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2026–2031

U.S. Geological Survey Strategy for a Hazard Ready Nation

Actionable Science for Risk Reduction



Circular 1568

U.S. Department of the Interior
U.S. Geological Survey

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By Alice B. Pennaz, Jack R. Friedman, Nathan J. Wood, and Jacqueline R. Meszaros

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Abbreviations

DOI	U.S. Department of the Interior
HRN	Hazard Ready Nation
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
ORR	[USGS] Office of Risk and Resilience
Risk CoP	[USGS] Risk Research and Applications Community of Practice
SLTT	State, local, Tribal, territorial
USGS	U.S. Geological Survey

2026–2031 U.S. Geological Survey Strategy for a Hazard Ready Nation—Actionable Science for Risk Reduction

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Executive Summary

The USGS Strategy for a Hazard Ready Nation provides an approach that U.S. Geological Survey (USGS) researchers and staff can use to deliver actionable, user-focused science that supports risk-informed decision making aimed at reducing risk and losses across the Nation. The Strategy builds upon successful efforts within the USGS and seeks to promote and prioritize similar work in the future under an organized framework.

Rooted in four priorities—(1) center end-user needs, (2) enhance research relevance, (3) support product and service development and implementation, and (4) improve communication—the USGS Strategy for a Hazard Ready Nation is designed to focus and guide, not prescribe, activities. Strategic actions are proposed to achieve these four priorities in a timely fashion. The USGS plans to continually build upon the Strategy for a Hazard Ready Nation to deliver actionable information for risk-informed decision making.

Vision

A Hazard Ready Nation (HRN) is one in which individuals, communities, businesses, and governments—

- understand where and when hazards can occur and their potential impacts, and
- can make informed decisions to protect people, property, resources, and the economy before, during, and after hazard events.

Mission

Focus on the needs of the end users of U.S. Geological Survey (USGS) science to deliver reliable and actionable scientific information through products and services that inform decisions to minimize the loss of life, property, and resources from hazards.

Purpose

The strategy for an HRN (hereafter referred to as "the Strategy") is designed to guide and support USGS personnel in advancing the science, partnerships, and communication needed to ensure that USGS information is timely, relevant, accessible, and actionable for the decisionmakers and communities working to build a more hazard ready Nation. Drawing on existing successful USGS efforts (for examples, refer to the "Hazard Ready Nation in Action" section), the Strategy provides a unifying framework to help align USGS hazard and risk science with real-world needs. The Strategy is grounded in four priorities:

1. **Center end-user needs:** Focus USGS hazard and risk science on end-user and core partner needs.
2. **Enhance research relevance**: Advance USGS hazard and risk science to inform decisions to protect lives, property, and resources.
3. **Support product and service development and implementation:** Put USGS hazard and risk science to work in the form of actionable tools and services.
4. **Improve communication:** Prioritize consistent, user-focused, and actionable communication.

Background

The Strategy builds upon the 2018 USGS Circular "Science for a Risky World—A U.S. Geological Survey Plan for Risk Research and Applications*"* (referred to as "the Risk Plan") and adopts the Risk Plan's definition of hazard: a "dangerous process, phenomenon, substance, activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage" (Ludwig and others, 2018, p. 51). The USGS Office of Risk and Resilience (ORR) developed the Strategy in collaboration with the USGS Risk Research and Applications Community of Practice (Risk CoP), with inputs from the National Oceanic and Atmospheric Administration's (NOAA's) Weather-Ready Nation team, the TsunamiReady Program, and the National Weather Service (NWS) to align USGS efforts with those of partner agencies. The ORR team held meetings and workshops in 2023 and 2024 that included participants from across the USGS to shape the vision, mission, and priorities of the Strategy. Early drafts of the Strategy's goals were shared widely within the Bureau to collect feedback for further refinement.

The Strategy is not a budget initiative; rather, it is a shared roadmap for collaboration, integration, and innovation across hazard areas relevant to USGS science. Using this strategy, USGS personnel can focus their efforts where they will have the greatest effect: providing science that supports risk-informed decision making and advances the Department of the Interior's (DOI) mission to protect lives, property, and natural resources.

