# Chapter 76
# Sharing Environmental Data through GEOSS

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## ABSTRACT

*Understanding the complexity of earth-system processes is crucial to convey improved information on the environment to decision-makers and the general public. Addressing this need by sharing environmental data is challenging because it requires a common agreed framework that allows easy and seamless integration of data from different sources. In this regard, the Global Earth Observation System of Systems (GEOSS) portends major benefits through various sharing mechanisms and by giving access to services that could be linked together to process and generate new understandable knowledge and information. Various United Nations projects could greatly benefit from the GEOSS approach.*

## INTRODUCTION

Today we are living in a globalized world with rapidly evolving processes including climate change, population growth or environmental degradation. In parallel, means of communication have expanded to take on a remarkable place in our society, allowing us to access an enormous and continuous flow of information.

In the last 30 years, the availability of geospatial data has grown dramatically following the evolution of communication technologies supported by the rapid development of spatial data capture means such as remote sensing imagery, sensors and

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GPS (Philips, Williamson, & Ezigbalike, 1999). One of the challenges we are facing today is to make sense of this vast amount of data in order to turn them into understandable knowledge (Gore, 1998). Concrete actions can be taken only on the basis of knowledge and understanding, but often we know too little about the state of our planet's environment to take informed and sound decisions about how it should be managed.

Our planet is a multi-dimensional system made of complex interactions highly interconnected and continuously evolving at many spatial and temporal scales (GEO secretariat, 2007b). This means that to understand these interactions, we need to gather and integrate different sets of data about physical, chemical and biological systems. Altogether, these sets of data constitute environmental data sets or data related to the environment. These data are often georeferenced, describing a geographical location through a set of attributes and thus could be understood as being part of geospatial data. An environmental data set is seldom interesting in itself, but rather displays its full information potential when used in conjunction with other data sets, allowing one to monitor and assess the actual status of the global, regional or local environments, to discover complex relationships between them and to model future changes.

In 1998, the former vice-president of the United States, Al Gore, presented his visionary concept of a Digital Earth (Gore, 1998), a representation of the Earth embedding a vast amount of geospatial data and allowing to make better sense of it. To achieve this vision, Gore highlighted the need for a collaborative effort (from government, industry, academia and citizens) and pointed out the different technologies required: computational power, mass storage, satellite imagery, broadband network, interoperability and metadata.

Despite the fact that administrations and governments are recognizing that geospatial data are an important component of an information infrastructure (such as e-governement) that needs to be efficiently coordinated and managed for the interest of all citizens (Ryttersgaard, 2001), this huge amount of geospatial data is stored in different places, by different organizations and the vast majority of these data are not being used as effectively as they should. In consequence, a framework allowing one to discover, access, publish, share, maintain and integrate geospatial data appears to be essential. Such a framework is commonly known as a Spatial Data Infrastructure (SDI).

Different initiatives at the regional and global levels are influencing and promoting the creation of SDIs allowing data providers to share and publish their data in an interoperable manner. These initiatives coordinate actions that promote awareness and implementation of complementary policies, common standards and effective mechanisms for the development and availability of interoperable geospatial data and technologies to support decision making at all scales for multiple purposes. These initiatives are related to data access, harmonization, standardization, interoperability, seamless integration and services. Such an initiative is the Global Earth Observation System of Systems (GEOSS) which is a worldwide voluntary effort, coordinated by the Group on Earth Observation secretariat, to connect already existing SDIs and Earth Observation infrastructures. GEOSS is foreseen to act as a gateway between producers of geospatial data and end users, with the aim of enhancing the relevance of Earth observations for the global issues and offering public access to comprehensive information and analyses on the environment (GEO secretariat, 2005, 2007a). The GEOSS Common Infrastructure (GCI) provides core capabilities that allow users to search, access and use data, information, tools and services, and is made of five components: GEO portal (web portal to access GEOSS and search registries), GEOSS clearinghouse (connects the different components), GEOSS components and services registry (catalogue of services and components), GEOSS standards and interoperability registry (catalogue of standards to use allowing users to set

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