Chapter 9
Approaches for Overcoming Anticipated Problems

The process of developing and implementing long-term state and local landslide hazard mitigation programs is beset with certain obstacles to success. The most significant problem is generating the resolve and motivation to organize, implement, and fund such a broad-scale effort. The expenditure of the time and money necessary to derive long-term benefits is not always attractive to state or local leaders. Unfortunately, sometimes only an actual disaster will provoke action. Developing creative approaches to financing and obtaining leadership support for mitigation projects is an ongoing challenge to mitigation proponents. Nevertheless, it is clear that the ultimate costs to taxpayers are likely to be significantly increased when mitigation activities are postponed.

Organizational Problems

The need for the plan preparation team and subsequent permanent hazard mitigation organization to be broadly representative, multidisciplinary, and intergovernmental presents some immediate organizational and coordination problems. An important first step in organizing such a group is to ensure that all elements of the team concur with their roles and assignments before work begins. This agreement should be formalized in a contract, memorandum of understanding, or some other document. A further recommendation is that a project manager be appointed early on to schedule meetings, tend to administrative and financial details, ensure deadlines are met, and direct and coordinate the effort.

The project manager should be selected from the state organization designated as the lead agency and one of his or her first tasks is to integrate the broad range of technical, planning, community, and organizational expertise available into an effective working team. Eliminating jargon and arriving at acceptable terminology for planning may require some compromise among team members. On-site visits to selected landslide areas within the state and the collection of pertinent reports and literature are important steps that the planning team should undertake. It may also be useful to organize a technical advisory committee that would meet occasionally to review draft plan material and to provide overall guidance and recommendations.

Management Problems

The research and writing efforts involved in creating a state plan will involve geologists, engineers, planners, emergency managers, elected officials, and interested citizens. The integration of these many points of view is a difficult management task but necessary if the plan is to be practical and usable for the management and mitigation of landslide hazards. The project manager, with guidance and help from other members of the team, must manage this work and establish tasks, assignments, and completion dates. In order to obtain a clear and consistent document, an editor with some background in natural hazards, earth sciences, planning and/or mitigation technology should be employed.

Financial Problems

Regardless of the source or sources of funding for development of the plan, careful management of a budget will be required to ensure all project expenses are accommodated (staff costs, travel expenses, fees for editing, printing, graphics, etc.). Since the planning process will involve several agencies working on independent tasks, periodic reviews of the budget should be conducted to prevent overruns.

Coordination Problems

Because of the difficulty involved in managing such a comprehensive effort, it is important to set realistic deadlines and to allow sufficient time for necessary coordination of involved agencies and integration of the various work elements. The involvement of all levels of government will necessarily affect progress in plan preparation, and time must be allowed for obtaining concurrence and approval from governmental agencies contributing to the mitigation process. In addition, executive and/or legislative leadership that will formally approve the plan should be kept informed of the work and made aware of the plan well in advance of publication.

Finally, in order to produce a single, clear draft of the plan, it is also necessary to coordinate the word processing systems of the participating agencies. If compatibility between computer systems is not possible, the various elements of the plan may have to be re-entered into one system. The time and expense of plan publication (typesetting, printing, distribution) should also be determined as soon as possible to permit identification of realistic deadlines. ❑

References Cited

Advisory Board on the Built Environment, 1983, *Multiple hazard mitigation strategies for communities prone to multiple natural hazards*: National Research Council, National Academy Press, Washington, D.C., 60 pp.

Advisory Committee on the International Decade for Natural Hazard Reduction, 1987, *Confronting natural disasters*: National Research Council, U.S. National Academy of Sciences, and U.S. National Academy of Engineering, National Academy Press, Washington, D.C., 60 pp.

Allen, P.M., and Flanigan, W.D., 1986, *Geology of Dallas, Texas, United States of America*: Bulletin of the Association of Engineering Geologists, v. 23, no. 4, pp. 363–418.

Alfors, J.T., Burnett, J.L., and Gay, T.E., 1973, *Urban geology master plan for California—the nature, magnitude and costs of geologic hazards in California and recommendations for their mitigation*: Bulletin 198, California Division of Mines and Geology, Sacramento, California, 112 pp.

Bernknopf, R.L., Brookshire, D.S., Campbell, R.H., Shapiro, C.D., and Fleming, R.W., 1985, The economics of landslide mitigation strategies in Cincinnati, Ohio: A methodology for benefit-cost analysis: Chapter D, **in** *Feasibility of a nationwide program for the identification and delineation of hazards from mud flows and other landslides*: Open File Report 85–276D, U.S. Geological Survey, Reston, Virginia, 16 pp.

