

The National Flood Insurance Program:
An Annotated Bibliography

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Acronyms

CAC	Community Assistance Contact
CAP	Community Assistance Program
CAV	Community Assistance Visit
CBRS	Coastal Barrier Resource System
CRS	Community Rating System
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FIA	Federal Insurance Administration
FIMA	Flood Insurance and Mitigation Administration
FIRM	Flood Insurance Rate Map
FY	Fiscal year
GAO	General Accounting Office
HUD	Department of Housing and Urban Development
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
OIG	Office of Inspector General
NFIP	National Flood Insurance Program
PL	Public Law
SFHA	Special Flood Hazard Area
WYO	Write Your Own

Abernathy, Ann Marie and Leslie Weiner. (1995). Evolving federal role for emergency relief. *Forum for Applied Research and Public Policy*, 10(1), 45-8.

Keywords :

disaster assistance, history, legislation

Abstract: The evolving philosophy, activities, and responsibilities of FEMA are outlined from the first federal law to authorize funding for disaster relief enacted in 1950 to proposed legislative amendments in 1994. Originally assisting with natural disasters such as earthquakes and floods, FEMA has come to provide assistance with technological, human-made, and natural catastrophes today. FEMA's emphasis on hazard mitigation shows a focus on consequences of disasters and emergencies. Internal agency improvements to increase federal responsiveness and efficiency are described.

Al-Futaisi, Ahmed and Jerry R. Stedinger. (1999). Hydrologic and economic uncertainties and flood-risk project design. *Journal of Water Resources Planning and Management*, 125(5), 314-24.

Keywords :

economic modeling, risk assessment

Abstract: A hypothetical basin was developed to explore the performance of designs identified by different economic-risk decision models. This article explores models that reflect alternative ways of addressing uncertainty. It then presents a Monte Carlo analysis that assesses the performance of several promising decision and flood-risk model combinations. In addition, the article describes the benefits of including parameter uncertainty and prior information in the posterior description of flood risk.

American Geological Institute. (2000). *Natural Hazards Mitigation and Insurance Update*. American Geological Institute, Government Affairs Program.

Available at: <http://inet2.agiweb.org/agi/gap/legis106/mitigation.html>

Keywords :

Stafford Act, mitigation, legislation

Abstract: On October 30, 2000, President Clinton signed H.R. 707, the Disaster Mitigation and Cost Reduction Act, into law (P.L. 106-390). The law amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act to require that states submit a detailed, comprehensive state program for emergency and disaster mitigation prior to receiving funds from FEMA. The law requires FEMA to hold a public comment period before "adopting new or modified policies that may result in a meaningful change in the amount of assistance a state or local community may receive."

American Geological Institute. (2002). *Natural Hazards Mitigation Policy*. Washington, DC: Government Affairs Program, American Geological Institute.

Available at: <http://inet2.agiweb.org/agi/gap/legis107/mitigation.html>

Keywords :

Stafford Act, mitigation, legislation

Abstract: This document reviews the recent legislation relating to natural hazards mitigation. It focuses on the legislative bottleneck that precluded new legislation from amending the Stafford Act. Two flood-related exceptions to the bottleneck were a disaster mitigation pilot program within the Small Business Administration and a law requiring states to submit detailed,

comprehensive state programs for emergency disaster and relief before receiving funds from FEMA.

American Society of Civil Engineers. (2000). *Reducing Flood Losses through the International Code Series: Meeting the Requirements of the National Flood Insurance Program*. Washington, DC: FEMA in cooperation with International Code Council, Building Officials and Code Administrators International, International Conference of Building Officials, Southern Building Code Congress International, Inc., Association of State Floodplain Managers, and the American Society of Civil Engineers.

Available at: <http://www.fema.gov/pdf/hazards/report-all.pdf>

Keywords :

floodplain management, International Codes, building codes

Abstract: The guide's purpose is to help community officials decide how to integrate the 2000 edition of the International Codes (I-Codes™) for building safety into their current floodplain development and regulatory processes. The I-Codes™ contain provisions that meet the minimum flood resistant design and construction requirements of the National Flood Insurance Program (NFIP). The guide neither endorses any specific approach nor does it explain the NFIP requirements and how to administer them. Chapter 1 includes an overview of the NFIP, community and state responsibilities under the NFIP, the benefits of participation in the NFIP, and the implications of not participating. Chapter 2 reviews approaches to floodplain management, noting that integrating a community's approach with the I-Codes™ involves planning to reduce overlap of regulations, duplications of effort, and conflicts. Worksheets are provided to help communities assess how their current approaches to regulating development compare to the NFIP's requirements and to facilitate decisions. Chapter 3 discusses the implications of adopting the I-Codes™ in terms of development other than buildings and structures, on-site utility systems, NFIP's Community Rating System, building code amendments for consideration by communities that choose higher standards, requirements for handling substantial improvement and repair of substantial damage, and the provision of "Increased Cost of Compliance" coverage for substantially damaged buildings. Chapter 4 reviews community responsibilities under the NFIP, including record keeping, permits, notification requirements, flood hazard map-related duties, elevation certificates, inspections, enforcement and violations, and the variance process.

Anderson, Dan R. (1974). *The national flood insurance program: Problems and potentials*. *Journal of Risk and Insurance*, 16(4), 579-99.

Keywords :

communication, marketing, NFIP

Abstract: The National Flood Insurance Act of 1968 provides for subsidized flood-insurance and seeks to reduce long-term flood damage through land-use and other control measures. The floods of 1972 and 1973 provided early tests of the program, and it appears to have been deficient in many respects. The author examines these deficiencies and offers reasons for their existence. Ameliorative actions that were taken and others that have been proposed to improve the program are analyzed. Finally, the lessons learned from this study are used to postulate guidelines for improving existing and future government-industry programs. These guidelines include the use of modern marketing techniques, adequate incentives for salesmen, commitment from management, and measuring demand for the product.

Anderson, Dan R. (2000). Catastrophe insurance and compensation: Remembering basic principles. *CPCU Journal*, 53(2), 76-89.

Keywords :

insurance

Abstract: This publication reviews the basic principles for insurance as it relates to catastrophe insurance. The author concludes that the current systems for insurance and compensating property damages caused by natural disasters, including floods, are flawed by endemic problems. The severity of the problems has grown over 25 years in conjunction with increasing catastrophe-related property damage. A review of the problems (increased frequency and severity of events, rapid population of properties in high risk areas) and recommendations for new/alternative approaches are described, including a return to fundamental insurance principals.

Anselmo, V., G. Galeati, S. Palmieri, U. Rossi, and E. Todini. (1996). Flood risk assessment using an integrated hydrological and hydraulic modeling approach: A case study. *Journal of Hydrology*, 175, 533-54.

Keywords :

modeling, hydrology, risk assessment, Italy

Abstract: This paper describes an integrated hydrological and hydraulic modeling approach for the risk assessment of a flood-prone area and its application to analyzing the effects of extreme flood events on the Montalto di Castro thermoelectric power plant. The approach is based on four major steps. The first step entails a detailed analysis of available critical events as well the collection of hydro-meteorological and cartographic data to perform a statistical evaluation of extreme rainfall events and an estimation of the probable maximum precipitation (PMP). The second step involves the calibration of a rainfall-runoff model for the upper catchment area based on the data observed during a recent flood event. The third step involves the calibration of a two-dimensional hydraulic model for simulating floodplain inundation using the previously reconstructed runoff and a comparison of the results with the maximum flood levels observed during the same event. The final step concerns the simulation by the two-dimensional hydraulic model of the flood wave obtained via the rainfall-runoff model using the extreme and PMP values of rain redefined in the first step. The results of this approach appear to be extremely useful and easily transferable to other areas.

Armstrong, John M. and R. Bruce Denuyl. (1977). An investment decision model for shoreland protection and management. *Coastal Zone Management Journal*, 3(3), 237.

Keywords :

property values, erosion, coastal areas, cost-benefit analysis

Abstract: The article presents an investment decision model for problems associated with shoreline erosion. The model determines the economic benefits that a landowner can realize from available alternative protection structures. Benefits are estimated from erosion-induced property value decline for specific reaches of shoreline. This approach enables the decision-maker to determine the local economic impact of alternative shore land management policies. The economic effects of coastal management policies, such as nonstructural shore land protection, wetlands regulation, and public beaches, are discussed in terms of the model's ability to evaluate and compare the opportunity cost of alternative policies. Finally, the article presents and discusses computational examples of the model output.

Arnell, Nigel W. (1984). Flood hazard management in the United States and the National Flood Insurance Program. *Geoforum*, 15, 525-42.

Keywords :

pre-FIRM structures, floodplain management

Abstract: The NFIP provides flood insurance to floodplain occupants and encourages local communities to adopt floodplain land-use regulations. A major issue influencing the success of the NFIP in curbing flood damages is its treatment of properties built before the adoption of floodplain regulations. The potential for using the NFIP to encourage floodproofing and influence post-flood hazard mitigation must be fully explored.

Association of State Floodplain Managers. (1996). *Coast to Coast: 20 Years of Progress. Proceedings of the Twentieth Annual Conference of the Association of State Floodplain Managers, San Diego, CA, June 10-14, 1996. Madison, WI: Association of State Floodplain Managers.*

Keywords :

floodplain management

Abstract: *Coast to Coast: 20 Years of Progress* is divided in 12 parts: national policy and programs; multihazard mitigation; multi-use watercourses; local planning and management for flood mitigation, coastal hazard mitigation, hydrology and hydraulics; modeling and computer programs; mapping; precipitation, gauging, forecasting, and warning; stormwater management; on construction techniques, building, performance, and data collection; and planning for, using, and maintaining structures for loss reduction. The most relevant contributions to this book include: (a) Michael Davis' "New Directions for the Corps of Engineers Water Resources Programs." Davis, who was Deputy Assistant Secretary of the Army for Planning, Policy and, Legislation, summarized the Corps of Engineers' new policies. He emphasized the need for both developing strong partnerships with state and local governments and nonstructural approaches: "this will require some cultural changes at the state and local level, but it will require some cultural change in my organization as well"; (b) Shirley Mattingly's "Mitigation and Partnerships for Floodplain Management." Mattingly, director of FEMA's Region IX, argued that "with the creation of the Flood Mitigation Assistance Program ... FEMA can now establish a pre-disaster mitigation program"; (c) Bernard Scheff and Kenneth Nacci's "Floodplain Management in Urban Redevelopment: A Case Study in Multiple Objective Management." This presentation introduced the Arcadia Creek flood control project as a case study to show how multiple objectives of urban development could be effectively achieved: "the challenge was to develop a flood control project that served as a water amenity and ultimately an enticement to urban development"; (d) David Knowles and Peter Richardson's "The Zone A Crunch." In this presentation, the authors pointed out the increasing demand for better mapping, particularly "now that banks are strictly enforcing the flood insurance purchasing requirements"; (e) William Weaver's "Urban Stormwater Regulations: A Worthy Opponent to Development-Induced Flooding." He concludes that since the late 1970s, urban regulations have been important to reduce the impact of urbanization upon flood conditions; and (f) Frank Thomas, who provided a summary of the conference. Thomas identified the the inherent policy conflicts between land-use development and natural hazard loss reduction and the need to build closer working relationships within a multigovernmental, multihazard, and multidisciplinary framework.

Association of State Floodplain Managers, Flood Mitigation Committee. (1996). *Use of Benefit/Cost Analyses to Evaluate the Elevation of Substantially Damaged Structures*. Madison, WI: Association of State Floodplain Managers.

Keywords :

cost-benefit analysis, floodplain management, substantial damage

Abstract: The report offer comments on the use of benefit/cost analyses for FEMA-funded elevation of substantially damaged buildings. In 1996 FEMA issued a policy memorandum waiving the requirement for a benefit/cost analysis in the acquisition of substantially damaged buildings, except in coastal areas. Compelling arguments are made on both sides of the issue as to whether a benefit/cost analysis should be required when elevating substantially damaged buildings. Arguments in favor of requiring benefit/cost analysis focus on the position that limited mitigation funding can be put to better use than in projects that do not provide an equitable return in damage prevented. Supporters of a waiver of the analysis requirement cite a variety of efficiency and consistency issues. In the vast majority of cases, substantially damaged buildings are cost effective to elevate, and the NFIP requires it. To devote resources to project-by-project benefit/cost analyses wastes resources, interferes with other planning considerations, and probably has little effect on projects, at least in some people's opinions.

Association of State Floodplain Managers. (1997). *Floodplain Management in a Multifaceted World*. Proceedings of the Twenty-first Annual Conference of the Association of State Floodplain Managers, Little Rock, Arkansas, April 28-May 2, 1997. Madison, WI: Association of State Floodplain Managers.

Keywords :

floodplain management, public policy, Hurricane Fran, coastal areas, hydrology, mapping, geographic information systems, mitigation, Army Corps of Engineers

Abstract: *Floodplain Management in a Multifaceted World* is divided in 13 parts: national policy and programs; state and local planning and management for flood mitigation; watershed management; coastal issues; lessons from Hurricane Fran; hydrology and hydraulics; mapping; using structures for loss reduction; using geographic information systems; protecting and using floodplain resources; evaluating environmental projects, international approaches; and the practice of floodplain management. James Lee Witt (FEMA's Director), summarized FEMA's initiatives, in particular those involving buyouts, mapping, and communication. He also announced a ASFPM-FEMA cooperative project to develop an academic fellowship for floodplain management. Michael Davis (Deputy Assistant Secretary of the Army for Planning, Policy and, Legislation) concluded that integrated policies are possible: "we do not have to choose between flood protection and environmental protection." Dennis Mileti argued that the traditional perspective in dealing with natural disasters is flawed because it has focused on a hazard-by-hazard approach. He argued for a more holistic view of hazards. Gilbert White argued that the next challenge for floodplain management is to find ways "to incorporate this whole range of concepts" in "a rather fresh approach to floodplain management." Robinson et al. presented the Corps of Engineers' new cost-effectiveness and incremental-cost analysis software called ECO-EASY. Hansen et al discussed the environmental planning research at the Corps of Engineers. They pointed out that the Corps had initiated the Evaluation of Environmental Investments Research Program (EEIRP) in 1993 to "provide Corps planners with methods and techniques to develop supportable environmental restoration and mitigation projects" under a limited budget.

Association of State Floodplain Managers. (1999). *Planning Ahead: Reducing Flood Losses in the 21st Century*. Proceedings of the Twenty-third Annual Conference of the Association of State Floodplain Managers, Portland, OR, May 24-28, 1999. Madison, WI: Association of State Floodplain Managers.

Keywords :

floodplain management

Abstract: *Planning Ahead: Reducing Flood Losses in the 21st Century* addresses: local projects and programs for planning, mitigation, acquisition, and recovery; watershed management; protecting and restoring natural and cultural resources in floodplains; community assistance for the NFIP; techniques and projects in stormwater management; hydrologic forecasting; flood modeling, GIS and simulations; flood hazard mapping; special flood-related hazards; international approaches to floodplain management; flood insurance; and federal programs, policies, and initiatives. Relevant contributions include: (a) Peterson et al.'s "Reducing Flood Losses Through Floodprone Land Acquisition: Identifying Total Costs and Benefits." The authors analyzed Pima County's (AZ) flood-prone land acquisition program (FLAP), which the county had initiated in 1984. The initial concept behind that program was the offering to individuals who had either lost their homes or sustained severe damage the option of selling their property to the county rather than rebuilding at the same location (although it was later expanded to include the acquisition of underdeveloped properties and parcels in upper watershed areas). According to the authors, the program has several advantages. Two of the most important are that it is often less expensive than a structural solution and that it eliminates flood insurance costs. The authors also point out that this program has the disadvantage of requiring a funding source to purchase properties and that it provides lower perceived political benefit compared to structural improvements; (b) Burrell Montz and Graham Tobin's "The Effectiveness of the NFIP in Two Communities: Syracuse, NY, and Tampa, FL." (c) Mark Boyer's "Coming Full Circle: Using the NFIP to Prevent At-Risk Development in Flood-Prone Lands." The author concludes that "the best mechanism for achieving no new building in flood-prone zones may well be to use the federal policy that is already in place, the National Flood Insurance Act" and (d) Michael Scheffler's "Flood Risk Assessment and Mitigation - An Insurance Company's Approach." The author suggests that the flood management community needs to ally with and draw on the insurance industry's network of loss-control engineers. They should obtain the free flood insurance study backup information from FEMA that is available during the 90 days post revision. The author feels insurers, floodplain managers, and the public need ready access to the organized data sets used in FEMA's analyses of flood hydrology and hydraulics. Schleffer also considers it essential to reverse cutbacks on funding in the US Geological Survey's stream gauge program, which provides critical data to quantify and direct changes in flood risk.

Association of State Floodplain Managers. (2000). *The Nation's Responses to Flood Disasters: A Historical Account*. Madison, WI: Association of State Floodplain Managers.

Keywords :

floodplain management

Abstract: This document examines the forces and events that have shaped floodplain management policy and practice. One major result of past influences was the merging of flood control, disaster assistance, and resource protection programs. Future concerns lay in needed policy changes suggested by a number of floodplain and natural hazard response assessments

conducted during the 1990s. Floods continue to teach us about the need for fundamental policy changes in disaster response, recovery, and mitigation and for long-term floodplain management. Because policy changes during the last decades of the twentieth century were largely the result of agency initiatives, the outlook for significant congressional actions going into the twentieth century are not promising for either providing overall direction on national flood policy or in coordinating federal programs and policies.

Association of State Floodplain Managers Inc. (2000). *National Flood Programs in Review, 2000: Summary*. Madison, WI: Association of State Floodplain Managers.

Keywords :

floodplain management

Abstract: This study examines national floodplain management policies and programs and identifies improvements that would help secure sustainable floodplain lands and disaster-resilient communities for the future. The study identifies five areas in which the Association will focus over the next several years: (a) fostering responsibility and capability at the individual, local, and state levels; (b) refining policies, programs, and coordination to build on existing strengths and remedy deficiencies; (c) assembling and improving the data and tools that are vital to wise floodplain management; (d) enhancing education, training, and public awareness; and (e) assessing and evaluating programs so that the appropriate lessons can be learned from them.

Association of State Floodplain Managers. (2000). *Study of the Economic Effects of Charging Actuarially Based Premium Rates for Pre-FIRM Structures*. Madison, WI: Association of State Floodplain Managers.

Keywords :

subsidies, pre-FIRM structures, insurance premiums

Abstract: This study attempts to determine the number and types of properties nationwide that would be affected by reducing or eliminating pre-FIRM subsidies and estimating the resulting effects on premiums, participation in the program, property values, and property tax revenue. The study undertook field surveys and data collection. The conclusion suggests that if the flood insurance subsidy were eliminated among the many pre-FIRM policies, within a year the average premium would increase from \$585 to about \$2,000 per year. The study analyzes various scenarios for eliminating the subsidy.

Attanasi, E.D. and M.R. Karlinger. (1979). Risk preferences and flood insurance. *American Journal of Agricultural Economics*, 61, 490-5.

Keywords :

insurance purchase decision, economic modeling, risk assessment

Abstract: A detailed theoretical model characterizing the individual's decision to purchase flood insurance is specified and the magnitude of the risk parameter is estimated using data based on transactions of flood insurance purchases. Empirical results for several samples of this subset of the general population indicated that consumers exhibited a relatively uniform degree of risk aversion across various localities where different hydrologic and economic conditions prevailed. More specifically, results indicate that the individual's demand for insurance becomes more price inelastic and shifts to the right as the risk parameter value increases. While the estimates presented should not be directly extrapolated to the entire population located in a flood prone

area, they provide evidence that parameters determining an individual's and/or community's willingness to pay for flood protection can be measured.

Aucoin, J.L. (1985). Missouri's resourceful sales tax. *Environment*, 27(May), 44-5.

Keywords :

environmental protection, Missouri

Abstract: In August 1984, following a grassroots effort by agricultural and environmental groups, Missouri's voters approved a 0.1 percent sales tax to finance soil-conservation programs and state-park maintenance. The tax was expected to generate over \$150 million during the next five years. The authors expected that funds allotted to the Small Watershed Protection and Flood Prevention Program and the Soil and Water Conservation Cost-Share Program, which assist farmers in installing conservation measures, would help tackle the state's erosion problems (half of the funds would go to the Division of Parks and Historic Preservation for building and grounds maintenance, public services, and other uses).

Ayscue, Jon K. (1996). *Hurricane Damage to Residential Structures: Risk and Mitigation*. Natural Hazards Research Working Paper #94, Natural Hazards Research and Applications Information Center Institute of Behavioral Science, University of Colorado.

Keywords :

hurricanes, wind,, Hurricane Andrew, Hurricane Hugo, Hurricane Iniki

Abstract: This paper describes potential hurricane hazards from wind and water. Damage to residential structures from three recent intense hurricanes—Hugo, Andrew, and Iniki—shows that wind is responsible for greater property loss than water. The economic cost of the damages caused by these hurricanes is reported.

Ayyub, Bilal M., Andrew Nyakaana Blair, and Stuart A. Davis for BMA Engineering, Inc. (2000). *Economic Consequence Assessment of Residential Flood Damage Expert-opinion Elicitation*. Alexandria, VA: USACE Institute for Water Resources, US Army Corps of Engineers.

Keywords :

flood damage, Army Corps of Engineers

Abstract: This report offers the Army Corps of Engineers' assessment of the economic consequences of residential flood damage. The Corps estimates residential structure and content values and damages and the associated uncertainty parameters in order to estimate damages from floods and the benefits of flood-damage reduction projects. The Corps developed its Corps of Engineers Floodplain Inventory Tool (CEFIT) for organizing floodplain inventory data and estimating residential structure and content damage for various depths of flooding on a structure-by-structure basis. Information related to structure and content depth-damage relationships at the component level is not available from historical records, prediction methods, or literature review. Expert-opinion elicitation provides a means of gaining information on these essential risk-related quantities. This report describes the different components of the expert-opinion elicitation process, outlines the process itself, and documents the results.

Barnard, Jerald R. (1978). Externalities from urban growth: The case of increased storm runoff and flooding. *Land Economics*, 54(3), 298-314.

Keywords :

development, modeling, urban areas, hydrology

Abstract: This paper is concerned with the problem of increased frequency and magnitude of flooding from urban growth and its impact on urban residential property. The research involves a joint hydrologic and economic investigation into urban growth in small watersheds.

Additionally, the paper adds to the list of negative externalities linked with urban growth, namely the increased flood hazard that can develop in a small watershed due to urban growth. Results indicate that an externality and income-distribution effect arise from urban expansion in a small watershed. The hydrologic evidence shows that as urban expansion spreads further into the upper portions of the watershed, the probability of flooding downstream properties is increased. The analysis of property values indicates that the property market has recognized the effect of flood hazard, and property owners in the lower part of the watershed have suffered a relative decline in property values

Baumann, Duane D. (1984). *Determination of the Cost-effectiveness of Flood Hazard Programs*. In selected abstract of papers presented at the Sixth Annual Applied Geography Conference.

Keywords :

risk communication, cost-benefit analysis, mitigation

Abstract: This research developed and evaluated three information programs directed toward increasing awareness of, affecting attitudes toward, and eliciting the adoption of flood damage mitigation measures by homeowners vulnerable to the threat of floods. Each program was designed according to a previously determined set of principles: the programs differed only according to intensity (cost) of application.

Bea, Keith. (1992). *Federal Emergency Management Agency and the Disaster Relief Fund*. Washington, DC: Congressional Research Service.

Keywords :

disaster assistance, federal programs, legislation, Stafford Act

Abstract: FEMA was established in 1978 by President Jimmy Carter and consolidated the emergency management and preparedness functions of various federal agencies. The agency is responsible for a broad range of statutory authorities and falls within the jurisdiction of a number of congressional committees and their subcommittee. FEMA administers the principal federal disaster relief authority, the Robert T. Stafford Disaster Relief and Emergency Assistance Act. While authorized disaster relief funds have traditionally been appropriated with little debate, a funding shortfall occurred in 1991. Action was taken to prevent recurrence of a shortfall.

Bea, Keith. (2000). *Disaster Mitigation Assistance Bills in the 106th Congress: Comparison of Provisions*. Washington, DC: Congressional Research Service.

Keywords :

development, floodplain management, legislation

Abstract: The author argues that the Clinton administration's initiative to shift federal emergency management policy away from a "response and recovery" emphasis generated little congressional controversy, although some raised concerns about the cost effectiveness of implementing a mitigation strategy. Greater attention, it is generally argued, should be given to mitigation (loss reduction) efforts before disasters occur in order to reduce future losses. Some future disasters may be prevented, or their impact lessened, by taking action beforehand. State

and local governments have lowered disaster costs by retrofitting buildings in earthquake zones, elevating structures in floodplains, revising and enforcing building codes, or modifying land use plans. Advocates of the legislation seek to support these and other mitigation efforts.

Beard, Leo R. (1997). Estimating flood frequency and average annual damage. *Journal of Water Resources Planning and Management*, 123(2).

Keywords :

modeling, flood damage, economic modeling

Abstract: In the National Research Council's report, *Flood Risk Management and the American River Basin--An Evaluation*, the use of expected probability (accounting for sampling uncertainty) in estimating flood frequencies and average annual flood damages, as practiced by the Army Corps of Engineers, was said to be biased. Alternative procedures recommended in the report are based on studies of samples drawn from a Gaussian population with a fixed damage function. There is no extension of the study to diverse populations (many flood locations) with different flow-damage functions, but conclusions drawn are that the recommended procedures provide frequency and damage estimates that are nearly unbiased. Beard demonstrates that expected-probability procedures used by the Corps are appropriate for flood-frequency estimation and for estimation of average annual flood damages.

Belsie, Laurent. (1998). Rethinking a river. *Christian Science Monitor*, December 3.

Keywords :

Midwest floods of 1993, Missouri River, environmental restoration

Abstract: This article examines efforts to return the Missouri River to a more natural state in the late 1990s. It discusses the importance of the river's floodplains to the ecology of the river, balancing the economic and commercial needs of people along the river with environmental concerns, the percentage of the river's native fish and wildlife species, which are on federal and state protection lists, the Missouri River Basin Association, and how the 1993 flood has impacted efforts to aid the floodplains.

Bennett, Dery. (1993). Paying for sand. *Audubon*, 95(Sept./Oct.), 132.

Keywords :

coastal areas, development, subsidies

Abstract: The author complains that despite geological evidence that the edge of the sea is an imprudent place to build houses, development along the Atlantic coastline is increasing. Many shore communities are inaccessible to the public yet rely on public funds for flood insurance, shore protection, post-storm cleanup, and restoration of houses damaged by coastal storms. The author concludes that if individuals were forced to bear more of the cost of shoreline living, homebuyers might think twice before deciding to build expensive homes on the coast.

Berz, Gerhard. (2000). *Flood Disasters: Lessons from the Past - Worries for the Future*. Munich, Germany: Munich Reinsurance Company.

Keywords :

economic impacts, public policy

Abstract: Flood disasters account for about a third of all natural catastrophes throughout the world (by number and economic losses) and are responsible for more than half of the fatalities. Trend analyses reveal that major flood disasters and the losses generated by them have increased

drastically in recent years. Cooperation between the state, the affected population, and the insurance industry assumes a key role with regard to the flood hazard. Scientists, engineers, and insurers must work together in formulating their requirements and shaping them in such a way that politicians can derive clearly recognizable policy options (e.g., land-use restrictions) from them. Another important aspect is stepping up the efforts being made towards curbing climate change, which might otherwise exacerbate the risk situation in the future.

Bezuyen, M.J., M.J. van Duin, and P.H.J.A. Leenders. (1998). Flood management in the Netherlands. *Australian Journal of Emergency Management*, 13(2) 43-9.

Keywords :

flood control, Netherlands

Abstract: During the last several years, residential and commercial development of once unoccupied floodplains has increased significantly in the Netherlands. The development has prompted Dutch authorities to reconsider and revise their approaches to flood management. This article deals with several aspects of the floods that occurred in 1993 and 1995 and outlines the formal system of disaster management in the Netherlands. Finally, an overview is provided of the events that occurred during both floods with special emphasis on warning and evacuation. Important lessons drawn from Dutch flood management include: adoption of rules concerning entrance into an abandoned, flooded area; development of procedures for the evacuation of livestock; understanding of the economic consequences to agriculture, business, and industry; knowledge of how the government awards post-disaster aid; and the communication of flood-related information to the public. Furthermore, the authors cite the self-regulating behavior of the Dutch people as one of the most critical factors to their success with flood management.

Bin Atan, Ismail and A.V. Metcalfe. (1994). Estimation of seasonal flood risk using a two-stage transformation. *Water Resources Research*, 30(7), 2197-206.

Keywords :

modeling, Great Britain

Abstract: Hydrological time series are often asymmetric in time, inasmuch as rises are more rapid than recessions, as well as having highly skewed marginal distributions. A two-stage transformation is proposed for deseasonalized series. Rises are stretched and recessions are squashed until the series is symmetric over time. An autoregressive moving average (ARMA) model is then fitted to the natural logarithms of this new series. A double mixture of Weibull and exponential distributions represent the residuals from the ARMA model. The method is demonstrated with 24 years of daily flows from the River Cherwell in the south of England and a 40-year record from the upper reaches of the Thames. The article gives seasonal estimates of flood risk and these can be conditioned on catchment wetness at the time of prediction.

Blocker, T. Jean, E. Burke Rochford, Jr., and Darren F. Sherkat. (1991). Political responses to natural hazards: Social movement participation following a flood disaster. *International Journal of Mass Emergencies and Disasters*, 9(3) 367-82.

Keywords :

socioeconomic impacts, natural disasters

Abstract: While much research attention has been focused on understanding and interpreting social movements that emerge in response to technological hazards, comparatively little work has been directed toward the systematic examination of factors related to protest activity in the

aftermath of natural hazards. The authors study community activism after a major flood mitigation project failed to provide the promised protection from storm water damage. They conclude that citizen response to natural events is becoming far less distinct from that witnessed in the aftermath of man-made events, because the technology to mitigate impacts of natural disasters is becoming more available. The results of the study show that solidarity is a necessary ingredient for social movement facilitation, particularly when the movement is loosely structured and urgently organized, and that the presence of solidarity aids in the communication of grievances, recruitment of members, and the coordination of activities.

Bollens, Scott A. (1990). Public policy and land conversion: Lessening urban growth pressure in river corridors. *Growth & Change*, 21(1), 40-59.

Keywords :

floodplain management, development, Colorado, Missouri, North Dakota, Nebraska, Illinois, Georgia, Arizona, Ohio, Oklahoma, New Jersey

Abstract: The author examines the extent to which floodplain management programs influence the investment and predevelopment decisions of owners of vacant floodplain land in ten cities: Arvada, CO; Cape Girardeau, MO; Fargo, ND; Omaha, NE; Palatine, IL; Savannah, GA; Scottsdale, AZ; Toledo, OH; Tulsa, OK; and Wayne, NJ. He discusses the role of landowners in the urban floodplain market, land acquisition, holding vacant land, the influence of local floodplain policy on land holding, property value expectations, and landowners as targets of public policy.

Bollens, Scott A., Edward J. Kaiser, and Raymond J. Burby. (1988). Evaluating the effects of local floodplain management policies on property owner behavior. *Environmental Management*, 12(3), 311-25.

Keywords :

risk perception, floodplain management, riverine areas, development

Abstract: This article examines the degree to which riverine floodplain management affects purchase and mitigation decisions by owners of developed floodplain property. Based on a survey (N=105) of floodplain property owners in ten US cities with floodplain management programs, the authors find that the stringency of such policies does not lessen the purchase of properties in floodplain because of the overriding importance of site amenity factors. Indeed, flood protection measures incorporated into development projects appear to add to the attractiveness of floodplain location by increasing the perceived safety from the hazard. Property owners' responses to a flood hazard after occupancy involve political action more often than individual on-site mitigation. It is suggested that floodplain programs will be more effective in meeting their objectives if they are directed at intervention points earlier in the land conversion process.

Booz-Allen & Hamilton. (2000). *Blueprint for the Future. Final Report*. Washington, DC: FEMA.

Keywords :

strategic planning, NFIP

Abstract: From March through August 2000, the FIA developed a strategic *Blueprint for the Future for the NFIP* through a series of leadership workshops attended by members of the FIA Executive Committee and through independent data gathering and analysis. This report

incorporates the results of the workshops and supplemental analysis and includes a discussion of program mission, customer and stakeholder analysis, program vision, future scenarios, impediments to achieving strategy, goals and objectives, action plans, implementation guidance, and next steps. NFIP's Program Vision for the next five years is threefold: (a) a program that efficiently delivers insurance products that are accessible, desired, and seamlessly provided to its customers and partners; (b) a program where communities not only meet, but exceed NFIP's floodplain management standards; and (c) a program that is financially sound both as an agent of change and as a long-term insurance solution.

Bowker, R. R. (1993). *Audit of Flood Insurance Mapping Activities*. Collingdale, PA: DIANE Publishing Company, Reed Elsevier Inc.

Keywords :
mapping

Abstract: The cornerstone of the NFIP is the identification and mapping of flood areas. The maps are critical to the NFIP's mitigation and insurance activities. This audit discusses how the FIA could improve the mapping process and distribution of the maps.

Bozell. (2001). *The Cover America and Cover America II Campaigns: A History of Bozell's Efforts to Promote the National Flood Insurance Program*. Washington, DC: FIMA.

Keywords :
Cover America, marketing, awareness

Abstract: This report reviews all of Bozell's efforts involving the Cover America campaigns and their work with the NFIP. The report summarize all aspects of the Cover America and Cover America II campaigns, including types of advertising, the markets that were targeted, and when the ads ran. Bozell then presents the campaign results for the various types of media utilized and by each year of the campaigns. The overall results of the campaign show that both awareness and favorable opinions of flood insurance and the NFIP increased by 4 percentage points for each year of the campaigns.

Bozell and KRC Research and Consulting. (2000). *Cover America Campaign Evaluation (Draft)*. Washington, DC: FIA.

NOTE: This report was in draft form at the time of its inclusion in this bibliography. Consequently, FEMA had not yet provided comments necessary for Bozell and KRC Research and Consulting to produce a final version.

Keywords :
marketing, Cover America

Abstract: This report was prepared as an evaluation of the Cover America campaign, which ran from October 1995 to March 1999. The campaign incorporated television, radio, and print advertising, as well as direct mailings and public relations efforts such as media tours and articles, to increase knowledge about floods and flood insurance and to help generate sales of policies. The report outlines the entire campaign by area of advertising and presents the methodology and results for determining the campaign's success. The report shows that the campaign was successful in increasing awareness and favorability of FEMA and the NFIP and outlines which methods were the most efficient way to reach potential buyers and agents.

Breo, Dennis L. (1993). Flood, sweat, and tears - Trying to build 'emotional levees.' *Journal of the American Medical Association*, 270, 2860-2.

