

THE EARTH SCIENCE EDUCATION CENTER:
EARTHQUAKES AS A BASE FOR COMMUNICATING EARTH SCIENCE
CONCEPTS TO THE PUBLIC

Jill D. Stevens^I

ABSTRACT

Since 1983 the Center for Earthquake Research and Information (CERI) has become a well-known source for earthquake information in a variety of formats. Issues encompassing seismology, earthquake engineering, preparedness and mitigation, seismic building codes, earthquake insurance and public policy are routinely addressed. The considerable resources of the scientific staff, Earth Sciences Library, and the Seismic Resource Center provide a wide capability for providing information quickly and accurately.

An earthquake education component has existed at CERI since 1983. The Earth Science Education Center (ESEC) will be established to formalize and expand ongoing education activities. Using the earthquake risk in the central United States as a base, the ESEC, when complete, will incorporate broader concepts of earth science, weaving them in thematic components through the study of earthquakes. It will be a source of information available in a variety of formats: through a visitor center/museum component, a course and workshop component, and an expanded resource center component.

A five year time-span is anticipated to establish the full range of activities of the ESEC. The first phase, funded by an internal grant from CERI, is scheduled to be completed in 1993, with outside funding to be utilized for the remainder of the project.

The ESEC will be a valuable addition to the awareness, public education and preparedness sources for earthquake information, and through its association with CERI, will provide expert information in a variety of formats unique in the central United States.

INTRODUCTION

The Earth Science Education Center is an outgrowth of the earthquake education activities of the Center for Earthquake Research and Information (CERI), Memphis State University. Beginning in 1983, through funding by the Federal Emergency Management

^ISeismic Resource Center Manager, Center for Earthquake Research and Information, Memphis State University, Memphis, TN 38152

Agency (FEMA), CERI began implementing a series of educational activities geared toward raising the level of awareness in the region about the earthquake risk from the New Madrid seismic zone (NMSZ). Part of that process was teaching basic earth science concepts in geology, principally plate tectonics related to the occurrence of earthquakes, with a particular emphasis on the underlying geology in the central United States. It became apparent early in the program that basic knowledge of earth processes was lacking in nearly all age groups targeted in the earthquake education program.

Since 1983 CERI has become a well-known information source for earthquakes and earthquake preparedness, but within the last two years it has become evident that much information seeking by different segments of the population in the region has become concentrated in earth science related areas, with requests for earthquake preparedness information being secondary.

As part of the expansion of educational activities at CERI, a more formalized and structured component will be created through the ESEC. The focus of the ESEC will not only be on earthquakes in the central U.S, although that will be a major component, but will also be on earth science in a broader sense, that is, the elements that are contained in the study of the earth, and how they impact humans. The ESEC will be a source of information in a variety of formats, including: a visitor center/museum component; courses taught to various age groups from elementary students to senior citizens through Memphis State University's continuing education program; and a resource center for teachers, students and other interested community members (already in place through the Seismic Resource Center). The ESEC will be designed to be a regional resource for earth science information from a recognized research institution with access to the most up-to-date and pertinent information in the field. Most of the information and activities will be available at no cost or minimal cost to the public.

Establishing the visitor center/museum component will be the greatest challenge, as it does not yet exist in any form. Courses through continuing education are offered on a periodic basis, and the Seismic Resource Center now supplies significant amounts of earth science/earthquake information to a wide cross-section of agencies, institutions, media sources, and individuals in the central U.S.

