

The Use of Geographic Information System and Remote Sensing in Environmental Impact Assessment: Current Issues and Applications

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Environmental impact assessment (EIA) in Korea has been used to improve environmental conservation and decision-making since environmental impact statements (EISs) were introduced in 1981. Various methods have been developed to improve the effective implementation of the EIA process. The process of environmental impact assessment consists of screening, scoping, inventory surveys, prediction and assessment, mitigation measures, alternative assessment, and post-project management. The EIA process is conducted using many methods, such as matrix and network techniques in scoping, predictive models such as the Climatological Dispersion Model, cost-benefit analysis in alternative assessment, and monitoring and management techniques in post-project management.

Geographic information systems (GIS) and

remote sensing (RS) introduced recently can systematically build and integrate attribute data and geographic data for environmental management. On June 26, 1995, an amended Korean Environmental Impact

Statement preparation Regulation recommended the application of GIS and RS to analyze land use and ecosystem factors included in EISs, the introduction of scoping process to determining the specific issues and impacts, and cost criteria for preventing dumping between EIS preparation consultants, etc. This paper advocates the use of GIS and RS of streamline and aid the EIA process.

National Institute of Environmental Research in Korea has made efforts to apply these tools to EIA since 1992. Various applications of GIS and

RS have been introduced. These include suitability analyses of landfill sites, systematic analysis and management of environmental information, integration of geo graphic information system and air dispersion model, and assessment of land use change and ecosystem assessment.

One of these applications, ecosystem assessment illustrates the value of GIS and RS. In an ecosystem assessment, nature conservation must be considered in the screening and scoping stages of an EIA. Currently, most EISs use "Degree of Green Naturality" (DGN) in assessing the ecosystem factor. DGN is calculated based on an ecosystem survey, conducted between 1988 and 1990. A DGN value ranges from class 0 to class 10 with "0" indicating the hydrosphere area, "1" indicating the street and man-made area, and "10" indicating the alpine natural grassland. National areas that include 100,000 km² are covered (one grid size = 1 km x 1 km). Classification values depend on the extent of naturalness and species ecosystem within a grid. DGN has room for improvement as an index for assessing the actual ecosystem situation because it calculates the same value within 1 km², depending on the past survey. A Vegetation Index (VI) (from 1 to 256 depending on land cover, "1" indicating almost none flora, and "256" indicating highly dense flora) derived from remote sensing data can be used to assess current ecosystem at current and detailed-scale. For the application of VI, Landsat TM data of Chunchon on May 2, 1989 and June 1, 1994, and data of Ulsan on

November 5, 1984, November 2, 1992, and May 9, 1994 are used. This study compared VI with DGN according to seasons and locations. The values of DGN and VI correlate highly. The integration of GIS into RS work enables clarified analysis.

Because GIS and RS require the use of environmental information and technical expertise as well as computer systems, the application of GIS and RS to EIA is still in the beginning stage. Some critics say that GIS and RS cost too much for what they provide, but further development will lower costs and increase its value. More and more, GIS and RS are recognized as useful at the strategic level as well as at the project level.

keywords: Environmental Impact Assessment, Geographic Information System, Remote Sensing, Strategic Level, Project Level, Degree of Green Naturality, Vegetation Index

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