Collaboration for a Hazard Ready Nation

Central to this Strategy and the HRN approach is a focus on collaboration to meet the needs of end users and core partners.

- End users are part of a broad category defined as individuals or groups whose decisions are now, or could be, informed by USGS science. Examples of end users include emergency managers, homeowners, community planners, business owners, public utility and infrastructure managers, State, local, Tribal, and territorial (SLTT) government officials, and resource-development investors.

- Core partners are groups, organizations, and government agencies with unique needs for increased or intensive interaction with USGS data, products, and services to support decision making. While these groups contribute to the data, products, and services provided by the USGS, the "core partner" designation identifies entities having an operational need for direct access to USGS information or that require direct interaction with the USGS to support public safety decision making. These core partners work directly with the USGS to—

  - prepare or disseminate USGS-related natural hazards information or other emergency information, and

  - convey end-user needs to the USGS and coordinate end-user collaboration with the USGS to inform scientific endeavors and product development.

Examples of core partners include State geological surveys; Federal and SLTT emergency managers and first responders; building code councils; national and regional industry groups; academic institutions and research-based organizations; public land and resource-management agencies; governmental and nongovernmental public safety organizations; Federal scientific agencies; and national defense organizations.

Hazard Ready Nation Priorities

Priority 1: Focus USGS Hazard and Risk Science on End-User Needs

Identifying end-user needs and building core partnerships drives science-informed risk reduction.

Strategic Actions

1.1. Support USGS staff to prioritize areas for research and identify core partnerships.

a. Use hazard exposure analyses to identify geographic and thematic areas where engagement and research may have the highest impact.

b. Develop how-to guides to help USGS personnel understand what factors to consider when identifying potential core partnerships. Use programmatic guidance to support these practices.

1.2. Strategically and collaboratively develop effective core partnerships.

a. Leverage core partnerships with national and regional associations to facilitate communication, coordination, and collaboration with organizations at local levels across the Nation.

b. Work across USGS programs to identify, catalog, and share information about core partnerships to enable collaboration and communication across USGS programs.

1.3. Assess user needs to determine how to improve USGS hazard data, methods, and services.

a. Coordinate and conduct needs assessments of end users to understand their decision-making requirements, capabilities, and contexts to inform the development of USGS hazard data, methods, and services.

b. Evaluate existing research, products, and services to determine if and how they address and meet user needs.

Priority 2: Expand USGS Hazard and Risk Science That Informs Decisions to Protect Lives, Property, and Resources

Delivering actionable information enables end users to make informed choices.

Strategic Actions

2.1. Address end-user needs by supporting and conducting hazard- and risk-related research to inform impact-based decision making.

a. Develop guidance for research design, implementation, delivery, and evaluation to inform impact-based decision support.

b. Develop and build upon USGS hazard and risk science, to include hazard-exposure analyses, disaster-loss data collection, uncertainties related to risk estimation, and risk-communication research to inform potential risk-reduction actions.

c. Expand USGS hazard and risk research on intersecting and cascading hazards to provide a holistic perspective for decision making that leverages interagency partnerships when applicable.

2.2. Create avenues for end users and core partners to inform USGS research.

a. Develop USGS guidance on the incorporation of end-user and core partner perspectives and needs into USGS hazards and risk research and product development.

b. Establish a generic Paperwork Reduction Act (Public Law 96–511, 94 Stat. 2812) clearance to support USGS hazard and risk science focused on end-user and core partner needs, disaster experiences, communication effectiveness, and decision-making contexts.

Priority 3: Put USGS Hazard and Risk Science to Work in the Form of Actionable Tools and Services

Creating applications, tools, and services that transform USGS hazard science into practical products.

Strategic Actions

3.1. Create an environment that accelerates the transition of USGS science into relevant and timely products and services.

a. Identify USGS research that can and should be transferred into operational tools and services to meet core partner and end-user needs.

b. Develop USGS guidance to help USGS researchers, developers, and communicators incorporate end-user needs throughout the product-development lifecycle.

c. Share and apply lessons learned from successful USGS tools and services to improve future products.

d. Develop training and support for USGS personnel to implement best product-development practices, including the use of readiness levels.

