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Environmental Geology and Genetic Mapping

by

L. F. Brown, Jr.

ABSTRACT

One of the most critical problems facing the world during the last decades of this century w i l l be the effect of expanding population with its myriad needs for water, sanitation, recreation, and proper land use, coupled w ith complementary industrial expansion in developing megalopolis belts. A paradox exists between a concern about the ultimate supply of natural resources necessary to maintain the present westernlife style, and a growing concern about diminishing resources and the I m pact of accelerating exploitation on delicately balanced or endangered environments and ecosystems. Environmental management is the key to p r o p e r balance between exploitation and conservation.

Environmental Geology is, above all else, the practical or functional application of the s c ience to critical environmental p r obl e m s; geologists h a v e for years similarly applied the science to m i n e ral exploration and investigations of earth history and processes. More and m o r e traditionally trained geologists will begin filling a n increasing number o f positions involving environmental studies; these tasks will require the best in research and application that the science of geology has to offer.

A major geological thrust is needed at this time to define and inventory natural environmental systems, their present status, and the impact of human modification. The principal geological tool in the battle against pollution, diminishing resources, and in discriminant land u s e will be properly conceived and innovative geologic maps. The United State I s poorly covered b y geologic maps of adeq u a t e scale and proper concept for so lving impact problems. Maps should b e composed principally of genetic u nits, even i f they do not c o n f o rm t o traditional maps nor formally accepted nomenclature. For example, first-order environmental units may i n c l u d e substrate units or facies such as f l u v i a I channel-fill sand or reef limestone; vegetational units such as salt marsh or grass-stabilized dunes; landforms such as tidal deltas or highly dissected badlands; process-defined u n i t s such as land-slide areas or storm-washover channels; and man-made units. Maps of genetic units allow rapid derivation of special - use environmental maps for a broad spectrum of scientists and non-scientists. Delineation of genetic units allows three-dimensional extrapolation and interpolation of physical properties to predict the behavior of material under varied land use.

Results of environmental geologic investigations should be presented using innovative formats and techniques that encourage interdisciplinary communication, unite diverse specialists, and allow all experts to focus simultaneously on impact problems. Coupled with computer data storage, the environmental geologic map and derivative maps provide a current record of natural environments, processes and materials, as well as a permanent record of rates of erosion, deposition, and human modification and exploitation. Planners, economists, engineers, biologists, chemists, lawyers, legislative councils, and others can plot, plan, refer, and digest specific environmental data that are visually related to detailed inventory maps depicting the distribution and nature of fundamental natural systems.

Approximately 12 man-years of environmental geologic and derivative mapping and study in the 18,000-square mile Texas Coastal Zone by the Texas Bureau of Economic Geology have resulted in text and 64 full-color maps including Environmental Geology, Current Land Use, Physical Properties, Environments and Biologic Assemblages, Active Processes, Mineral and Energy Resources, Man-Made Features and Water Systems, Rainfall, Discharge and Surface Salinity, and Topography-Bathymetry. The "Environmental Geologic Atlas of the Texas Coastal Zone" provides a case history with which the philosophy approaches, and results of an extensive environmental investigation can be evaluated.

BIOGRAPHICAL SKETCH - L. F. Brown, Jr.

Born:

June 1, 1928, Seminole, Oklahoma

Education:

1946-1948	Oklahoma State University
1951	Baylor University, B.S., Geology, cum laude
1953	University of Wisconsin, M.S. in Geology
1955	University of Wisconsin, Ph.D. in Geology (Soil Minor)

Professional Experience:

1949-1952	Instructor, Baylor University
1952-1955	Wisconsin Alumni Research Assistant
1953	Instructor, University of Wisconsin
1955-1957	Exploration Geologist, Standard Oil of Texas
1957-1960	Research Scientist V, Bureau of Economic Geology, The University of Texas.
1960-1966	Assistant and Associate Professor, Baylor University.
1961-1963	Bureau of Economic Geology, Summer Field Research
1966-Pres.	Associate Director (Research), Bureau of Economic Geology - Professor of Geological Sciences, The University of Texas at Austin.

Memberships:

Sigma Xi
American Association of Petroleum Geologists
Permian Basin Chapter, Society of Economic Paleontologists and Mineralogists
Geological Society of America (Fellow)
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Publications:

Approximately twenty-five publications on Texas Upper Paleozoic stratigraphy depositional systems including deltaic and fluvial facies; environmental geology of the Texas coastal zone; and contributions to various Texas mapping programs in both ancient rocks and Pleistocene and Modern-Holocene sediments

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