VISITOR CENTER/MUSEUM COMPONENT

The visitor center/museum component is envisioned as a combination of permanent and temporary displays, with concepts relating to earth science shown within the context of earth processes occurring and having occurred in the region. The target audience will be the same as for any museum, the broad spectrum that exists in any community. Temporary exhibits will be designed for more specific elements of the community. The permanent display area will give the broadest possible perspective of earth science processes related to the central U.S, while the temporary displays will focus on more specific aspects and how they relate to the central U.S. Space for the visitor center/museum is very limited and will have to be cleverly and imaginatively designed, certainly something that has been done many times before. The visitor center/museum will contain the following components (preliminary list):

Potential Components of Permanent Exhibit

On-line seismic monitoring of NMSZ and Southern Appalachians
Seismograms of recent significant local and global earthquakes

Plate tectonics
Geologic time
Rock cycle

Fossils (central U.S. origin)
Geologic history of the central U.S.
Reelfoot Rift

Mountain building (Ozarks, Ouachitas & Appalachians)
Mississippi Embayment
New Madrid seismic zone

Earthquakes

How, where, why, when (faults, etc, instrumentation, scales)
Intracontinental earthquakes around the world

Earthquake effects
Vibration/structural response
Soil liquefaction
Lateral spreading
Landslides

Side effects - fires, chemical spills, non-structural hazards
Side effects - societal, psychological, sociological, economic

Reducing risk

Earthquake engineering - geotechnical solutions
Non-structural hazard mitigation
Earthquake safety information - children, adult, elderly, disabled

Potential Temporary Exhibits

Volcanoes

Plate boundary earthquakes
Tsunamis and seiches

History of earthquake detection devices
Geology in the Bible (the Bible as historical information about earthquakes)

Significant historical earthquakes

Earthquake prediction - a social history

Earthquakes & history - how earthquakes changed history

Earthquake myths and legends from around the world

International Decade of Natural Disaster Reduction

Anatomy of seismograms

New Madrid earthquakes - do we really know how big they were?

Earthquake lights and sounds

Imaging the earth's interior - how we know what we know

Other earthquake source zones in the central and eastern U.S.

From Francis Bacon to plate tectonics

What's new in earthquake research - GIS/GPS

The earthquake prediction episode of 1990

Although there is a great deal of technical capability available at CERI to accomplish the goals of the ESEC, outside expertise in the planning of the visitor center/ museum component will be utilized. A curator from the Memphis Pink Palace Museum will be a consultant to this phase of the ESEC, and other technical advice will be utilized as needed.

CLASS/WORKSHOP/TOUR COMPONENT

As part of the present outreach activities at CERI tours are offered to the public on a year-round basis, and periodic classes are conducted through the continuing education department at Memphis State University. Both of these areas will be expanded and offered to more diverse segments of the public than at present. Workshops will be offered for students, teachers and senior citizens, and classes will continue to be offered through continuing education. Tours will expand from the present lecture/demonstration format to include, when possible, a more interactive format with the exhibits in the visitor center/museum.

RESOURCE COMPONENT

The Seismic Resource Center currently maintains a small collection of earthquake education materials that can be utilized by the public. Plans are to upgrade and expand resources available for check out, including not only printed information but models and plans for their construction. A special effort will be made to make materials available to teachers, who lack earth science related teaching aids. This will involve constructing new models as well as updating some of those already in existence to reflect a more current state of knowledge in earth science. Providing presentations to the public and disseminating scientific and non-scientific information about earthquakes will continue as requested.

LONG TERM GOAL/CONCLUSION

Knowledge of the earthquake risk in the central United States has been an evolving process, primarily the result of 20 years of research by St. Louis University, the U.S. Geological Survey (USGS) and CERI. One of the difficulties in communicating risk information to the public is that there is no tangible framework for understanding why there is a risk. Felt earthquakes are very rare events and there is no visible geologic structure responsible for creating them. Thus, the perception of earthquake risk has largely been driven by the scientific community and it is the scientific community who will continue to define the nature of the risk from the New Madrid seismic zone (NMSZ), at least until there is a significant damaging earthquake. It will be the goal of the ESEC to try and provide a framework for understanding this risk, through providing tangible concepts of the processes that create earthquakes both in the central United States and worldwide. By portraying earthquakes as natural events within a broader conceptual base, and communicating that information in a variety of different ways, the ESEC hopes to convey some of the wonder and excitement inherent in the field of earth science.