Brabb, E.E., 1984a, *Minimum landslide damage in the United States, 1973–1983*: Open-File Report 84–486, U.S. Geological Survey, Reston, Virginia 8 pp.

_____, 1984b, Innovative approaches to landslide hazard and risk mapping, **in** *Proceedings of the 4th International Symposium on Landslides*, Toronto, Canada, September 1984, v. 1, pp. 307–323.

Briggs, R.P., Pomeroy, J.S., and Davies, W.E., 1975, *Landsliding in Allegheny County, Pennsylvania*: Circular 728, U.S. Geological Survey, Reston, Virginia, 18 pp.

Colorado Geological Survey, Colorado Division of Disaster Emergency Services, and University of Colorado Center for Community Development and Design, 1988, *Colorado landslide hazard mitigation plan*: Bulletin 48, Colorado Geological Survey, Denver, Colorado, 149 pp.

Colorado Water Conservation Board and Colorado Division of Disaster Emergency Services, 1985, *Flood hazard mitigation plan for Colorado*: Colorado Water Conservation Board, Denver, Colorado, 234 pp.

Colton, R.B., Holligan, J.A., Anderson, L.W., and Patterson, P.E., 1975, *Preliminary map of landslide deposits, Durango 1° x 2° Quadrangle, Colorado*: Map MF–703 U.S. Geological Survey, Reston, Virginia.

Committee on Ground Failure Hazards, 1985a, *Reducing losses from landsliding in the United States*: National Research Council, Commission on Engineering and Technical Systems, National Academy Press, Washington, D.C., 41 pp.

Eisbacher, G.H., and Clague, J.J., 1984, *Destructive mass movements in high mountains—hazard and management*: Paper 84–16, Geological Survey of Canada, Ottawa, Canada, 230 pp.

Ellen, S.D., and Mark, R.K., 1988, *Automated modeling of debris-flow hazard using digital elevation models*: EOS Transactions of the American Geophysical Union, v. 69, no. 16, 347 pp..

Erley, D., and Kockelman, W.J., 1981, *Reducing landslide hazards—a guide for planners*: Planning Advisory Service Report no. 359, American Planning Association, 29 pp.

Filson, J.R., 1987, *Geological hazards programs and research in the U.S.A.*: Episodes, v. 10, no. 4, pp. 292–295.

Fleming, R.W., and Taylor, F.A., 1980, *Estimating the costs of landslide damage in the United States*: Circular 832, U.S. Geological Survey, Reston, Virginia, 21 pp.

Gray, R.E. and Gardner, G.D., 1977, *Processes of colluvial slope development of McMechen, West Virginia*: Bulletin of the International Association of Engineering Geology, no. 16, pp. 29–32.

Kaliser B.N. and Slosson, J.E., 1988, *Geologic consequences of the 1983 wet year in Utah*: Miscellaneous Report 88–3, Utah Geological and Mineral Survey, Salt Lake City, Utah.

Keefer, D.K., Wilson, R.C., Mark, R.K., Brabb, E.E., Brown, W.M. III, Ellen, S.D., Harp, E.L., Wieczorek, G.F., Alger, C.S., and Zatkin, R.S., 1987, *Real-time landslide warning during heavy rainfall*: Science, v. 238, pp. 921–925.

Kockelman, W.J., 1986, *Some techniques for reducing landslide hazards:* Bulletin of the Association of Engineering Geologists, v. 23, no. 1, pp. 29–52.

Krohn, J.P., and Slosson, J.E., 1976, *Landslide Potential in the United States*: California Geology, October, 1976, pp. 224–231.

Leighton, F.B., 1976, Urban landslides: targets for land-use planning in California, **in** Coates, D.R., ed., *Urban Geomorphology*: Special Paper 174, Geological Society of America, Boulder, Colorado, pp. 37–60.

Lessing, P., Kulander, B.R., Wilson, B.D., Dean, S.L., and Woodring, S.M., 1976, *West Virginia landslides and slide-prone areas*: West Virginia Geological Survey, Environmental Geology Bulletin 15, 64 pp.

Miller, R.D., 1973, *Map showing relative slope stability in part of west-central King County, Washington*: Miscellaneous Geologic Investigations Map I–852A, U.S. Geological Survey, Washington, D.C.

Ministry of Construction (Japan), 1983, *Reference manual on erosion control works [in Japanese]*: Erosion Control Department, Tokyo, Japan, 386 pp.

Nilsen, T.H., and Turner, B.L., 1975, *Influence of rainfall and ancient landslide deposits on recent landslides (1950–71) in urban areas of Contra Costa County, California*: Bulletin 1388, U.S. Geological Survey, Reston, Virginia, 18 pp.