Keywords :

mental health, Midwest floods of 1993

Abstract: Breo discusses the experiences of counselors who dealt with the psychological damage caused by the 1993 flooding in the Midwest. Many of the affected people live with the nightmare of the floods returning the following year.

Browne, M.J. and R.E. Hoyt. (2000). The demand for flood insurance: Empirical evidence. *Journal of Risk and Uncertainty*, 20(3), 291-306.

Keywords :

insurance purchase decision, risk communication, compliance

Abstract: Flood damages that occur worldwide remain largely uninsured losses despite the efforts of governmental programs that often provide insurance available at less than fair market cost. The current study focuses on the financial experience of the NFIP from 1983 through 1993 to examine the hypothetical determinants of decisions to purchase flood insurance. The same set of factors is important for both individuals and businesses -- price, probability of loss, and amount of loss. Additionally, there is a negative relationship between the amount of money the federal government spends on mitigation and both the number of policies purchased and the amount of insurance purchased. At the state level, purchase of flood insurance correlates highly with the level of flood losses during the previous year.

Burby, Raymond J. (1994). Floodplain planning and management: Research needed for the 21st century. *Water Resources Update*, 97(Autumn), 44-51.

Keywords :

floodplain management

Abstract: This article acknowledges the progress in research on the management of floodplains but laments the "gaps" in what we need to know to manage floodplains effectively. State and local floodplain managers, in particular, will have to develop more sophisticated tools for building the private sector's commitment to and capacity for accomplishing flood-loss reduction. The major gaps that are highlighted include: (a) research on the effect of floodplain management on development decision making in the private sector and on the ultimate impacts of public policy on economic, social, and environmental well-being; (b) research on cost-effective programs that motivate individuals and firms to reduce risk to existing developments; (c) research on the impact of nonstructural flood-hazard mitigation programs on various accounts; and (d) research to identify the effects of existing floodplain management programs on communities' economic, social, and environmental well-being and to develop usable policy analysis tools for local decision makers.

Burby, Raymond J. (2001). Flood Insurance and Floodplain Management: Issues for Evaluation. Presented in Boulder, CO, July 2001.

Keywords :

NFIP

Abstract: To deal with the rising exposure to flood losses, the federal government provides flood insurance through the NFIP. The NFIP has three key elements: identification of flood hazard areas and risk; mitigation of flood losses through mandated local regulation of

construction in floodplains; and provision of flood insurance. Evidence to date suggests that while its accomplishments are notable, in many respects the program has fallen short when measured against its primary objectives. Flood hazard identification is incomplete. Mitigation has failed to contain increasing exposure to property damage in floods and coastal storms. And, market penetration of flood insurance may be low, in spite of the availability of subsidized insurance rates for two-thirds of the buildings located in flood-hazard areas. These conclusions, however, are based on circumstantial evidence and need to be evaluated through systematic study.

Burby, Raymond J. and Steven P. French. (1981). *Coping with floods: The land use management paradox. Journal of the American Planning Association* 47(July), 289-300.

Keywords :

floodplain management, development

Abstract: The authors surveyed 1,203 local political jurisdictions to measure their activities in floodplain management. The authors found that communities with the greatest exposure to the NFIP tend to have adopted the broadest, most stringent local programs. Yet, these very communities were often the ones that had allowed more development of floodplains in the past. The authors also found that the NFIP was not effective in slowing growth in the floodplains, partly because the communities that were experiencing the greatest growth were also inclined to join the program, causing adverse selection, which makes the paradox of the program apparent.

Burby, Raymond J. and Steven P. French with Beverly A. Cigler, Edward J. Kaiser, David H. Moreau, and Bruce Stiftel. (1985). *Floodplain Land Use Management: A National Assessment. Boulder, CO: Westview Press.*

Keywords :

floodplain management

Abstract: This book concentrates on floodplain management as a component of broader urban programs to control floods that might also include structural measures, floodproofing of existing buildings, participation in the NFIP, preferential tax treatment, density transfers, and public information programs. A major finding of the study is that management of land use in floodplains is most effective in communities that use a number of the flood control instruments just mentioned and in which the goal of flood control is integrated with other public objectives such as recreation, preservation of open space, and the protection of natural areas.

Burby, Raymond J., Scott A. Bollens, James M. Holway, Edward J. Kaiser, David Mullan, and John R. Sheaffer. (1988). *Cities Under Water: A Comparative Evaluation of Ten Cities' Efforts to Manage Floodplain Land Use. Boulder, CO: Institute of Behavioral Science, University of Colorado.*

Keywords :

floodplain management, flood damage

Abstract: The authors studied the efforts of ten cities to manage land use in floodplains and conclude that floodplain management has significantly reduced annual flood damage (a saving of \$11 million per year in reduced losses). However, the authors believe that the NFIP, by making floodplain structures safer through building standards and flood control works and more financially secure through flood insurance, seems designed to stimulate rather than retard consumers' willingness to locate in floodplains.

Burby, Raymond J. and James M. Holway. (1990). The National Flood Insurance Program's impacts on the development of riverine floodplains. In *Challenge Ahead: Flood Loss Reduction Strategies for the '90s*. Boulder, CO: Institute for Behavioral Science, University of Colorado.

Keywords :

floodplain management, riverine areas

Abstract: The authors compared changes in floodplain development between 1976 and 1985 in ten cities and conclude that the NFIP and the floodplain management regulations it has fostered in communities across the United States are having a measurable effect in reducing new development in riverine flood hazard areas.

Burby, Raymond J. with Beverly A Cigler, Steven P., French, Edward J. Kaiser, Dale Roenigk, Dana Weist, and Dale Whittington. (1991). *Sharing Environmental Risk: How to Control Governments' Losses in Natural Disasters*. Boulder, CO: Westview Press.

Keywords :

natural disasters, public policy

Abstract: This book summarizes the results of an extensive study of public losses from natural disasters during the 1980s and how those losses can be controlled through reforms in federal, state, and local policy. The study, initiated in 1986, considered its objective to provide a carefully conducted study that documents the magnitude and character of public losses in over 130 natural disasters, describes a range of policy options for dealing with those losses, and evaluates opportunities for and constraints on innovation and reform in this policy arena. The study uses data from federal records to investigate local losses due to natural disasters, a case study of the Whittier Narrows earthquake (October 1987) to demonstrate the wide variation in losses nearby governments experience in a large, presidentially declared disaster, and several surveys to evaluate the impact of federal policies on local governments' adoption of protective measures.

Burby, Raymond J., Peter J. May, and Robert Paterson. (1997). *Improving Compliance with Regulations: Choices and Outcomes for Local Government*. Seattle, WA: Center for American Politics and Public Policy, University of Washington.

Keywords :

development, enforcement, compliance

Abstract: Shortfalls in compliance have been found in a number of recent reviews of development and environmental programs. In this article, the authors examine critical choices planning administrators face if they are to improve compliance. They also offer suggestions about what can be done to ensure that regulations, once adopted, are subsequently followed by contractors, builders, and developers. Based on data collected from a national sample of cities and counties, the article finds that improving compliance is not simply a matter of enhancing capacity for detecting and correcting violations. It shows that improving compliance also requires an increase in the private sector's willingness to comply with regulations voluntarily. The means for effecting this result include making greater use of incentives and employing facilitative enforcement techniques.

Burges, Stephen J. (1979). Analyses of uncertainty in flood plain mapping. *Water Resources Bulletin*, 15(1), 227-43.

Keywords :

mapping, modeling

Abstract: Components contributing to uncertainty in the location of the fringe of a mapped floodplain are identified and examined to determine their relative importance. First-order uncertainty analysis is used to provide a procedure for quantifying the magnitude of uncertainty in the location of the fringe. Application of the procedure indicated that one standard deviation of uncertainty in floodplain inundation width is about one-third of the mean computed inundation width for several population-flood geometry combinations. Suggested mapping criteria, which directly incorporate uncertainty estimates, are given. While these criteria are more suitable for use in developing areas than in floodplains that have had extensive development, the analysis procedure can be used to accommodate property owners who challenge the validity of estimated flood fringe boundaries. Use of uncertainty analysis in floodplain mapping should enhance the credibility of the final plan.

Burn, Donald H. (1999). Perceptions of flood risk: A case study of the Red River Flood of 1997. *Water Resources Research*, 35, 3451-8.

Keywords :

awareness, risk communication, risk perception, Red River, disaster planning, Manitoba, Canada

Abstract: Burn examines issues that affect an individual's perceptions of risk associated with national hazards in the context of the 1997 flood of the Red River in Manitoba, Canada. Information about risk perception came from ten public meetings held by the Manitoba Water Commission to review actions taken during the flood. The response to the flood event varied between and within various locations in the Red River Valley. Flood damages were limited in areas that were adequately prepared for the flood, where there was good support from local government, and where recent experiences from the 1996 flood were relevant. Areas that experienced widespread flood damage were those that were unable to prepare in time because of misleading experience in 1996 and poor forecasts, or newly flooded areas that lacked relevant flood experience and received limited warning and minimal support from the local government. The greatest success occurred where planning for the flood started early. The paper concludes that, "warnings of flood events should be tailored to the experiences of the individuals in different areas since the unique experiences of the individuals will lead to different responses." However, because experience is a complex factor, there are limits to the benefits that can be derived from previous experience. Two recommendations are made: (a) the experience of individuals and local government officials should be used to revise and update the emergency flood response plan for an area, and (b) public education immediately following a major flood event can increase awareness of flood risks and the importance of developing and following an emergency plan.

Campbell, W.A. and M.S. Heath, Jr. (1979). *Legal Aspects of Flood Plain Management*. Chapel Hill, NC: Water Resources Research Institute, University of North Carolina.

Keywords :

floodplain management, legislation, North Carolina

Abstract: The NFIP has made it possible for some landowners to obtain subsidized insurance protection against flood damages. As a condition of this protection, however, the local

governments in which flood-prone land is located must adopt certain restrictions on the use of land in the floodway and flood hazard areas. North Carolina's legislative centerpiece for authorizing local floodplain regulations is the Floodway Act. This act was deficient both in terminology and in scope of coverage when examined in light of the NFIP's requirements. To remedy these deficiencies it is recommended that the act's coverage be broadened to include flood hazard areas beyond the floodway, to include areas of coastal flooding, and to delete the uses automatically permitted in the floodway. It is important for the state to play a major coordination and advisory role in land-use regulation for flood protection. Local governments need technical assistance in preparing and administering the necessary regulatory measures, and the state has an important role to play in coordinating local efforts with the FIA and in overseeing the program. In addition, state property must meet the federal requirements in order for the state to obtain insurance or to qualify as a self-insurer. Statutory changes are suggested to meet these needs.

Casualty Actuarial Society, Committee on Ratemaking Principles. (1988). *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*. Arlington, VA: Casualty Actuarial Society.

Available at: <http://www.casact.org/library/sppcrate.pdf>

Keywords :

liability, insurance premiums

Abstract: This statement was produced by the Casualty Actuarial Society to identify and describe principles applicable to the determination and review of property and casualty insurance rates. The statement consists of: definitions, principles, considerations, and conclusions. The principles discussed in the statement provide the foundation for the development of actuarial procedures and standards that seek to protect the insurance system's financial soundness and promote equity and availability for insurance consumers.

Chang, Semoon. (1984). Do disaster areas benefit from disasters? *Growth and Change*, 15, 24-31.

Keywords :

disaster assistance, Hurricane Frederic, Alabama

Abstract: With the premise that recovery from a disaster is a process in which lost community assets are replaced by outside assistance, this study examined, on the basis of Hurricane Frederic data, how closely outside aid came toward making a complete recovery possible. The author found that the disaster counties in Alabama did not benefit from the hurricane and that most of the disaster aid provided was not retained in the disaster area.

Changnon, Stanley, A, Jr. (1985). Research agenda for floods to solve policy failure. *Journal of Water Resources Planning and Management*, 111, 54-64. Champaign, IL: Illinois State Water Survey Division.

Keywords :

mitigation, nonstructural approaches

Abstract: For the first 60 years of the twentieth century, US policy regarding floods was aimed at flood control. In the next 20 years, policy shifted to a goal of mitigation. However, flood losses continued to rise and the Congress and others raised questions about the causes of policy failure. The answer is complicated because flood policy involves four changing issues, including

the shift from federal to local-state responsibilities, the existence and form of the NFIP, the shift to nonstructural approaches for flood mitigation, and the developing programs for emergency assistance. A comprehensive assessment of research needs reveals that policy must have a view of efficient use of floodplains, not just loss reduction. The socioeconomic database is considered inadequate for many policy decisions, and our knowledge of floods is uneven, with much more known in the physical sciences than in the social sciences. Attention to interdisciplinary research involving economists, sociologists, political scientists, and geographers is needed to achieve better policymaking and flood hazard mitigation.

Changnon, Stanley A., Jr. (1987). *Future flood research agenda for the United States. In Flood Hydrology: Proceedings of the International Symposium on Flood Frequency and Risk Analyses. Louisiana State University, Baton Rouge, LA, May 1986.*

Keywords :

mitigation, nonstructural approaches, structural approaches

Abstract: Flooding remains a major unresolved problem in the United States with losses mounting after 60 years of largely structural efforts to mitigate loss. Hence, a major two-year assessment of research needs to more effectively address flood mitigation was conducted within the context of our national shift to new federalism, the NFIP, the shift of emphasis from structural to nonstructural approaches for flood mitigation, and the evolution in national programs of emergency assistance where flooding is but one of many hazards treated. Recommendations for research centered around six general themes: (a) more attention to socioeconomic-political research; (b) a goal of efficient use of flood-prone lands, not loss reduction; (c) the importance of interdisciplinary research (70 percent of all 115 recommended tasks are multidisciplinary); (d) the need to develop comprehensive data banks and flood information centers; (e) orienting future research needs to user needs; and (f) the need for continuing re-assessment of flood research every three years.

Changnon, Stanley A. Jr., ed. (1996). *The Great Flood of 1993: Causes, Impacts, and Responses. Boulder, CO: Westview Press.*

Keywords :

Midwest floods of 1993, socioeconomic impacts, disaster planning, public policy

Abstract: Through detailed case studies and sectoral analyses, this volume diagnoses the social and economic impacts of the Midwest floods of 1993, assessing how resource managers, flood forecasters, public institutions, the private sector, and millions of volunteers responded to it. This comprehensive evaluation of the 1993 flood examines the ways floods are forecasted and monitored, the effectiveness of existing recovery processes, and how the nation manages its floodplains. The flood offered major lessons for future flood disasters, both to the public and private sectors, and these lessons are identified. The emphasis here is on the flood's many impacts and the policy issues that they raise.

Changnon, Stanley A., Jr., R. Schicht, and R. Semonin (1983). *Plan for Research on Floods and their Mitigation in the United States. Final Report to the National Science Foundation. Champaign, IL: Illinois State Water Survey.*

Keywords :

hazard identification, mitigation, strategic planning

Abstract: Recent assessments of flood problems and issues are used to compile a comprehensive assessment of the research needed relevant to flooding and flood mitigation. Experienced researchers identified four new major national issues or trends: (a) a shift in responsibilities from federal to local and state entities; (b) the policy of the NFIP; (c) the shift of emphasis from structural approaches to nonstructural approaches for flood mitigation, such as floodplain management and zoning, coastal zone management, flood warning systems, evacuation and relocation, flood insurance, and land acquisition; and (d) the recognition of the developing national programs in emergency assistance. The major conclusion of the assessment is that much flood-related research must be interdisciplinary in nature. It identifies 115 high-priority research tasks in the fields of meteorology, hydrology and hydraulics, ecology, public health, economics, sociology, political science, and interdisciplinary fields. All 115 tasks met the criteria for critical research, namely, that the problem being addressed will probably be solved by further research and that the cost of the research is justified by the benefits.

Chatam County, Georgia. (2000). Preparing a crisis communication plan. Presented at the Project Impact Summit 2000. Washington, DC, November 14-15, 2000. Washington, DC: FEMA.

Keywords :

floodplain management, risk communication, disaster planning, media

Abstract: This presentation points out the need for communities to have a crisis communications plan to audit all vulnerabilities, establish guidelines for crisis communication coordination, state roles of key people and agencies, and precoordinate with other plans before a crisis occurs. When a crisis occurs, the document suggests that communities assess the incident, assemble a crisis team, communicate facts, and minimize rumors. It also suggests, among others, that communities should activate a crisis center, designate a lead spokesperson, develop a crisis fact sheet, contact critical players, open a media center, and establish guidelines for the news media.

Chatam Emergency Management Agency. (2000). Media guidelines. Presented at the Project Impact Summit 2000. Washington, DC, November 14-15, 2000. Washington, DC: FEMA.

Keywords :

floodplain management , risk communication, disaster planning, media

Abstract: This presentation details the procedural guidelines to be employed whenever the Chatham County (GA) Emergency Operations Center (EOC) is activated. The goal of these guidelines is “to ensure the most rapid and comprehensive news coverage while permitting unimpeded emergency response operations.” Some of the suggested procedures include a preliminary media briefing prior to activation of the EOC; after the initial activation of the EOC, allow the media, one station or network at a time, to take file footage shots of the EOC; to make available a media office next to the press conference area in the basement; reserve parking space for media vehicles; as developing conditions permit, to conduct routine press conferences each hour according to pre-established schedules; and to accommodate specific requests for information whenever possible.

Cheatham, L.R. (1975). A Case Study of Some Economic Aspects of the National Flood Insurance Program. Starksville, MS: Water Resources Research Institute, Mississippi State University.

Keywords :

property values , Mississippi, development

Abstract: Based on a study of Columbus, MS, this research was designed to determine if subsidized, pre-FIRM insurance has been a cause of increases in capital investment on that community's floodplains. The scope was limited primarily to determining the effect on new construction, on location decisions of businesses, and on land values. Analysis of flood insurance statistics, amounts of new construction, location decisions, and data on land values in Columbus revealed only insignificant evidence to substantiate the hypothesis that flood insurance has encouraged encroachment into floodplains. The results suggested that most firms did not view the flood hazard as being as great as other types of insurable hazards. Moreover, in general, both commercial and noncommercial properties subject to flooding had shown greater increases in value than those of negligible flood hazards. The only exceptions included those with extremely high-expected flood frequencies. The effects of subsidized flood insurance on land values were relatively insignificant. Economic growth factors were primarily responsible for increases in values of land in floodplains. Lastly, the study revealed little evidence to support the hypothesis that subsidized flood insurance stimulated encroachment. Federal disaster aid appeared to provide more inducement to locate and remain on lands where flood losses were likely to be sustained.

Cheatham, L.R. (1979). *An Assessment of Some Economic Effects of FIA Land Use Requirements on Urban Coastal Zone Development*. Starksville, MS: State Division of Business Research, Mississippi State University.

Keywords :

economic impacts, property values, coastal areas, Mississippi, urban areas

Abstract: Land-use requirements for eligibility in the early NFIP did not cause any significant decreases in total annual construction in urban coastal floodplains along the Mississippi Coast. Construction activity in Zone A continued at high levels. The relatively high cost of elevating residential structures, along with other factors unrelated to ordinances, caused some relocation of new construction to other areas of communities. The inability to construct commercial structures to comply with ordinances and maintain functional utility prevented some commercial construction. The impacts on construction employment were negligible. The value of land and existing structures increased in communities, but less so in Zone A. The county's total construction employment and income were not affected by ordinances. In the typical community of Biloxi, less than half of total new construction in Zone A was actually regulated due to exemptions for repairing, remodeling, and so on, not exceeding 50 percent of structure value. In this community, construction of regulated new structures decreased slightly, but patterns in nonresidential new structures did not confirm any decrease. Total construction in Biloxi increased since ordinances were implemented.

Childers, Cheryl D. (1999). *Elderly female-headed households in the disaster loan process*. *International Journal of Mass Emergencies and Disasters*, 17(1), 99-110.

Keywords :

disaster assistance, socioeconomic impacts

Abstract: The purpose of this exploratory research was to compare the income and approval rates of elderly single-female households and other types of households applying for disaster aid. Households from two parishes involved in the flooding in and around New Orleans, LA, in May

1995 who applied for federal loans via FEMA's National Teleregistration Center were compared on demographics and outcomes. The analysis showed that elderly single-female households were over represented in the population applying to FEMA; they were two and one-half times as likely as other elderly households or nonelderly households to have incomes of \$11,000 or lower; and three times less likely than other elderly households to receive a low-interest loan. This study indicates that the current federal low-interest loan program does not adequately address the needs of poor elderly women. Special initiatives are needed that target this population effectively.

Christian Science Monitor. (1998). Buying back beaches. *Christian Science Monitor* September 8.

Keywords :

erosion, beach nourishment

Abstract: This editorial discusses efforts in the United States to prevent further erosion of the country's beaches and shorelines. It forecasts the percentage of people who will live near the shore by 2025 and hypothesizes why changes to the NFIP could be effective. It questions the validity of beach restoration projects, and discusses efforts by the federal government to shift the cost of erosion prevention programs to states and local communities.

Clark, Charles S. (1993). Disaster response: Does the country need a new national strategy? *CQ Researcher*, 3, entire issue.

Keywords :

Hurricane Andrew, Florida, disaster planning

Abstract: "Natural disasters are becoming more frequent and more serious in the United States. The property damage wrought by Florida's Hurricane Andrew last year - quadruple that of any previous calamity-has prompted government officials, insurers, scientists and relief specialists to call for a new national strategy to deal with and prevent disasters. Americans in hazard-prone areas are being asked to rethink their living situations, and the federal government is considering a new national reinsurance fund that would stand behind the commercial insurance industry in the event of unprecedented devastation." This article contains a map of the natural disaster danger zones in the US.

Clark, R.D. (1998). *CAI Comments to FEMA Regarding National Flood Insurance Program*. Washington, DC: FEMA.

Available at <http://www.caionline.org/govt/advoc/fed/fema-flood-comments.cfm>

Keywords :

insurance premiums, community associations

Abstract: The Community Associations Institute (CAI) represents the nation's 205,000 condominium associations, cooperatives, and homeowner associations. In the opinion of the CAI, "FEMA's residential condominium/association building policy (RCBAP) contains a coinsurance requirement that places an undue penalty on community associations and has skewed data for rate determinations." CAI further suggested that "FEMA should eliminate the coinsurance requirement, as there is no coinsurance requirement for any other type of building in any of NFIP's other programs. Eliminating the requirement will allow for affordable premiums by way of lower coverage limits. In turn, more associations would carry flood insurance allowing for a broader premium base to help FEMA absorb large shock losses and help minimize adverse selection." CAI also complained about FEMA's policy deductibles (limited to \$1,000 and

\$5,000), and suggested that FEMA allow “for higher deductibles so that associations can afford to carry flood insurance. Increased coverage will reduce the risk of loss due to the perils of flood, heavy rains, or other water sources. Attendant to higher deductibles should be dramatic reductions in rate. Since the majority of flood claims occur in the first dollar layers of coverage, self insuring associations (those that choose high deductibles) will be rewarded by significant reductions in premiums.”

Clemens, Petra and Jennifer R. Hietala. (1999). Risk of domestic violence after flood impact: Effects of social support, age, and history of domestic violence. *Applied Behavioral Science Review*, 7(2), 199-207.

Keywords :

domestic violence, North Dakota, mental health, socioeconomic impacts

Abstract: Community professionals observed an increase in domestic violence during the aftermath of the 1997 Grand Forks flood. In the past, research has documented emotional symptoms that result from natural disasters, and separate studies have observed domestic violence to result from these same emotional symptoms. No research was found, however, specifically on the effects of natural disasters on domestic violence. The purpose of the current study was to test the effects of a model of variables on domestic violence, including flood impact, the emotional symptoms, as well as other intervening variables that might act as a buffer against the effects of flood impact. Results of this cross-sectional survey of 140 adults in Grand Forks ND indicated that domestic violence was significantly greater among respondents after the flood. Flood impact led to increased levels of anxiety, depression, and hostility. Whether these emotional symptoms subsequently led to increased domestic violence depended on the level of social support, the age of the respondent, and whether he/she had a history of domestic violence before the flood. Those with lower social support, the elderly, and those with a prior history of violence were most affected. The results have implications for work with the elderly, with domestic violence treatment and prevention programs, and with communities affected by floods.

Clinton, William J. (1995). Message to the Congress transmitting the report on floodplain management. *Weekly Compilation of Presidential Documents*, 31(10), 372-7.

Keywords :

floodplain management, Mississippi River

Abstract: This message focuses on the proposal to reform floodplain policy for the Mississippi River in the wake of the damage caused by massive floods in 1993. It discusses the impact of the flood on agricultural and urban property owners, the construction of mainstream levees, and the conversion of wetlands to agriculture. The message concludes that the conversion of floodplain wetlands to agriculture throughout the Mississippi River Basin has been extensive. Eighty percent of the floodplain wetlands of the Lower Mississippi River have been cleared and converted to cropland. Clearing rates in much of the Upper Basin and the Missouri River system have been comparable. The message also suggests that the Mississippi River’s system of dams, levees, and river training works is tremendous but not sustainable over the long term: “People have gone too far in severing the river and its tributaries from their floodplains. The message from the floods is that the Mississippi wants to recapture the floodplains that historically were part of the river. It lies in wait for major flood events to do this.” The message concludes by noting that: “A program of floodplain restoration would go a long way towards creating a much more sustainable, low-cost flood management system in the Mississippi River Basin than exists

today.” The message also suggests that the Corps of Engineers must reform how it spends federal dollars on flood control works in the basin, while the federal government expands the Wetland Reserve Program created by the 1990 Farm Act in the Mississippi Basin.

Comerio, Mary C. (2000). Paying for the next big one. *Issues in Science and Technology*, 16(3), 65-72.

Keywords :

insurance, Hurricane Andrew, mitigation, California, Florida, Hawaii, Illinois, Wisconsin, Oklahoma

Abstract: The author states that private insurance companies were shocked by losses from natural disasters such as Hurricane Andrew. Because of that, most companies no longer offer disaster insurance along with a traditional homeowner policy in California, Florida, and Hawaii. Coverage is available only through state-managed disaster insurance pools with high premiums, high deductibles, and limited coverage. The author points out that until 1996, disaster appropriations were designated as emergency funds and were therefore exempt from budget limitations. The 104th Congress changed that rule, and now supplemental disaster appropriations require compensating cuts from other domestic programs. Thus, the author argues, although the public believes that insurance is unnecessary because FEMA will be there to pick up the pieces, the reality is that federal disaster recovery programs will be subject to political whims and partisan deals. To bolster disaster recovery, new policies that promote shared risk and responsibility are urgently needed. The author explains that, because of the limited availability of insurance and caps on federal spending, FEMA has advocated establishing “disaster resistant communities.” Under this strategy, seed funds would be provided to cities to promote mitigation of hurricane hazards by building owners before disaster strikes in order to limit federal and personal recovery costs. This program has enjoyed some success. However, the success of individual projects does not necessarily translate into regional or national programs. One of the limitations of this program is that, despite the fact that mitigation can reduce losses, the real estate market does not reward a building owner for such expenditures in higher rents or higher property values. Similarly, FEMA has a buyout program in which homes and property in flood-prone communities are purchased and converted to parks or wetlands. Although this program has been a success in a few small towns in Illinois, Wisconsin, and Oklahoma, most owners simply refuse to move or even elevate their homes. The author argues that the promotion of predisaster mitigation by the government will need a combination of regulation and incentives. Tax credits are an obvious incentive, she notes, but she also complains that they tend to go to those who would do the mitigation anyway. To reach a large number of homeowners and some apartment owners, it is important to devise a policy that taps into the real estate marketplace. The author concludes that, since FEMA wants to promote mitigation as a cost cutter, the agency should promote policies to help insurance companies return to the market and promote programs that incorporate safety assessments into real estate transactions.

Congressional Budget Office. (2000). *CBO's Review of a Study of the Economic Effects of Charging Actuarially Based Premium Rates for Federal Flood Insurance*. Washington, DC: Congressional Budget Office.

Available at: <http://www.cbo.gov/showdoc.cfm?index=2449&from=4&sequence=0>

Keywords :

insurance premiums

Abstract: This document was submitted to the Subcommittee on Housing and Community Opportunity of the House Committee on Banking and Financial Services. It reviews FEMA's study on actuarially based premiums, provides an overview of the study's data, methods, and limitations, and interprets the subnational results. It concludes that FEMA's findings should be interpreted primarily in qualitative terms, particularly with regard to the results of individual communities and small groups of communities.

Conners, John B. (1998). *Coastal Exposure and Community Protection: Hurricane Andrew's Legacy*. Collingdale, PA: DIANE Publishing Company.

Keywords :

hurricanes, building codes, coastal areas, property values

Abstract: This book examines problems raised by destructive hurricanes with respect to the growing concentrations of people and property in high-risk coastal areas. It also discusses the urgent need to provide better protection for people, buildings, and communities through more rigorous construction standards and better enforcement of building codes, flood insurance requirements, and land-use regulation in areas subject to hurricanes. It also includes an appendix showing the value of insured coastal property exposures by state for coastal counties on the Atlantic Ocean and Gulf of Mexico.

Conrad, David R., Ben McNitt, and Martha Stout. (1998). *Higher Ground: A Report on Voluntary Property Buyouts in the Nation's Floodplains: A Common Ground Solution Serving People at Risk, Taxpayers and the Environment*. Washington, DC: National Wildlife Federation.

Keywords :

buyouts, floodplain management, nonstructural approaches, mitigation, Project Impact, relocation, repetitive losses

Abstract: This report reviews the status of voluntary property buyouts and relocations as a strategy for floodplain management. In addition, the report analyzes the 18-year history of repetitive flood losses to identify communities that may have significant potential to utilize new nonstructural approaches to reduce flood hazards. The report provides recommendations for program and policy changes to improve floodplain management and to increase the utilization of nonstructural approaches to reduce flood damages. Some of the offered recommendations include: the need for federal, state, and local governments to coordinate and develop predisaster hazard-mitigation plans to facilitate timely, coordinated hazard-mitigation efforts before and after floods occur; the need for Congress and the Executive Branch to provide support for programs such as FEMA's Project Impact and to develop a flexible, consolidated, and streamlined voluntary buyout and relocation assistance program; the need for FEMA and Congress to revise flood insurance rate schedules and community participation standards for the NFIP to provide increased incentives to reduce flood risks; the need for FEMA to enforce the NFIP's substantial damage requirement for elevation or removal of substantially damaged buildings after floods; the need for Congress and the Executive Branch to eliminate the current bias in federal water resource project planning and evaluation procedures that favor structural approaches for flood damage prevention and mitigation over nonstructural approaches; the need for Congress to reduce the basic cost-share for federally supported flood control projects to 50 percent, with incremental cost-share incentives to promote flood hazard mitigation ranging to a maximum 65 percent federal cost-share; and the need for Congress and the Executive Branch to

increase levels of funding and support for programs that provide technical assistance to states and communities for improving floodplain management and flood loss reductions activities.

Cooney, Catherine M. (2000). NIEHS eyes potential threats from Hurricane Floyd. *Environmental Science & Technology*, 34(1), 8.

Keywords :

Hurricane Floyd, North Carolina, flood damage, environmental impacts

Abstract: This paper describes the long-term environmental and human damage of Hurricane Floyd in North Carolina. It also describes the role of the National Institute of Environmental Health Sciences in monitoring damage in weather-related disasters. It also reports concerns on the contamination of soils and groundwater by chemicals, as well as the risk for diseases due to polluted well waters.

Cordes, Joseph J. and Anthony M.J. Yezer. (1998). In harm's way: Does federal spending on beach enhancement and protection induce excessive development in coastal areas? *Land Economics*, 74(1), 128-45.

Keywords :

development, insurance premiums, coastal areas, subsidies

Abstract: Residential development on beaches grew faster in the past 32 years than residential development generally. In the 42 beachfront communities examined for this paper, the average annual rate of growth in housing units (3-9 percent) was well above the nation generally (2.4 percent) between 1960 and 1992. The authors offer an econometric model to measure the extent to which this growth can be attributed to (a) demand for recreational property; (b) public investments in shore protection (such as Corps of Engineer projects) and (c) the NFIP. They conclude that, on balance, "the growth in beach front communities has been prompted mainly by increased demand for recreation caused by rising income and employment in inland areas. Federal flood insurance also appears to have encouraged additional shoreline development. But public investments in shore protection seem to have had little or no effect" (p. 128). They go on to say the NFIP's effect depends on whether the insurance premium is subsidized. During the emergency phase of the program, before flood insurance rate maps are available, the authors' model suggests that the NFIP had a significant positive effect on residential development, resulting in an increase of building permits of about 50 percent over what they otherwise would have been. This finding is in direct contrast to the finding of the General Accounting Office in 1982 that said the program had only marginal effect on development. It supports the findings by Shilling, Sirmans and Benjamin (1989) that during the NFIP's emergency phase the program created an incentive to develop as much land as possible before a FIRM was finished. Developers recognized that property built after the map was in place would not qualify for subsidized insurance rates. This is carried forward in the authors' further finding that once a community moved into the regular (post-FIRM) phase of the program when insurance would be available only at actuarial rates, the program did not precipitate growth or development.

Correia, F.N., M.D. Saraiva, F.N. Da Silva, and I. Ramos. (1999). Floodplain management in urban developing areas. Part I - Urban growth scenarios and land-use controls. *Water Resources Management*, 13(1), 1-21.

Keywords :

development, floodplain management, urban areas, geographic information systems, Portugal

Abstract: Some of the most critical flood problems occur in urban areas where values at risk are higher and damages tend to be larger than in nonurban areas. Fast developing urban regions raise problems because of the unsteady situation of these regions in terms of catchment land-use and urban encroachment. A realistic approach to flood management in these situations requires the consideration of urban growth scenarios and the simulation of the corresponding flood conditions. Coastal towns are frequently located in floodplains and are subject to flood hazard. This is the case for many coastal areas in Southern Europe that are still developing fast due to immigration. In such cases, flood management cannot be disassociated from land-use management, and non-structural measures for flood control can play a crucial role. It is important to make an ex-post evaluation of these measures in areas where they have been adopted. These issues are addressed in two Portuguese catchments, representative of urban growth and related to flood problems in Portugal and other Southern European regions. The Laje catchment is used for the ex-post evaluation of nonstructural measures, and the Livramento catchment is used for the modeling of urban growth scenarios. Quantitative results and policy recommendations are presented based on these two case studies. Floodplain management is better done with Geographic Information Systems (GIS), especially if it is linked to hydrologic and hydraulic modeling capabilities. The use of GIS for conducting these studies is presented in Part II of this article.

Correia, F.N., M.D. Saraiva, F.N. Da Silva, and I. Ramos. (1999). Floodplain management in urban developing areas. Part II - GIS-based flood analysis and urban growth modeling. *Water Resources Management*, 13(1), 23-37.

