



How GEOSS supports decision making in nine Societal Benefit Areas (SBAs)

The societal benefits identified by the Group on Earth Observations (GEO) illustrate how GEOSS serves the needs of the international community. The nine SBAs of disasters, health, energy, climate, water, weather, ecosystems, agriculture and biodiversity supply concrete examples of how decision makers can use the data and services available through GEOSS to address major global opportunities and challenges. None of the SBAs, of course, exists in isolation: the full value of the Global Earth Observation System of Systems lies in its ability to integrate information across disciplines.

Earth observations can help to reduce the loss of life and property from natural and human-induced disasters. Rapid access to weather forecasts, data on land and ocean conditions, maps of transport links and hospitals, seismographic data, and information on socio-economic variables can strengthen disaster preparedness, prediction and response. Key disaster-management services available through GEOSS include the Global Early Warning System for Wildland Fire and the Sentinel Asia and (for Africa and Central and South America) SERVIR satellite monitoring systems.

Understanding how the environment affects health can boost human well-being. Key environmental variables include airborne, marine, and water pollutants; stratospheric ozone depletion; land-use change; food security and nutrition; noise levels; population trends; and weather-related stresses and disease vectors. For example, analyses of desertification trends and forecasts of windstorms are being used to provide early warnings of epidemics in Africa's 'meningitis belt'; this allows the World Health Organization and local health experts to target their vaccination programs more effectively.

GEOSS is supporting efforts to advance sustainable energy. Earth observations are vital for monitoring and forecasting fluctuations in hydropower, solar, ocean and wind energy sources; assessing and predicting the environmental impacts of energy exploration, extraction, transportation and consumption; reducing weather-related and other risks to energy infrastructure; and matching energy supply to demand. To support solar energy planners, for example, GEO is coordinating a solar data programme that offers one-stop access to databases, applications and information relating to solar radiation trends and patterns.

End-to-end information services and sustained observing systems are essential for addressing climate variability and change. GEO is a leading advocate for maintaining and strengthening the climate observation capacities of atmospheric, terrestrial and oceanic monitoring systems. For example, 20-plus GEO members are contributing to the global array of some 3,000 robotic Argo buoys that are monitoring ocean temperatures and salinity. GEO members are also establishing essential decision-support services, such as an innovative system for monitoring and verifying forest carbon content and a program on Climate for Development in Africa.



Water experts are collaborating through GEO to define the data and systems needed for improved water-cycle forecasting. National meteorological and hydrological services, along with several United Nations agencies, are collaborating through GEO's "Integration of In-Situ and Satellite Data for Water Cycle Monitoring" project. This project aims to fill gaps in global measurements, standardize metadata, and improve the accuracy of data and predictions. Other ongoing initiatives relate to information products on precipitation, soil moisture, and groundwater.

GEOSS is interlinking weather forecasting systems with other Earth observation systems. By integrating weather data with the growing number of data sets available in fields such as biodiversity, health, energy, and water management, GEOSS will greatly expand the uses to which weather information and forecasts can be put. Other efforts to improve the value of weather forecasting include the WMO-led THORPEX Interactive Global Grand Ensemble project, or TIGGE, which aims to accelerate improvements in the accuracy of one-day to two-week weather forecasts.

GEO is building international teams to monitor ecosystems and generate maps and other decision-support tools. One team is working to improve the classification and mapping of diverse ecosystems. Another is extending a South American network for monitoring ocean temperatures and chlorophyll to the global scale. Still others are collaborating on monitoring and delineating protected areas, including UNESCO World Heritage sites; measuring the impact of tourism and other socio-economic activities on ecosystems; assessing the vulnerability of sea basins around the world; and assessing the vulnerability of mountain regions.

GEO is developing an Agricultural Monitoring System of Systems that will integrate in-situ and space data from multiple fields. Farmers and policymakers require accurate forecasts and cross-cutting data on food production and supplies, storms and droughts, climate change and variability, water levels, market demand and changes in productive land and ocean areas. They need this information for responding to immediate challenges and opportunities, for crafting longer term strategies for adapting their farming practices to changing conditions, and for ensuring the sustainable management of fisheries and grazing lands. Enhanced Earth observations will also assist international relief organizations to plan more effectively for famines.

Comprehensive monitoring is critical to the conservation and sustainable use of the world's biological diversity. The GEO Biodiversity Observation Network, known as "the biodiversity arm of GEOSS", is interlinking the field's numerous stand-alone databases and observation systems to improve assessments of plant and animal populations, track the spread of invasive alien species, and promote information sharing and cost savings. It will also connect these systems to other Earth observation networks that generate relevant data, such as climate and pollution indicators.

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