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## GIS Application for Wind Energy

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### Abstract

The objective of this paper is to determine optimal solutions for the implementation of renewable energy in Romania, using for this purpose the available Geographic Information Systems technology. We also want to demonstrate that the GIS technology can be used as a substitute for programs dedicated to wind energy.

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### 1. Introduction

The world we are living in is in a continuous transformation and evolution. The necessity of getting fast access to information and finding fast answers to more and more complex questions led to the development of many activity areas. One of the areas excessively developed lately is that of the Geographic Information Systems (GIS).

Excessive computerization and industrial development, which is a high energy consumer, are closely related. Due to the fact that the production of energy using classic fuel - coal, oil, natural gas - involves a constant degradation of the environment, these resources requiring a longer time to recover, it was concluded that the most suitable solution for saving them is the development of technologies for the production and storage of energy, using the renewable resources such as wind, sun and water. The usage of renewables leads to clean energy, definitely less polluting than the conventional methods for the production of energy.

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### Nomenclature

AsterDEM	Advanced Spaceborne Thermal Emission and Reflection Radiometer Digital Elevation Model
DBMS	Database Management System
GDB	Geodatabase (Geographic Database)
GIS	Geographic Information Systems

## 2. GIS Unconventional Applications

In a conventional way, GIS technology is used in fields' applications which have a direct geographic relevance, meaning that the applications refer to the territory and the manner of using it. On the other hand, one may find applications whose geographical relevance is either indirect or less obvious (e.g. mosquito control, protect great apes, elections, etc.).

In principle, it can be qualified as GIS application any application - some of them being considered unconventional or non-specific - that uses layers or coverages in order to organize data and, also, uses specific operations to combine and analyze data. As it follows, we will present some examples, aiming, in particular, to highlight the great diversity of GIS applicability.

### 2.1. Medicine

The importance of using GIS technology in the public health area is illustrated by the fact that even from the early 1970s existed a specific field of study called "health geography" (*medical geography*) or "geomedicine" [2] defined as "the application of concepts and techniques of geographical matters on health" [6].

### 2.2. Archeology

The three main areas in which GIS is used for archeology are: *predictive modeling* - seeks to establish causal relationships between certain environmental parameters and known locations of archaeological sites [7]; *simulation and representation of changes* over time in the geographic pattern of human settlements and their related facilities and *intra-site analysis*, referring in particular to the establishment and representation of spatial relationships between various artifacts found during excavations made in the archaeological sites.

### 2.3. Registry of green areas

Law no. 24/2007 on the regulation and management of green spaces in urban areas [9] states that "... the register of green spaces is an information system (GIS) containing technical data of green spaces" and establishes the obligation of local authorities to organize and lead the green spaces register for the public and private territory that they administer.

## 3. Renewable Energy Sources

In the last half century, humanity has become more and more concerned about the state of the environment and energy production, both problems representing critical aspects of progress. The production of energy which is essential for raising living standards and civilization is attended, inevitably, by environmental degradation such as reducing in an irreversible manner the classical resources (fossil fuels: coal, oil, natural gas). In this context, it had

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