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# The Value of Geologic Mapping

**Position Statement.** To improve the scientific basis for public and private natural resource and land-use decisions, The Geological Society of America (GSA) supports comprehensive geologic mapping on local, state, and national scales and advocates increased public investments for current state and national geologic mapping programs.

**Purpose.** This position statement (1) summarizes the consensus views of GSA regarding the importance of geological mapping for natural-resource and land-use decision making; (2) encourages partnerships among government, academia, and industry to share mapping expertise and technology; (3) promotes the development of digital data and maps in a readily accessible and useable form; and (4) encourages educational institutions to value and reward the teaching of geologic mapping skills.

## RATIONALE

Geologic maps are tools portraying interpretive, three-dimensional views of rock, sediment, and soil units that depict their distribution and age relationships. They provide information on Earth's structure and other features at and below Earth's surface and offer baseline data for mineral and energy resources. Geologic maps can also show how the physical environment has been impacted by human activity. Our understanding of issues important to society, such as natural hazards, water resources, and soil conservation, is also grounded in geologic maps. The preparation of geologic maps is a fundamental skill unique to the science of geology.

Geologic maps provide a context for testing scientific theories, hypotheses, and models. They stimulate scientific thinking, questions, and ideas and promote further development of geologic methods and techniques. Biologic, climatologic, and other scientific data should be considered in the context of the geologic framework provided by mapping at appropriate scales, yielding increased understanding and encouraging further multidisciplinary scientific investigations. Geologic maps are also valuable teaching tools in earth-science classrooms.

## PUBLIC POLICY ASPECTS OF GEOLOGIC MAPPING

Geologic maps and their subsequent derivative products have immense economic and societal value. They are particularly useful when in digital format and accessible online. Geologic maps support our ability to locate and develop mineral, energy, and water resources; assess and protect groundwater quality; safely site solid and hazardous waste disposal facilities; construct, restore, maintain, and protect sensitive ecosystems; and identify and prepare for such natural hazards as earthquakes, volcanic eruptions, landslides, and land subsidence. Geologic maps enhance our ability to identify health hazards; to site and build the nation's infrastructure of roads and highways, railroads, pipelines, utilities, dams and locks, buildings, and foundations; and to make more informed land-use and planning decisions to meet societal needs. Geologic maps have proven to be essential elements for informing the policy decisions of federal, state, and local agencies.

## RECOMMENDATIONS

GSA adopts this statement as a reflection of its institutional and individual commitment to the following actions:

- Within the priorities of local, state, and national government, increased programmatic and financial investments are needed to adequately support the development, publication, and use of geologic maps. Increased programmatic emphasis for mapping can be enhanced through development of partnerships among state and federal agencies, educators, and scientists in the public and private sectors. Enhanced overall public investments in

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the geosciences should include geologic mapping as a critical component. For example, funding for the National Cooperative Geologic Mapping Program should be increased. This is one example of a productive and cost-effective partnership to expand the geologic mapping of the United States.

- It is essential to bring geologic mapping and geologic map publication into the digital age so that societally relevant information on resources and land use can be readily available to decision makers. This should include (1) development of digital protocols for encoding geologic map information; (2) adaptation of geologic mapping and geologic map publication to the possibilities presented by digital technology, including the publication of digital and scientifically attributed map databases; and (3) optimum Web accessibility and delivery of geologic map data.
- Teaching geologic mapping skills and methodology is important and deserves the full support and recognition of academic institutions and departments. GSA members should engage students in geologic mapping activity to the maximum extent practicable and strongly support teaching of geologic mapping. They should also support the offering and funding of geologic field mapping courses and other educational initiatives that provide financial support to equip and engage students in geologic mapping as well as to publish the resulting geologic maps. Academic institutions should fully recognize the scholarship and scientific merit, as well as the economic and societal value, inherent in the development of geologic maps as they evaluate individuals for tenure and promotion.

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#### **ABOUT THE GEOLOGICAL SOCIETY OF AMERICA**

The Geological Society of America, founded in 1888, is a scientific society with more than 25,000 members from academia, government, and industry in more than 100 countries. Through its meetings, publications, and programs, GSA enhances the professional growth of its members and promotes the geosciences in the service of humankind. GSA encourages cooperative research among earth, life, planetary, and social scientists, fosters public dialogue on geoscience issues, and supports all levels of earth science education. Inquiries about the GSA or this position statement should be directed to GSA's Director for Geoscience Policy, Kasey S. White, at +1-202-669-0466 or [kwhite@geosociety.org](mailto:kwhite@geosociety.org).

## OPPORTUNITIES FOR GSA AND ITS MEMBERS TO HELP IMPLEMENT RECOMMENDATIONS

To facilitate implementation of the goals of this Position Statement, GSA recommends the following actions:

- We should seek opportunities to communicate effectively the value of geologic mapping to international, national, state, and local legislative bodies and government agencies, private developers, economic development corporations, professional land-use planners, chambers of commerce, and other local decision makers. GSA members are encouraged to work with print, electronic, and broadcast media in promoting the value of science based approaches for addressing critical resource and land-use issues.
- We should seek opportunities to engage representatives of industry, colleges and universities, and public decision-making entities in opportunities to foster financial support for geologic mapping partnerships. If possible, it is beneficial to provide potential industry, academic, and public decision makers with local examples of when geological mapping has contributed vital information to a resource or land-use planning or decision-making effort. What also must be made clear is how the geoscientific information might have prevented or lessened the effect of a costly adverse land-use activity or reduced devastating consequences of a natural disaster.
- We should seek opportunities to communicate effectively the value of geologic mapping to community groups. The public must be able to respond in an informed manner to resource and land-use decision making that potentially has detrimental effects on their community and personal property. There is a growing need for the public to be educated about the value of geological mapping in identifying the geographic extent and thickness of deposits at both the land surface and at depth, which in turn provides valuable insights regarding water and mineral resource availability. As above, it is beneficial to provide decision makers with local examples of how geologic mapping has either contributed to resource land-use planning efforts or its lack resulted in costly adverse land-use activities or the devastating consequences of a natural disaster.
- We should participate in professional forums and town hall meetings for open community discussions on the value of geologic mapping. Our discussions should emphasize the value of geoscientific information for water and mineral resource evaluations, land-use planning and decision making, and enable GSA members to be better informed advocates for requesting funding in support of geologic mapping.
- GSA, both as an institution and through its individual members, should seek appropriate opportunities to inform and educate decision makers that geologic maps provide valuable information regarding natural resources and land use. GSA recognizes that geologic maps support many areas of public and private decision making.
- GSA should provide members with readily accessible print, Web, and personnel resources to support geoscientists' communications with decision makers regarding the value of geologic mapping. Considerable expertise and resources are available to members through GSA's Geology and Public Policy Committee, GSA's Geology and Society Division, and GSA's Director for Geoscience Policy in Washington, D.C.
- GSA can raise awareness of the value of geological mapping by publishing geologic maps and associated articles and by encouraging members to propose geologic mapping sessions, workshops, short courses, and field trips at Annual and Sectional GSA meetings.