Environmental Data Management Best Practices

Geospatial Data Management
Organization Standards

This document provides an outline of standards that may be considered by an organization to provide credibility of the organization's geospatial data and improve transparency and trust by the public in that data. Organization standards for geographic data are the standards for quality that an organization has in place to ensure all geospatial data are managed properly, from project planning, geospatial data collection, storage, presentation of geospatial information to other organizations or the public, and archival or disposal standards. These standards may be in either an organization-wide geospatial data strategy or included with a project-specific quality management plan. Organization standards ensure quality data for scientifically valid decisions. GIS professionals, information technology (IT) professionals, project managers, and program managers will find the information in this fact sheet useful. The Geographic Data Management subgroup created these best management practices and guidelines for management, collection, communication, visualization, and dissemination of environmental geospatial data.



Overview

Formally, a "standard" is documentation established by consensus of subject matter experts and approved by a standard authority that provides rules, guidelines, or characteristics for activities or their results (ISO 2021). State or federal agencies may have organizational or institutional standards they must follow due to state or federal law, administrative rules, or organizational information technology policy. Agencies may also have internal "standard operating procedures" or other quality management planning documents that include geospatial data storage, collection, management, and dissemination guidelines or requirements. These topics are expanded in other fact sheets in this series (Geospatial Data Collection Consistency, Geospatial Visualization of Environmental Data, and Geospatial Data Dissemination: Web Format subtopic sheets).

Agency standards for geographic data are the standards for quality that an organization has in place to ensure all geospatial data are managed properly for the life of a program or project. The life of a project includes project planning, geospatial data collection, geospatial data storage, presentation of geospatial information to other organizations or the public, and finally geospatial archival or disposal standards. These standards may be either organization-wide (example: USEPA National Geospatial Data Policy) or contained with a project-specific quality management plan.

Management, standards, and dissemination of geospatial environmental data can be unique to an agency. Validation of

coordinate information can be a component of a sample's accuracy and determine the sample result's appropriateness for use in further analysis. Because the locations of environmental information are contained within geographic data, it is wise to be aware of and respect any laws, policies, or potential legal or privacy concerns inferred by analysis, dissemination, and management of geospatial data. Due to the importance of accurate and legally defensible geospatial data, it is best practice to have organizational policy and standards for collecting, storing, managing, analyzing, and disseminating geospatial data collected and used by the organization that follow all applicable state, federal, and local laws and rules.

Importance of Organization Standards

Having geospatial environmental data standards for the organization provides credibility for the organization's data, improving transparency and trust by the public in that data. Such standards ensure the correct use of the geospatial data at the correct scale and resolution. Additionally, these standards promote geospatial data transfer and interoperability, enabling the smooth transfer of geospatial data from one organization or entity to another.

Organization standards are different from an organization's geospatial data policy. The organization's geospatial policy, if it exists, is an aspirational document, with a vision and mission of how geospatial data fit into the organization's overall business needs (see Lewin [2021] for more thorough discussion of components of a geospatial strategy). An organization's geospatial standards are for specific aspects of a geospatial project and may include standards for planning, location data collection, presentation, or dissemination of geospatial data, as well as storage and eventual disposal or archiving of geospatial environmental data.

Suggested Components of Geospatial Standards

Standards can be written for each phase or component of geospatial data management, including but not limited to:

- project planning
- geospatial data collection (the collection of coordinate data using a GPS device, for example)
- visualization or dissemination of geospatial data
- storage or archiving of geospatial data

For every phase or component of geospatial environmental data management, an organization should consider the following topics when developing standards. For illustrative purposes, each topic includes an example of a geospatial standard.

- **Scope of the standards or policy**
    - Does the standard apply only to data held within the organization, or must entities submitting data to the organization follow the standards?
    - Do contractors need to adhere to or be aware of your agency's geospatial data standards, quality assurance plans, or project plans?
        - *Example: If an organization hires a private company to complete their required environmental sample collection, does the private company need to adhere to the collection standards of the contracting organization? Does that private company need to have a GPS collection standard? It is up to the organization to determine whether they will have that standard in place, or if it is the responsibility of the private company to have the geospatial location collection standard.*
- **Audience**
    - Who is the audience of the geospatial standard? Typically, the audience would include direct GIS data stewards, data owners, users, developers, and any person involved with using or distributing geospatial data. The audience can also include information officers, field technicians, program or project management personnel, and other management or leadership personnel. Typically, the general public is not the direct audience of a standards document. An exception would be if the standard is designed specifically for citizen science projects, then the general public would be the audience. However, citizen science is outside the scope of this fact sheet.
        - *Example: If a GPS standard is written by the organization, the audience may be the field personnel of the private company that is collecting the GPS data. It may also be future GIS professionals who are reviewing the data to see if a particular procedure is followed*

or indicated in the standard.

- **Background and authority**
    - Geospatial standards for an organization can list reasons why they are developing the standard, and list legal authority to both write and enforce the standards. Authority can include state or federal statutory requirements or both. Organizations will often create or adopt their own geospatial data standards to meet the requirements of the National Geospatial Data Infrastructure Strategic Plan (FGDC 2020).
        - *Example: If the organization is a state agency, it may reference applicable state or federal laws as the basis for its authority to write standards to meet quality measures identified in a project plan.*

- **Procedures**
    - Organization geospatial standards outline proper procedures for geospatial project-related tasks, such as field data collection, geospatial data storage, or geospatial data archival procedures. The standard may describe a step-by-step process or procedure that the GIS professional, IT professional, or manager must do to ensure quality geospatial data. Often the individual procedures may be separate standards. Procedures can include guidance for data documentation, new data collection and acquisition, geospatial data processing and final documentation, data storage and access, maintenance of data, and procedures for incorporating historical geospatial data, and geospatial data retirement, disposal, or archiving. Examples of a geospatial procedure standard or policy can be found on USEPA's Geospatial Policies and Standards web page (see Resources below).
        - *Example: An organization's GPS data collection standard may include a step-by-step description of the tasks that field personnel are to use if they are to collect accurate coordinate information that meets a project's intended data quality measures.*

- **Roles and responsibilities**
    - Agency standards can also outline the roles and responsibilities for geospatial data management among GIS staff. They can include the geospatial information officer or coordinator, data steward(s), data owners, and system administrators. The defined roles can be used for establishing data governance and stewardship protocols.
        - *Example: The organization's GPS data collection standard may define the role and responsibility of a field technician. Their role may be collection of the data, and responsibility is to ensure that the procedure is followed as outlined in the standard.*

Resources

- ITRC GRO-1, Geospatial Analysis for Optimization at Environmental Sites: https://gro-1.itrcweb.org/
- USEPA FRS data dictionary: https://www.epa.gov/sites/default/files/2015-09/documents/frs_data_dictionary.pdf
- Federal Geographic Data Committee data standards: https://www.fgdc.gov/standards
- Open Data standards: https://standards.theodi.org/
- NJDEP GPS Data Collection Standards for GIS Data Development–April 2017 https://www.nj.gov/dep/gis/standards.html
- USEPA Geospatial Policies and Standards web page:

https://www.epa.gov/geospatial/geospatial-policies-and-standards