Olshansky, R.B., and Rogers, J.D., 1987, *Unstable ground: landslide policy in the United States*: Ecology Law Quarterly, v. 13, no. 4, pp. 939–1006.

Rogers, W.P., Ladwig, L.R., Hornbaker, A.L., Schwochow, S.D., Hart, S.S., Shelton, D.C., Scroggs, D.L., and Soule, J.M., 1974, *Guidelines and criteria for identification and land-use controls of geologic hazard and mineral resource areas*: Special Publication 6, Colorado Geological Survey, Denver, Colorado, 146 pp.

Sangrey, D.A. and Bernstein, A.B., 1985, *Landsliding—a hazard that can be mitigated*: Ground Failure, no. 1, Winter 1984–85, pp. 6–10.

Schuster, R.L., and Fleming, R.W., 1986, *Economic losses and fatalities due to landslides*: Bulletin of the Association of Engineering Geologists, v. 23, no. 1, pp. 11–28.

Scullin, C.M., 1982, *Excavation and grading code administration, inspection and enforcement*: Prentice-Hall, Englewood Cliffs, New Jersey, 405 pp.

Slosson, J.E., 1969, *The role of engineering geology in urban planning: The Governor's Conference on Environmental Geology*: Special Publication 1, Colorado Geological Survey, Denver, Colorado, pp. 8–15.

Slosson, J.E., and Krohn, J.P., 1982, Southern California landslides of 1978 and 1980, **in** *Storms, Floods and Debris Flows in Southern California and Arizona, 1978 and 1980: Proceedings of a Symposium*: National Academy Press, Washington, D.C., pp. 291–319.

University of Utah, Bureau of Economic and Business Research; Utah Department of Community and Economic Development; and Utah Office of Planning and Budget, 1984, *Flooding and Landslides in Utah—an economic impact analysis*: University of Utah, Bureau of Economic and Business Research, Salt Lake City, Utah 123 pp.

U.S. Geological Survey, 1981a, *Facing geologic and hydrologic hazards–earth sciences considerations*: Professional Paper 1240B, U.S. Geological Survey, Reston, Virginia, 108 pp.

_____, 1981b, *The 1980 eruptions of Mount St. Helens, Washington*, edited by Lipman, P.W., Mullineaux, D.R., Professional Paper 1250, U.S. Geological Survey, Reston, Virginia, 844 pp.

_____, 1982, *Goals and tasks of the landslide part of a ground-failure hazards-reduction program*: Circular 880, U.S. Geological Survey, Reston, Virginia, 48 pp.

Varnes, D.J., 1978, Slope movement types and processes **in** Schuster, R.L. and Krizek, R.J., eds., *Landslides—Analysis and Control:* Special Report 176, Transportation Research Board, National Academy of Sciences, Washington, D.C., pp. 11–33.

Varnes, D.J., and the International Association of Engineering Geology Commission on Landslides and Other Mass Movements on Slopes, 1984, *Landslide hazard zonation— a review of principles and practice*, in Natural Hazards, v. 3, 63 pp.

Watters, R.J., 1988, *Slide Mountain, Nevada: a landslide-induced, water flood-debris flow*: Ground Failure, no.4, Spring 1988, pp 18–19.

Weber, G., von Schulez, W., and Czerniak, R., 1983, *Flood hazard management plan for the Sheridan watershed area: Sheridan, Wyoming*: Geographic Applications and Research Group, Boulder, Colorado, 113 pp.

Wieczorek, G.F., 1982, *Map showing recently active and dormant landslides near La Honda, Central Santa Cruz Mountains, California*: Miscellaneous Field Studies Map MF–1422, U.S. Geological Survey, Reston, Virginia.

_____, 1984, *Preparing a detailed landslide-inventory map for hazard evaluation and reduction*: Bulletin of the Association of Engineering Geologists, v. 21, no. 3, pp. 337–342.

Wieczorek, G.F., Wilson, R.C., and Harp, E.L., 1985, *Map showing slope stability during earthquakes in San Mateo County, California*: Miscellaneous Investigations Series Map I–1257E, U.S. Geological Survey, Reston, Virginia.

Wiggins, J.H., Slosson, J.E., and Krohn, J.P., 1978, *National hazards—earthquake, landslide, expansive soil loss models*: Techincal Report, J.H. Wiggins Company Redondo Beach, California, 162 pp.

Youd, T.L., 1978, *Major cause of earthquake damage is ground failure*: Civil Engineering, v. 48, no. 4, pp. 47–51. ❑