Keywords :

floodplain management, development, urban areas, geographic information systems

Abstract: In Part I of this article the very dynamic nature of floodplain management was discussed and the need for modeling the urban growth processes and formulating scenarios of urban development was emphasized. In this second part, the use of Geographic Information Systems (GIS) for addressing those problems is presented. GIS have been recognized as a powerful means to integrate and analyze data from various sources in the context of comprehensive floodplain management. Adequate information and prediction capability is vital to evaluate alternative scenarios for flood mitigation policies and to improve decision-making processes associated with floodplain management. A framework for the comprehensive evaluation of flood hazard management policies is also addressed in this article. This comprehensive approach to flood problems is more than an attitude or a philosophical starting point. It makes use of specific technological tools conceived to be used by different actors, some of them being non-experts in flood analysis. These tools, based on GIS, are appropriate for a participatory approach to the formulation of strategies for floodplain management because they help communicate with the public in a scientifically correct and yet rather simple manner.

Coy, Peter. (1999). Don't subsidize castles built on sand finance. *BusinessWeek*, September 27.

Keywords :

Hurricane Floyd, flood damage, federal programs

Abstract: Hurricane Floyd did more than smash real estate. By the time the cleanup and rebuilding are complete, US taxpayers will have paid for Floyd through big payouts on subsidized flood insurance as well as grants and low-cost loans to people living in federally

designated disaster areas. The author believes that government policies thwart sensible behavior. They make it too easy for people to live in beautiful but disaster-prone places such as barrier beaches, floodplains, cliff sides, tinder-dry canyons, and seismic fault zones. That is one reason why financial losses from natural disasters are growing at a rate faster than the economy itself is expanding. The solution is not an elaborate new government disaster-relief program. In most cases, the best thing the government can do is to get out of the way and let the free market do its work. James Lee Witt, the director of FEMA, advocates denying subsidized flood insurance to people who make repeated claims and refuse to take preventive measures, ranging from sealing their basements to raising their houses on stilts. A version of the proposal was introduced in the House of Representatives this summer as the Two Floods and You Are Out of the Taxpayer's Pocket Act. Meanwhile, the Coastal Barriers Act is up for reauthorization. A revamped disaster-insurance program would not only save money, it would save lives. With the proper incentives, people will choose to live in safe homes on safe ground and everyone will benefit.

Cross, John A. (1985). *Flood Hazard Information Disclosure by Realtors*. Working paper #53. Boulder, CO: University of Colorado.

Keywords :

development, Florida, coastal areas, insurance purchase decision

Abstract: Based on a survey of realtors in the lower Florida Keys, the author found that although disclosure of flood hazard information seemed to have a positive effect on decisions to buy flood insurance, it did not diminish the growth of population in flood hazard areas of the Keys.

Cross, John A. (1989). Flood insurance and coastal development. *The Florida Geographer*, 23, 22-45.

Keywords :

development, Florida, coastal areas, insurance

Abstract: Based on a survey of realtors in the lower Florida Keys, the author concluded that the availability of flood insurance may have contributed to the increased occupation of the coastal flood zones.

Cross, John A. (1990). Longitudinal changes in hurricane hazard perception. *International Journal of Mass Emergencies and Disasters*, 8(1), 31-7.

Keywords :

Florida, risk perception, hurricanes

Abstract: Data on perceptions of the hazards associated with hurricanes, periodically collected over a 12-year period from the same sample of Lower Florida Keys residents, were analyzed to determine what changes in hazard perception and mitigation behavior had occurred. Contrary to hypotheses that concerns about hazards decline with length of residence in hazard zones, overall perceptions that both hurricane winds and flooding are problems facing local residents have increased. Awareness of the hurricane threat remains high, with two-thirds of the residents stating that it is likely that the area will experience a damaging hurricane within the next ten years, even though a major hurricane has not occurred within the area for nearly three decades.

Crowell, Mark. (1997). Coastal erosion and the National Flood Insurance Program. *Shore and Beach*, 65, 24-6.

Keywords :

erosion, mapping, coastal areas, insurance premiums

Abstract: The National Flood Insurance Reform Act (NFIRA) was enacted into law on September 23, 1994. Section 577 of the Act requires that FEMA to submit a report to Congress that evaluates the economic impact of erosion and erosion mapping on coastal communities and on the NFIP. Section 577 follows many years of debate concerning whether the effects of erosion should be considered in mapping flood risk zones and setting rates for flood insurance rates.

Crowell, Mark, Stephen P. Leatherman, and M.K. Buckley. (1991). Historical shoreline change: Error analysis and mapping accuracy. *Journal of Coastal Research*, 7(3), 839.

Keywords :

erosion, mapping, coastal areas, Upton-Jones Amendment

Abstract: FEMA is assessing technical methodologies and procedures for the collection, analysis, and computation of coastal erosion rates. This assessment is being performed to determine the feasibility of generating such data for use as a basis for administering Section 544 of the Housing and Community Development Act of 1987 (commonly known as the Upton-Jones amendment to the NFIP). It is likely that the methodology selected will involve the use of historical data compared with current shoreline information. Several states use this fundamental approach to predict shoreline location based on extrapolation of past changes in developing data to support setback programs. Requirements contemplated for data development include: (a) standardization of a methodology for developing data on erosion rates; (b) consistency in application; (c) capability of being applied in a timely manner; and (d) accuracy commensurate with program needs. This paper addresses the last issue by examining sources of errors inherent in the raw data. Source data include historical and recent National Ocean Service (NOS) T-sheets (produced ca. 1840s to present) and air photos (taken ca. late 1930s to present) as well as any other types of accurate map and photographic data. A study of this nature requires extensive preparation of the required source material prior to digitization. For example, the high water line or bluff line must be identified and annotated on the air photos and maps. Furthermore, the source material must undergo extensive pre-digitization and post-data compilation accuracy checks and reliability assessments necessary to screen inaccurate maps and air photos. For example, older historical maps with obsolete coordinates must be updated to current standards and analyzed to insure that distortion has not rendered the map inaccurate and unusable. In addition, computerized techniques (e.g., metric mapping, analytical stereoplotters) or manual techniques (such as the Zoom Transfer Scope) must be used to correct for distortion inherent in aerial photography.

Cuny, Frederick C. (1991) Living with floods: Alternatives for riverine flood mitigation. In Kreimer, Alcira and Mohan Munasinghe eds. *Managing Natural Disasters and the Environment: Selected Materials*. Washington, DC: The World Bank, 62-73.

Keywords :

structural approaches, riverine areas, mitigation, developing nations, socioeconomic impacts

Abstract: Most efforts designed to reduce the effects of floods have focused on such structural measures as the construction of dams and embankments (polders, levees, and the like). Many of these large-scale, capital-intensive projects had been questioned on both technical and environmental grounds. Development experts question whether large-scale flood control projects are economically suitable for the least-developed countries since they increase the country's debt significantly for little economic return. Some flood control projects may be counterproductive.

Embankments may foster unrealistic expectations that all flooding can be prevented and stimulate movement onto floodplains, thereby increasing total risk. In recent years, there has been increased interest in alternative strategies for protecting the floodplains, especially in rural areas. A key strategy has been to encourage people living in rural areas and in some small communities to adapt to floods and to capture their benefits for economic development. Traditional rural societies have developed many ways to adapt to floods and their consequences. These strategies can often be adopted or modified into a “living with floods” strategy. Where this strategy has been applied, it has been cost-effective, easy to implement, and compatible with the environment. These measures can be applied before and after floods. More important, they can be incorporated in long-term development programs at little cost

Dacy, Douglas C. and Howard Kunreuther. (1969). *The Economics of Natural Disasters*. New York, NY: The Free Press.

Keywords :

insurance, federal programs

Abstract: The book’s main objective is to formulate a clear-cut case for developing a comprehensive system of disaster insurance as an alternative to what the authors consider to be a paternalistic federal policy. To do so, the authors searched the literature relevant to insurance for disasters. These studies and reports were primarily concerned with organizational problems during the emergency postdisaster period and only occasionally referred to economic phenomena. The authors’ treatment of the economics of disaster can be conveniently divided into three parts: (a) the framework for analysis; (b) empirical evidence on short-term recuperation behavior; and (c) the capital and labor needs facing disaster areas. The authors also critically examine the federal government’s role in providing disaster relief to the private sector. The Small Business Administration (SBA) was the principal agency offering low-interest loans for replacing or repairing damaged homes and businesses. The authors explore the inequities of the SBA program and suggest alternative policies for eliminating these effects. They conclude that comprehensive disaster protection under the alternative system should lead not only to a more efficient and equitable recovery but would also curtail the growth of hazard-prone areas that resulted from the existing relief program.

Daniels, R. Steven and Carolyn L. Clark-Daniels. (2000). *Transforming Government: The Renewal and Revitalization of the Federal Emergency Management Agency*. Birmingham, AL: The PricewaterhouseCoopers Endowment for the Business of Government.

Keywords :

disaster assistance

Abstract: In this study, the researchers investigated the evolution of the disaster assistance programs of FEMA from the Bush administration to the Clinton administrations. The federal response to Hurricane Hugo, the Loma Prieta Earthquake, and Hurricane Andrew revealed serious flaws in FEMA’s structure and procedures. Extraordinary tensions existed between the secretive National Preparedness Directorate and the more public State and local Programs and Support Directorate. The Bush administration frequently bypassed FEMA and centralized response in the White House. The administration’s response to catastrophic disasters was largely reactive. Little of the funding went toward mitigation of future disasters. The media, Congress, and several evaluative organizations including the General Accounting Office, the National Academy of Public Administration, and FEMA’s Inspector General all underscored the

shortcomings of FEMA's structure and operations. Learning from the Bush experience, the Clinton administration moved quickly to recast federal disaster response. President Clinton appointed James Lee Witt, Arkansas's emergency services director as director of FEMA and elevated the FEMA's director to cabinet-level status. Director Witt moved to redefine FEMA's mission, reorganize the agency around basic emergency management functions, make FEMA more consumer oriented, rebuild the staff's commitment to FEMA's mission, and redirect the focus of disaster assistance toward mitigation. Consequently, media and political criticism has diminished. However, FEMA is not free from problems, with issues, regarding financial management and decision criteria still remaining to be addressed.

David, Sheila D., Sarah Baish, and Betty Hearn Morrow. (1999). Uncovering the hidden costs of coastal hazards. *Environment*, 41(8), 10-9.

Keywords :

coastal areas, Hurricane Hugo, socioeconomic impacts, economic impacts, environmental impacts, hazard identification

Abstract: This paper focuses on the hidden costs of coastal hazards, like business interruptions, social problems, disruption of governmental services, and damage to natural resources and ecosystems. This article reports the immediate hidden or unreported costs of traumatic coastal disasters, particularly those related to Hurricane Hugo in 1989.

Dawdy, David R. and Dennis P. Lettenmaier. (1987). Initiative for risk-based flood design. *Journal of Hydraulic Engineering*, 113(8).

Keywords :

modeling, risk assessment

Abstract: A recent report of the Interagency Advisory Committee on Water Data found that there is "no current procedure for assigning an exceedance probability to the probable maximum flood (PMF) ... in a reliable, consistent, or credible manner." This conclusion was used as justification for continuation of the current, quasideterministic, PMF-based spillway design methods used by all federal agencies. This is despite criticism by both researchers and practitioners that PMF-based methods tend to lead to a false sense of security and to misallocation of resources for dam safety improvements. As an alternative to perpetuation of the status quo, the writers outline four general areas in which research should be promoted for improved estimation of extreme floods, as well as research aimed at development of a method for incorporation of risk information into spillway design. The writers believe that if the federal agencies were to promote research in the areas suggested the current stagnation that has set in would be broken, and the self-fulfilling prophecy that there are no alternatives to current practice could no longer be justified.

Deloitte & Touche. (1999). *Evaluation of the National Flood Insurance Program's Underwriting and Loss Adjustment Processes.*

Keywords :

NFIP, liability, insurance claims

Abstract: This consultant report provides recommendations to improve the NFIP's operations by identifying practical changes to the underwriting/rating and claims processes and to FIA controls. Although the NFIP's requirements and controls (and compliance with them) were found to be generally adequate to ensure effective management of the NFIP, and the degree of

compliance with NFIP underwriting/rating and claims requirements is adequate, areas for improvement were noted in four major functional categories: operational/communications, underwriting, claim/loss adjusting, and financial reporting/audit. These functional areas correspond to areas in which opportunities for improvements in the process and controls areas were detected.

Deloitte & Touche. (1999). *NFIP Financial Stabilization Project.*

Keywords :

NFIP, economic modeling, strategic planning, risk financing

Abstract: FEMA hired Deloitte and Touche to investigate alternatives to current financing from the Department of the Treasury for the NFIP. This report details the consultant's research findings on agreed upon risk financing and risk transfer options, including the identification and interviewing of organizations with relevant option and commercial financing experience. The report discusses the development of a stochastic model using underlying FIA assumptions to simulate the NFIP's total financing costs over a ten-year period. The total financing activity and stabilization effect (i.e., variability) of the following eight scenarios are reviewed: (a) bank financing; (b) financial reinsurance; (c) catastrophe bonds - interest and principal at risk; (d) catastrophe bonds - interest at risk; (e) program capitalization; (f) funding the premium differential; (g) Treasury financing; and (h) capitalization from congressional appropriations. The document concludes that the first four scenarios, which involve commercial financing activities, add costs to the NFIP's operations. It also concludes that scenario iii would be the least expensive (99 percent nonexceedence level). The economic value of scenarios i and ii varied depending on the nonexceedence level reviewed. Scenario i was the least expensive at low exceedence levels due to the 100 basis-point fee charged on the unused bank facility. Scenario ii is the least expensive at the mid-exceedence levels. The remaining scenarios include congressional appropriations and assume appropriations are provided on an interest-free basis.

Diggins, William. (1980). *Necessary decisions? Disaster mitigation policy on the local level.* Paper presented at the American Sociological Association Annual Meeting, New York, NY, August 27-31. Washington, DC: American Sociological Association.

Keywords :

risk communication, mitigation, public policy

Abstract: A model of "administrative decision making" in local communities is tested for the case of the policy of land-use and building regulations for the purpose of mitigating flood risks. This model implies that the extent of the problem in the community causes local decision makers to perceive the problem as being serious, this then causes appropriate decisions to be made to alleviate the problem. Multiple regression analysis of flood data from the Red Cross and interviews with 432 mayors and council members in 100 local communities shows that the extent of the flood problem in local communities has positive effects on the officials' perceptions of the extent and seriousness of the local flood problem. However, these factors have little effect on the officials' attitudes toward policies affecting the mitigation of flood risks.

Disaster Mitigation Research Working Group. (2002). *Benefits of flood mitigation in Australia: Report 106.* Canberra, Australia: Bureau of Transport and Regional Economics.

Keywords :

cost-benefit analysis, economic impacts, Australia, mitigation

Abstract: This working group examined the realized economic benefits of flood mitigation activities with a literature review, consultations with key planners, and case studies of areas with repeated past flooding. The case studies examined individual mitigation measures (land use planning, voluntary purchase, building controls, sealed roads, and levees) in specific locales and yielded quantitative data to suggest Australia's various flood mitigation measures created substantial, tangible savings. The report includes dollar amounts for each measure in each locale. At the same time, the enumerated savings reported are likely to underestimate the full benefit of flood mitigation because intangible savings (like reduced stress) cannot be quantified. More broadly, the report identified a number of important points related to the benefits of mitigation: there is a trend toward nonstructural mitigation solutions; levees appear to have been effective in preventing substantial damage; altering the way infrastructure is designed and constructed can be very cost-effective; mitigation solutions must be tailored to their location in order to be successful; community awareness and preparedness play an important role in determining the success of mitigation; equity and perceived fairness are powerful factors in community acceptance; and finally that drainage and storm water issues are closely linked to other flood issues, regardless of the source of flooding (e.g., storm surge or cyclones).

Dixon, L.S. (1990). Inclusion of wetlands in designated floodway studies. In *Hydraulics/Hydrology of Arid Lands (H2AL)*. New York, NY: American Society of Civil Engineers.

Keywords :

environmental protection, hydrology, wetlands

Abstract: The traditional methods and procedures used by hydrologists and hydraulic engineers to define floodways and floodway fringe areas are changed so that designated floodways are adjusted to encompass wetlands, resulting in better protection of the nation's diminishing wetlands and a reduction in development problems due to permit requirements pursuant to Section 404 of the Clean Water Act. Hydrologic studies to define floodways and floodway fringe areas are an important tool in the management of floodplains. A minimum standard for defining floodways has been developed under the NFIP. Implementation of more stringent standards is a local community decision. By proposing the inclusion of wetlands in the determination of designated floodways, hydrologists and hydraulic engineers have an opportunity to contribute to the protection of wetlands and to assist in better defining floodway fringe areas available for development.

Donnelly, William A. (1989). Hedonic price analysis of the effect of a floodplain on property values. *Water Resources Bulletin*, 25(3), 581-6.

Keywords :

economic modeling, property values

Abstract: The effects of a floodplain location on the market value for property is controversial, with the conventional wisdom being that buyers are myopic. Previous statistical tests have proven inconclusive in deciding the issue. Herein, a theoretical model, that of hedonic price indexes, is posited and tested, using housing sales characteristics data obtained from a Multi-List Service cooperative. This study suggests that home buyers do adjust the purchase price for houses within a floodplain, and this amounts to, on average, just over 12 percent. The data are from a small midwestern town in which the last severe flooding occurred a decade ago.

Douglas, James, M. and Brad Hail. (1986). Risk information for floodplain management. *Journal of Water Resources Planning and Management*, 112(4).

Keywords

communication, risk assessment

Abstract: The United States began structural flood measures in the 1950s and added complementary nonstructural measures in the 1950s. Nevertheless, national flood damage totals continue to increase. Reversal of this trend will require better communication among regulatory agencies, experts assessing risk, and floodplain occupants. Modern technology provides tools to measure specific risks and communicate the hazards of property loss and personal dangers to individuals able to reduce the losses. One problem with the existing communication, based on a safety standard tied to the 100-year floodplain, is that some locations in the 100-year floodplain are subject to only trivial damage by shallow flooding, while other locations outside that boundary are subject to major devastation and threats of drowning by floods that could be as common as the true 25-year event. Systematic estimation and dissemination of the risk of economic loss can reduce flood losses, vary community programs with the hazard to life and property, and help every floodplain occupant accommodate more effectively with his site-specific problem.

Downton, Mary W. and Roger A. Pielke, Jr. (2001). Discretion without accountability: Politics, flood damage, and climate. *Natural Hazards Review*, 2(4) 157-66.

Keywords :

disaster assistance, public policy

Abstract: Federal disaster assistance is one component of US policy for coping with damaging floods. The president ultimately determines whether federal relief is provided to states and local communities following a disaster, yet guidelines governing the president's discretion are vague and the total federal cost of disaster assistance is difficult to determine. This study analyzes flood-related presidential disaster declarations from 1965 to 1997. It compares the annual number of flood-related declarations to measures of precipitation and flood damage, finding that presidents have differed significantly in disaster declaration policy. Annual differences in declarations during seven presidential administrations do not correspond to the president's political party affiliation. In addition, a state's ability to pay has not been a major consideration in presidential decisions about whether a disaster warrants federal assistance. However, presidential decisions are related to whether the president is running for reelection. Declarations are also related to changes in legislative and administrative policy. This article discusses the significance of these findings in the context of national policies governing floods and other disasters.

Driscoll, Paul and Michael B. Salwen. (1996). Riding out the storm: Public evaluations of news coverage of Hurricane Andrew. *International Journal of Mass Emergencies and Disasters*, 14(3), 293-303.

Keywords :

Florida, Hurricane Andrew, risk communication, risk perception, media

Abstract: Residents of South Florida who experienced Hurricane Andrew evaluated the credibility of the hurricane-related information from television as more trustworthy than that from other sources. Contrary to what was hypothesized, the broadcast medium of television (but not radio) was evaluated on the dimension of expertise as being higher than newspapers. As

predicted, interpersonal sources were judged high on trustworthiness, but much lower on expertise than any of the mass media sources. The findings indicated that when people wanted factual information and self-help information, they expressed reservations about the credibility of other people (friends, neighbors, or relatives). In such cases, there was a marked tendency to place emphasis (or faith) in television.

Dunn, S., R. Friedman, and S. Baish. (2000). Coastal erosion: Evaluating the risk. *Environment*, 42(7), 36-45.

Keywords :

erosion, coastal areas, risk communication

Abstract: This article discusses the risk to property in the United States from coastal erosion. Coastal erosion caused by rising sea levels, large storms, and powerful ocean waves is wearing away the 10,000 miles of US ocean and Great Lake shoreline and could destroy 85,000 houses over the next 60 years. In March, the H. John Heinz III Center for Science, Economics, and the Environment completed a nationwide study of the effect of erosion on the NFIP and other federal programs and on coastal communities. The findings suggest that property owners must be informed of the erosion risks that they face. Furthermore, erosion risk must be included in local land-use planning, state coastal management, and private and public lending and insurance practices.

Emani, Srinivas and Jeanne X. Kasperson. (1996). Disaster communication via the information superhighway: Data and observations on the 1995 hurricane season. *International Journal of Mass Emergencies and Disasters*, 14(3), 321-42.

Keywords :

risk communication, risk perception, Hurricane Opal, Florida, media

Abstract: Although researchers and practitioners have been using the Internet to communicate information on disasters, few systematic studies have assessed the type of information that is or should be communicated via this medium. This paper presents an exploratory, yet systematic, study of FEMA's coverage of the 1995 hurricane season via e-mail and the World Wide Web. An overview analysis of the 1995 season shows that FEMA distributed 184 e-mail messages of which 138 were hurricane-related and 46 were nonhurricane-related. Following this overview analysis, a case study is presented of FEMA's coverage of Hurricane Opal, which was associated with significant impacts in Florida. The focus of analysis in the case study is a type of e-mail message called the situation report (sitrep), which FEMA used to communicate information on disasters. The number, timing, and content of sitreps that FEMA issued for Hurricane Opal are analyzed and the results used to discuss the agency's communication efforts via the Internet.

Evatt, Dixie S. (2000). Does the National Flood Insurance Program drive floodplain development? *Journal of Insurance Regulation*, 18(4), 497.

Keywords :

development, floodplain management, NFIP

Abstract: This article presents a review of 36 studies in the United States that assessed whether the NFIP has influenced development in floodplains. The author provides an historical perspective of the program; lists factors to be considered about the flood insurance program, and points out the consequences of outlawing federal insurance for sensitive coastline. The author concludes that there is insufficient empirical evidence to support the popular belief that the NFIP

is a primary factor in floodplain development today. Neither does the empirical evidence lend itself to the opposite conclusion.

Faber, Scott. (1996). *On Borrowed Land: Public Policies for Floodplains*. Cambridge, MA: Lincoln Institute of Land Policy.

Keywords :

floodplain management, Midwest floods of 1993

Abstract: Flooding is a natural hydrologic occurrence, but flood-related damage to property and the risks to human life are exacerbated by urban growth and other intensive development in floodplains. The conventional response has been to construct ever-larger flood control systems, but floodplains are not fixed and they defy simply structural solutions. The report considers ecological, economic and legal issues of land use in floodplains through case studies of local responses to the disastrous 1993 floods in the Midwest, as well as other river basin management programs around the country.

Faber, Scott and Constance Hunt. (1994). River management post-1993: The choice is ours. *Water Resources Update, Spring (95), 21-5.*

Keywords :

Midwest floods of 1993, Mississippi River, riverine areas, environmental restoration

Abstract: Largely the result of hydrologic alterations, the upper Mississippi River basin has become destabilized and is no longer physically compatible with its climate. The river is experiencing higher and more frequent flood stages and lower flows during dry seasons. The result is an unpredictable river that can flood farmhouses miles from its normal channels during floods and render barges marooned during droughts. Due to the Midwest floods of 1993, the opportunity is in hand to reverse current watershed management and restore some of the natural conditions that made the Mississippi River an unusually rich ecosystem. This article considers the policy implications of these floods focusing on changing the funding priorities on the federal level to favor programs that enhance the ability of the landscape to retain and filter water with their floodplains and programs that provide technical and financial assistance to landowners for wetland restoration.

Faupel, Charles E., Susan P. Kelley, and Thomas Petee. (1992). The impact of disaster education on household preparedness for Hurricane Hugo. *International Journal of Mass Emergencies and Disasters, 10(1), 5-24.*

Keywords :

South Carolina, risk communication, risk perception

Abstract: This article examines the impact of disaster education on hurricane preparedness among residents in Charleston, SC. The article examines: (a) the impact of participation in disaster education programs generally; (b) the impact of hurricane experience as a type of education; and (c) the impact of participation in earthquake specific education programs to determine whether there is any transference of knowledge across agent types. Two indices of preparedness are used: household planning activities and adaptive response activities. Participation in some type of disaster education program was strongly related to the preparedness measures. Hurricane experience had some minimal effect on adaptive response but not on household planning. Participation in the earthquake specific education programs was not a significant predictor when controlling for other variables.

FEMA. (1980). *Elevating to the wave crest level: A benefit-cost analysis*. Washington, DC: FEMA.

Keywords :

coastal areas, Base Flood Elevation, building codes, Hurricane Frederic, cost-benefit analysis

Abstract: Prior to Hurricane Frederic, the NFIP required new construction in coastal high hazard areas to be elevated with the lowest floor at or above the storm surge stillwater level. Damage to new construction during Frederic led to an evaluation of elevating the lowest floor to the wave crest level. The engineering and economic analyses concluded that elevating a new house to the wave crest level associated with 100-year storm surge reduces both flood loss potential and flood insurance premiums, each of which more than offsets the added costs to elevate to that height.

FEMA. (1982). *National Flood Insurance Programs Act*. Washington, D.C: FEMA.

Keywords :

NFIP, legislation, federal programs

Abstract: This publication represents an update to June 1982 of the consolidated laws governing all aspects of the NFIP. This document covers the program responsibilities of both the FIA (insurance) and the State and Local Programs and Support Directorate (floodplain management engineering).

FEMA. (1983). *Improving the Flood Insurance Study Process*. Washington, DC: FEMA.

Keywords :

NFIP, mapping

Abstract: The Committee on Flood Insurance Studies Research of the National Research Council's Advisory Board on the Built Environment reviewed the NFIP's operations and concluded that considerable progress has been made but that there exist many operational concerns related to the need for: (a) continuation of flood insurance studies and mapping in areas not yet studied; (b) restudy of areas previously studied; (c) improved flood insurance study products; and (d) more economical and efficient methods for the preparation of flood insurance studies and restudies.

FEMA. (1986). *National Flood Insurance Program: Community Compliance Program Guidance*. Washington, DC: FEMA.

Keywords :

compliance, enforcement

Abstract:

This manual provides guidance to FEMA personnel involved in ensuring that participating communities are administering their flood loss reduction programs in compliance with NFIP criteria. It offers procedures for taking enforcement actions against noncompliant participating communities as well as noncompliant individual structures.

FEMA. (1988). *Maine lender compliance with the Flood Disaster Protection Act of 1973: An analysis of flood insurance purchase requirements for April 1987 flood disaster victims*. Boston, MA: FEMA.

Keywords :

lending institutions, compliance, mandatory purchase, Maine, communication

Abstract: On April 9, 1987, the president declared a disaster as the result of severe flooding in Maine. Following this declaration, 2,332 disaster victims applied for disaster assistance through FEMA Region I's Disaster Assistance Program Division. Out of this total number, 613 applications came from personal or commercial properties located in Special Flood Hazard Areas (SFHA). After paring down the sample, FEMA examined 94 properties and found that only 12 of them had flood insurance at the time of mortgage closing. FEMA cites the following reasons for lender noncompliance based on its analysis: (1) human error on the part of the lender when reading the FIRM; (2) legitimate differences in interpretation of the FIRM for borderline properties; (3) the lender opted not to require flood insurance for borderline properties out of consideration for the limited income of some of the property owners; (4) ignorance on the part of lender concerning the flood insurance purchase requirements; (5) the lender ignored the flood insurance purchase requirements; and (6) a lack of follow-up enforcement by the lender when policies expired. Furthermore, FEMA makes several policy proposals to improve lender compliance which include: (1) requiring property owners to provide mortgage information when they apply for disaster assistance; (2) widening NFIP's information loop; (3) targeting lenders for participation in the Lender Workshop Program; (4) incorporating a "Lender Education Visit" into Community Assessment Visits; and (5) regularly updating, publishing, and distributing Community Status Lists.

FEMA. (1989). *Guidance for Conducting Community Assistance Contacts and Community Assistance Visits.* Washington, DC: FEMA.

Keywords :

Community Assistance Contacts, floodplain management, Community Assistance Visits

Abstract: This manual provides guidance to FEMA employees, states, and other federal departments and agencies conducting Community Assistance Contacts (CACs) and Community Assistance Visits (CAVs) under the NFIP's Community Assistance Program (CAP). The major objective of the NFIP's CAP is to ensure that communities participating are achieving the program's objectives for the reduction of flood losses. FEMA uses CACs and CAVs to identify floodplain management issues and opportunities to assist communities' management of their floodplains.

FEMA. (1991). *Detailed Chronology of Significant National Flood Insurance Program Events.* Washington, DC: FEMA.

Keywords :

NFIP, history, legislation

Abstract: This document contains a comprehensive but concise chronology of significant events affecting the NFIP. Events appear briefly summarized in the document by month and year of occurrence. The chronology begins in August 1956, pointing out that it was then when the Federal Flood Insurance Act of 1956 became law. The chronology ends by with the initiation of the Mortgage Portfolio Protection Program in January 1991.

FEMA. (1993). *Audit of Flood Insurance Reinspection Activities.* Washington, DC: Office of Inspector General, FEMA.

Keywords :

insurance claims, Write Your Own programs

Abstract: The primary goal of the FIA's reinspection program is to ensure that claims are properly paid. This report finds that the program is not accomplishing its goal. Specifically, procedures to reinspect claims written by Write Your Own (WYO) companies are much more lenient than those used for direct claims, and the number of WYO claims reinspected is much smaller than that for direct claims. Moreover, the FIA does not have an effective internal control system to track or monitor the results of reinspections. The report therefore recommends that the FIA use uniform reinspection procedures for a test period to demonstrate the effect of using different procedures, increase the number of WYO claims inspected, and have WYO companies notify FIA within a few days of a claim filing to allow FIA to reinspect the claim before payment. Furthermore, the report recommends that the FIA develop policies and procedures to track recommended claim adjustments and any subsequent repayments.

FEMA. (1994). *Audit of FEMA's Mitigation Programs*. Washington, DC: Office of Inspector General, FEMA.

Keywords :
mitigation

Abstract: This report covers the audit of FEMA's and selected states' mitigation activities. It addresses initiatives to make mitigation a priority, obstacles to overcome, and suggestions for improving mitigation activities. The audit concludes that an effective mitigation strategy depends on state and local governments being willing and able to plan and fund such activities. All administrations and directorates within FEMA need to cooperate as do other federal agencies with responsibilities for mitigation. More streamlining of postdisaster grants can be achieved. Recovery programs need to emphasize mitigation. Measures of effectiveness must be developed. Innovative approaches should be encouraged.

FEMA. (1995). *The Fifty Percent Rule: The Eligibility of Facilities for Replacement Under 44 CFR 206.226(d)(a)*. Washington, DC: FEMA.

Keywords :
substantial damage, legislation

Abstract: This document covers the interpretation of FEMA's regulations that govern the cost of replacement for damaged facilities. The regulation states that "a facility is considered repairable when disaster damages do not exceed 50 percent of the cost of replacing a facility to its pre-disaster condition, and it is feasible to repair the facility so that it can perform the function for which it was being used as well as it did immediately prior to the disaster." The document states that the determination of eligibility of a facility for replacement will be calculated by the following fraction: The cost of repair of the disaster damage (repair of the damaged components only, using present day materials and methods) divided by the cost of replacement of the facility with a facility of equivalent capacity, using current codes for new construction. If this calculation is greater than 50 percent, then replacement is considered to give a better return on the taxpayers' investment and is thus eligible for funding.

FEMA. (1995). *Audit of the Accuracy of Flood Zone Ratings*. Washington, DC: Office of Inspector General, FEMA.

Keywords :
insurance premiums, zoning, mapping

Abstract: This audit found that there were zone misratings in at least 27 percent of the policies in the sample, and 10 percent of the sample policies had incorrect premiums. Accordingly, the report concludes that the FIA needs to improve its internal controls by expanding its review programs to include verification of rating factors. An obstacle to this is the complexity of the rating process, particularly the policy of administrative grandfathering. The report recommends assessing the impact of eliminating administrative grandfathering, and, if feasible, to begin phasing it out. It further recommends the establishment of a quality control program to monitor the accuracy of premium ratings and to identify problem areas. This will require improving the accuracy and content of FIA's database on flood insurance policies. Lastly, the report recommends that the Mitigation Directorate establish a committee that includes map users to review mapping procedures and determine cost-effective ways to increase the detail on FIRMs to make them more user-friendly.

FEMA. (1995). *Guidelines and Specifications for Wave Elevation Determination and V-Zone Mapping*. Washington, DC: FEMA.

Keywords :

coastal areas, zoning, mapping, modeling

Abstract: Coastal communities generally have unique flood hazards because of storm surges and wave action from large open water bodies. Defining Coastal High Hazard Areas (V Zones) requires determination of wave elevations associated with the 100-year flood. FEMA compiled the *Guidelines* to specify technical policies and procedures to be employed in the preparation of coastal Flood Insurance Studies (FISs) and restudies. The *Guidelines* provide unified instructions on the application of the methodologies used to determine the coastal flooding elevation hazards set forth in the FIS, and on the delineation of the flood elevations and hazards on the FIRM. The *Guidelines* are not applicable to studies on Great Lakes coasts because different analysis procedures and computer models are applied there.

FEMA. (1995). *Options for Reducing Public Assistance Program Costs*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

public assistance

Abstract: This inspection discusses potential cost reductions through changes to eligibility criteria for public assistance grants. Options are presented in the four primary areas of building codes and standards, repair versus replacement, private nonprofit organizations, and alternate projects. These options include amending the Stafford Act to limit funding to the federal estimated cost of returning a facility to its predisaster condition regardless of code requirements, to eliminate public assistance grants for private nonprofit organizations, and to eliminate the opportunity to accept reduced funding to use public assistance grants for alternate projects. The report also concluded that costs could be reduced by revising FEMA's regulations to raise the cost repair threshold that triggers replacement of a public facility. In addition, the inspection identifies cost saving opportunities achieved from shortening the appeals process, depreciating building contents when calculating replacement costs, and converting eligibility for publicly owned parks, recreational facilities, and income producing facilities from public assistance grants to federal loans.

FEMA. (1995). *The Zone A Manual: Managing Floodplain Development in Approximate Zone A Areas: A Guide for Obtaining and Developing Base (100-year) Flood Elevations.* Washington, DC: FEMA.