3.2. Create tools and services to meet the high-priority needs of end users.

a. Provide and identify consultation services, technical services, and tools that allow USGS staff to accelerate product development, such as formalizing user requirements and usability testing, product architecture, lifecycle considerations, interoperability opportunities, the use of artificial intelligence, iterative design approaches, the integration of datasets, and evaluation.

b. Provide testbeds and technical services to accelerate the development of new applications, tools, and services that meet end users' functional and operational requirements.

c. Develop enterprise technology infrastructure to efficiently integrate datasets across hazards and reliably deliver risk information by location, asset, or resource, and enable information delivery for cascading or intersecting hazards.

Priority 4: Prioritize Consistent, User-Focused, Actionable Communication

Providing effective, tailored communication—during crisis and noncrisis situations—to ensure that end users receive the right information at the right time to support risk-informed decisions.

Strategic Actions

4.1. Deliver targeted information aligned with end-user requirements for format, timeliness, and the scale at which decisions are made.

a. In collaboration with end users, determine and implement best practices across the USGS to disseminate hazard and risk information that prioritizes alignment with end-user timelines and creates opportunities for iteration during crisis and noncrisis situations.

b. Use creative techniques, media, and venues to share information in nontechnical, actionable, and memorable ways.

c. Frame USGS hazard communication in ways that support risk-informed decisions, such as presenting a range of potential consequences and protective actions.

d. Deliver information about data and model uncertainty in approachable formats to inform balanced decision making.

4.2. Improve how USGS hazard and risk science is communicated to, with, and through core partners.

a. Work to harmonize language about hazards, risks, and protective actions across the USGS and with its core partners to avoid confusion or conflicting messages.

b. Leverage partnership networks to deliver, amplify, translate, and appropriately tailor USGS information about hazards and risks to a broad spectrum of appropriate audiences.

4.3. Identify and fill communication gaps related to societal risks associated with intersecting and cascading hazards.

a. Develop guidelines for communicating societal risks from intersecting and cascading hazards.

b. Collaborate across the USGS and other Federal entities to communicate the societal risks of cascading and intersecting hazards. Develop linkages to other national programs, such as the NWS's Weather-Ready Nation program, to align preparedness for cascading and intersecting hazards.

Hazard Ready Nation in Action

The Strategy was inspired by many products at the USGS that demonstrate the priorities outlined in the "Hazard Ready Nation Priorities" section. Examples include collaboration with key stakeholders to develop products such as—

- the National Seismic Hazard Model, which informs building codes, land use, and hazard mitigation planning for earthquake hazards (https://www.usgs.gov/programs/earthquake-hazards/science/national-seismic-hazard-model);
- the Total Water Level and Coastal Change Forecast Viewer, which provides critical information for short-term planning related to elevated coastal water levels, ranging from nuisance flooding at high tide to storm events (https://coastal.er.usgs.gov/hurricanes/research/twlviewer/);
- postfire debris-flow inundation assessments that inform emergency management decisions about evacuations after heavy rainfall, as well as inform long-term hazard mitigation strategies (https://landslides.usgs.gov/hazards/postfire_debrisflow/);
- aviation-sector specific advisories for volcanic ash emissions that allow planes to be diverted from potentially hazardous areas (https://www.usgs.gov/programs/VHP/volcano-updates#vonas);
- SpawnCast, which allows managers to anticipate and mitigate harmful invasive species in U.S. waterways (https://il.water.usgs.gov/proj/spawncast/); and
- the Real-Time Flood Impact Map, which provides geolocated, real-time information about where floods are happening or may soon affect critical safety and infrastructure features, to support State and local plans and decisions (https://apps.usgs.gov/rtfi-map/#/).

A Path Forward and Additional Information

As the "Hazard Ready Nation in Action" section shows, the USGS works to make the United States safer and more resilient. Although geographically and disciplinarily dispersed, a Hazard Ready Nation uses a common language to describe the extensive work the USGS does to keep the United States and its resources safe and resilient. Under the banner of a Hazard Ready Nation, the USGS plans to build upon the methods, information products, relationships, and science already underway to ensure that the delivery of actionable information for risk-informed decision making continues to grow and flourish. To learn more, visit the Hazard Ready Nation website (https://www.usgs.gov/office-of-risk-and-resilience/hazard-ready-nation).

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