Wetland Mapping: History and Trends

Interpretive Summary:

Technical Abstract: Historically, the biologic, aesthetic, and economic values of wetlands were largely unappreciated. Wetlands within the United States have been and are continuing to disappear at a rapid rate. Efforts are being made to conserve remaining wetlands and many regulatory policies have been adopted in support of this goal. To regulate the loss, preservation, and/or restoration of wetlands and judge the effectiveness of these regulatory efforts to preserve associated ecosystem services, wetlands must be routinely monitored. Wetland mapping is an essential part of this monitoring program and much effort has been made by state and federal governments, as well as other organizations, to provide quality map products. Wetland maps can serve a variety of purposes including regulation, input for models, natural resource management, and to quantify wetland function. Wetland hydrology is the most important abiotic factor controlling ecosystem function and extent, and it should therefore be a vital part of any wetland mapping or monitoring program. Wetland hydrology is dynamic, varying inter-annually, seasonally, and at finer time scales. New approaches are needed to not only map wetlands, but also to monitor wetland hydrology as it varies in response to weather, vegetation phenology, surrounding landuse change, and other anthropogenic forces including climate change. Recently developed remote sensing technologies and techniques have the potential to improve the detail and reliability of wetland maps and the ability to monitor important parameters such as hydrology. Various types of remotely sensed data (e.g., aerial photographs, multispectral, hyperspectral, radar, and lidar) have different capabilities and specific advantages and disadvantages for wetland mapping. Although aerial photographs were traditionally used to map wetlands and infer hydrology, fine-resolution optical images are now available more frequently as commercial agencies increase satellite coverage (e.g., Quickbird and IKONOS). However, optical data, such as aerial photographs and multispectral satellite images have limitations, including their inability to detect hydrology below dense vegetative canopies and their limited ability to detect variations in hydrology. The restrictions of optical data are increasingly being compensated for with the use of new technologies, including synthetic aperture radar, lidar, and geospatial modeling. The availability of these new data sources is increasing rapidly. For example, many States are now collecting synoptic state-wide coverages of lidar data. The sources, strengths, and limitations of these different types of remotely sensed data are reviewed in this paper, as well as the importance of temporal and spatial resolution. Examples applications are provided and the potential of multi-temporal, multi-sensor approaches which capitalize on geospatial modeling are emphasized for meeting current wetland mapping challenges.
Wetlands Mapping for Transportation and Design. DOWNLOAD. Wetlands Mapping. Transportation Planning. The classified vegetation maps produced by ITRES, digital elevation model, and hydric soils maps were combined by Mississippi State University NCRST-E in a weighting analysis called focal geospatial processing. Locations were given points for having vegetation, drainage and soils characteristic of wetlands. The results from the combined analysis compared favorably with previous NWI and ground surveys. The use of remote sensing data can greatly reduce the amount of fieldwork required in environmental minimization studies while providing a multi-use dataset and a regional overview of a large are