Keywords :

mapping, riverine areas, zoning, Base Flood Elevation, Special Flood Hazard Areas

Abstract: This guide was developed for use by community officials, property owners, developers, surveyors, and engineers who may need to determine Base (100-year) Flood Elevations (BFEs) in special flood hazard areas designated as approximate Zone A on FEMA's Flood Insurance Rate Maps. One of the primary goals of this document is to provide a means to determine BFEs at a minimal cost. This guide is primarily intended for use in riverine and lake areas where flow conditions are fairly uniform (i.e., those that do not involve unusual flow regimes no areas that experience alluvial fan flooding. The guide is not appropriate for use in Zone V (velocity) areas or coastal Zone A areas that are subject to flooding due to storm surge from hurricanes and other coastal storms.

FEMA. (1996). *Unintended Consequences: The High Cost of Disaster Assistance for Park and Recreational facilities.* Washington, DC: Office of Inspector General, FEMA.

Keywords :

park and recreation facilities, flood damage

Abstract: This report focuses on six areas that accounted for considerable disaster grants for park and recreational facilities between FY 1989-95: debris removal, building damage, revenue-generating facilities, marinas, golf courses, and tree and shrub replacement. The report discusses cost reducing options in these areas and the associated impacts their implementation would incur. The options discussed include: (a) limiting funding for parks and recreational facilities to debris removal only; (b) limiting funding to the repair/replacement of recreational buildings only; (c) excluding revenue-generating facilities from receiving any grant funding; (d) eliminating funding for marinas and golf courses with the exception of debris removal; and, (e) eliminating funding for trees, shrubs, and other planting replacement for all recreational facilities other than parks. The report makes no recommendations.

FEMA. (1997). *Guidance on Estimating Substantial Damage Using the NFIP Residential Substantial Damage Estimator.* Washington, DC: FEMA.

Keywords :

substantial damage , building codes, Special Flood Hazard Areas

Abstract: Communities that participate in the NFIP often have difficulty determining whether structures meet the program's definition of being substantially damaged. This is particularly true after a major flood or other disaster in which large numbers of buildings have suffered damage and there is a need to provide damage determinations so that reconstruction can begin. Structures in special flood hazard areas that are substantially damaged must be brought into compliance with the minimum requirements of that community's laws or ordinances and the NFIP. To assist communities in making such determinations, FEMA developed the Residential Substantial Damage Estimator software, which provides guidance in estimating building value and damage costs for both single family and manufactured homes. Based on the NFIP's regulatory requirements, the software is intended to be used in conjunction with industry-accepted, residential-cost estimating guides. The guidance document provides information on how to use the software as well as how to collect data and conduct field inspections.

FEMA. (1997). *Modernizing FEMA's Flood Hazard Mapping Program: A Progress Report*. Washington, DC: FEMA.

Keywords :

mapping

Abstract: This report is the initial report of a task force convened to plan the future of FEMA's Flood Hazard Mapping Program. It surveys the current state of the program, presents a visionary plan for the future, and details the strategies for implementing the plan. The cornerstones of the modernization plan are to: (a) develop accurate and complete flood hazard information for the entire nation; (b) provide that information in a readily available, easy-to-use format; and (c) alert and educate the public regarding the risks of flood hazards. This plan will use existing digital engineering, mapping, information management, and electronic communication technologies to improve the program in four primary areas: map accuracy and completeness; map utility; map production; and public awareness and customer service. A cost-benefit analysis is currently being conducted.

FEMA. (1997). *Multihazard Identification and Risk Assessment*. Washington, DC: FEMA.

Keywords :

hazard identification, risk assessment

Abstract: This document summarizes the findings of a research project to clarify and document previous efforts to identify natural and technological hazards and to assess associated risks. The report is one part of an effort to develop a national approach to mitigating human and economic loss caused by disasters. The chapter on floods includes sections on hazard identification; risk assessment; research, data collection, and monitoring activities; and mitigation approaches. Among others, the report concludes that the large influx of people to coastal areas over the past 30 years resulted in thousands of residents who are unaware of the hazard associated with hurricanes and floods in coastal high-hazard zones. Also, the report claims that in the immediate shorefront area affected by tropical cyclones, relocation of exposed utility lines, water mains, sewer lines, and roadways has been effective in mitigating damage. The report warns that land-use controls and regulatory setback programs in coastal high hazard zones can be difficult because of intense development pressure and high property values. The report states that the NFIP has probably been the most dominant positive influence on floodplain management over the past 15 years. However, the majority of buildings exposed to identified flood hazards remain uninsured.

FEMA. (1997). *Strategic Plan FY 1998 through FY 2007 with Operational Objectives through FY 2003: Partnership for a Safer Future*. Washington, DC: FEMA.

Available at: <http://www.fema.gov/library/splan.pdf>.

Keywords :

strategic planning

Abstract: This update of FEMA's 1994 strategic plan fulfills the requirements of the Government Performance and Results Act. The plan describes FEMA's role as leader for the Nation's emergency management system and its specific responsibilities, mission, vision, eight core values, and strategic planning template. The plan then identifies the agency's three strategic goals: (a) protect lives and prevent the loss of property from all hazards; (b) reduce human suffering and enhance the recovery of communities after disaster strikes; and (c) ensure that the

public is served in a timely and efficient manner. For each goal, strategic objectives for FY 2007 are identified, including performance measures, strategies to achieve each goal, five-year operational objectives, the legal authorities to support the strategy, the technology to implement it, and how performance will be evaluated.

FEMA. (1998). *Annual Performance Plan: Fiscal Year 1999*. Washington, DC: FEMA.

Keywords :

strategic planning

Abstract: The *Annual Performance Plan* outlines how FEMA's strategic goals and objectives will be pursued during FY 1999 (later to be replaced by FEMA's Annual Performance Plan for FY 2001). This document accompanies FEMA's Strategic Plan, *Partnership for a Safer Future*. The *Annual Performance Plan* presents annual performance goals for FY 1999. Each of these supports a five-year operational objective contributing to one of three strategic goals: "Protect Lives and Prevent the Loss of Property From Natural and Technological Hazards"; "Reduce Human Suffering and Enhance the Recovery of Communities After Disaster Strikes"; and "Ensure the Public is Served in a Timely and Efficient Manner." Some of the objectives within these goals include a reduction in expected annual flood disaster losses by \$1 billion and the identification of the most critical 10-percent of weaknesses in state capability while maintaining the current capability of states and localities to respond to disasters. Other objectives seek to achieve training and education opportunities for the fire protection community and to use information technology upgrades to improve services and accessibility that reduce the costs for the response to and recovery from emergencies and disasters.

FEMA. (1998). *An Evaluation of the National Flood Insurance Program's Community Rating System*. Washington, DC: FEMA.

Keywords :

Community Rating System, mitigation

Abstract: In 1994, a formal evaluation of the overall effectiveness of the Community Rating System (CRS) was initiated. Due to the technical and statistical nature of these evaluation analyses and the need for some impartial expertise, FEMA retained Human Technology, Inc. to assist in this endeavor. The data collection and analysis techniques included questionnaires and surveys, technical studies, site visits, focus groups, and reviews by experts. As a result of the evaluation efforts, three general conclusions were reached with regard to changes in the CRS creditable activities: (a) certain elements deserve more credit based on a review of their effectiveness in reducing flood losses; (b) communities should be encouraged to design their own programs; and (c) scoring procedures and documentation requirements should be simplified. Overall, CRS has become an important tool for mitigation as well as a mechanism for integrating mitigation with insurance.

FEMA. (1998). *Federal Programs Offering Non-structural Flood Recovery and Floodplain Management Alternatives*. Washington, DC: FEMA.

Keywords :

nonstructural approaches, floodplain management

Abstract: This document provides information to interested parties about federal programs that support nonstructural approaches to floodplain management. It includes broad strategies and specific federal programs that could form the basis for a non-structural response to a flood event.

Some of these programs include flood mitigation assistance; floodplain management service program; planning assistance to states; river, trails, and conservation assistance program; watershed protection and flood prevention program; and others.

FEMA. (1998). *Hazard Mitigation Funding under Section 406 (Stafford Act)*. Washington, DC: FEMA.

Keywords :

mitigation, Stafford Act, Hazard Mitigation Grant Program

Abstract: This document is intended to guide FEMA personnel responsible for the administration of its public assistance grant program. Its aim is to help ensure national consistency in the use of Section 406 mitigation funds, promote measures that reduce future loss to life and property, protect the federal investment in public infrastructure, and, ultimately, to help build disaster-resistant communities. An appendix lists potential mitigation measures that can be considered cost effective. FEMA considers a mitigation measure to be cost-effective when it: (a) does not exceed 100 percent of the project's cost; (b) is appropriate to the disaster damage; (c) will prevent future similar damage; (d) is directly related to the eligible damaged elements; (e) does not increase risks or cause adverse effects to the property or elsewhere; (f) meets standards of good professional judgment; and, (g) otherwise meets requirements stipulated in the policy on Hazard Mitigation Funding Under Section 406 (Stafford Act).

FEMA. (1998). *Review of FEMA's Implementation of Insurance Requirements in the Public Assistance Program*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

mandatory purchase, public assistance

Abstract: The purpose of this review was to determine whether FEMA could improve its administration of the insurance coverage mandate in the Public Assistance Program. The review identified the following opportunities to streamline the application, review, and approval process for such assistance: (a) recruit a cadre of insurance specialists; (b) require all pertinent insurance information at the time of application for assistance; and (c) consider anticipated insurance proceeds in determining eligibility for funding at the beginning of the process. The review also recommends that FEMA clarify its rules governing waivers of requirements for insurance that are granted by state insurance commissioners.

FEMA. (1999). *Cooperating Technical Community (CTC) Guidance Document. FY 2000-2001*. Washington, DC: FEMA.

Keywords :

floodplain management, mapping

Abstract: Because flood conditions change over time due to natural and man-made changes in watersheds and floodplains, FEMA has an ongoing program to update flood maps for flood-prone communities. At the same time, however, the need for updated flood maps is increasing and federal funding is limited. As a result, a significant portion of the 100,000-panel flood map inventory is outdated. Therefore, in 1997 FEMA designed a plan to modernize the inventory. Over time, the objective is to eliminate the existing backlog of outdated maps and to convert all the maps to a digital format. One of the key objectives of the modernization plan is to increase local involvement in, and ownership of, the mapping process. Therefore, the Cooperating Technical Community (CTC) concept was developed. As technologies have increased

dramatically, many states, regional agencies, and local communities have become increasingly sophisticated and have invested significant resources in the identification of flood hazards. This document contains the initial guidance for the CTC initiative. Some of the objectives of the CTC initiative are (a) to recognize the contributions that FEMA's partners (states, regional agencies, and communities) make in assisting FEMA by providing timely and accurate flood hazard information; (b) to integrate contributing partners into the mapping process; and, (c) to provide training and technical assistance. To implement these objectives, CTC partners need to enter into an overall partnership agreement with the appropriate FEMA Regional Mitigation Division. As the CTC partner and FEMA identify specific tasks to undertake, agreements will be developed and entered into under the umbrella of the overall CTC Partnership Agreement.

FEMA. (1999). *Cover America: FIA's Marketing and Advertising Campaign*. Washington, DC: FEMA.

Available at: <http://www.fema.gov/nfip/market2.htm#1>.

Keywords :

marketing, risk communication, Cover America, Write Your Own programs, NFIP

Abstract: In October 1995, FIA started a nationwide marketing and advertising campaign called Cover America. The campaign's goals include improving awareness of and attitudes about the NFIP and flood insurance, stimulating demand for flood insurance, and providing opportunities for insurance agents, Write Your Own (WYO) companies, and other NFIP stakeholders to participate in and build on the messages delivered. The Cover America campaign uses paid advertising and public relations to reach consumers, insurance agents, and other NFIP stakeholders. Market research is conducted throughout the year to assess how well the campaign is meeting its goals. Findings from this research and other tracking mechanisms are used to improve the campaign. This document describes the campaign and its different components: television, print and radio advertising, direct mail, and Yellow Pages. This document also describes the NFIP co-op advertising program, which provides WYO insurance companies and agents the opportunity to split their advertising costs for any approved flood insurance print or Yellow Pages display ads with the NFIP as well as the development of collateral materials such as brochures and public relations. This document also provides some results attributable to the Cover America campaign. Those results are in concordance to those produced for FEMA by Gallup and Robinson, Inc (1999).

FEMA. (1999). *Environmental Policy Memoranda*. Washington, DC: FEMA.

Keywords :

environmental policy, public assistance, federal programs, legislation

Abstract: This document compiles all environmental policy memoranda that have been issued by FEMA that were in effect as of May 1999. The goal of this memoranda is to serve as an easy reference by program staff in coordinating public assistance grant activities involving environmental issues. Five environmental memos are included: (a) Categorical Exclusion (CATEX) of Projects Involving the Acquisition of Damaged Properties and Implementation of E.O. 12898 Concerning Environmental Justice, April 18, 1994; (b) Other Federal Agency Clearance for Environmental Assessments, May 24, 1994; (c) Policy for Projects Completed Without Environmental Review Required by the National Environmental Policy Act (NEPA), March 24, 1995; (d) Availability and Use of the Updated List of Categorical Exclusions Published February 5, 1996, as a Revision of 44 CFR 10.8, February 27, 1996; and (e)

Documentation of National Environmental Policy Act (NEPA) Categorical Exclusions (CATEX), June 20, 1997.

FEMA. (1999). *Guidelines and Specifications for Flood Map Production Coordination Contractors*. Washington, DC: FEMA.

Keywords :

mapping, NFIP

Abstract: These guidelines define the technical requirements, coordination and documentation activities, and product specifications for a variety of technical tasks such as reviewing the results of studies completed by FEMA's study contractors; converting nonflood-prone and minimally flood-prone communities to the regular phase of the NFIP; processing requests for revisions to flood insurance studies and FIRMs; identifying letters of map change that are superseded when a revised FIRM becomes effective; processing community requests for map updates to reflect recent annexations; processing requests for FEMA's review of determinations made by lending institutions whether buildings or manufactured homes are located in identified SFHAs; responding to inquiries from FEMA's constituents about the NFIP; responding in writing to inquiries from the US Congress about mapping-related matters; processing map revisions under the Coastal Barrier legislation; performing riverine and coastal erosion studies; providing risk assessment activities; and others.

FEMA. (1999). *Hazard Mitigation at Work: Two Alabama Communities*. Washington, DC: FEMA.

Keywords :

Alabama, cost-benefit analysis, mitigation, Hazard Mitigation Grant Program

Abstract: This report tells the story of how FEMA helped Elba and Geneva, AL reduce the impact of repeated flooding. The document begins with a discussion of FEMA's Hazard Mitigation Grant Program (HMGP). It also provides a cost-benefit analysis for the mitigation measures applied at both localities. This report concludes that "hazard mitigation can be a cost-effective way to help reduce the toll of future disasters."

FEMA. (1999). *Hazard Mitigation at Work: Two Georgia Communities*. Washington, DC: FEMA.

Keywords :

cost-benefit analysis, mitigation, Georgia, Tropical Storm Albert

Abstract: This report tells the story of how FEMA helped Newton and Albany, GA reduce the impact of repeated flooding. Both cities have a history of flooding, and both suffered severe damage in the floods caused by Tropical Storm Albert in 1994. This document reviews the FEMA-funded hazard mitigation projects implemented in each community after the floods: removing hundreds of flood-prone properties. It also explains how the cost-benefit analysis was conducted for each project. The document states that "as it turned out, the projects prevented flood damages in each community only a few years after they were implemented." In March 1998, heavy rainstorms caused more flooding in southwest Georgia. While generally not as severe as in 1994, both Albany and Newton again suffered extensive flooding. But because the project removed the structures from flood-prone areas after the 1994 floods, millions of dollars in damages were avoided. This document concludes that "these results underscore the need for hazard-prone communities to get serious about mitigation."

FEMA. (1999). *Hazard Mitigation Grant Program Desk Reference*. Washington, DC: FEMA.
Available at: <http://www.fema.gov/mit/toc.pdf>

Keywords :

Hazard Mitigation Grant Program, Stafford Act, mitigation, legislation

Abstract: Authorized under Section 404 of the Stafford Act, the Hazard Mitigation Grant Program administered by the FEMA provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. FEMA can fund up to 75 percent of the eligible costs of each project. Eligible applicants are state and local governments, Native American tribes, and certain nonprofit organizations. Although homeowners and businesses cannot apply directly to the program, a community can apply for them.

FEMA. (1999). *Mandatory Purchase of Flood Insurance Guidelines*. Washington, DC: FEMA.

Keywords :

legislation, mandatory purchase, legislation

Abstract: Title V of the Riegle Community Development and Regulatory Improvement Act of 1994 (the Reform Act) substantially amended the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The Reform Act tightened the mandatory purchase provisions that originated with the Flood Disaster Protection Act of 1973. Because of the Reform Act's continuing impact on lenders, the FIA updated and reformatted the purchasing guidelines, previously issued in October 1989 and May 1997. This report notes that implementing the mandatory flood insurance purchase requirements is the responsibility of the various federal agencies that oversee lenders, not the FIA. "However, federal Agencies and Instrumentalities shall, in cooperation with the Director of FEMA, issue appropriate rules and regulations to govern the regulations under the Reform Act."

FEMA. (1999). *Mapping Activity Statement Templates for Cooperative Technical Partners Initiative*. Washington, DC: FEMA.

Keywords :

mapping

Abstract: The Mapping Activity Statements cover a range of products and services that depend on the partner's interest, technical expertise, and available resources. The statements can cover simple activities, such as providing a digital base map, and more sophisticated activities, such as conducting flood hazard studies and preparing print-ready digital flood maps for distribution by FEMA. Nine templates for Mapping Activity Statement are included. These templates address the most common mapping activities. They can be used directly or as guidelines for the development of specific agreements between FEMA and its local, regional, or state partners. FEMA states that agreements other than the nine listed may also be possible.

FEMA. (1999). *Model Programmatic Agreement: Historic Review*. Washington, DC: FEMA.

Keywords :

historic sites, public assistance, legislation

Abstract: This document makes available the Model Programmatic Agreement to accomplish the Section 106 requirements under the National Historic Preservation Act (NHPA) of 1966, as

amended. It is intended for FEMA personnel in coordinating historic review for FEMA undertakings using grant funds for public assistance. Section 106 of NHPA requires all federal agencies to review the effect of an agency undertaking on historic properties prior to funding the project, activity, or program. FEMA developed this document in order to simplify and expedite coordination and to provide specific guidance to consulting parties in the historic review process. This document also exempts routine disaster-recovery activities with little potential of adversely affecting historic properties from the review mandated by the NHPA.

FEMA. (1999). *Modernizing FEMA's Flood Hazard Mapping Program: Recommendations for Using Future Conditions Hydrology for the National Flood Insurance Program.*

Washington, DC: FEMA.

Keywords :

mapping

Abstract: This document describes FEMA's plan to modernize its mapping program through cooperative agreements with state and/or local partners. FEMA will provide funds for mapping, technical assistance, and mentoring to the state or local partner, which will then develop and maintain all or a component of its flood map, thus maintaining the connection between mapping and managing flood hazard areas. One conclusion is that FEMA's maps should display floodplains based on future conditions hydrology, as determined by the local partners, while FEMA will continue to require regulation of floodplain development based on existing conditions data. Topics discussed include the role of state and local partners; emphasis on local mapping needs; historical perspective on future conditions; defining future conditions; use of flood hazard maps for floodplain management, flood insurance rating, and other purposes; constraints and benefits of using future conditions data on NFIP maps; conclusions; and implementation through map specifications, Cooperating Technical Community agreements, revisions, rule making, and outreach.

FEMA. (1999). *Modernizing FEMA's Flood Hazard Mapping Program (Fiscal Year 1999 Progress Report).*

Washington, DC: FEMA.

Keywords :

mapping

Abstract: In 1997 the FEMA developed a plan to modernize its flood mapping program. This report summarizes the progress the agency made toward implementing the plan in FY 1999. The plan is a seven-year effort to upgrade its inventory of flood maps and enhance its products, services, and processes. It is anticipated that the map modernization plan will help prevent approximately \$26 billion in flood damages to new buildings over a 50-year period. The map production process includes a mapping needs assessment, a tailored scope of work to be developed with FEMA's mapping partners, and concurrent production processes. Objectives of the modernization plan that have been completed include Flood Hazard Mapping Web Site Architecture, the establishment of the FEMA Map Assistance Call Center, Multi-Year Study Contracts, Guidelines and Specifications for Flood Map Production Coordination Contractors, and a Memorandum of Agreement with the Department of Defense. Other objectives are ongoing, have been deferred, or are new objectives.

FEMA. (1999). *Mutual Aid Agreement for Public Assistance.*

Washington, DC: FEMA.

Keywords :

public assistance, Stafford Act

Abstract: This document specifies criteria by which FEMA will recognize the eligibility of costs under the Public Assistance Program incurred through mutual aid agreements between applicants and other entities. It is intended for personnel involved in the administration of the Public Assistance Program. It applies to emergency work authorized under Sections 403, 407, and 502 of the Stafford Act. The motivation for this document is as follows: many state and local governments and private nonprofit organizations formulate mutual aid agreements to provide emergency assistance to each other in the event of disasters or other crises. The conditions of the agreements may be to provide reciprocal services or to receive direct payment through specific labor and equipment rates outlined in the agreements. These agreements usually are written but, occasionally, are by understanding or are arranged after a disaster occurs. This document addresses both written and unwritten mutual aid agreements. Among others, this document lists the conditions under which FEMA will reimburse the cost of mutual aid agreement associated with emergency assistance (e.g., “the mutual aid agreement applies uniformly in emergency situations. The agreement must not be contingent upon a declaration of a major disaster or emergency by the federal government or on receiving federal funds.”), states that “there are no provisions for reimbursement for mutual aid when there is no formal written agreement,” and warns that “long term use of these agreements is not expected. Applicants must advertise and award competitive bid contracts for permanent repairs.” “FEMA recognizes only mutual aid agreements that are between governments or private nonprofit organizations in separate areas. FEMA does not recognize ‘mutual aid agreements’ between agencies, departments or entities of the same town, county or state government.”

FEMA. (1999). *The National Flood Insurance Program Community Status Book*. Washington, DC: FEMA.

Keywords :

lending institutions, mandatory purchase, risk communication, NFIP

Abstract: This book provides information about communities participating in the NFIP as well as communities that are not participating in that program but that have had special flood hazards identified by the FIA. The purpose of this book is, among others, to assist lenders in determining whether flood insurance must be required as a condition of federal or federally related financial assistance; assist property owners and insurance agents in determining whether flood insurance is available in a particular community, and whether a map showing flood zones is available. This book also contains several useful appendices, such as the mandatory purchase guidelines, lender regulations, Mortgage Portfolio Protection Program, Write Your Own Company guidelines and requirements, and private flood insurance criteria.

FEMA. (1999). *Numerical Models Accepted by FEMA for NFIP Usage*. Washington, DC: FEMA.

Keywords :

modeling, zoning, NFIP

Abstract: FEMA has developed a comprehensive listing of all numerical models that are accepted for NFIP usage. This document is arranged under a chart format that provides essential references for coastal models (coastal storm surge, coastal wave height, and coastal wave effects models), hydrologic models (single event and continuous event models), statistical models, hydraulic models (one-dimensional steady flow, one-dimensional unsteady flow, two-

dimensional steady/unsteady flow, and floodway analysis models), and sediment transport models.

FEMA (1999). *Public Assistance Guide*. Washington, DC: FEMA.

Keywords :

public assistance

Abstract: This guide supports FEMA's grants for infrastructure recovery through the Public Assistance Program. Potential recipients of this funding include state and local governments and certain types of private nonprofit organizations. The guide replaces FEMA 286, issued in September 1996. It describes the program's provisions and application procedures.

FEMA. (1999). *Riverine Erosion Hazard Areas: Mapping Feasibility Study*. Washington, DC: FEMA.

Keywords :

erosion, mapping, modeling, riverine areas

Abstract: Section 577 of the National Flood Insurance Reform Act of 1994 requires that FEMA submit a report to Congress that evaluates the technological feasibility of mapping Riverine Erosion Hazard Areas (REHAs) and assesses the economic impact of erosion and erosion mapping on the NFIP. The purpose of this study is to determine whether it is technologically feasible to map riverine erosion hazards. Based on a literature review, case study analysis, and input from experts, methodologies for analyzing and mapping REHAs were identified. Using cost data associated with existing case studies, the document estimated the approximate cost per river mile of conducting riverine erosion hazard studies and adding areas to existing FIRMs. The case studies indicated that there are scientifically sound procedures for delineating riverine erosion hazards, although for shorter time frames (30 years) than the 60 years specified in Section 577. Estimated average study values were \$2,000-\$3,000 per mile for geomorphic methods, \$6,000-\$7,000 for engineering methods, and \$10,000-\$12,000 for mathematical modeling methods. The report estimated that the implementation of this effort as part of the NFIP would cost between \$200 and \$300 million. This report does not include a cost-benefit analysis.

FEMA. (1999 Draft). *Vermont lender compliance with the Flood Disaster Protection Act of 1973 and the Title V of the Riegle Community Development and Regulatory Improvement Act of 1994*. Boston, MA: FEMA.

Keywords :

lending institutions, compliance, mandatory purchase, Vermont

Abstract: This post-disaster study assesses the rate of lender compliance following catastrophic flooding in Vermont during the summer of 1998. FEMA determined that out of the 1,549 applications received for federal disaster assistance, 120 of them came from commercial or residential properties located in Special Flood Hazard Areas (SFHA) designated as Flood Zone A. The study finds that 54 of these properties (45 percent) had mortgages from a federally regulated institution but did not have flood insurance as required by law. Moreover, the federal government provided approximately \$500,000 in disaster assistance to these properties—money that would not have been provided had these properties maintained flood insurance.

FEMA. (2000). *1999 Stakeholder's Report*. Washington, DC: FEMA.

Keywords :

NFIP

Abstract: This report is the most recent annual update of the status of the NFIP and all of its components. It details the activities in the areas of insurance policy changes, marketing, claims, and mitigation, and provides statistical profiles of the NFIP's income and expenses by types.

FEMA. (2000). *Annual Performance Plan: Fiscal Year 2001*. Washington, DC: FEMA.

Keywords :

strategic planning, NFIP

Abstract: The *Annual Performance Plan* outlines how FEMA's strategic goals and objectives will be pursued during FY 2001. The plan presents 30 annual performance goals for FY 2001. Each of these supports a five-year operational objective contributing to one of the three FEMA strategic goals. Some of the objectives include an increase in the availability and effectiveness of natural hazards information and an increase in the availability of loss-estimation and risk-assessment methods and tools. Other activities include working with federal agencies that influence the built environment to develop and implement a consistent federal policy on natural-hazard mitigation; providing incentives and support to the nonfederal public sector to increase disaster resistance; increasing by 20 percent over 2000 baselines the private sector's involvement in disaster resistance; and supporting states, tribes, and communities in their mitigation activities. FEMA will also collect and validate building and flood loss data; confirm that the reduction in estimated losses from NFIP activities exceeds \$1 billion; and continue systematic assessment of the NFIP's impact and effectiveness; increase the number of NFIP policies in force by 5 percent; and operate the mitigation program for repetitive-loss properties and implement measures to reduce the subsidy to pre-FIRM properties to improve the program's underwriting ratio.

FEMA. (2000). *Audit of FEMA's Cost Estimate for Implementing the Flood Map Modernization Plan*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

mapping

Abstract: This report concludes that FEMA's estimates of the cost of modernizing its maps can, and should, be improved. In some instances, FEMA did not verify data, use reliable cost data, or establish a sound basis for some assumptions. In addition, FEMA did not fully consider savings that could be realized from technology. The report recommends that FEMA validate its mapping needs for mapped and unmapped communities and determine whether creating or updating maps would be cost beneficial; track costs related to map modernization so that actual cost data will be available to use in estimating future costs; and present the estimate as a range to better disclose the uncertainty in the assumptions and the financial impact of alternative assumptions. It is additionally recommended that Mitigation Directorate expedite the incorporation of new flood-study and terrain data collection techniques and include in the Flood Map Modernization Plan the cost impact of partnerships with state and local governments, new mapping techniques, and technological advances.

FEMA. (2000). *Call for Issues Status Report*. Washington, DC: FEMA.

Keywords :

strategic planning, NFIP

Abstract: In 1998, FEMA decided to solicit outside input. This solicitation was implemented through a nationwide *Call for Issues*. Through the *Call for Issues*, FEMA requested comments on all facets of the NFIP from its partners and customers. The *Call for Issues Status Report* summarizes issues related to the FIA, mitigation, and hazard identification and mapping. FEMA responded to each issue submitted with a definitive decision or action and provided an explanation for each issue to clarify the decision and possible actions to be taken.

FEMA. (2000). *Compendium of Flood Map Changes Archive*. Washington, DC: FEMA.

Keywords :

mapping

Abstract: The *Compendium of Flood Map Changes* is a list of all the changes made to the NFIP maps including Physical Map Revisions, Letters of Map Revision, and Letters of Map Amendment during a given six-month period. For each Letter of Map Change, information on the map panel(s) affected, effective date of this change, case, number and determination type is provided. For each physical map change, the Map Revision listing provides the map panel(s) affected and the effective date of this change. The listing is updated every six months and published in the Federal Register.

FEMA. (2000). *Cover America II*. Washington, DC: FEMA.

Available at: <http://www.fema.gov/nfip/coverii.htm>

Keywords :

marketing, risk communication, Cover America, NFIP

Abstract: This document describes the characteristics of the Cover America II campaign. This campaign started in 1999 and will continue until 2003. It replaces the Cover America I campaign (1995-1999). This document announces that to increase awareness, improve attitudes and increase flood insurance sales, FEMA has “established a brand for the NFIP. It builds on the yellow diamond street sign, which we see everyday, used to warn drivers of upcoming dangers and to change their behavior as a result of the potential danger. Our new brand couples this sign with the message: ‘Be Flood Alert.’ To the right of the sign are the words: ‘National Flood Insurance Program.’ This brand aims to serve as the foundation for all components of the campaign, including advertising, co-op advertising, and public relations, and gives us the opportunity to talk about all aspects of the NFIP, from mitigation to flood insurance. This document describes the 1999 radio and TV campaign and the co-op advertising program. It also lists ‘mat stories’: stories written and distributed to newspapers across the country throughout the year. These articles provide tips about floods, flood insurance, and flood prevention.” The document contains samples of printed ads as well as the testimony of some co-op advertising partners, and some recent mat stories.

FEMA. (2000). *Economic Impact Assessment Reports for Hurricane Floyd for New Jersey*. Washington, DC: FEMA.

Keywords :

economic impacts, Hurricane Floyd, New Jersey

Abstract: This report, completed by the Department of Commerce’s Economic Development Administration at FEMA’s request, is intended to: (a) provide a comprehensive assessment of the economic impacts of Hurricane Floyd on the affected areas of New Jersey; (b) provide recommendations for businesses, state and community officials on how to accelerate the

recovery process; (c) build back safer, stronger, and smarter; and, (d) create disaster-resistant businesses and jobs. Hurricane Floyd affected more than 76,000 residences and 4,000 businesses in the nine disaster declared counties in New Jersey. The assessment focuses on six communities that were most at risk for long-term negative impacts from the storm: the boroughs of Lodi, Bound Brook, and Manville and the cities of Trenton, Passaic, and Paterson.

FEMA. (2000). *Economic Impact Assessment Reports for Hurricane Floyd for North Carolina*. Washington, DC: FEMA.

Keywords :

economic impacts, Hurricane Floyd, North Carolina

Abstract: This report, completed by the Department of Commerce's Economic Development Administration at FEMA's request, is intended to: (a) provide a comprehensive assessment of the economic impacts of Hurricane Floyd on the affected areas of North Carolina; (b) provide recommendations for businesses, state and community officials on how to accelerate the recovery process; (c) build back safer, stronger, and smarter; and, (d) create disaster-resistant businesses and jobs. Hurricane Floyd caused approximately \$6 billion in economic losses in North Carolina: \$1 billion in business structural losses, \$4 billion in business revenues; and \$1 billion in agricultural losses. Sixty-six of the 100 counties in the state were declared disaster areas, with 44 counties suffering economic impacts ranging from minor to severe. The assessment focuses on these 44 counties. The analysis is divided into nonagricultural and agricultural business sectors.

FEMA. (2000). *Economic Impact Assessment Reports for Hurricane Floyd for Virginia*. Washington, DC: FEMA.

Keywords :

economic impact, Hurricane Floyd, Virginia

Abstract: This report, completed by the Department of Commerce's Economic Development Administration at FEMA's request, is intended to: (a) provide a comprehensive assessment of the economic impacts of Hurricane Floyd on the affected areas of Virginia; (b) provide recommendations for businesses, state and community officials on how to accelerate the recovery process; (c) build back safer, stronger, and smarter; and, (d) create disaster-resistant businesses and jobs. Throughout Virginia, Hurricane Floyd affected 206 businesses, with losses of \$35 million. In addition, agricultural losses reached \$17 million. The City of Franklin, and the adjacent counties of Isle of Wight and Southampton, were especially hard hit by flooding. These areas of the Commonwealth therefore became the focus of the detailed analysis and recommendations in the report.

FEMA. (2000). *FEMA Launches Project Impact Disaster Prevention Radio PSA*.

Washington, DC: FEMA.

Keywords :

mitigation, Project Impact, media

Abstract: FEMA's Project Impact: Building Disaster Resistant Communities launched a combined television and radio public service announcement (PSA) campaign encouraging Americans to ask what their community is doing to become disaster resistant. The PSA followed two recent surveys regarding tornado and hurricane seasons. Survey respondents said they felt well prepared for disasters, but that they had not taken any prevention measures to prepare for

natural disasters. In hurricane-prone states, 76 percent of respondents in northern states and 58 percent in southern states had not taken any prevention measures. The National Association of Broadcasters, which serves and represents America's radio and television stations, has taken on FEMA's Project Impact as a national campaign and will work to promote among its members the importance of prevention measures to reduce disaster damage.

FEMA. (2000). *Flood Insurance Manual*. Washington, DC: FEMA.

Keywords :

NFIP, insurance agents

Abstract: The *Flood Insurance Manual* is used primarily by insurance companies and agents writing flood insurance. This new *Manual* reflects all of the changes in the rewritten Standard Flood Insurance Policy (SFIP), which is included in the *Manual's* policy section. A summary of significant changes to the SFIP is provided in front of each policy form. A full edition available at <http://www.fema.gov/nfip/covr1000.pdf> also contains the 1994 Edition that was revised and reprinted October 1997, the change pages for May 1, 1998, October 1, 1998, May 1, 1999, October 1, 1999, May 1, 2000 and October 1, 2000.

FEMA. (2000). *NASA joins FEMA's Project Impact Effort*. Washington, DC: FEMA.

