recommendations. Each technique recommended is linked to corresponding procedural guidelines.

For more details on the Greenbank see:

http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_544.pdf

The full Greenbank system can be purchased at:

http://www.trb.org/news/blurb_detail.asp?id=5617