Keywords :

mitigation, mapping, Project Impact, California, Virginia, Red River, North Dakota, Minnesota

Abstract: FEMA and the National Aeronautics and Space Administration (NASA) signed an agreement under which FEMA will use NASA science, technology and remote-sensing research in emergency management and disaster prevention activities. FEMA expected that the cooperative agreement would result in updated and more accurate maps of floodplains, a better understanding of wildfires and maps to improve disaster recovery and mitigation by state and local communities throughout the United States. The first cooperative activity under the agreement involved mapping floodplains in California's Los Angeles basin and around Sacramento, CA, Virginia Beach, VA, the Red River along the North Dakota and Minnesota borders, and San Francisco.

FEMA. (2000). *National Flood Insurance Program Community Rating System: Biennial Report to Congress*. Washington, DC: FEMA.

Keywords :

Community Rating System, insurance premiums, mitigation

Abstract: This third biennial report submitted to Congress provides an overview of the Community Rating System (CRS) from inception to future directions. This report reminds the reader that (a) the CRS was implemented in 1990 "to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards; (b) the National Flood Insurance Reform Act of 1994 codified the CRS in the NFIP, and (c) under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities. The report describes the ten CRS classes (class I requires the most credit points and gives the largest premium reduction). The report states that over 900 communities received discounted insurance premiums based on their implementation of measures that go beyond minimum NFIP requirements. The report points out that these 900-plus communities accounted for over 66 percent of the NFIP's policy base.

FEMA. (2000). *Opportunities to Enhance Compliance with Homeowner Flood Insurance Purchase Requirements*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

compliance, mapping, Special Flood Hazard Areas

Abstract: The report notes a 38 percent compliance rate with the requirement that property owners with mortgages from federally regulated lending institutions acquire and maintain flood insurance. The report recommends that to increase compliance the FIA should study compliance levels in areas most recently impacted by floods and identify structures that were originally outside special flood hazard areas, but where after the flood map was updated, the status may have been changed. The report also recommends a process to ensure that lapsed policies are identified.

FEMA. (2000). *Project Impact: Building Disaster Resistant Communities*. Washington, DC: FEMA.

Keywords :

risk communication, Project Impact, awareness, mitigation, disaster planning

Abstract: With Project Impact: Building Disaster Resistant Communities, FEMA expects to change the way America deals with disasters. Project Impact aims to help communities to protect themselves from natural disasters. Project Impact bases its work and planning on three principles: preventive actions at the local level; private sector participation; and long-term efforts and investments in prevention measures. The report explains that in 1997, FEMA partnered with seven pilot communities across the country and was encouraged by the benefits seen and the determined commitment that flourished at the local level. Project Impact quickly became a nationwide initiative as more communities began to see the value in disaster planning and mitigation. Today there are nearly 250 communities, as well as more than 2,500 businesses that have joined as Project Impact partners.

FEMA. (2000). *Project Impact: Identifying and Reporting Partner Contributions*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

federal programs, mitigation, Project Impact, NFIP

Abstract: This report assessed the community mitigation grant initiative of NFIP's Project Impact and revealed several areas where the identification and reporting of partner contributions should be improved. The report recommends that FEMA take steps to increase the accuracy of reported partner contributions by issuing guidance to communities to identify contributions more accurately and consistently and to improve its strategy for reporting quantifiable and nonquantifiable contributions so that valuable attitudinal and behavioral changes in communities are not overlooked. As the number of Project Impact communities grows, the report recommends that "best practice" examples be disseminated to share successful ideas and exemplary tasks and that FEMA realign its resources to better meet the increasing workload placed on regional coordinators. The report further recommends that FEMA educate communities about grant procedures, ensure that communities are selecting viable projects, and more closely monitor mitigation projects using federal funds so that the current trend of communities' slow spending of federal grant monies can be changed.

FEMA. (2000). *Report on Costs and Benefits of Natural Hazard Mitigation*. Washington, DC: FEMA.

Keywords :

cost-benefit analysis , mitigation

Abstract: This report reviews benefits that can accrue to different segments of society from mitigation, the costs incurred, the types of analyses needed to evaluate cost-effectiveness, the tools of hazard mitigation (including design and construction, land use planning, organizational plans, and hazard control and how they are implemented), and FEMA's mitigation programs. Sixteen case studies illustrate the diversity of mitigation measures that can address risk situations. The cases demonstrate that mitigation is effective against several types of natural hazards and can be accomplished through the use different mitigation tools. The report concludes that hazard mitigation is a long-term community-based undertaking that relies on an investment from all sectors of the community, not just federal, state, and local governments. Mitigation often requires a structuring of incentives and relies on a recognition of the risks of natural disasters and the development of new methods to reduce these risks.

FEMA. (2000). *Report of the Floodplain Management Forum*. Washington, DC: FEMA.

Keywords :

floodplain management, strategic planning

Abstract: This report summarizes the proceedings of The Floodplain Management Forum, held on June 8, 2000, in Washington, DC. A diverse group of experts on floodplain management participated in discussions of the future of floodplain management in the United States. Some of the major themes presented (though not necessarily agreed upon) by the participants include: shifting focus from flood-loss reduction to sustainable communities and protection of natural/beneficial functions of floodplains, encouraging and providing incentives for communities to develop master plans and hazard mitigation plans, developing more effective ways to communicate risks to citizens, considering incorporating components of the Community Rating System into NFIP regulations, and developing methods to improve flood insurance and eliminate subsidies.

FEMA. (2000). *Summary of Significant Changes to the Standard Flood Insurance Policy Effective December 31, 2000*. Washington, DC: FEMA.

Keywords :

insurance coverage

Abstract: This report summarizes changes to the standard flood insurance policy that took place in 2000. These changes include 16 changes affecting the insurance coverage of dwellings, 13 changes affecting the insurance coverage of general properties, and another 13 changes affecting the insurance coverage of residential condominium buildings.

FEMA. (2001). *Buyouts: Hurricane Floyd and Other Issues Relating to FEMA's Hazard Mitigation Grant Program, Report to the Chairperson, Subcommittee on VA, HUD, and Independent Agencies, Committee on Appropriations, US Senate (I-02-01)*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

buyouts, cost-benefit analysis, Hazard Mitigation Grant Program, Hurricane Floyd, relocation

Abstract: This report summarizes the Office of Inspector General's findings concerning money allocated for buyout and relocation programs (P.L. 106-113 and P.L. 106-246) following Hurricane Floyd. The Inspector General was requested to determine whether FEMA's buyout estimates are accurate and to provide an assessment of FEMA's oversight procedures. The report's first section focuses on: (a) the process used to identify buyout structures; (b) the method used to estimate the total cost of the buyout; (c) the impact of other sources of disaster assistance on buyout decisions; (d) the process developed for allocating funds; and, (e) the procedures used for cost-benefit analysis. The second section addresses concerns regarding the implementation of the Hazard Grant Mitigation Program (HGMP) and develop recommendations for action and issues for further review. In the final section, the report suggests further improvements that can be made to the HMGP.

FEMA. (2001). *Coastal Barrier Resources System: FEMA's Management Controls Governing the Prohibition of Flood Insurance*. Washington, DC: Office of Inspector General, FEMA.

Keywords:

Coastal Barrier Resource System, legislation, Write Your Own programs, communication, Alabama, Florida, Rhode Island, South Carolina

Abstract: FEMA's Office of Inspector General (OIG) conducted this review of internal controls to prevent the sale of flood insurance to properties within the Coastal Barrier Resource System (CBRS). The OIG reviewed relevant legislation and regulations governing the CBRS and the prohibition on the sale of flood insurance to these properties. The OIG reviewed files maintained for resolution of policies issued in the CBRS and reviewed all policies indicated to be potentially within the CBRS in Alabama, Florida, Rhode Island, and South Carolina. The OIG also conducted interviews with officials at FIMA as well as contractors who have a role in CBRS compliance requirements and Write Your Own (WYO) companies involved in the sale of insurance in near CBRS areas. First, the OIG found that policies potentially in the CBRS were not always fully processed or reported due to lack of accurate community identification, low confidence level in addresses, and outdated digital FIRM data. The OIG recommended that all policies be fully processed using the Geographic Policy Edit System even when only incomplete information is available and that policies potentially in the CBRS be reported to WYO companies and FIMA's Direct Serving Agent for further clarification. Second, the OIG examined how policies identified as potentially in the CBRS are resolved. The OIG found that of the policies examined potentially in the CBRS, about 46 percent had no record of determination (it is not required for WYOs to seek determination). The OIG recommended that FIMA require resolution of all cases where there is no record and encourage use of the U.S Fish and Wildlife Service to resolve unclear policies. Lastly, the OIG recommended that FIMA explore the possibility of requiring the resolution policies potentially in the CBRS prior to issuing policies.

FEMA. (2001). *Compliance with Public Assistance Program's Insurance Purchase Requirements*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

enforcement, public assistance, compliance

Abstract: This inspection assessed compliance with insurance purchase requirements as required for FEMA's Public Assistance Program, the insurance review process for the program, insurance applicability issues, and possible rule changes for insurance. With respect to compliance with insurance purchase and maintenance requirements, the inspection revealed that 34 percent of the

projects were not maintaining insurance, 39 percent of the project files did not contain acceptable evidence of insurance, and some projects were purchasing less insurance than required. With respect to the insurance review process, the report recommends that FEMA take specific steps to improve the quality of the documentation accepted as proof of insurance for projects in order to decrease the likelihood of FEMA providing unnecessary assistance. The report also recommends that FEMA regularly monitor public entities to ensure they are maintaining insurance on public buildings that previously received public assistance. The report proposes an option for a proposed rule that would help eliminate current disincentives, streamline insurance reviews, and encourage state and local governments to obtain insurance cover.

FEMA. (2001). *Fiscal Year 2002 Annual Performance Plan*. Washington, DC: FEMA.

Keywords :

strategic planning

Abstract: The *Annual Performance Plan* outlines how the strategic goals and objectives of the FEMA will be pursued during FY 2002. The plan illustrates how FEMA will execute its mission to “reduce the loss of life and property and protect our institutions from natural and technological hazards by leading and supporting the nation in a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery.” The following goals are identified: (a) support the development of disaster resistance in communities and states; (b) collect, validate, and refine building and flood-loss data and confirm that the reduction in estimated losses from NFIP activities exceeds \$1 billion; (c) increase the number of NFIP policies in force by 5 percent, with the active assistance of new and existing program partners; and, (d) improve the “bottom line” or combined loss and expense ratio by 1 percent.

FEMA. (2001). *Status of Funds Awarded under the Hazard Mitigation Grant Program and Other Project Management Issues (I-03-01)*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

Hazard Mitigation Grant Program, mitigation

Abstract: In this report FEMA’s Office of Inspector General evaluated the status of awards under the Hazard Mitigation and Grant Program (HMGP) and examined factors impacting timely distribution of funds and completion of mitigation projects. The report concluded that the large balance of undisturbed funds is due to the inability of FEMA, state, and local governments to spend available funds and implement projects in a timely manner and it is neither fiscally prudent nor responsible for FEMA to carry such large balances. Another factor is FEMA’s failure to consider state and local capacity before providing grants and the weakness of program designs. The report makes a series of recommendations about how the program could be more effectively implemented, including allocating funds on an annual basis, broader incentives for states to expedite mitigation projects, and establishing a competitive process for deobligated funds. The report finds that FEMA has addressed some of the recommendations made in the report and has made progress in shortening the project approval timeframes, however several recommendations remain unresolved.

FEMA. (2002). *Duplication of Benefits: National Flood Insurance Program and the Disaster Housing Program’s Minimal Repair Grants (I-02-02)*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

disaster assistance, public assistance, federal programs, compliance

Abstract: This report presents results regarding duplication of benefits (DOB) between the NFIP and the Disaster Housing Program's Minimal Repair Grants. A sample of seven disasters revealed 863 cases of potential DOB totaling \$3.5 million. Of these 863 cases of potential DOB, FEMA notified 156 to return funds and received full or partial payments from only 89.

Furthermore, data inconsistencies between the NFIP and NEMIS databases impede the efficient and effective identification of potential DOB. Based on these results and observations, the reports makes the following recommendations to FEMA: (1) develop consistent data entry and maintenance standards for key data elements maintained in the NFIP and NEMIS databases; (2) develop an automated interface, data warehouse capability to query key data elements between the NFIP and NEMIS databases prior to paying for minimal repairs; (3) perform post-disaster database comparisons as an interim measure until an automated system is operational; (4) follow up on the DOB cases identified during this review and initiate recoupment action, as appropriate; and (5) enhance the debt collection process under the Disaster Housing Program to ensure the DOB is identified and recovered in a reasonable time frame.

FEMA. (2002). *Extent that Mitigation Funds are Used to Address Repetitive Flood Loss and Other Related Issues (I-01-02)*. Washington, DC: Office of Inspector General, FEMA.

Keywords :

repetitive losses, Hazard Mitigation Grant Program, federal programs, mitigation

Abstract: As incidents of widespread flooding persist, the number of insured properties suffering repetitive flood losses continues to cause financial hardship for the National Flood Insurance Program (NFIP). This report assesses the extent to which mitigation funds are being used to address the problem of repetitive flood loss and makes recommendations in three areas. First, the HMGP and FMA program cannot adequately address repetitive flood loss properties without exemption from or elimination of certain policies including time limits and formulas used for allocating funds. Second, the collection and dissemination of data on repetitive flood loss properties needs improvement with regards to accuracy, consistency, and usability. Finally, FEMA and State officials can better use NEMIS to manage the repetitive loss problem. The report also notes several impediments faced by property owners to mitigate including the inability to share the costs, a lack of knowledge about mitigation opportunities, and the availability of subsidized flood insurance.

FEMA. (2002). *Guidelines and specifications for flood hazard mapping partners*. Washington, DC: FEMA.

Keywords :

mapping

Abstract: In this report, FEMA defines technical requirements, products specifications for Flood Hazard Maps and relation National Flood Insurance Program (NFIP) products, and associated coordination and documentation activities. These guidelines combine FEMA technical, programmatic, and administrative procedure publications, guidance documents (listed below), and memorandums regarding Flood Hazard Mapping. These guidelines also reflect recent changes to processes and products associated with the implementation of the FEMA Map Modernization Program, including the Cooperating Technical Partners initiative and the new Project Scoping procedures. Unless specifically indicated otherwise by FEMA for a particular

contract or agreement, these guidelines supersede previous FEMA guidelines and documents regarding the preparation of Flood Hazard Maps, including, but not limited to, the following:

- Flood Insurance Study Guidelines and Specifications for Study Contractors (FEMA 37, January 1995) and any previous revisions thereof;
- Airborne Light Detection and Ranging Systems (Appendix 4B to FEMA 37, May 2000)
- Guidelines and Specifications for Flood Map Production Coordination Contractors (Final Draft, February 17, 1999);
- Guide for Preparing Technical Support Data Notebook (January 1990);
- Guidelines for Determining Flood Hazards on Alluvial Fans (February 23, 2000);
- Guidance for Scoping Flood Mapping Projects (January 12, 2001);
- Guidelines and Specifications for Wave Elevation Determination and V Zone Mapping (March 1995);
- Guidelines and Specifications for Wave Elevation and Determination and V Zone Mapping – Great Lakes (October 1994);
- “Procedures for Collecting, Depositing, and Reporting Fees Under Part 72 of the NFIP Procedures” (undated);
- “Procedures for the Administration of FEMA’s Fee-Charge System” (undated);
- DFIRM Graphic Specifications (November 2000); and
- Standard DFIRM Database Guidelines and Specifications (May 2001).

Federal Interagency Floodplain Management Task Force. (1992). *Floodplain Management in the United States: An Assessment Report*, 2 volumes. Vol. I – Summary Report. Boulder, CO: University of Colorado Natural Hazards Information Center. Vol. II – Full report. Washington, DC: US Government Printing Office.

Keywords :

floodplain management, Unified National Program, awareness

Abstract: This assessment of floodplain management in the United States is a report to the public and to the Congress on progress toward implementation of *A Unified National Program for Floodplain Management*. It states that although a truly unified national program to manage floodplains is not yet in place, great strides have been made in that direction. Awareness of flood hazards, particularly among public officials, has clearly increased, while loss of life and injury due to flooding has been curtailed. Nationwide mapping of flood-prone areas by the FIA has resulted in the initial mapping of more than 12,000 communities and the restudy of over 1,700 communities since coordinated studies began in the 1960s. Eighty-two percent of all flood-prone communities in the United States have joined the NFIP. Computers are increasingly being incorporated into floodplain management and now facilitate such functions as hydrologic modeling, flood warning, and floodplain mapping. The study also declares that modifying flooding has traditionally been the most popular strategy for reducing floodplain losses because the states or federal government conduct most of the planning, funding, construction, and implementation for structural measures and because local and individual adjustments or sacrifices are minimal. Although there is increased recognition of possible adverse effects of these approaches, they are still needed, particularly to protect existing development. In contrast, the strategy of restoring and preserving the natural and cultural resources of floodplains has had little exposure to date and needs to be better integrated both with other floodplain management tools and strategies and with efforts in other fields, such as river corridor management and pollution control.

Federal Interagency Floodplain Management Task Force. (1994). *A Unified National Program for Floodplain Management*. Washington, DC: FEMA.

Keywords :

floodplain management, Unified National Program, public policy

Abstract: This report provides a conceptual framework for floodplain management that includes a statement of overall purpose, definitions, working and general principles, and management strategies and tools. The report also suggests setting national goals and a timetable for their achievement, providing for periodic evaluations of the status of floodplain management, defining the roles and responsibilities of each level of government and the private sector. Floodplain management aims to achieve a reduction in the loss of life, disruption, and damage caused by floods and the preservation and restoration of the natural resources and functions of floodplains (which, in turn, lessens damage potential). There are four main strategies for managing floodplains: (a) modifying human susceptibility to flood damage and disruption; (b) modifying the impact of flooding on individuals and the community; (c) modifying flooding; and (d) preserving and restoring the natural resources of floodplains. Under this framework, the decisions of floodplain managers involve choosing the best mixture of strategies and tools, balancing competing uses, weighing costs and benefits, and evaluating various alternatives. To ensure that the result of this ongoing decision-making process is improvement of the status of floodplains, four broad goals have been recommended, along with a list of objectives that must be accomplished to reach them. The goals include: (a) formalizing a national goal-setting and monitoring system for floodplain management; (b) reducing, by at least half, the risks to life, property, and the natural resources of the floodplains; (c) developing and implementing a process to encourage positive attitudes toward floodplain management; and, (d) establishing capacity for in-house floodplain management.

Flanigan, George, Rob Isaacs, David C. Marlett, and Elaine Sebald. (2000). *Managing Flood Losses: An International Review of Mitigation and Financing Techniques*. Malvern, PA: Central Illinois Chapter, Chartered Property Casualty Underwriters

Keywords :

risk financing, mitigation, Australia, Brazil, Canada, China, Japan, Netherlands, Great Britain

Abstract: This article identifies effective methods for handling the flood peril. It also considers whether such techniques should be considered by the US government and/or private insurance market to strengthen the flood risk safety net. The authors compare the US flood risk financing and mitigation system with those used by Australia, Brazil, Canada, China, Japan, the Netherlands, and the United Kingdom.

Flood Hazard Team. (2000). *Earth Observation Satellites for Flood Management, Flash Flood Analysis and Prediction*. Committee on Earth Observation Satellites, Disaster Management Support Group.

Keywords :

mapping

Abstract: The Committee on Earth Observation Satellites Disaster Management Support Group “supports natural and technological disaster management on a worldwide basis by fostering improved utilization of existing and planned Earth Observation (EO) satellite data.” This report addresses the use of Earth Observation satellites for flood managers, flash flood analysis and

prediction, and the user community. This report concludes that the potential of high and low resolution polar orbital Earth Resource Satellites have been shown to be an excellent tool for providing hydrological information. A family of satellite-derived products from the operational meteorological satellites (geostationary and polar) for application to general flood and flash flood analysis and prediction is also presented. Gaps in our remote sensing capabilities are discussed and future improvements and requirements are presented. The ultimate goal is to integrate geostationary with polar orbital data and to have microwave onboard geostationary satellites early in the next millennium.

Flood Insurance Interagency Task Force. (1998). *Enforcement and Compliance Procedures Necessary to Carry Out the Provisions of the National Flood Insurance Reform Act (NFIRA) Final Report to Congress.* Washington, DC: Flood Insurance Interagency Task Force.

Keywords :

compliance, enforcement

Abstract: The Flood Insurance Interagency Task Force conducted studies resulting in the following actions, conclusions, and recommendations: (a) a compliance model checklist was developed to provide a general framework for the comparison of existing flood insurance compliance programs; (b) a catalog of compliance assistance materials was developed to ensure adequate compliance with the laws governing flood insurance; (c) a reasonable degree of standardization of enforcement exists within the organizations responsible for implementation; (d) on fees charged by the flood zone determination industry and developed conclusions about the reasonableness of these fees.

Fordham, Maureen. (1999). *Participatory planning for flood mitigation: Models and approaches.* *Australian Journal of Emergency Management*, 13(4), 27-34.

Keywords :

floodplain management, mitigation, socioeconomic impacts, Oklahoma, Colorado, England, Bangladesh, Portugal

Abstract: Planning for floods is a complex endeavor. This paper critically examines the dominance of top-down, scientific, and technical modes of analysis in decision-making structures for flood hazard mitigation. It explores the possibilities of incorporating more diverse and contextual knowledge—emphasizing social and cultural, as well as scientific and technical, dimensions—and creating more democratic forms of decision-making. The community-based mitigation underscored by the author involves the participation of people in the analysis of problems and the development of proposals. Examples from the United States, England, Bangladesh, and Portugal illustrate various approaches, successful and otherwise, to flood management.

Fordham, Maureen. (2000). *Managing floods in a changing social environment.* Paper presented at the *Floods and Flooding in a Changing Environment Conference*, Northampton, England, April 28-29, 2000.

Keywords :

England, socioeconomic impacts, awareness, disaster planning

Abstract: The author uses the Northampton (England) floods of Easter 1998 as a starting point for a discussion on the improvement of disaster management processes. In order to create sustainable, disaster-resilient communities, flood management must find a workable balance

between technical expertise and social awareness. Specifically, the article makes the following recommendations: (1) ensure public awareness of flood risks is maintained in areas with existing structural flood defenses; (2) ensure emergency management procedures are also adequately addressed in areas with existing structural flood defenses; (3) ensure all social groups are adequately catered for, in all phases of disaster planning and management; (4) ensure emergency/disaster planning and management agencies maintain links with local communities; (5) ensure socially inclusive, participatory disaster planning and management are developed; and (6) ensure interagency liaison and communication procedures are working adequately.

Fox, Richard T. (1995). Measuring catastrophic events on operating viability of firms: Hurricane Hugo and hospitals. *International Advances in Economic Research*, 1(3), 251-62.

Keywords :

Hurricane Hugo, economic modeling

Abstract: The author developed a model to isolate for study the immediate, short-, and long-run effects of natural disasters on business. The author applied the model to assess the impact of Hurricane Hugo on hospitals in its path. This paper reports on the most seriously affected hospitals.

Freeman, A. Myrick, III and Robert H. Haveman. (1970). Cost-benefit analysis and multiple objectives: Current issues in water resources planning. *Water Resources Research*, 6(6), 1533-9.

Keywords :

cost-benefit analysis

Abstract: This paper critiques Major's (1969) analytical framework for cost-benefit analysis in a multiple objective investment planning framework. Major showed how a cost-benefit ratio can be calculated, which, through a weighted function, combines the effects of an investment on both objectives. This paper identifies the shortcomings of Major's analysis. Basic principles of multiple objective planning are discussed. The need for careful, nonoverlapping, empirically measurable definitions of each objective is brought out. The limits placed on multiple objective planning by the absence of a set of social weights are pointed out, and the possibility of deducing these weights from congressional actions is discussed. The regional development objective receives particular attention.

French, R.H. (1992). Preferred directions of flow on alluvial fans. *Journal of Hydraulic Engineering*, 118(7), 1002-13.

Keywords :

hazard identification, modeling, alluvial fans

Abstract: In this paper, modifications of the method used to delineate floodplains on active alluvial fans for the NFIP are suggested, given new data regarding the deviations of channels from the medial radial line at the apex of the fan. In the original methodology, it was assumed that every point on an alluvial fan contour had an equal probability of being impacted during a flood event (i.e., a uniform probability distribution was assumed). Data now available suggest that a normal distribution better describes the probability of points on an alluvial fan contour being hit during a flood event. Results from an example of the application of the modified methodology are compared with the results obtained using the original methodology.

French, Steven P. and Raymond J. Burby. (1980). *Managing Flood Hazard Areas: The State of Practice*. Chapel Hill, NC: Center for Urban and Regional Studies, University of North Carolina.

Keywords :

floodplain management

Abstract: By 1979, many communities and regional agencies had become involved in floodplain management as a result of the NFIP, the Coastal Zone Management Program, numerous state programs, and the initiative of local citizens. This report describes current practices in floodplain management in these agencies. The data presented were derived mainly from two mail surveys conducted in 1979. The first survey was directed to a sample of local agencies involved in the NFIP. Members of the National Association of Regional Councils received the second survey. Information on the goals, methods, and implementation of floodplain management was gathered. Local and regional perceptions of the relative effectiveness of various methods, the overall effectiveness of agency efforts, and the major obstacles to better floodplain management were also obtained.

Fridgen, Patrick M. and Steven D. Shultz. (1999). *The Influence of the Threat of Flooding on Housing Values in Fargo, North Dakota, and Moorhead, Minnesota*. Fargo, ND:

Department of Agricultural Economics, North Dakota State University.

Keywords :

development, property values, Minnesota, economic modeling, North Dakota, hundred-year flood standard

Abstract: The hedonic valuation method (HVM) was used to quantify the impact of the threat of flooding on housing values in Fargo, ND and Moorhead, MN (Fargo-Moorhead). Prices of 3,783 Fargo-Moorhead homes sold between 1995 and 1998 were regressed against structural housing characteristics, neighborhood and environmental indicators, and three flood risk variables. Being located in the 100-year floodplain lowered the sale price of an average home by \$8,900 and approximately 81 percent of the price depreciation was associated with required flood insurance premiums. After the extensive 1997 flood, homes in the 100-year floodplain were on average priced \$10,241 less than similar homes located outside the floodplain were before the 1997 flood event. The aftermath of publicity of the 1997 flood was responsible for average homes in the 100-year floodplain being reduced by an additional \$1,350. In contrast, homes in the 500-year floodplain on average sold for \$3,100 more than similar homes not in the floodplain. It was concluded that homebuyers in Fargo-Moorhead place a value on flooding risk, that more disclosure is needed regarding the location of the 500-year floodplain, and that substantial housing-related benefits are likely to be generated by various flood mitigation projects in the area that result in a redesignation and reduction of the 100-year floodplain.

Friends of the Earth. (1998). *Flood Funding Fiasco: National Flood Insurance Program*.

Friends of the Earth.

Keywords :

Coastal Barrier Resource System, development, Florida, NFIP

Abstract: This memorandum states that NFIP has more than 3.8 million policies along the nation's coasts and rivers, with a potential liability of over \$400 billion. This report argues that limited (beneficial) reforms to NFIP were enacted in 1994, but a provision included in the 1996 Omnibus Parks bill exempted eight Florida beaches from the Coastal Barrier Resources System,

thus allowing developers to obtain flood insurance (which can cover storm damage) for disaster-prone beachfront properties. Thus the NFIP hurts both taxpayers and the environment by inducing development in floodplains.

Fukuoka, Shoji, ed. (1998). *Floodplain Risk Management. Proceedings of an International Workshop on Floodplain Risk Management, Hiroshima, Japan, November 11-13, 1996. Rotterdam, Netherlands: Balkema/Rotterdam/Brookfield.*

Keywords :

risk management, levees, disaster planning

Abstract: This international workshop examined the risk management measures taken in the past to minimize loss of life and property damage in the event of large-scale flooding of a city by river or sea water, following partial or complete collapse of a levee. It was also intended to identify proper techniques and counter measures by discussing national and international risk management for floods in the context of actual cases of large-scale flooding in which the risk of flooding was minimized. The following topics were discussed in the workshop: floods (forecasts, analysis, and case studies); mechanisms of levee breach and design standards for levees; emergency management systems, including sharing roles by national and municipal governments; development of hazard maps and their usage; information release, evacuation, rescue, volunteer activities, and flood fighting; secondary damage; flood insurance and land acquisition; law suits against flood damage; use of floodplains and restrictions on their use; flood control without disturbing the natural environment; and basin-wide flood control and management. The papers fall into two categories: those written by senior engineers who are responsible for managing major floods in different countries and have had experience in decision making for mitigation of flood damage and those written by researchers who investigated the risk management of floodplains.

Galloway, Gerald E., Jr. (1994). *Floodplain management: A present and a 21st century imperative. Water Resources Update, 97 (Autumn), 5-8.*

Keywords :

floodplain management, relocation, structural approaches, floodproofing

Abstract: As a result of the development of the floodplain, both for agricultural and recreational purposes, the nation faces three major problems: (a) people and property remain at risk, not only in the floodplains of major rivers, but also throughout many other areas in the nation; (b) many regions face severe ecological consequences due to the loss of habitat in riverine areas; and (c) the division of responsibilities for floodplain management among federal, state, tribal, and local governments lacks clear definition. This article summarizes the conclusions and recommendations provided in *Sharing the Challenge* by the Interagency Floodplain Management Review Committee in 1994. The committee recommended supporting a strategy that avoids unnecessary human use of the floodplain, that supports permanent evacuation of flood-prone areas, flood proofing of structures remaining in the floodplain, creation of additional natural and artificial storage, and provision of adequately sized and maintained levees and other structures.

Galloway, Gerald E., Jr. (1995). *New directions in floodplain management. Water Resources Bulletin, 31(3), 351-7.*

Keywords :

floodplain management, Midwest floods of 1993, public policy, riverine areas

Abstract: Over the past 30 years, average annual riverine flood damages have exceed \$2 billion. Damages associated with the Midwest floods of 1993 exceeded \$12 billion and these costs do not include the nonquantifiable, human impacts of this disaster. In a report submitted to the White House in June 1994, a federal interagency floodplain management review committee proposed better ways to manage the nation's floodplains. The committee indicated that the 1993 flood was the result of a significant hydrometeorological event, that federal flood control efforts in the Mississippi basin had prevented nearly \$20 billion in potential damages, and that, in spite of flood-damage reduction efforts, people and property remain at risk due to inevitable future flooding. The committee also recommended that the division of decision and cost-sharing responsibilities among federal, state, and local governments be more clearly defined and that the nation adopt a strategy of, sequentially, avoiding inappropriate use of the floodplain, minimizing vulnerability to damage through both nonstructural and structural means, and mitigating damages as they occur. The report did not call for abandonment of human use of the floodplain but argued for full consideration of the economic, social, and environmental costs and benefits of all future floodplain activity.

Gallup and Robinson, Inc. (1999). *Cover America: A Campaign Evaluation Report*. Pennington, NJ: FEMA.

Keywords :

marketing, risk communication, Cover America, NFIP

Abstract: In 1995, the FIA contracted for the initiation and implementation of a nationwide marketing and advertising campaign called Cover America. The purposes of the program were to establish the importance and value of flood insurance in the minds of consumers, stimulate demand for flood insurance, and provide opportunities for other NFIP stakeholders to communicate with the market. The bulk of the 43-month program (May 1995 through December 1998) consisted of media advertising, with direct mail and public relations also included. This report summarizes the results of an independent review that FEMA requested of the effectiveness of the Cover America campaign. This report concludes that, "based on our review of the available data, we believe that the Cover America campaign has successfully met its objectives." More specifically, this report states that the Cover America campaign has positively influenced consumers. It has increased awareness, changed attitudes, generated intermediate actions like information requests, and produced desired outcomes, including sales. Awareness of NFIP has also increased. Before the campaign, 52 percent of respondents said they had never heard of NFIP. Most recently, 43 percent of respondents said they had never heard of NFIP. However, the proportion of respondents who have never heard of FEMA has remained generally unchanged since the Cover America program was launched. Similarly, the positive image of NFIP has improved during the advertising period, from 18 to 30 percent, while the positive image of FEMA has stayed the same. Among those aware of NFIP, positive image has improved 16 percentage points and among those aware of FEMA, positive image has improved 8 percentage points.

Gardiner, John, Odon Starosolszky, and Vujica Yevjevich. eds. (1995). *Defense from Flood and Floodplain Management. From the proceedings of the NATO Advanced Study Institute, Budapest, Hungary, April 26-May 7, 1994*. Dordrecht, Netherlands: Kluwer.

Keywords :

floodplain management, Austria, Hungary, Greece, Italy, Netherlands, Portugal, England

Abstract: This book discusses all aspects of floodplain management related to defense from floods, including specific issues such as the maintenance of flood defenses, and reveals many aspects of a more holistic approach to the management of flood risk, expanding the structural/nonstructural debate into prevention and cure in the floodplain and its catchment. Recent experience is recounted by experts from Hungary, Austria, Greece, Italy, the Netherlands, Portugal, England, and the United States.

Garner, Anna C. (1996). The cost of fighting Mother Nature: News coverage of the 1993 Midwest floods. *Journal of Communication Inquiry* 20, 83-98.

Keywords:

Midwest floods of 1993, media

Abstract: This article contrasts national and local press coverage between July 1 and August 31, 1993, of the “The Great Flood of 1993,” exploring major themes used to explain the disaster and to knowledge of the flood and its impact on people of the Midwest. National coverage in *Time*, *Newsweek*, and *The New York Times* focused on depersonalized economic costs of the flood, framing the flood in political terms such as entitlement programs, while the regional *Des Moines Register* focused on the flood’s impact on individuals, families, and communities. The main theme of all the flood discourse was a fight with Mother Nature. Subthemes were (a) technological progress (especially in the national media), with a counter-theme of skepticism of technology; (b) national and personal cost, with a secondary theme of the cost to the taxpayer (the national media suggested that flood insurance is a federal bailout, while local media took a more positive approach); and, (c) the politics of compassion (including the concern and support of elected officials and celebrities), which the national media regarded as undermining self-reliance. The author suggests that personal stories are important in covering disasters in that they help readers understand and relate to the event.

Geotrac. (1999). Lender Compliance Flood Study.

Keywords :

compliance, North Dakota

Abstract: This study determined that one-quarter to one-third of flood-damaged properties in Grand Forks, ND required to have flood insurance were not covered. The outcome is significant in terms of the flood event and study timeframe because it was following the National Flood Insurance Reform Act of 1994, which was designed to strengthen enforcement of the lender compliance requirement enacted in 1973.

Glick, Daniel. (1994). The flood insurance game. *National Wildlife*, 32, 44-5.

Keywords :

NFIP, liability

Abstract: The author argues that the NFIP, which has three goals--limit government spending on disaster relief, halt development in floodplains, and provide insurance to residents of flood hazard areas, has not succeeded. The author argues that development in floodplains continues, while participation in the flood insurance program is poor. The author argues that the NFIP may be one of the biggest domestic liabilities, next to Social Security.

Godschalk, David R. (1984). *Impacts of the Coastal Barrier Resources: A Pilot Study*. Chapel Hill, NC: Department of City and Regional Planning, University of North Carolina.

Keywords :

Coastal Barrier Resource System, North Carolina, Florida, legislation

Abstract: At the time of this study for the US Department of Commerce, the Coastal Barrier Resources Act (CBRA) was only two years old. The author sought to identify initial impacts of CBRA. He conducted two case studies, made inquiries directly to insurance and financial organizations and sent a survey to authorities in three states. He said withdrawal of federal flood insurance from Topsail Island in North Carolina had a clear impact in deferred development, so much so that local developers tried unsuccessfully to sue to get their lands removed from the designation so they could regain access to flood insurance. Withholding of federal funds for infrastructure was also having an effect. The author found that on Hutchinson Island in Florida, local authorities placed a moratorium on new projects referred and denied several pending proposals when they found that federal help would not be forthcoming to improve the carrying capacity of bridges serving the barrier island. From his surveys, Godschalk predicted a range of possible future effects of the CBRA limitations, including increased development in already developed areas or a shift from reliance on federal insurance coverage. "The most common response, however, was that effects of federal flood insurance and infrastructure assistance are not yet apparent, overall impacts have been either minor or neutral to date."

Godschalk, David R., David J. Brower, and Timothy Beatley. (1989). *Catastrophic Coastal Storms: Hazard Mitigation and Development Management*. Durham, NC: Duke University Press.

Keywords :

coastal areas, hurricanes, public policy, mitigation, Hurricane Camille, Hurricane Frederic, Hurricane Alicia

Abstract: This is a study of coastal storm hazards and related policies. The authors outline a strategy for overcoming obstacles to safeguarding people and property. They conclude that federal policies encouraging development in vulnerable coastal hazard areas must stop. They advocate withholding disaster assistance and federal flood insurance from areas that have disregarded previous hazard-reduction requirements. This book discusses coastal storm risk as a policy problem; alternative approaches to mitigating coastal storm hazards; mitigation measures after hurricanes Camille, Frederic, and Alicia; federal and state mitigation programs and policies; local mitigation tools and techniques; mitigation practice in high-hazard coastal localities; and influences on mitigation priority, adoption, and effectiveness.

Godschalk, David R., Timothy Beatley, Philip Berke, David J. Brower, Edward J. Kaiser, Charles Bohl, and R. Matthew Goebel. (1999). *Natural Hazard Mitigation: Recasting Disaster Policy and Planning*. Washington, DC: Island Press.

Keywords :

Hazard Mitigation Grant Program, mitigation, Florida, Missouri, Iowa, California, Massachusetts, Tennessee, Hurricane Andrew, Midwest floods of 1993, Hurricane Bob

Abstract: This book begins by describing the importance of natural hazard mitigation and describing the history and evolution of mitigation and disaster assistance policy. Next, it describes in detail six natural disaster cases, including Florida after Hurricane Andrew, Missouri after the Midwest Floods of 1993, Iowa after the Midwest Floods of 1993, California after the Loma Prieta and Northridge earthquakes, Massachusetts after Hurricane Bob and other storms, and Tennessee after a series of floods and storms. The book also provides an assessment of the

national mitigation system and the Hazard Mitigation Grant Program. Finally, it provides ethical guidelines for hazard mitigation and planning for sustainable communities.

Green, Robert H. (1999). *Risk-Based Analysis for Flood Damage Reduction Studies Engineer Manual*. Collingdale, PA: DIANE Publishing Company.

Keywords :

risk assessment, Army Corps of Engineers

Abstract: This book describes and provides procedures for risk and uncertainty for Army Corps of Engineers (ACE) flood-damage reduction studies. The guidance presented and procedures described in this manual apply to all ACE elements, major subordinate commands, labs, and field operating activities having civil works responsibilities. The procedures described herein lead to estimation of expected benefits of proposed flood damage reduction plans using risk and uncertainty analysis. Quantitative and qualitative methods of representing the likelihood and consequences of exceedance of the capacity of selected measures are also included.

Greene, Mark R. (1979). A review and evaluation of selected government programs to handle risk. *The Annals of the American Academy of Political and Social Science*, 443(May), 129-44.

Keywords :

liability, cost-benefit analysis

Abstract: Six government insurance programs are evaluated against criteria of size and significance of the economic burden imposed by the risks covered, public acceptance of the program, and need for government to accept the risk if private insurers will not do so. The author concludes that governmental insurance of flood and swine flu liability risks is justified; that the necessity of federal crop insurance is questionable due to the existence of private insurance against this risk; and that government programs of riot reinsurance, crime insurance, and nuclear energy liability should be terminated.

Griffith, Charles T. (1994). *The National Flood Insurance Program: Unattained purposes*. *William & Mary Law Review*, 35(2), 727-65.

Keywords :

NFIP, history

Abstract: This article discusses the development and history of the NFIP presents problems and suggested solutions. The author reviews the three stages of implementing NFIP in a community. He also poses problems of the NFIP with the Disaster Relief Act and examines the effects of three cases, known as the trilogy cases, to NFIP. He concludes with other existing measures being implemented to improve the NFIP.

Grigg, Neil S. and Otto J. Helweg. (1975). *State-of-the-art of estimating flood damage in urban areas*. *Water Resources Bulletin*, 11(2), 379-91.

Keywords :

flood damage, economic impacts, urban areas

Abstract: With implementation of the Flood Insurance Act of 1968 many additional local flood protection projects are being considered. Consulting engineers and local agencies need consistent methods to estimate flood damage in order to perform feasibility studies. Federal agencies have a great deal of data and long experience in making damage estimates but no comprehensive guides

are available at the local level. Curves of flood damages to different residential structure types are presented. The relationships in use by the FIA are shown to be reasonable and are recommended for use as approximate guides.

Grimm, Mike. (1998). Floodplain management. *Civil Engineering*, 68(3), 63-9.

Keywords :

Colorado, floodplain management

Abstract: The author describes how floodplain management efforts in Fort Collins, CO reduced the loss of life and property damage after a massive flood struck the city in July 28, 1997. He discusses the background on the city's floodplain management, the positive effects of predisaster mitigation, the adoption of a storm-water basin map, and the identification of floodplains in the Master Drainageway Plans.

Gruntfest, Eve. (1995). Long Term Social and Economic Impacts of Extreme Floods. Paper presented at the US- Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods. Perugia, Italy, November 13-17 1995.

Keywords :

economic impacts, socioeconomic impacts, Midwest floods of 1993, Pennsylvania, West Virginia, South Dakota, Colorado, California, North Dakota

Abstract: This paper states that social science research following disasters is limited and outdated: most of the few longitudinal studies are 25 years old. This paper summarizes the existing research efforts on these impacts, reviews the actual impacts from nine extreme events (including: 1889 and 1997 Johnston, PA; 1972 Buffalo Creek, WV; 1972 Rapid City, SD; 1976 Big Thompson, CO; the Midwest floods of 1993; 1990 Yuba City, Linda, and Olivehurst, CA; and 1997 Grand Forks, ND). This paper also provides recommendations for future research. Some of the most difficult questions that need to be addressed are: (a) What time frame constitutes long term? (b) How can the social and economic effects of a flood be isolated from other local, regional, and national factors? (c) How can the negative effects of a flood on a neighborhood be evaluated when they may be overshadowed by prosperity at the community level? Finally, the author suggests that disaster prevention needs to address economic and political issues, not only geological and meteorological aspects. Consequently, the links between social and physical science need to be developed.

Gruntfest, Eve and Daniel Pollack. (1994). Warnings, mitigation, and litigation: Lessons for research from the 1993 floods. *Water Resources Update*, 95 (Spring), 40-4.

Keywords :

communication, risk assessment

Abstract: This article explores the relationship between warnings and litigation. It examines a case study in St. Louis to analyze where technological and scientific limits are reached and where legal liability begins. The authors make recommendations for future research concerning warnings. Four conclusions follow from their analysis: (a) forecasting accuracy is not precise; (b) natural and technological hazards are inextricably linked; (c) more precise forecasts and more confidence in the forecasts might have allowed the company studied (Phillips) to avoid the problems that ensued when their propane contaminated the river; and (d) the severity, frequency, and "fault line" of a flood are more predictable than other natural disasters and should be acknowledged. The article calls for research that addresses the links between technological and

natural disasters, as well as the relationship between technological sophistication and forecasting accuracy.

Gruntfest, Eve and Marc Weber. (1998). Internet and emergency management: Prospects for the future. *International Journal of Mass Emergencies and Disasters*, 16(1), 55-72.

Keywords :

media

Abstract: This article reports on the growing value of Internet resources for the emergency management profession. The analysis has six components: (a) a brief history of the field prior to the introduction of the Internet; (b) an overview of the changes in emergency management since the introduction of the Internet and a summary of the characteristics of Internet communications; (c) some descriptions of how the Internet is currently used in flood, earthquake, and volcano research; (d) examples of Internet use as a tool for education; (e) federal and state employment of the Internet in emergency management during disasters and for public education and awareness between disasters; and (f) conclusions and suggestions for future research.

Grzeda, Stan. (1996). FEMA digital flood mapping program. *Earth Observation Magazine*, 5, 22-5.

Keywords :

hydrology, mapping, Special Flood Hazard Areas

Abstract: FEMA uses Flood Insurance Studies (FISs) to acquire flood risk data through hydrologic and hydraulic studies. Currently, FISs have been completed for virtually all of the 21,400 communities with flood risks. The results of each FIS are utilized by FEMA's Technical Evaluation Contractors to prepare FIRMs. These maps depict the spatial extent of Special Flood Hazard Areas, subject to inundation by the 100-year flood (>1 percent annual probability) and other thematic features. The FIRM is the basis for floodplain management, mitigation, and insurance activities of the NFIP being utilized as the basis for establishing premiums for flood insurance.

Haeuber, Richard A. and William K. Michner. (1998). Natural flood control. *Science and Technology Online*, 1998(Fall).

Keywords :

floodplain management, environmental protection

Abstract: The authors point out that, although we understand all too well the damage floods do, we have not, until recently, understood well the many beneficial aspects of flooding. Floods are critical for maintaining and restoring many of the important services provided to humans by riparian ecosystems. It has become apparent that floods present us with a paradox: we want to prevent them because they threaten our lives and ways of life yet we find ourselves searching for ways to allow or even reintroduce flooding, because it supports the biological infrastructure that makes valued aspects of our lives possible. Thus flood control as it currently stands cannot be effective over the long term. Rather, the key is a new, more informed kind of flood management working with the forces of nature instead of trying to eliminate them.

Hamlin, M. (1994). Avoiding liabilities downstream. *Mortgage Banking*, 55, 111-26.

Keywords :

compliance, geographic information systems, mapping, liability, lending institutions

Abstract: New flood legislation not only exposes lenders to the risk of financial penalties for noncompliance but also now dramatically increases the risk of lawsuits by borrowers arising from inaccurate determinations. Thus, lenders must take the accuracy issue seriously. While there are many ways of determining whether a property is in a special flood hazard area, accuracy can be improved by utilizing more specific sources for locating the property and by cross-checking data. Mapping determination processes range from strictly manual to fully automated. Three general categories of automated systems exist: first, the probability system assesses the probability that a given property is in a special flood hazard area. Second, flood mapping systems that rely on geographic information systems generally require two distinct layers of information: a flood map layer and a secondary source street map layer. Third, digital flood maps can be created by converting the paper into computer form through a process called digitizing. FEMA is beginning to release some digital flood maps.

Hampson, Rick. (2000). So many people- And nowhere left to run. *USA Today*, July 25.

Keywords :

Florida, disaster planning, hurricanes

Abstract: The US coastline has become too crowded to evacuate everyone safely when disaster strikes. Evacuations must begin earlier, when there is still uncertainty about a storm's path (three-quarters of evacuations turn out to be unnecessary). A two-decade lull in hurricane activity may be ending, sea levels are rising, and a surprising number of people don't flee hurricanes. Lee County, FL, has considered several unconventional and controversial approaches: (a) public storm shelters (not endorsed by the American Red Cross) in areas that could be inundated by strong hurricanes; (b) refuges of last resort (which some believe encourage people not to evacuate); (c) growth controls; (d) review of new construction; and (e) storm-proof parking garages. Lee County is also trying to develop an "evacuation culture," in which the threat of disaster is taken seriously. This would involve evacuation plans for each family, houses with "safe rooms" for sitting out weaker storms, and interstate highways whose lanes can all be easily converted to move away from the storm. The article provides estimated evacuation times during peak tourist season for a Category 4 hurricane for 16 "problem areas"—these times range from 20-29 hours in places like Myrtle Beach and Long Island to 50-60 hours in Ft. Myers and New Orleans.

Hampson, Rick. (2000). Where nature is an immovable object. *USA Today*, July 25

Keywords :

development, erosion, Florida, coastal areas, environmental protection, disaster planning

Abstract: Sanibel Island, FL, is relatively undeveloped, as a wildlife preserve comprises about two thirds of the land mass.. The causeway that connects the island with the mainland threatened the island with over-development, and the city voted to adopt a growth cap restricting the number of new housing units. Partly it was not safe to have more people on the island than could be evacuated in an emergency. The city's image became synonymous with smart growth, with a tough building code and zoning laws as well as conservation laws to preserve the landscape. The city purchased land where erosion was a problem and replaced sand only after much debate. Residents want to save the coastal environment and see a problem with people who build too close to the beach.

Handmer, John. (2002). Are flood warnings futile? Risk communication in emergencies. *The Australasian Journal of Disaster and Trauma Studies*, 2.

Keywords :

risk communication, awareness, Australia

Abstract: Flood warnings often don't work well and too frequently fail completely – and this despite great effort by the responsible authorities. The reasons for this may be inherent in the methodology and definitions used to assess warnings, for example, higher standards may be applied to warnings than to other forms of risk communication, and the definition of failure will often determine the outcome of an evaluation. Aside from these methodological issues, warnings may fail for a range of reasons associated with the meshing of the warning message with those at risk; as well as institutional factors such as cooperation between the organizations involved, and how they conceptualize the warning task. The task may be conceptualized narrowly leaving out important elements of the risk. These factors are examined in the context of recent European and Australian research and experience of warnings. Despair is understandable; while resources devoted to warning systems are fairly static, the task is probably becoming more challenging by the day because of social evolution – and in turn this raises the issue of the validity of much earlier research. Although success with warnings may become more difficult to achieve, there are potential changes in the operating environment, which may force higher performance. Other conclusions include: the importance of developing consensus over the aim of warning systems; a more negotiated approach to those at risk (rather than a monopolistic supplier approach); and targeting to ensure that no identifiable group is missed.

Harrington, Scott E. (2000). Rethinking disaster policy. *Regulation*, 23(1).

Keywords :

disaster assistance, risk management

Abstract: The author explores the conventional view of disaster policy which suggests that government programs reduce dependence on “free” disaster assistance and promote efficient risk management by property owners and farmers. He draws three conclusions from his analysis. First, the narrow scope of private-sector disaster insurance reflects in large part the low demand for coverage. Demand is low in part due to the availability of disaster assistance, which substitutes for insurance. Federal tax policy reduces supply by substantially increasing insurers’ costs of holding capital to cover large but infrequent losses. Second, because of subsidized rates and limited underwriting and risk classification, government insurance programs fail to encourage efficient risk management. Third, the practice of subsidizing government insurance, while giving disaster assistance to people who eschew coverage and to some people who have it, is more likely to raise taxpayers’ costs than to reduce them.

Hartill, Lane. (2000). Are we drowning in flood insurance? *Christian Science Monitor*, March 30.

Keywords :

development, economic impacts, Hurricane Floyd

Abstract: This article states that “in fiscal year 1999, more than \$750 million in loss and loss adjustment (a large percentage of this came from Hurricane Floyd) was paid out nationally, compared with \$533.8 million in claims paid in 1989. The findings are nothing new to officials: James Witt, director of FEMA, acknowledges the crisis. The author also states that “the stubborn irony about the damage caused to people living in floodplains, say both federal disaster officials

and environmentalists, is that it is caused by people continuing to build in these naturally at risk areas.”

Haveman, Robert H. (1972). *The Economic Performance of Public Investments: An Ex-Post Evaluation of Water Resources Investments*. Baltimore, MD: Johns Hopkins Press.

Keywords :

cost-benefit analysis, risk financing

Abstract: This book deals with the analytical problem of doing ex-post evaluations of public investments (as opposed to ex-ante). Particularly relevant is Chapter II: “The ex-post evaluation of flood control investments.” A case study (the John H. Kerr Reservoir) in which ex-post results fell short of the ex-ante expectations is presented.

Hayes, Thomas L. and Randall A. Jacobson. (2001). *Actuarial Review*. Washington, DC: FEMA.

Keywords:

insurance premiums, subsidies

Abstract:

This is the annual update of actuarial reviews, undertaken to maintain NFIP’s goal of a fiscally sound rating and coverage structure. The distribution of business written in 2002 is anticipated to be 29% at subsidized rates and 71% at full-risk premiums. The most recent changes were effected on May 1, 2001 with an average rate increase of 3.2% for actuarially rated policies and 2.7% for subsidized policies.

Hazard Mitigation Technical Assistance Partnership, Inc. and French & Associates, Ltd. (1998). *Review of the Impact of CRS Activities on Areas Impacted by Hurricanes Bertha and Fran in North Carolina*. Washington, DC: FEMA (FEMA).

Keywords :

Community Rating System, Hurricane Fran, Hurricane Bertha, North Carolina, cost/benefit analysis, building codes

Abstract: For many in eastern North Carolina the combined effects of Hurricanes Bertha and Fran in 1996 set a new benchmark from which to measure future storms. FEMA commissioned this report in order to assess the benefits provided by selected mitigation activities implemented by communities and by CRS. The project aimed to put a dollar figure on the actual flood damage prevented by the mitigation activities in a real event, not theoretical calculations of benefits and costs. The project team reviewed nine CRS mitigation activities and elements in eleven communities that were hit by Hurricane Fran: six coastal and five inland. The team collected flood data and interviewed local officials. It estimated damage data and compared the data with available disaster assistance and claims payments from flood insurance. One conclusion (among several others) indicates that structures built with no flood protection standards suffered twice the damage as those built to NFIP standards, and four times the damage to those built to the newer state coastal construction standards.

Hazard Mitigation Technical Assistance Partnership, Inc., French & Associates, Ltd., and FEMA. (2000). *Evaluation of CRS Credited Activities during Hurricane Floyd*. Washington, DC: FEMA.

Keywords :

Community Rating System, Hurricane Floyd, North Carolina, mitigation

Abstract: This report reviews the performance of several communities' activities as part of the Community Rating System (CRS) during and after the flooding caused by Hurricane Floyd in North Carolina in 1999. Using a combination of data collected in the field, data from flood insurance claims, and interviews with local officials and residents, this report evaluates the impact of several CRS activities and elements (public information activities, mapping and regulations, and flood damage reduction). The report finds that although residents of CRS have a higher level of awareness that they are exposed to a flood hazard, they retain a higher level of flood insurance coverage, and they implemented more flood protection measures, these indicators cannot be statistically linked to community-run public information programs. Also, the report estimated that the average savings from preserving flood-prone areas as open space ranged from \$47,500 to \$111,000 per acre. The report also found that the acquisition and relocation of flood-prone buildings was more effective at reducing flood losses than any other approach. The report also found that the CRS was the cause for starting or modifying some local activities. However, in many cases it was not the only cause and it was overshadowed by recent flooding and disaster assistance funds. Further, the report found that the CRS had a greater impact on activities that were inexpensive or could be implemented with current staff resources (e.g., public information and flood warning).

Heaton, J. (2000). Creative financing workshop: Funding sources. Presented at the Project Impact Summit 2000, Washington, DC, November 14-15, 2000.

Keywords :

mitigation, federal programs

Abstract: This presentation identifies and summarizes existing federal and state funding sources for hazard mitigation activities other than FEMA's Project Impact. Some of the programs listed in this presentation are: the Hazard Mitigation Grant Program, the Flood Mitigation Assistance Program, the NFIP, Floodplain Management Systems, community development block grants, the Emergency Watershed Protection program, and low-interest disaster loans provided by the Small Business Administration. The author warns the reader that the provided list of sources is not exhaustive.

Higney, Francis. (1999). Lucky escape for insurers. Post Magazine, September 23, 12.

Keywords :

Hurricane Floyd

Abstract: Insurers may have fared relatively well in the wake of Hurricane Floyd, which swept along the eastern seaboard of the United States in September 1999, wreaking havoc in many states. Property damage caused by flooding is expected to reach \$2.5 billion but insured damages may only be in the area of \$0.5 billion as most policies exclude flood damage, according to the Insurance Information Institute. A large part of insurers' liability will be for damages to vehicles covered by comprehensive policies. Allstate and Nationwide said they had each received around 10,000 claims. State Farm said it had received over 26,000 but expected this number to rise as flood waters subside. This latest catastrophe has thrown the viability of the catastrophe bond market, used by some insurers as an alternative to reinsurance, into stark relief.

H. John Heinz III Center for Science, Economics, and the Environment. (2000). Evaluation of Erosion Hazards. Washington, DC: FEMA.

Summary available at: http://www.fema.gov/mit/tsd/hz_erosn.pdf

Keywords :

erosion, insurance premiums, coastal areas

Abstract: This study concludes that, despite facing higher risk, homeowners in erosion-prone areas currently are paying the same amount for flood insurance as are policyholders in nonerosion areas. The study suggests that FEMA incorporate the risk of erosion into the cost of insurance along the coasts. Otherwise, other NFIP policyholders will have to subsidize what it is likely to become a substantial cost.

H. John Heinz III Center for Science, Economics, and the Environment. (2000). *The Hidden Costs of Coastal Hazards: Implications for Risk Assessment and Mitigation*. Washington, DC: Center for Science, Economics and the Environment, Island Press.

Keywords :

coastal areas, mitigation, risk assessment

Abstract: This book addresses the need for a broader understanding of the categories and extent of coastal hazard costs. It makes specific recommendations for the improvement of the estimation and reporting of the cost of coastal hazards, for the improvement of risk and vulnerability assessment, and for the development and evaluation of mitigation strategies. The recommendations for improvement in these areas demand efforts at the federal, state, and local levels, and they focus on expanding the conceptual framework—previously limited to economic considerations—to include social, business and environmental costs. In addition to these recommendations, the report proposes a framework for community planning. This framework is organized around three principles: (a) the importance of developing a broad set of alternative mitigation and preparedness strategies, recognizing the relevance of the status quo but not being restricted by current policy; (b) the importance of characterizing the potential losses from disasters of different magnitudes by linking risk assessment with a region's vulnerability; and (c) the need to incorporate a broad range of economic, business, social, and environmental costs (both immediate and incurred over time) associated with weather-related hazard events when evaluating alternative mitigation and preparedness strategies.

Ho, F.P. (1974). *Storm Tide Frequency Analysis for the Coast of Georgia, National Weather Service Technical Memo*. Silver Spring, MD: Office of Hydrology, National Weather Service.

Keywords :

Georgia, hazard identification, modeling, coastal areas

Abstract: Storm tide height frequency distributions are developed on the Georgia coast for the NFIP by computing storm tides from a full set of climatologically representative hurricanes, using the National Weather Service's hydrodynamic storm surge model. Tide levels are shown in coastal profile between annual frequencies of 0.10 to 0.002. The report is intended for use in estimating actual risk to buildings from coastal floods and in land-use management.

Holway, James M. and Raymond J. Burby. (1990). The effects of floodplain development controls on residential land values. *Land Economics*, 66(3), 259-71.

Keywords :

development, building codes, floodplain management, economic modeling, zoning, property values

Abstract: This paper considers the effect of floodplain management programs on the market for vacant residential land. The authors model the developers' profits from housing production to illustrate the expected effects of parcel characteristics on land value. The hedonic method is utilized to analyze data on vacant floodplain parcels from nine communities that vary by type of flooding, regulatory programs, and geographic location. The authors' results show that zoning floodplains for lower density development, implementing building regulations requiring elevation above the level of the flood, and providing clear local leadership of programs each contribute to lowering floodplain land values.

Holway, James M. and Raymond J. Burby. (1993). Reducing flood losses through local planning and land use controls. *Journal of the American Planning Association*, 59(2), 205-16.

Keywords :

Base Flood Elevation

Abstract: The NFIP emphasizes building elevation requirements to protect property from flood damage and to limit continued increases in flood losses. Economists believe that the cost to elevate buildings will shift some development to flood-free locations. This article provides evidence that elevating buildings to NFIP standards does indeed reduce losses, but that adding additional elevation requirements will have little effect on the rate of increase in floodplain development. Instead, these requirements must be supplemented with regulations of land use in floodplains.

Houck, Oliver A. (1985). Rising water: The National Flood Insurance Program and Louisiana. *Tulane Law Review*, 60, 61-165.

Keywords :

enforcement, Louisiana, NFIP, legal proceedings, liability

Abstract: This article discusses the evolution and operation of the NFIP and Louisiana's stake in its success. Louisiana is a major participant in the NFIP, representing almost 12 percent of all policies in 260 participating communities. Research on the execution of the program in a number of specific inland and coastal Louisiana regions and communities illustrates both successes and problems in its implementation. The author notes that federal disaster relief payments might be lower if participation in the NFIP were required in high-risk areas. The article also considers the emerging problem of enforcement and the extent to which floodplain ordinances give rise to duties and liabilities. The largest litigation to arise under the NFIP occurred in Louisiana in the case of *United States v. Parish of St. Bernard*, which sued for violations of obligations and ordinances under the NFIP. The impact of this case may determine whether litigation could become an enforcement tool, and it will affect NFIP communities nationwide as NFIP's ordinances are crucial to the program's financial success and efficacy. The article also examines the question of what the federal government can do to recover its losses. Recommendations for making the NFIP economically and politically viable include actions at the congressional level, such as structuring water project construction and disaster relief to aid rather than frustrate the NFIP; examining other federal assistance and disaster relief benefits to flood-prone areas; and mandating a study of the degree to which upstream levees and channelization affect water downstream. Other recommendations involve improvements available to FEMA and local authorities within the NFIP, suggestions for structural elevation and storm-proofing requirements for insurance eligibility, and suggestions for strengthening FEMA's resources.

Hovey, S.T., C. Daniel, and P.E. Bryant. (1998). *Complementing Remote Sensing Systems in Flood Mitigation and Preparation*. Fort Belvoir, VA: Army Topographic Engineering Center.

Keywords :

mapping, mitigation, disaster planning

Abstract: As a result of FEMA's response to the many natural disasters of the 1990s, Congress directed FEMA to make mitigation of impacts from future natural hazards its highest priority in working with state and local governments. The NFIP, and its related flood-risk studies and flood hazard mapping activities, are increasingly important mitigation support functions. A current focus is the modernization of maps to speed the flood-mapping process, lowering its cost, and increasing the accuracy of these results. A further emphasis is support to the local areas as exemplified by Project Impact, which seeks to mitigate disasters' impacts by taking actions in advance of these events.

Howard, JoAnn. (1999). National flood insurance compliance. *Credit Union Magazine*, 65, 43-4.

Keywords :

compliance, mandatory purchase, lending institutions

Abstract: The NFIP's Federal Insurance Administrator explains that mandatory purchase provisions of the 1994 National Flood Insurance Reform Act require owners of all structures located in flood hazard area of participating communities to purchase and maintain flood insurance as a condition of receiving a federally related mortgage or home equity loan on that structure. Although policyholder growth has increased markedly since the effective date of the joint final rule on loans in areas having special flood hazards, a considerable gap remains between the number of households that the program insures in hazard areas compared with the number at risk. By following the correct procedures to determine whether the structure to be refinanced is in a special flood hazard area as shown on FIRMs, lenders will comply with the law. A basic approach to complying with flood insurance requirements for all mortgage-related personnel in any lending institution includes four steps. First, understand the flood peril. It can and does flood throughout the United States and its territories, especially in special flood hazard areas but also in non-hazard areas. Many lending institutions have outsourced the responsibility of performing flood zone determinations to a flood zone determination company. Second, know all the compliance issues. The act and its accompanying regulations cite compliance provisions in the areas of coverage, escrow, force placement, determination fees, use and retention of required forms, dispute resolution, and proper notification procedures. Three, focus on retention. Have a process in place to monitor renewals; keep service information up-to-date on all policies so that expiration notices get to the proper entities; develop a diary system to verify that each policy does renew. Four, be a risk manager. Manage flood insurance issues beyond their compliance minimums. Treat it the same way you manage all other risk-related issues in the loan process.

Hudgens, D. (1999). Adapting the National Flood Insurance Program to relative sea level rise. *Coastal Management* 27(4), 367-75.

Keywords :

coastal areas, floodplain management, mitigation, sea-level rise, hundred-year flood standard

Abstract: Congress created the NFIP to provide much-needed flood insurance to property owners and to decrease the nation's susceptibility to flooding. Relative sea-level rise now poses a threat to the nation's flood preparedness, with coastal property owners facing increasingly severe flooding. FEMA could address this vulnerability in several ways. By recalculating and extending the 100-year floodplains to incorporate estimates of relative sea-level rise, the program would prepare coastal property owners for the near-future flood risks. Further adaptation approaches to improve the NFIP include requiring floodproofing, obtaining "rolling easements," and conducting education campaigns.

Hughes, Rebecca Quinn. (1990). Bailing out the victims: A look at federal programs affecting coastal development. In *Focus on Maryland's Forgotten Bays: Report on the Conference on the Outer Coastal Bays, May 5, 84-6, 92-101.*

Keywords :

development, North Carolina, coastal areas

Abstract: In her capacity as legislative officer, Association of State Floodplain Managers, Inc. and Maryland Department of Natural Resources, Water Resources Administration, Hughes takes exception with the assumption that the NFIP is a major factor in coastal development. She notes that much of the development occurred before the NFIP was established. Indeed, state coastal zone managers told the Congressional Research Service (1988) that they could not document how the NFIP affects patterns of coastal development and the value of coastal property. She cited as an example the Sail Beach of North Carolina, where privately funded infrastructure has led to development.

Hulsey, Brett and Geoff Tichenor. (2000). *How Restoring Wetlands Can Help Family Farmers, Reduce Water Pollution and Flood Risks.* Madison, WI: Sierra Club Midwest Office, Sierra Club.

Keywords :

environmental protection , agriculture , wetlands

Abstract: This article states that since its inception in the 1985 Farm Bill and its expansion in the 1990 Farm Bill, the Wetlands Reserve Program (WRP), Emergency WRP, and Emergency Watershed Protection Program have protected more than 900,000 acres of wetlands. The authors claim that "there are 170,000 acres backlogged in Upper Mississippi River Basin states and 500,000 backlogged in the US" and therefore, "if we really want to help farmers, the environment and reduce flooding, we need to expand this program."

Hunt, Constance E. (1994). Improving the effectiveness of flood damage reduction policies through an integrated approach to watershed management. *Water Resources Update, 97(Autumn), 21-4.*

Keywords :

floodplain management

Abstract: The coordinator of the Coalition to Restore Aquatic Ecosystems (CRAE) highlights four findings from *Sharing the Challenge* with respect to floodplain management: (a) integration of multiple objectives; (b) interagency coordination; (c) local control; and (d) coordination mechanisms. Within the CRAE, there exists general consensus that strategies to reduce flood damage should be integrated with strategies for achieving other objectives. Communities should take the lead in the development and implementation of these strategies for their subbasins while

considering information on the relationship between their subbasins and the rest of the watershed. State and federal agencies should work at a regional level to develop the larger watershed context in which these strategies will operate, and provide data and technical and financial support to these local efforts. This well-integrated framework for making decisions on water resource management can realize economic and environmental objectives on a sustainable basis and cut the costs of flood control.

Institute for Business and Home Safety. (1999). *Flood Insurance and the 1997 Flood in Grand Forks, North Dakota: Homeowner Survey Results*. IBHS Technical Report Series #1, Institute for Business and Home Safety (IHBS). Boston, MA: Institute for Business and Home Safety.

Keywords :

risk communication, North Dakota, Red River, awareness, risk perception, insurance purchase decision

Abstract: In 1997, devastating floods along the Red River of the North in North Dakota affected over 90 percent of Grand Forks' 50,000 residents. Only 20 percent of damaged homes were covered by flood insurance, leaving taxpayers and victims to shoulder most of the costs of recovery. In an effort to improve awareness of the need for disaster protection, the "Grand Forks Flood Insurance Summit" was held, bringing together federal, state, and local government officials with the insurance industry. In preparation for the summit, IBHS and the University of North Dakota's Bureau of Governmental Affairs conducted a survey of Grand Forks homeowners to determine which factors influenced their decision to purchase or not purchase flood insurance. The Homeowner Survey Results report indicates that most homeowners simply believed they were not at risk from flooding. It also describes actions taken since the flood and provides recommendations to the insurance industry and government to improve flood awareness and the purchase and retention of flood insurance.

Insurance Research Council. (1986). *Catastrophic Losses: How the Insurance System Would Handle Two \$7 Billion Hurricanes*. Malvern, PA: Insurance Research Council.

Keywords :

hurricanes, economic modeling, liability

Abstract: This study starts with two hypothetical hurricanes causing \$7 billion each in insured property losses and tracks those losses through the insurance system to find out where they would fall. It also analyzes the financial impact two such losses would have on primary companies and reinsurers, as a group, in the United States and abroad. The study also collected information on actual hurricane losses for 1983 and 1985, resulting in a substantial upward revision of earlier loss estimates for those storms.

Insurance Research Council. (1989). *Surviving the Storm: Building Codes, Compliance, and the Mitigation of Hurricane Damage*. Malvern, PA: Insurance Research Council.

Keywords :

coastal areas, compliance, enforcement, hurricanes

Abstract: This study indicates that good building codes and strong enforcement can reduce hurricane damage to property. But it also shows wide variations in wind codes and code compliance among Gulf and Atlantic coastal states. Included are state-by-state estimates of

insured property values exposed to hurricanes and the added costs of making homes more hurricane-resistant.

Insurance Research Council. (1990). *The National Flood Insurance Program: Agency and Insurer Perspectives*. Malvern, PA: Insurance Research Council.

Keywords :

communication, risk perception

Abstract: Surveys of insurers and agents explore their views and practices regarding the NFIP and Write Your Own programs. The study examines reasons for participation/non-participation by providers and property owners, the role of lenders in the sale of flood insurance, growth in policies sold, and views on who is responsible for promoting flood insurance.

Insurance Research Council. (1995). *Coastal Exposure and Community Protection: Hurricane Andrew's Legacy*. Malvern, PA: Insurance Research Council.

Keywords :

Hurricane Andrew, modeling, coastal areas, building codes

Abstract: This study uses data from coastal counties in the 18 states along the Atlantic Ocean and Gulf of Mexico to document population and insured exposure increases from 1980 through 1993. The devastation of Hurricane Andrew is analyzed to show the strengths and weaknesses of current building code practices and enforcement and to make recommendations for improvement. Computer models are presented that estimate potential losses from future hurricanes.

Insure.com. (1998). *Lawsuit seeks to end Florida flood insurance rule*.

Available at: www.insure.com/states/fl/home/fwuasuit898.html

Keywords :

coastal areas, Florida, Hurricane Erin, Hurricane Opal, Special Flood Hazard Areas, zoning, wind

Abstract: This document argued that Florida homeowners in coastal areas may be favored by a class-action lawsuit that might force the Florida Windstorm Underwriting Association (FWUA) to change the way it does business. In 1998, the FWUA required that people who live in SFHAs A and V purchase flood insurance for about the same amount as their wind (the Flood Rule). Alan Cook, a spokesman for the FWUA, said that the Flood Rule started after Hurricanes Erin and Opal in 1995, both of which were very wet storms. "There were a lot of people who had flood damage but no flood policies, and they wanted their wind policies to pay for their damage," recounted Cook. State Rep. John Cosgrove and Owl Food Stores Inc. filed suit against the FWUA on Aug. 13, 1998. Together, the plaintiffs hoped to represent both private citizens and business owners who were forced to buy policies from the state's last-resort windstorm insurer.

Interagency Floodplain Management Review Committee. (1994). *Blueprint for Change: Sharing the Challenge: Floodplain Management into the 21st Century*. Washington, DC: US Government Printing Office.

Keywords :

Midwest floods of 1993, mitigation, public policy

Abstract: In January 1994 the Clinton administration's Floodplain Management Task Force assigned the Interagency Floodplain Management Review Committee. Its mission was to

delineate the major causes and consequences of the Midwest floods of 1993 and to evaluate the performance of existing floodplain management and related watershed management programs. The committee was also asked to make recommendations to the Task Force on changes in current policies, programs, and activities of the federal government that most effectively would achieve risk reduction, economic efficiency, and environmental enhancement in the floodplain and related watersheds. This is the final report of the Review Committee. The thesis of the report is straightforward: floods will continue to occur. The goals for floodplain management are clear. The means to carry out effective floodplain management exist today but need improvement and refocusing. The report concludes that the United States has lacked the focus and the incentive to engage itself seriously in floodplain management. The 1993 flood managed to focus attention on the floodplain and provided the incentive for action. The Interagency Floodplain Management Review Committee proposes “a better way” to manage the floodplains. It begins by establishing that all levels of government, all businesses, and all citizens have a stake in properly managing the floodplain. The Review Committee supports a floodplain management strategy of, sequentially, avoiding inappropriate use of the floodplain, minimizing vulnerability to damage through both structural and nonstructural means, and mitigating flood damages when they do occur. To ensure a long-term, nationwide approach to floodplain management, the Review Committee proposes legislation to develop and fund a national Floodplain Management Program with principal responsibility and accountability at the state level. It also proposes revitalization of the Water Resources Council to better coordinate federal activities, limited restoration of some basin commissions for basin-wide planning, and issuance of a presidential executive order requiring federal agencies to follow floodplain management principles in the execution of their programs.

International Joint Commission. (2000). *Living with the Red*. Ottawa, ON, and Washington, DC: International Joint Commission.

Keywords :

Red River, floodplain management, mitigation

Abstract: After the Red River Basin flood of 1997, the governments of the United States and Canada asked the International Joint Commission (IJC) to analyze the root causes of the flood and to make recommendations as to how damage from major Red River floods could be mitigated in the future. This final report endorses most of the International Red River Basin Task Force’s conclusions and recommendations (see *The Next Flood: Getting Prepared*), modifies some, and adds some new conclusions and recommendations of its own. For example, the IJC makes the following recommendation: to reduce vulnerability to flooding, all possible approaches, including both structural and nonstructural damage reduction measures, must be considered as part of a comprehensive plan. This would include, when environmentally, economically, and socially justified, development of additional reservoir storage, restoration of wetlands, microstorage, construction or improvement of levees and dikes, floodwalls and bypass channels, permanent evacuation of high-risk areas, flood-proofing, and the enhancement of flood forecasting and warning systems.

International Red River Basin Task Force. (2000). *The Next Flood: Getting Prepared*. Ottawa, ON, and Washington, DC: International Joint Commission.

Keywords :

Red River, floodplain management, mitigation

Abstract: The International Joint Commission asked the International Red River Basin Task Force to investigate the causes and effects of the disastrous Red River Basin flooding of 1997 and to recommend ways to reduce the impact of major floods. This report summarizes the proposals of the Task Force, which range from stricter building standards in special flood hazard areas to improved interagency coordination of flood management responsibilities. The following recommendations provide a sample of those presented: (Recommendation 3) communities in the US portion of the Red River Basin should ensure that community-built flood damage reduction projects are certified by FEMA for 100-year or greater protection, or should participate in the Non-Federal Flood Control Works Inspection Program, (Recommendation 15) the 500-year flood (0.2 percent flood) should be defined throughout the Red River Basin and used to inform the public of the potential risks of flooding from rare events, including the need to buy flood insurance in the United States, and as the basis of regulations for siting and floodproofing critical facilities, and (Recommendation 19) state, provincial, and other appropriate authorities should review the effectiveness of and compliance with the floodplain management regulations in the Basin and take steps as needed to improve enforcement. Many of the topics addressed by this report parallel those addressed by the evaluation of the National Flood Insurance Program.

Jacob, Klaus H. (2000). Futuristic hazard and risk assessment: How do we learn to look ahead? *Natural Hazards Observer*, 24, 2-5.

Keywords :

mapping, modeling, risk assessment

Abstract: Quantitative, probabilistic hazard assessment is generally based on the record of past hazardous events and used to account for present and near future hazards. However, the catalog of hazardous events is not always the only input to the assessment. Sometimes, generalized models, based on the historic record that account for the physical processes in the region, are used. To be maximally effective, the latest scientific knowledge must be applied when estimating future hazards and risks. Take, for instance, NFIP maps. For most localities, flood zones were mapped many decades ago. Land use patterns have since drastically changed in many of the most rapidly developing regions of the United States, altering the ability of the land to absorb high amounts of precipitation and to extend the duration of runoff in rivers and floodplains. Flooding beyond designated flood zones appears to be increasing, although systematic surveys to confirm this notion are generally lacking. Hence, flood-zone mapping does not depict the present state of the hazard, nor have we evaluated other increasing risk exposures threatening many parts of the United States.

Jaffe, Greg and Rich Motok. (1998). Building in waves: Mere hurricanes won't stop this barrier island. *Wall Street Journal*, July 15.

Keywords :

North Carolina, hurricanes, subsidies, coastal barriers

Abstract: This article reports how homes and condominiums on Topsail Island, NC are often damaged or destroyed when hurricanes move up the coast. It discusses the criticism of government aid to high-risk areas and describes financial aid given to the area by FEMA. Finally it presents statistics like the number of homes on the island that retain flood insurance.

Jensen, Ric. (1990). Finding answers to flooding woes: Federal policies, unsound development, and reservoir operations all contribute to flood problems. *Texas Water Resources*, 16 (Fall).

Keywords :

dams, development, flood control, modeling, Texas, structural approaches, nonstructural approaches

Abstract: This article asks the reader if building flood control dams and other structures are the best way to reduce flood damages. Structural measures like large dams provide a false sense of security that makes people feel they are safe from flooding. Structural measures are also expensive and can result in catastrophic losses if they fail. By contrast, nonstructural alternatives include managing existing dams to mitigate floods during emergencies, preventing construction in low-lying areas, lessening the impacts of urbanization, and increasing the effectiveness of flood insurance and floodplain management. The author summarizes efforts in Harris County, TX to alleviate flood risks: in 1990, studies were underway that would assess the impact of floods depending on the amount of development that is allowed. Development in the region's floodplain was being regulated by establishing uniform criteria. Harris County started to build computer models to provide a better idea of how many homes and businesses have been built in low-lying areas. New developments were also required to include provisions to store stormwater runoff temporarily. The US Geological Survey was working with state agencies to improve models to simulate flows in the Trinity River basin and to identify high-risk areas.

Johnson, A.A. (1990). Improvements to mapping of alluvial fan flooding. In *Hydraulics/Hydrology of Arid Lands (H2AL)*. New York, NY: American Society of Civil Engineers.

Keywords :

mapping, modeling, alluvial fans

Abstract: FEMA is working to refine its assistance to engineers and floodplain managers by issuing revised and simplified guidance and modeling to mapping the regulated floodplains subject to alluvial fan flooding. FEMA has also developed and released a model to be used on a personal computer that is intended to simplify the application of FEMA's alluvial fan flooding methodology. The timeliness and accuracy of mapping or remapping the flood risk for alluvial fan flooding sources shown as SFHAs on FIRMs has improved and will continue to improve. FEMA has taken steps in FY 1990 to improve the quality of the draft flood insurance studies by revising the study guidelines and by releasing the PC version of the alluvial fan model. In FY 1991, FEMA planned to work to revise the guidance and regulations to define more clearly the documentation that would demonstrate that the protection provided by natural or structural flood-control measures warrants removing areas from alluvial fan SFHAs.

Jones, E. and W. Stolzenburg. (1988). Building in the coastal barrier resources system. Paper Presented on behalf of the National Wildlife Federation to the Coastal Zone 1989 Conference, July 13, 1988, Charleston, SC. Washington, DC: National Wildlife Federation.

Keywords :

Coastal Barrier Resource System, development, legislation

Abstract: This study is cited in testimony by the National Association of Realtors before Congress during consideration of the Coastal Barrier Resources Act. The hearing on S. 2729 was held before the Senate Committee on Environmental and Public Works. A copy of the paper is no longer available, therefore, the summary provided here represents the assessment of the

realtors and should be viewed in that light. This paper assesses development in areas of the CBRA over a six-year period (1982-88). Jones and Stolzenburg examined aerial photographs of the areas concluding that there was a 40.7 percent increase in the number of structures in these areas, half of which are in Florida. Although one of the purposes of the Act was to discourage development by denying the availability of flood insurance and federal financial assistance, the study found that the prohibition of flood insurance in these areas did not preclude development.

Kaiser, Edward J., Raymond J. Burby, Scott A. Bollens, and James M. Holway. (1987). Private sector land market decision agents as targets of floodplain policy. *International Journal of Mass Emergencies and Disasters*, 5(3), 311-35.

Keywords :

public policy, floodplain management, development

Abstract: This article examines the influence of floodplain land-use policy on land market decisions of three private-sector decision makers: owners of vacant land, developers, and building owners. It is based on a mail survey of 312 such decision makers in ten cities across the United States. The findings imply that effective floodplain programs must target builders and developers and owners of vacant land because their decisions come earlier in the rural-to-urban land conversion process and they are more likely to avoid the hazard or take mitigation actions in response to information, incentives, and regulations. Nevertheless, policy should also target the consumer, emphasizing insurance and awareness of the risks of flood damage, something that current policy does not do adequately.

Kamimura, Gary, Jeffrey A. Zinn, and Malcolm Simmons. (1987). *Managing Coastal Development through the Coastal Zone Management and Flood Insurance Programs: Experience to Date and the Views from Selected States*. Washington, DC: Congressional Research Service.

Keywords :

coastal areas, Alabama, California, Delaware, Florida, Massachusetts, Michigan, New Jersey, North Carolina, South Carolina, Virginia, Wisconsin

Abstract: The Federal Coastal Zone Management Program and the NFIP both foster wiser use of coastal areas. Sometimes, however, they work at inconsistent purposes. These inconsistencies are examined, using information supplied by federal agency officials and responses by 11 states (Alabama, California, Delaware, Florida, Massachusetts, Michigan, New Jersey, North Carolina, South Carolina, Virginia, and Wisconsin). The report concludes with recommendations for possible congressional action.

Karlinger, M.R. and E.D. Attanasi. (1980). Flood risks and the willingness to purchase flood insurance. *Water Resources Research*, 16(4), 617-22.

Keywords :

insurance purchase decision, economic modeling

Abstract: Computer simulation experiments were conducted to determine the effects of alternative sources of uncertainty on the willingness to pay for flood insurance. Two alternative insurance protection schemes were investigated: coinsurance and fixed coverage. The question investigated here is to what extent does the insurance scheme influence how purchasers respond to flood risks? Floods were assumed to be log normally distributed and the effects on the purchase of insurance of uncertainties in the parameters of the distribution were explored using

response surface analysis. Results indicate that fixed coverage insurance provisions shift most of the uncertainty in the physical parameters governing natural disaster occurrences away from the insured and onto the insurer. The results also show that the form of the damage function has little effect on the demand for flood insurance.

Karlsson, Per-Ola and Vacov Y. Haimes. (1989). Risk assessment of extreme events: Application. *Journal of Water Resources Planning and Management*, 115(3), 299-320.

Keywords :

dams, risk assessment, modeling, hydrology

Abstract: The safety of many existing dams could be improved by modifying them structurally in accordance with recent advances in statistical hydrology and improved availability of meteorological and hydrological data. Any increase in safety that might be gained by structural changes must be balanced against their costs. The risk analysis methodology known as the partitioned multiobjective risk method (PMRM) is explored in this paper through a dam-safety problem. The PMRM is well suited to the task of solving the probabilistic optimization problem posed by such risk-versus-cost considerations. With the PMRM, a number of conditional expected-damage functions are generated. Of these, one that represents events of a more extreme and catastrophic character is of particular interest. The close relationship that exists between the expectation of damage and the statistics of extremes is shown to simplify the implementation of the PMRM, and the relationship also permits the derivation of closed-form equations that determine (for any partitioning of the probability axis) the expected damage, given that a flood with a return period that equals or exceeds n years occurs. Finally, an analysis is made as to how the choice of the distribution function representing the annual flood peaks might affect the conditional expectations.

Keeney, Dennis R. and Robert H. Alexander. (1994). Droughts, floods, and sustainability. *Water Resources Update*, 95(Spring), 15-20.

Keywords :

Iowa, Midwest floods of 1993, floodplain management

Abstract: This article views the catastrophic rainfall and flooding in the Midwest in the larger context of regional sustainability. It discusses how converging strategies from different sources suggest how we might work cooperatively toward achieving healthy environments and healthy economies, now and in the future, while minimizing losses from disasters. The recommendations include: (a) creating demonstration projects within the area of intense 1993 flooding to illustrate ways that flood hazard mitigation and regional sustainability can advance together; (b) showcasing and monitoring exemplary programs that are already under way; and (c) considering such programs as centers of innovation waves and of voluntary adoption of sustainable land-management practices. Examples from Iowa are cited.

Kelmelis, John A. (1994). Scientific river basin management. *Water Resources Update*, 97(Autumn), 9-13.

Keywords :

Midwest floods of 1993, federal programs, communication, methodology

Abstract: In response to the Midwest floods of 1993, the Clinton administration recognized the need to make scientific information readily available to planners, managers, and policy makers in the basin area. To acquire and begin analyzing the data, the Scientific Assessment and Strategy

Team (SAST) was established in November 1993. SAST was an interdisciplinary, interagency team that also provided scientific support to the Interagency Floodplain Management Review Committee. This article discusses the major findings of the SAST and a strategy to incorporate scientific information into river basin management more effectively. The findings of the SAST show clearly that using scientific information when making decisions could help reduce the impact of floods. Such information and advice must be derived from a well-coordinated plan of activities that incorporates baseline information, detects changes to the system, determines the effects of changes, improves methods of predicting changes, and makes the knowledge available to the user community.

Kerns, Waldon R., Robert J. Byrne, and Carl H. Hobbs. (1980). An economic analysis strategy for management of shoreline erosion. *Coastal Zone Management Journal*, 8(2), 165-84.

Keywords :

economic modeling, erosion, coastal areas, Virginia, property values

Abstract: The report outlines an economic framework for making management decisions on tidal shoreline erosion by evaluating of the impacts of coastal erosion on shore-land property and structures. It determined coefficients for estimating erosion-induced losses to property and dwellings. Lots that contained a dwelling decreased in value by an average of \$0.24 for each square foot of soil lost to erosion. Decrease in value of dwelling due to erosion-induced loss of distance between dwelling and shoreline was an average decrease of \$8.64 per foot of distance lost. These values plus other measures were applied to three case study coastal areas in Virginia. The evaluation procedure provided a realistic basis for comparisons: (a) of benefits and costs of selected erosion control measures; (b) between various levels of control; and (c) distribution of costs of controls among property owners and between the private and public sectors.

Ketteridge, Anne-Michelle and Maureen Fordham. (1998). Flood evacuation in two Scottish communities: Lessons from European research. *International Journal of Mass Emergencies and Disasters*, 16(2) 119-43.

Keywords :

Scotland, flood disaster planning, risk communication

Abstract: In January 1993 and December 1994, two areas of Scotland experienced extensive flooding and large-scale evacuation of a spontaneous and unstructured nature. Both the flooding and the evacuation left their traumatic mark on the householders. The research reported here was qualitative, with the objective of investigating the evacuation process inductively—how it operated on the ground, what were the problems, and how the process could be enhanced to maximize effectiveness for those who have to experience the consequences. This long-term or extended process of evacuation is discussed in this paper, where it is emphasized that evacuation is not complete until everyone has returned home. The elderly, children, and women are also identified by the research as groups that suffered particularly as a result of the poorly executed evacuation and which require special attention. Policy and practical recommendations are drawn from the research, which may be equally applicable to future floods in the United Kingdom, Europe, and elsewhere.

Kirschenbaum, Alan. (1996). Residential ambiguity and relocation decisions: Population and areas at risk. *International Journal of Mass Emergencies and Disasters*, 14(1), 79-96.

Keywords :

relocation, mental health

Abstract: Residential relocation is one means of coping with living in a perceived high-risk area. An analysis of a sample of household members who live in such an area showed the extent to which fear of recurring emergency events affects attitudes toward seeking an alternative safer area in which to reside. Intent to relocate is linked to specific subgroups of families on the basis of how they comprehend the risks of remaining (educational level) and the extent of possible economic damage (level of assets). A series of independent variables reflected affective-emotive behavior during the disaster. Post crisis trauma related attitudes, and pre/post disaster neighborhood bonds were likewise linked with an intention to move to a safer neighborhood. A regression model focused the analysis on the degree to which concern of psychological damage to children played a decisive role in determining a relocation decision.

Klein, Robert. (1998). Regulation and catastrophe insurance. In Howard Kunreuther and Richard J. Roth, Jr., eds. *Paying the Price: The Status and Role of Insurance against Natural Disasters in the United States*. Washington, DC: The Joseph Henry Press.

Keywords :

insurance

Abstract: This chapter assesses the role that insurance regulation has played in society's response to disaster risk and identifies the issues that must be addressed in evaluating how regulatory policy might be modified to help lower disaster costs and support a more efficient and equitable way to finance them. This chapter provides a brief overview of the structure of insurance regulation, focusing on its primary institutions and functions. The author also provides a detailed evaluation of the areas of regulation that are most relevant to insuring disaster risk (e.g., regulation and its effect on availability and price and control of market entry and exit) and the options available to regulators to improve market conditions (e.g., financial regulations, policy forms and coverage requirements, rates, underwriting restrictions, and claims adjustment).

Kleindorfer, Paul R. and Howard Kunreuther. (2000). Managing catastrophe risk. *Regulation*, 23(4), 26-31.

Keywords :

mitigation, modeling, California, Florida, risk communication

Abstract: In this article the authors utilize computerized risk-mitigation measures (RMMs) models to examine the effect that risk mitigation increases would have on property owners and insurers. With this technology, the authors constructed statistical models of two earthquake-prone cities mimicking Oakland, California and Miami Dade County, Florida. They examined the reduction in damages that increased use of RMMs would have on these areas. In addition, they studied the effect that increased use of RMMs would have on the performance of two prototypical insurance companies, one small and large insurance company. The computer models indicate that mitigation would reduce aggregate losses to the insurer and the homeowner in both Oakland and Miami. If all homeowners mitigate in Oakland, the expected annual loss is \$2.38 million. In Miami if all households employ RMMs it would reduce the total cost to homeowners by \$1.46 million. Given the result that RMMs do save homeowners, insurers and taxpayers money, why are these groups of people not doing more risk mitigation? The study suggest that homeowners do not invest voluntarily and insurers do not reward such investment behavior because of existing policies and decision-making limitations concerning their ability to judge and

prepare for the consequences of rare events. Moreover, existing government programs dull the incentives for individuals and institutions to prepare for catastrophic natural disasters. A prescriptive approach would be to advocate insurance and mortgage reform so that the key players in the housing market would have the incentive to encourage homeowners to mitigate.

Kochaniec, Joanne Wojcik. (1999). Flood of claims to come: Farms, businesses devastated by Floyd's rains. *Business Insurance*, 33(39), 1.

Keywords :

Hurricane Floyd, North Carolina, agriculture, flood damage

Abstract: Industry sources say that although big commercial policyholders and agricultural operations in North Carolina are likely to be insured for damages resulting from the severe flooding caused by Hurricane Floyd, most small businesses and individual property owners will likely be uninsured for those losses. According to Scott Ellwanger, manager of claims at FM Global in Park Ridge, IL, most large commercial policyholders use flood insurance from FEMA as a primary layer and back this up with excess coverage from a commercial property insurer. However, JoAnn Howard, the top official at the NFIP, says that only around 25-50 percent of home and business owners in flood-prone areas typically buy flood insurance. The flood damage caused by Hurricane Floyd to farms and businesses in North Carolina is discussed.

KRC Research & Consulting. (1995). *Report on In-Depth Interviews Conducted with Direct Agents, Lenders and WYO Agents*. Washington, DC: FEMA.

Keywords :

attitudes, marketing, lending institutions, communication, Write Your Own programs, Florida, Iowa, California

Abstract: FEMA sponsored this research to ascertain public attitudes toward disaster planning, particularly in regards to insurance coverage. The report is based on in-depth telephone interviews with three Write Your Own (WYO) agents, four independent agents, and three lenders in Broward County, Florida, Des Moines, IA and Santa Clara County, CA. The report summarizes findings but does not detail methodology or results. It revealed that agents have a poor understanding of FEMA's role and its relationship to the NFIP and few had direct contact with FEMA. Agents are generally satisfied with the status quo and do not prioritize flood insurance. Lenders feel like they know little about FEMA and the NFIP and they would like more contact with FEMA. The report concludes that communication between FEMA and lenders and agents merits improvement and lists suggestions from lenders and agents. Most of those interviewed agreed that the public is not well informed about flood insurance, what it covers, and why they need it. Lenders felt a national advertising campaign was the best way to increase awareness in the public and among lenders. Agents were less open to a public education campaign believing that the public would not trust the government to sell them insurance. The report concludes that if those stakeholders interviewed are not invested in the NFIP's goals then they will have only limited interest in selling flood insurance. Therefore an effort should be made to develop and maintain and a strong relationship with these groups to generate more interest in flood insurance purchase.

KRC Research and Consulting. (1995). *Quantitative Benchmark Report*. Washington, DC: FEMA.

Keywords :

communication, marketing, risk communication, insurance purchase decision

Abstract: This document report looks at consumer and business decision-maker attitudes toward and their understandings of flood insurance. KRC Research & Consulting conducted a quantitative research study during September and October of 1995. They surveyed 1200 consumers and 600 business decision-makers (1/3 of the total sample obtained from high-risk areas, 2/3 from a random national sample, in each case) by telephone. This report concludes that: (a) FEMA and NFIP are not well known among either consumers or business decision-makers; (b) 52 percent of consumers and 40 percent of business decision-makers who know FEMA rate it favorably; (c) floods and hurricanes are top-of-the-mind natural disasters for most respondents, but few feel personally threatened by floods (even those who live in high-risk areas); (d) in the event of a flood, most would expect their insurance company to cover damages. FEMA is specified by only 2-3 percent; (e) About half of each group think the government should pay for clean up and repair after a natural disaster “because I/my company pay taxes.” However, when asked who is primarily responsible for finances, both groups mention their insurance companies and themselves before they speak of the federal government; (f) about half of each group has taken precautions in the event of a natural disaster (efforts vary but most often include references to insurance: 24 percent of consumers, 43 percent of businesses); (g) while most consumers think flood insurance is a wise investment (65 percent), most business decision-makers don't (only 37 percent agree it is). Based on these findings, this report recommends that FEMA: (a) “get the NFIP on the map, using any and all means possible”; (b) “break through the assumption that fires are a greater danger than floods”; (c) educate people “about the measures of risk” and convince them to “ask their agents to make sure they are covered by flood insurance”; (d) “educate the target audience as to exactly what is and what is not covered by flood insurance”; (e) “explain the concept of a federal disaster area”; (f) “tell the target audience that they can buy NFIP insurance through their insurance agent” and that “it is less expensive than they think”; and (g) “use a flood victim as a spokesperson instead of a fictional character.”

KRC Research & Consulting. (1995). *Qualitative Research Report: In-Depth Interviews with Community Officials, Lenders, Realtors, and Advisory Board Members*. Washington, DC: FEMA.

Keywords :

awareness, communication, marketing, insurance purchase decision

Abstract: FEMA retained KRC Research to conduct qualitative research with four key audiences—lenders, realtors, community officials, and members of an advisory board—to help guide the development of strategies and creative messages to facilitate the sale of flood insurance. In August 1995, KRC conducted 27 in-depth interviews with these key audiences. This research report summarizes general perceptions of the insurance industry, obstacles to understanding the flood insurance industry, perceptions of the NFIP, the public's decision-making process, and suggestions for a consciousness-raising campaign. Respondents felt that lack of knowledge about flooding, risk, and insurance is the primary reason people do not own flood insurance. Eligibility and coverage are major areas of confusion. While advisory board members have a good knowledge of the NFIP, the other respondents are largely ignorant about the program. The four constituencies agreed that the insurance industry does not have a good public image and that disaster insurance is generally unprofitable. They felt that retention is mainly the result of compliance with insurance requirements. All respondents felt that an education campaign is critical to improving the volume of flood insurance sold. They called for

improved communication between the NFIP, themselves, and the public, and they expressed enthusiasm for an advertising campaign.

KRC Research & Consulting. (1998). *Agent Quantitative Survey Results*. Washington, DC: FEMA.

Keywords :

insurance agents, communication, risk communication

Abstract: KRC conducted a quantitative 20-minute telephone survey to investigate insurance agents' knowledge, perceptions, practices, attitudes, and beliefs about what flood insurance covers; writing policies; and the benefits of flood insurance. The survey contained two components, one with a nationally representative sample of 300 agents who sell flood insurance (flood agents), and another with 100 agents who do not sell flood insurance (nonflood agents). The survey revealed that flood agents are much more aware of and favor the FEMA and NFIP, compared with nonflood agents. Second, in both groups, the decision to sell flood insurance is closely related to the agents' opinions of flood risk in the area where the client resides. Nine of ten agents would be more inclined to recommend flood insurance if they learned their clients were in areas with a high risk of flooding or that a flood was predicted for the client's area. Third, it may be difficult to sell flood insurance to clients who do not believe they are at risk or who think that the insurance is too expensive. Communications should continue to emphasize that virtually everyone is at risk for flooding, and that flood insurance is not as expensive as some might think. Fourth, flood agents are more likely to know that floods are likely to occur even in areas not designated as floodplains and therefore know that these people also need insurance. Fifth, the majority of flood agents believe that flood insurance is a wise investment, offering excellent coverage at a fair price. In contrast, nonflood agents do not think it is a wise investment given current levels of coverage and the price. Sixth, flood insurance is not seen as an overly difficult policy to write, but the rating system and the process of obtaining elevation certificates are seen as more difficult and time-consuming. Most agents indicate that learning that there is an easy-to-write policy available for 90 percent of homeowners would prompt them to recommend flood insurance. Agents aware of the Co-op Advertising Program believe it to be a good one.

KRC Research & Consulting. (1999). *Quantitative Evaluative Report IX, 1999*. Washington, DC: FEMA.

Keywords :

NFIP , awareness, communication, marketing

Abstract: This report details the ninth wave of tracking research to assess the attitudes of consumers and business decision-makers (BDMs) regarding the need for, and understandings of, flood insurance and the success of an advertising campaign. Conducted from January through April 1999, FEMA Quantitative IX consisted of telephone interviews with 1,200 consumers and 600 BDMs from a random national sample and from high-risk areas. The study assessed perceptions of natural disasters in general. Floods were, however, the primary focus. The study considered flood risk, insurance companies and insurance agents, awareness and perceptions of FEMA advertising, and flood insurance knowledge. It found the percentage of consumers and BDMs who, in the last two months, saw or heard an ad for flood insurance or insurance that would cover a natural disaster. It then determined the messages these listeners received from the ad and it also ascertained the awareness of and favorability toward the FEMA and NFIP; the

perceived risk for natural disaster/flooding; incidence of flood insurance coverage; the knowledge about flood insurance; the role of the insurance agent; and who the “apathetics” and “proactives” (those who do not and do purchase flood insurance) are. The report concluded that the advertising campaign continues to increase familiarity and favorability toward the FEMA and NFIP among consumers and BDMs, but the percentage of respondents who are aware of the ads could be higher. KRC recommends that FEMA: (a) spend more on the campaign; (b) continue to emphasize that floods can happen anywhere and make the connection between flooding and permanent water damage; (c) make the point that flood insurance is a wise investment; (d) include a single response mechanism at the end of the ad; (e) communicate that floods often occur alongside hurricanes and that current coverage may be insufficient; and, (f) inform insurance agents about the risk of flood and about the ease with which flood insurance may be written and serviced.

Kriesel, W. and C. Landry. (2000). Modeling the decision to buy flood insurance: Results from 62 coastal communities. Paper Presented at the American Agricultural Economics Association Annual Meeting, Tampa, FL, July 29-August 3, 2000.

Keywords :

coastal areas, insurance purchase decision, economic modeling

Abstract: The authors analyze how a household decision to purchase flood insurance relates to other measures of risk reduction and particular aspects of flood and erosion risk. They argue that there are five reasons why the NFIP does not have a higher rate of participation among property owners at risk of flooding: (a) government disaster relief programs provide a disincentive for purchasing flood insurance; (b) people tend to underestimate their chances of being a disaster victim; (c) the NFIP may undercompensate for losses; (d) coastal property owners regard the expected value of the potential loss as only a small part of their total wealth; and (e) the model's results apply only to risk-averse individuals. Their results indicate that the variables of income, waterfront (percent of properties that have frontage on the water), armor (percent of survey returns indicating the existence of coastal armoring at the nearest shore), elevation, built post-FIRM, mortgage, Pacific Region, and Gulf Region were significant at the .05 level or below in predicting the proportion of a community's properties protected by flood insurance.

Krimm, R.W. (1978). The National Flood Insurance Program and wetland protection. In *Proceedings of the National Wetland Protection Symposium*, Reston, VA, June 6-8, 1977, 123-5. Washington, DC: FEMA.

Keywords :

floodplain management, wetlands, environmental protection

Abstract: The NFIP was designed to reduce loss of life and property from floods. Part of the program's responsibility involves the development and enforcement of floodplain management standards to reduce flood damages. Regulations recently adopted require that communities wishing to qualify for the program protect mangrove stands and dunes that act as barriers to storm surges. The program also indirectly protects wetlands in several ways: it establishes disincentives for location of structures in areas of known flood risk; it prohibits the use of fill for elevation purposes in identified coastal high hazard areas; and it encourages use of columns for elevation to minimize the use of fill. Recent wetland and floodplain executive orders and their relations to the NFIP are discussed.

Krutilla, John V. (1966). An economic approach to coping with flood damage. *Water Resources Research*, 2(2), 183-190.

Keywords :

mandatory purchase, insurance premiums

Abstract: Krutilla proposes a compulsory flood insurance system as a mechanism to achieve efficient uses of floodplains. The author argues that insurance premiums proportional to risk and equal to both the private and social cost of floodplain occupancy would serve as a rationing device, eliminating economically unwarranted uses of floodplain lands.

Kuczera, George. (1983). A Bayesian surrogate for regional skew in flood frequency analysis. *Water Resources Research*, 19(3), 821-32.

Keywords :

modeling

Abstract: Kuczera considers the problem of how to best utilize site and regional flood data to infer the shape parameter of a flood distribution. Bulletin 17B of the US Water Resources Council (1981) approaches the problem with a log-Pearson distribution. This article considers a lesser known distribution. The power normal that fits flood data as well as the log-Pearson and has a shape parameter denoted by γ derived from a Box-Cox power transformation. The problem of regionalizing γ is considered from an empirical Bayes perspective where site and regional flood data are used to infer γ . The distortive effects of spatial correlation and heterogeneity of site sampling variance of γ are explicitly studied with spatial correlation being found to be of secondary importance. The end product of this analysis is the posterior distribution of the power normal parameters expressing, in probabilistic terms, what is known about the parameters given site flood data and regional information on γ . This distribution can be used to provide the designer with several types of information. It derives the posterior distribution of the T -year flood and illustrates the effect of nonlinearity in γ on inference. Because it explicitly allows for uncertainty in γ , it avoids the understatement in confidence limits due to fixing γ (analogous to fixing log skew). Finally, the report shows to obtain the marginal flood distribution, which can be used to select a design flood with specified exceedance probability.

Kunkel, Kenneth E., Stanley A. Changnon, and Steven E. Hollinger. (1993). A regional response to climate information needs during the 1993 flood. *Bulletin of the American Meteorological Society*, 76, 2415-21.

Keywords :

Midwest floods of 1993, disaster planning, modeling, weather

Abstract: Effective responses by government agencies, businesses, and private industry to climate disasters like the Mississippi River flood of 1993 hinge on the regional availability of up-to-date weather, climate, and water information. In addition to the obvious need for accurate forecasts and warnings of severe weather and floods, other types of meteorologically based information can contribute to effective responses. Some examples of information requested during and after the 1993 flood include (a) hydroclimatic assessments of the magnitude of the event; (b) agricultural assessments of the impacts of heavy rains and flooding on corn and soybean production; and (c) probabilistic outlooks of the recurrence of flooding based on soil moisture conditions. The authors conclude that quick responses to these needs necessitate: (a) a real-time climate monitoring system; (b) physical models to assess effects and impacts; and (c) scientific expertise to address complex issues.

Kunreuther, Howard. (1979). The changing societal consequences of risks from natural hazards. *The Annals of the American Academy of Political and Social Science*, 1979(443), 104-16.

Keywords :

disaster assistance, insurance purchase decision

Abstract: This article point out that the federal government has given substantial relief to victims of natural disasters in recent years, largely because such individuals often are not protected by insurance. Standard insurance protects against fire, wind, and hail; flood and earthquake policies can also be purchased, but most residents of hazard-prone areas have not done so. Recent empirical findings support a bounded rationality model of individuals' decisions about unlikely, though potentially severely harmful, events which indicates that individuals must be made graphically aware of the need for insurance to consider purchase. The author concludes that those who decide to do so are guided by informal networks of friends and neighbors.

Kunreuther, Howard. (1996). Mitigating disaster losses through insurance. *Journal of Risk and Uncertainty*, 12(2-3), 171-87.

Keywords :

lending institutions, Hurricane Andrew, insurance industry, mitigation

Abstract: Losses from natural disasters have increased in recent years due to population increases in hazard-prone areas and inadequate enforcement of building codes. This article contends that until recently, insurers viewed their role as a pass-through mechanism rather than as a promoter of safety. Following Hurricane Andrew, the insurance industry has taken a new view toward mitigation measures because of the severe losses that they incurred. This article proposes a disaster-management program that utilizes insurance coupled with well-enforced building codes to reduce future damage. Banks and financial institutions play a key role in this program by requiring inspections of homes as a condition for a mortgage. New forms of reinsurance coverage against catastrophic losses from natural disasters are necessary to protect insurers against potential insolvency from the next mega-disaster.

Kunreuther, Howard. (1998). A program for reducing disaster losses though insurance. In Howard Kunreuther and Richard J. Roth, Jr., eds. *Paying the Price: The Status and Role of Insurance against Natural Disasters in the United States*. Washington, DC: The Joseph Henry Press.

Keywords :

insurance purchase decision, Hurricane Andrew, risk communication

Abstract: The author looks at the market for insurance against natural disasters by addressing the following questions: What are the factors influencing property owner's demand for insurance? Why are insurers reluctant to provide coverage against hurricanes, floods, and earthquakes? Regarding the demand for insurance, the author concedes that what determines the demand for insurance when individuals have the freedom to specify coverage limits is still not well understood. Many homeowners at risk are not anxious to purchase insurance voluntarily because they feel the disaster will not happen to them. Others who have compared premiums with potential benefits may feel that insurance is not a good investment. The author also points out that the framing of the insurance decision process is relevant. For instance, some factors that may encourage individuals to buy an insurance policy against natural disasters are the vividness

of the media's reporting, the use of rebates so that policyholders feel they have experienced a gain if they do not collect their policies, and the use of the status quo as a reference point. On the supply side, the author argues that private insurers are averse both to risk and ambiguity, which make them follow a safety-first approach in their business decisions (in other words, the author suggests that insurers are first concerned with the safety of their firms, and then, with profit maximization). Therefore, the author concludes that private insurers have been reluctant to promote coverage against hurricanes, floods, and earthquakes because of uncertainty regarding the risk and because of concern with what the financial consequences of a natural disaster would be for their companies. Hurricane Andrew and the Northridge earthquake were wake-up calls for many firms, alerting them to the possibility of insolvency following another major event. The author suggests several measures to improve the market for insurance against natural disasters. He implicitly argues in favor of reducing the ambiguity insurers and individuals face. Some of the measures the author suggests are the provision of better information on cost-effective mitigation alternatives, as well as better enforcement of current policies (e.g., building codes). The author argues that public sector agencies have the role to assist low-income families in adopting cost-effective measures. Finally, because public sector damage from natural disasters results in a large cost to taxpayers, the author suggests that government officials should be encouraged to purchase insurance for public structures and invest in cost-effective risk reduction measures.

Kunreuther, Howard, R. Ginsberg, L. Miller, P. Slovic, B. Borkan, and N. Katz. (1978). *Disaster Insurance Protection: Public Policy Lessons*. New York, NY: Wiley.

Keywords :

insurance purchase decision, mitigation, awareness

Abstract: The authors demonstrate empirically that, even if people have knowledge and opportunity, relatively few of them will expend effort and money to avail themselves of needed protection, either through the implementation of loss prevention techniques such as sound land-use and control measures in flood- and earthquake-prone areas, or through the purchase of insurance.

Kunreuther, Howard and Louis Miller. (1985). Interactive computer modeling for policy analysis: The flood hazard problem. *Water Resources Research*, 21(2), 105-13.

Keywords :

modeling, disaster planning

Abstract: This paper discusses an interactive modeling system to support policy analysis for dealing with flood hazards. Policy analysis in this area is complex because diverse stakeholders have varying concerns, there are a variety of scenarios that might be considered, and there are even alternative policy options. These conditions require that a modeling system be flexible and support users in a variety of ways. The system should be viewed as a decision aid rather than a burden. This paper describes a modeling system to achieve these goals for micro-analytic models and deal with samples of homeowners in a flood-prone community.

Kunreuther, Howard C. and Gilbert F. White. (1994). The role of the National Flood Insurance Program in reducing losses and promoting wise use of floodplains. *Water Resources Update*, 95(Spring), 31-5.

Keywords :

enforcement, insurance purchase decision, NFIP

Abstract: This paper discusses the NFIP's objectives and accomplishments. Due to the NFIP's apparent failure to meet its original objectives, the article provides several hypotheses that should be tested. Concerning the demand for insurance, the article hypothesizes that the failure of most floodplain dwellers to purchase insurance when not required to do so is due primarily to their belief that a damaging flood will not occur during their occupancy of the structure. It also conjectures that underinsurance is due to the limited enforcement by banks and other lending institutions of the required coverage. With respect to the supply of insurance, the article hypothesizes that there are limited financial incentives for private insurance agents to promote flood coverage. The authors make five recommendations related to increasing the coverage under the NFIP and increasing the quality and use of flood mitigation activities.

Kunreuther, Howard and Richard J. Roth, Jr., eds. (1998). *Paying the Price: The Status and Role of Insurance against Natural Disasters in the United States*. Washington, DC: Joseph Henry Press.

Keywords :

Florida, Hurricane Andrew, insurance purchase decision, liability, insurance industry

Abstract: This book reviews, reasons for consumer resistance to flood insurance purchase. It "considers the effectiveness of insurance coverage for low-probability, high-consequence events such as natural disasters--and how insurance programs can successfully be used with other policy tools, such as building codes and standards, to encourage effective loss reduction measures. The authors discuss the reasons for the dramatic increase in insured losses from natural disasters since 1989 and the concern that insurers have about their ability to provide coverage against more such events in the future. It addresses why there has been an increasing demand for hazards insurance, what types of coverage private insurers are willing to offer, and the role of reinsurance and private-/public-sector initiatives at the state and federal levels for providing protection to victims of natural disasters. Detailed case studies of the challenges facing Florida in the wake of Hurricane Andrew in 1992 and California following the Northridge earthquake in 1994 reveal the challenges facing the insurance industry as well as other concerned stakeholders. The NFIP illustrates how a public-/private-sector partnership can mitigate damages and provide financial protection to victims. The book identifies new initiatives for reducing future losses and providing funds for recovery through cooperation by the relevant parties."

Kusler, Jon A. (1982). *Regulation of flood hazard areas to reduce flood losses: Volume 3*. Boulder, CO: University of Colorado, Natural Hazards and Applications Information Center.

Keywords :

floodplain management, development, coastal barriers

Abstract: The author looks back to the 1970s at the use of federal regulations, including flood insurance, as one element of a national strategy to manage floodplains. The author was concerned that during its emergency phase, the program had encouraged unwise floodplain and wetland development in coastal areas or barrier islands. The author also points out that, although it was difficult to separate the importance of insurance from other factors that foster development, most research tends to support the idea that the flood insurance program had encouraged development.

Kusler, Jon A. (1994). Flood response and the restoration of wetlands, riparian areas, and broader floodplains: Lessons learned from the Great Flood of 1993. *Water Resources Update*, 97(Autumn), 25-8.

Keywords :

Midwest floods of 1993, environmental restoration

Abstract: Federal, state, and local government efforts to restore wetlands and floodplains after the flood of 1993 provided many lessons that should be applied in future efforts. Floods do create restoration opportunities. But, there are also severe impediments to restoration in postflood contexts, given the limited statutory goals of post disaster programs that do not address the restoration of natural systems, the narrowly targeted funding, the lack of preflood assessments and plans, the lack of coordination of agency efforts, and the need to deal with immediate and real suffering and human needs. New institutional mechanisms are needed to both identify general restoration opportunities prior to flood events as part of broader ecosystem management planning and to rapidly assess specific restoration opportunities after a flood event. The article lists several specific recommendations (consistent with the overall recommendations of *Sharing the Challenge*) both for the Mississippi Basin and other future contexts.

Kusler, Jon A. and Larry Larson. (1993). Beyond the ark: A new approach to US floodplain management. *Environment*, 35(5), 7-11, 31-4.

Keywords :

environmental impacts, floodplain management, nonstructural approaches

Abstract: The authors point out that traditional floodplain management emphasizes structural changes such as dams, levees, channel alteration, and shoreline protection. Because approaches emphasize minimizing structural losses, other flooding impacts are ignored. These include deterioration in water supply, erosion, sedimentation, nonpoint source water pollution, or damage to wetlands and natural habitats. The authors suggest bringing floodplain management under the umbrella of broad multi-objective watershed management planning, and emphasize the importance of local community participation in such an approach. Their approach requires a change in the role of federal agencies from "supermanagers" of the nation's floodplains to facilitators of state and local programs. The authors acknowledge that bureaucratic inertia and opposition from certain interest groups may make such an approach difficult to implement, but they maintain that the benefits would ultimately justify the effort.

Landman, Georgina B. and T.W. Ihloff. (1976). The legal aspects of floodplain zoning and management: An annotated bibliography. *Council of Planning Librarians*, 26.

Keywords :

zoning, floodplain management, legislation

Abstract: This bibliography contains materials devoted primarily to the legal aspects of floodplain regulations including floodplain zoning and management. In addition, this bibliography covers the economic aspects of flood insurance; the planning, engineering, and geographic aspects of flood management; government documents and government publications; and land-use planning abstracts.

Larson, Larry A. (1993). The Mississippi flood. *Environment*, 35(10), 4-6.

Keywords :

Midwest floods of 1993, agriculture

Abstract: In this commentary, the author agrees with the analysis and conclusion of the article by Mary Fran Myers and Gilbert F. White in the same issue of *Environment* dealing with the 1993 floods in the Midwest. He discusses farmers and the lack of levee protection, farmers' concerns about environmental groups, and the desire to change farmland to protected wetlands.

Larson, Larry A. and Doug Plasencia. (2001). No Adverse Impact: A New Direction in Floodplain Management Policy. *Natural Hazards Review* 2(4).

Available at: <http://www.floods.org>

Keywords :

development, economic impacts, floodplain management, "mitigation", public policy

Abstract: Annual flood losses in the United States continue to worsen despite 75 years of federal flood control and 30 years of the NFIP. This trend is due primarily to federal policies that have encouraged at-risk development, provided for insufficient consideration of the impact of that development on other properties and on future flood and erosion potentials, justified flood control projects based on a cost-benefit ratio that favors an intensification of land uses within the floodplain, and engendered an unhealthy reliance on federal resources by state and local governments. The authors propose a new "no adverse impact floodplain" approach that shifts the focus from the techniques and standards used for flood-prone development to how adverse impact resulting from those land-use changes can be planned for and mitigated. The proposed policy promotes community involvement and planning, sustainable development, and local land-use management, with consideration for private property rights.

Laska, Shirley Bradway. (1986). Involving homeowners in flood mitigation. *American Planning Association Journal*, 52(4), 452-66.

Keywords:

Louisiana, mitigation

Abstract: This article summarizes efforts by floodplain managers to encourage homeowners to take action on their own property to minimize flood damage. The author challenges earlier conclusions that homeowners would not be involved in mitigation efforts. Using case studies of Slidell, LA in 1983, about 18 months after major flooding had occurred, the article shows that homeowners who have been flooded recently are interested and willing to participate in mitigation. The author then examines recommendations for improving homeowners' involvement in mitigation and considers changes in the roles of federal, state, and local government.

Lave, Tamara and Lester B. Lave. (1991). Public perception of the risks of floods: Implications for communication. *Risk Analysis*, 11(2), 255-67.

Keywords :

Pennsylvania, risk communication, awareness

Abstract: The authors pointed out that since the late 1960s, the US government emphasized flood insurance as the primary tool for improving construction location, informing flood-proofing decisions, and providing reimbursement for flood damage. Interviews conducted with 22 residents of three flood-vulnerable communities in Pennsylvania revealed that most respondents had little knowledge of the cause of floods or of what could be done to protect themselves and their property. The authors concluded that there was little effective communication about the nature and magnitude of flood risks or of measures people can take to

lessen physical and economic loss. The authors suggested that a risk management program was needed that emphasizes more adequate communication as well as enforcement of the current (1991) law requiring people at risk who hold federally funded loans to be insured.

Leatherman, Stephen. (1997). *Flood Insurance Availability in Coastal Areas: The Role It Plays in Encouraging Development Decisions*. Washington, DC: FEMA.

Keywords :

coastal areas, Delaware, development

Abstract: This report focuses on North Bethany Beach, a coastal community in Delaware. The author concludes that the availability of flood insurance has had no real impact on oceanside development. In contrast, the availability, or lack thereof, of flood insurance has had a negative effect in development of low-priced lots. The author argues that the main factors that promoted beachfront development among the affluent were, in order of importance: proximity to major metropolitan areas, limited supply of desirable property in the face of increasing demand, lifestyle issues, elite development with private beaches, and the strength of the economy. The availability of flood insurance is, according to the author, much less of a factor.

Lecomte, Eugene and Karen Gahagan. (1998). Hurricane insurance protection in Florida. In Howard Kunreuther and Richard J. Roth, Jr., eds. *Paying the Price: The Status and Role of Insurance Against Natural Disasters in the United States*. Washington, DC: The Joseph Henry Press.

Keywords :

insurance agents, Florida, Hurricane Andrew, liability, modeling

Abstract: The authors contend that the spate of hurricanes that struck Florida in the 1990s, Hurricane Andrew in particular, revealed the precarious financial position of many Florida insurers. Due to the magnitude of insured losses inflicted by Hurricane Andrew, an immediate post-storm reaction of a number of insurance companies was to attempt to reduce their underwriting exposure. Some of the factors that influenced such actions included: (a) the inability to obtain adequate reinsurance for new and existing risks in Florida;(b) the availability of new information from catastrophe risk models indicating that existing levels of exposure might be more significant than previously realized; (c) significant reductions in insurers' policyholders surplus as a result of Hurricane Andrew; (d) concerns about rate adequacy, especially for coastal counties, and for certain classifications of risk such as condominiums; (e) "hidden" exposures resulting from potential assessments by various other mandated mechanisms (e.g., residual markets, catastrophe funds, etc.); and (f) fear that an unfavorable catastrophe exposure would negatively impact the rating by agencies such as A. M. Best and Standard and Poor. Some initiatives had been implemented to alleviate these problems. One initiative was a proposal by the Florida Insurance Council (FIC) for an agreement establishing post-hurricane cooperation between the FIC, the state insurance department, and state and local emergency management officials. In addition, the governor created a Building Codes Study Commission to evaluate the effectiveness of the building code system. Another initiative was the Florida Commission on Hurricane Loss Projection Methodology to examine the role of computer models in determining insurance rates. The commission developed a set of standards that a model must meet and hired a professional team to audit the modeling companies on site.

Leonard, Barry. (1999). *Answers to Questions about the National Flood Insurance Program*. Collingdale, PA: DIANE Publishing Company.

Keywords :

awareness, NFIP

Abstract: This book acquaints the public with the NFIP. It is designed for readers who do not need a detailed history or refined technical or legal explanations, but do need a basic understanding of the program and the answers to some frequently asked questions. This book includes an introduction to the NFIP; flood insurance information for prospective buyers; information on coverage; and directions for how to complete a flood insurance claim. It also includes floodplain management requirements; flood hazard assessments and mapping requirements; NFIP address and phone directory; a list of available publications; and the address for obtaining the coordinator's manual for the Community Rating System.

Leonard, Barry. (1999). *Mandatory Purchase of Flood Insurance Guidelines*. Collingdale, PA: DIANE Publishing Company.

Keywords :

mandatory purchase

Abstract: This book includes a brief description of the mandatory purchase requirement. It uses flowcharts, details coverage availability, and outlines general mandatory purchase provisions. It also discusses the specificities of condominiums, cooperatives, and timeshares and mentions key provisions, legal references, lender regulations, statutory provisions, notice requirements, NFIP resources, standard flood hazard determination form, the waiting period for policy issuance, private flood insurance criteria, and key terms.

Leopold, Luna B. (1994). *Flood hydrology and the floodplain*. *Water Resources Update*, 95(Spring), 11-4.

Keywords :

floodplain management, hydrology, easements, structural approaches

Abstract: This article considers the possibility of utilizing the natural function of floodplains in conjunction with engineering works such as levees and dams. The extent of flood damage reduction achieved by allowing some floodplain areas to flood, its potential benefits and costs, and the locations and distribution of such benefits and costs, have not been studied in an organized way. While valuable theory and practice are available to compute the efficacy of using temporary storage of floodwater to decrease the downstream peaks, this theory has not been put to use in flood control policy. Furthermore, the technology to make field measurements is available. Finally, the article suggests that the purchase of easements for temporary flooding of some areas would decrease the amount of future disaster relief and would be a more permanent solution to some flood control needs.

Leopold, Luna B. and Thomas Maddock, Jr. (1954). *The Flood Control Controversy*. New York, NY: The Ronald Press Company.

Keywords :

flood control, hydrology, public policy, riverine areas

Abstract: This book examines the controversial aspects of flood control in terms of the technical problems that were involved in 1954. Starting with concrete knowledge about the hydrology of rivers and floods, the authors show the possibilities and limitations both of engineering structures

and land management. They demonstrate that flooding can never be completely eliminated in a river system. The major part of the book analyzes the effectiveness of upstream and downstream programs for flood control, as advocated by the Department of Agriculture and the Army Corps of Engineers. In discussing general problems of policy, the authors present cogent arguments for redefining the federal interest in flood control and for apportioning the costs and benefits more logically both for the groups who need flood protection and for the nation. Lastly, the authors provide an assessment of 1954 flood control measures and a lucid presentation of the hydrologic facts that have been overlooked.

Leuchtenburg, William E. (1972). *Flood Control Politics: The Connecticut River Valley Problem, 1927-1950*. New York, NY: Da Capo Press.

Keywords :

Connecticut River Valley, flood control

Abstract: This book considers the attempt to provide flood control in the Connecticut River Valley between 1927 and 1950 and outlines the conflicts that arose. The primary conflict, which is thought of as a microcosm of the political struggles of the period, was a federal-state conflict in the Connecticut Valley over the best uses of the valley resources and between competing special interests over their allocation.

Lewis, Gary L. (1992). Jury verdict: Frequency versus risk-based culvert design. *Journal of Water Resources Planning and Management*, 118(2), 166-184.

Keywords :

Wyoming, legal proceedings, liability

Abstract: A federal district court jury in Cheyenne, WY ruled that an act-of-God defense could not be used when a railroad culvert backed water onto residential properties during a catastrophic “10,000-year” rainstorm. The culvert capacity not only met, but also exceeded, industry design standards, yet the jury decided that the railroad was negligent for not installing a structure large enough to accommodate the “monster” storm. The 5-ft-diameter culvert, installed to replace a larger, deteriorating trestle, is sized by frequency-based methods to discharge the 50-year peak flow rate, with a nominal surcharge anticipated during the 100-year event. Both sides agreed that the selected structure could have safely passed more than a 500-year event, but was not able to discharge all the flows from the freak storm. Backwater pooled 9 ft over the top of the culvert, flooding more than 20 basements in one subdivision. The defendant is held liable for the damages and cited as negligent for not anticipating the storm and for failing to consider the risks to homeowners. Under court order, a large structure is installed. This paper is a review of several matters debated during the trial and in subsequent analyses, presented as a case study from the writer’s perspective. The writer participated as an expert witness who performed the analysis for the defense, but was called to the stand as a witness for the plaintiff. The jury verdict was in favor of the plaintiff. Implications for improvements in drainage design and expert testimony are discussed.

Lichtenberg, Erik. (1994). Sharing the challenge? An economist's view. *Water Resources Update*, Autumn (97), 39-43.

Keywords :

public policy, floodplain management, cost-benefit analysis

Abstract: The article addresses the following issues included in the recommendations of *Sharing the Challenge*: (a) economically efficient flood risk management; (b) preservation and enhancement of natural resources and functions of floodplains; (c) organization of floodplain management through the coordination of federal, state, and local agencies; (d) use of flood insurance to internalize the costs of floodplain development; and (e) the role of the federal government in floodplain management. Several implications about floodplain management follow from the general economic perspective presented. First, reducing expected flood damage should not be a goal of floodplain management per se; rather the appropriate level of protection from flooding should equate the marginal social benefits of expected damage reduction with its marginal social cost. Second, over time, some flood losses are certain to occur, even under optimal policy. Third, the concept of the Standard Project Flood should have little or no place in floodplain management. Instead, the level of protection for every location should equate marginal social benefit with marginal social cost.

Leikin, Howard and Thomas Hayes. (1999). *National Flood Insurance Program Flood Insurance Rate Review*. Washington, DC: FEMA.

Keywords :

subsidies insurance premiums, NFIP

Abstract: This report review NFIP's background, focusing on rating. One of NFIP's goals is to generate a target level of premium income at least sufficient to cover expenses and losses relative to what is called the "historical average loss year." The estimate of rates accommodates the portion of NFIP customers who pay less than full risk premiums (a subsidy provided by statute) as well as the portion who pay full risk premiums. In 2000, the distribution is anticipated to be 32 percent at subsidized rates and 68 percent at full-risk premium rates. The FIA estimates that, were the catastrophic contingency contemplated in establishing all rate levels, the pre-FIRM subsidized portion of the business would have to pay about two-and-one-half times the current premium and the overall target level for premiums would have to increase on the order of 50 percent to 100 percent. The rate review also discusses generally accepted actuarial principles of ratemaking, overall rate level indications, target level premium analysis, rate review results, increased cost of compliance, expense constants, and the federal policy fee. The rate review indicates that written premiums based on all rate and rule changes through May 2000 are expected to be 118 percent of the level needed to fund the historical average loss year.

Lind, Robert C. (1967). *Flood control alternatives and the economics of flood protection*. *Water Resources Research*, 3(2), 345-57.

Keywords :

economic impacts, flood control, insurance, structural approaches, zoning

Abstract: This paper discusses and compares the economic effects of alternative programs for coping with flood losses (structural transformation of the river bed, which includes dams, levees, channel improvements, etc.; flood insurance; flood warning and evacuation systems; floodproofing; and flood zoning). The author argues that structural flood-control measures such as dams alter the stream flow so as to change the distribution function associated to flood losses. Thus "structural protection, by eliminating the smaller, more frequent floods that account for a large part of total flood losses, thereby reduces the expected value of losses." Floodproofing, flood warnings, and evacuation systems do not alter flood frequency but lower the level of flood damage associated with a given level of flooding. Flood insurance does not reduce the expected

value of losses. Flood zoning may aim to reduce expected losses by affecting the pattern of development of the floodplain. However, the author states that: "it is very likely that in practice flood zoning will exclude some activities that could profitably locate in the floodplain." The author concludes that "first ... from an economic point of view, flood zoning is not a desirable method of coping with flood losses. Flood zoning could be justified only on the grounds that it is politically or administratively feasible, whereas other programs are not. Second, flood insurance should be carefully considered as an integral part of any program for coping with flood losses. Finally, land-enhancement benefits, properly measured, represent real gains that should be incorporated in benefit estimates."

Lohse, Deborah. (1999). Floyd teaches a hard lesson in flood insurance. *Wall Street Journal*, September 23.

Keywords :

flood damage, Hurricane Floyd, insurance, risk communication

Abstract: Many persons affected by Hurricane Floyd did not pay attention to the terms of their policies until it was too late. These include a renter whose renters' insurance did not cover flood damage, homeowners who did not expect to be flooded, and homeowners who had coverage for their homes but not for their belongings. Carriers have long excluded flood damage in standard homeowners' insurance policies. While traditional insurance covers some flood-related damage, it does not cover damage not technically related to floods (e.g., roof damage). The NFIP sells to homeowners, renters, and small business owners in flood-prone communities. Such coverage is mandatory for home buyers in these areas who obtain mortgages from federally regulated lenders, but not all lenders enforced the requirements. Floyd struck many areas that were not considered at high risk.

Lord, William B. (1994). Flood hazard delineation: The one-percent standard. *Water Resources Update*, 95(Spring), 36-9.

Keywords :

hundred-year flood standard

Abstract: This article examines the NFIP's one-percent standard. This standard, which describes an area with a one-percent probability of flood occurrence in any year, was established as the standard for defining the Special Flood Hazard Areas on FIRMs. The standard was useful for encouraging both community floodplain delineation studies and enrollment in the regular program. However, now that 85 percent of flood-prone communities are participating in NFIP, the standard has become instead an obstacle to informed and efficient floodplain management programs. What was intended to be a politically acceptable minimum standard of protection has too frequently become the only standard. Along with the abolition of this standard, the article makes several recommendations for hydrologic and topographic studies, improved zoning, and the distinction between existing structures in the floodplain from prospective development in hazard zone development.

Loughlin, James C. (1971). A flood insurance model for sharing the costs of flood protection. *Water Resources Research*, 7(2), 236-44.

Keywords :

development, NFIP

Abstract: This paper provides an early analysis of the passage of the NFIP in 1968. The author predicted that the highest degree of cost sharing would fall on future developers.

Lowry, G. Kem, Jr. (1980). Policy-relevant assessment of coastal zone management programs. *Coastal Zone Management Journal*, 8(3), 227-55.

Keywords :

coastal areas, public policy

Abstract: The purpose of this policy evaluation is to provide information about the development, alteration, or termination of coastal zone management programs. Such evaluation should involve the analysis of the extent to which an organization's goals have been achieved. In policy evaluation, the critical design issue is to anticipate the policy context in which the evaluative information will be used. Anticipating the policy context involves responding to several questions. Who will make policy decisions in regard to coastal zone management programs? What policy decisions need to be made? Do policy-makers require evaluative information to make these decisions? What types of evaluative information do they need? Can this information be provided in time to be used in the decision-making process? Because of the number of potential clients for such information and the variety of decisions that have to be made, no single evaluative approach is likely to be appropriate for all situations. Five general approaches are outlined: program logic, compliance, process, goal achievement, and impact assessment. The choice of a particular approach depends primarily on the issues faced by policy-makers. The choice of research design for policy-relevant evaluations of coastal zone management programs is affected by a host of factors. Two considerations are likely to be paramount, what types of policy decisions will the evaluations be used for? What are the stakes involved in the decision? The design and conduct of evaluative studies of coastal zone managements pose special problems. The causal analysis of the relationships among program interventions and coastal environmental conditions illustrates the research design problem. There are countless confounding factors that contribute to impacts on coastal resources. These factors represent rival explanations that can contribute to changing coastal conditions along with or instead of the program interventions. The ideal research design allows an evaluator to separate out spurious effects for true effects of the program intervention.

Luloff, A.E. and K.P. Wilkinson. (1979). Participation in the National Flood Insurance Program: A study of community activeness (sociological perspective). *Rural Sociology*, 44, 137-52.

Keywords :

economic modeling, Pennsylvania, compliance, NFIP, socioeconomic impacts

Abstract: This research analyzes the NFIP from a sociological perspective. It identifies those factors that influence the adoption of flood insurance regulation by studying all flood-prone municipalities in Pennsylvania. The study emphasized is placed on the communities' structural characteristics, typical patterns of response to previous issues, and past history with flooding. Through the use of multivariate analysis, the authors generate support for the utility of the field perspective of community action as an approach to the study of action. They conclude with an interpretation and possible implementation of these findings.

Lyons, Joseph K. and Robert L. Beschta. (1983). Land use, floods, and channel changes: Upper Middle Fork Willamette River, Oregon (1936-1980). *Water Resources Research*, 19(2), 163-71.

Keywords :

development, modeling, Oregon

Abstract: Flow trends and channel characteristics from 1936 to 1980 were evaluated for the Middle Fork Willamette River, which drains a 668-km² forested watershed in the Cascade Mountains of western Oregon. An inventory of aerial photographs from 1959 to 1972 shows that landslides associated with roads and in clearcuts were 27 and 23 times more frequent, respectively, than in forested areas. Numerous landslides unloaded sediments directly into the drainage system; most landslides appear to have been initiated during a large flood (return period greater than or equal to 100 years) of December 22, 1964. Analysis of precipitation and peak flows (greater than 100 m³ s⁻¹) from 1958 to 1980 by means of power function models suggests a trend of increasing flows as timber harvesting and road building expanded in the basin. Changes in channel pattern, documented from aerial photographs, show major increases in channel width from 1959 to 1967 and a trend of decreasing width from 1967 to 1980. During summer low flows in 1979 and 1980, 65 cross sections of the channel were surveyed to provide detailed measurements of existing channel conditions. Channel widths of 62% of the aggraded reaches were significantly greater ($\chi = 0.05$) than those for nonaggraded reaches.

MacDonald, Don M., James C. Murdoch, and Harry L. White. (1987). Uncertain hazards, insurance, and consumer choice: Evidence from housing markets. *Land Economics*, 63(4), 361-71.

Keywords :

economic modeling, insurance premiums

Abstract: This paper extends the option-price literature on uncertain housing characteristics to include insurance. The theoretical model predicts a relationship between housing price differentials and insurance premiums for housing located inside and outside of a hazard zone. The relationship is dependent on the consumer's perception of the loss from hazard relative to reimbursement from an insurance company. The theory provides an exogenous test (the insurance premium) for using the hedonic method to measure willingness to pay for housing. The theory is tested using housing data inside and outside a flood hazard zone.

MacDonald, Gordon J. (2000). *A Note on Order Statistics and Property Losses from Catastrophic Hurricanes and Floods in the USA*. Laxenburg, Austria: International Institute for Applied Systems Analysis.

Keywords :

Florida, hurricanes, Hurricane Andrew, Alabama, economic impacts

Abstract: The relative short time scale and limited spatial scales of hurricanes allow a normalization of damages at the present time. The most damaging hurricane in the period 1925-1995 was one that hit South Florida and the Alabama coast in 1926, following a path north of that followed by Hurricane Andrew in 1992. The normalized losses from the 1926 hurricane totaled \$72 billion compared to the normalized \$33 billion caused by Andrew. The most probable loss for a hurricane causing a loss greater than the 1926 hurricane is \$152 billion. In constant current dollars, the average yearly loss from flood in the USA is \$3.1 billion while losses exceeded \$4 billion in 25 years. The largest yearly flood-related loss was from the

Midwest floods of 1993, which caused a loss of \$19.5 billion. The most probable value for yearly losses greater than that of 1993 is \$32 billion.

Maloney, Frank E. and Dennis C. Dambly. (1976). The National Flood Insurance Program: A model ordinance for implementation of its land management criteria. *National Resources Journal*, 16(3), 665-736.

Keywords :

compliance, mandatory purchase, NFIP, takings

Abstract: After passage of the Flood Disaster Protection Act in 1973, property owners in communities that participated in NFIP were required to purchase flood insurance to be eligible for any new or additional federal or federally financed assistance for any construction located in areas identified by the Department of Housing and Urban Development as having special flood hazards. All identified flood-prone communities must enter the program within one year after formal notification that they contain special flood hazard areas in order to qualify their citizens. To enter the program, communities must adopt and submit required land use controls that govern flood plain management and apply to all areas identified as flood plain areas having special flood hazards. However, such land use controls are not self-executing, they require the enactment of local ordinances for their implementation. This article offers a model ordinance by which communities can use as an example to craft their own legislation. In addition, this article offers background for better understanding the 1973 Act and it includes a history of NFIP's development. An analysis of the NFIP in its present form follows. Part three discusses the problem of regulation under the Flood Disaster Protection Act and whether implementing state and local legislation constitutes a taking of regulated property in violation of state and federal constitutional provisions. Finally, part four offers the model ordinance with commentary including citation of sources from which the various provisions of the model were developed.

Marincioni, Fausto. (2001). A cross-cultural analysis of natural disaster response: The northwest Italy floods of 1994 compared to the US Midwest floods of 1993. *International Journal of Mass Emergencies and Disasters*, 19(2) 209-36.

Keywords :

Italy, Midwest floods of 1993, socioeconomic impacts, awareness

Abstract: The observation that similar types of natural disasters produce different reactions based on a particular culture and location demands a thorough and detailed analysis because the reasons are likely to be numerous and complex. Although the economic situation, political organization, and technological infrastructure of communities are fundamental factors, they do not offer a complete explanation of people's behavior in the face of risk and disasters. This article uses a cross-cultural perspective to clarify the relationship between two cultures and their different patterns of response to extreme flood events. The research was carried out in two Western societies, the United States and Italy, both of which have similar socioeconomic characteristics, but distinctly different historical and cultural traditions. The disasters studied were the Po River Valley floods of November 1994 in northwest Italy and the Mississippi River-Missouri River floods in the US upper Midwest during the summer of 1993. These two extreme floods were analyzed with respect to the pattern of human response during the preparation, rescue, recovery, and reconstruction phases. The study includes both human-response and cross-cultural analyses. A questionnaire was employed to gauge the perception of the flood disasters by the Italian and American disaster managers. The cross-cultural analysis was performed using

an etic-emic contrast. The results show that the different human responses observed in the floods of northwestern Italy and of the United States Midwest were linked to basic differences in four cultural elements: (1) experience with floods, (2) sociopolitical traditions and organization, (3) level of integration within the community, and (4) perception of the physical environment.

Marlowe, Howard. (2000). Coastal dwellers not to blame. *USA Today*, July 27.

Keywords :

erosion, beach nourishment, coastal areas, subsidies, environmental restoration

Abstract: The president of the American Coastal Coalition states that beach erosion is not due to homes built near the coast but to the development of ports, inland waterways, and dams that interfere with the natural flow of sand. He questions the allegation that coastal property owners are subsidized by the rest of the nation, noting that NFIP premiums paid by residents of coastal states exceed their claims, and that funds spent to restore and protect coastal America pay off handsomely for all Americans. While unchecked erosion can leave coastal communities more prone to damage caused by storm surges, studies such as the 1995 National Research Council report show that erosion is controllable by cost-effective, environmentally benign measures such as beach renourishment.

May, Peter J. (1985). *Recovering from Catastrophes: Federal Disaster Relief Policy and Politics*. Westport, CT: Greenwood Press.

Keywords :

disaster assistance, federal programs, legislation

Abstract: “This book examines the evolution of disaster relief policy, assesses problems with the current policy, and provides an understanding of the issues that are likely to be involved in future deliberations about federal policy. Three interrelated aspects of the history and politics of disaster relief are examined in the book. The first is legislative history, involving considerable change in disaster relief legislation, congressional politics, and normative aspects of the federal role in providing assistance. A second aspect of the history of disaster relief policy examined in the book is organizational history as it mainly relates to repeated internal reorganizations of the disaster relief function in the executive branch. Finally, there is the history of what actually happened in the field in the aftermath of disasters concerning relationships among federal, state, and local officials. The book analyzes the way in which negotiations over disaster-specific relief provisions shape overall policy.”

Mayer, David, Elizabeth Mayer, and Judith Mayer. (1984). Comparing costs of alternative flood hazard mitigation plans: The case of Soldiers Grove, Wisconsin. *Journal of the American Planning Association*, 50, 22-35.

Keywords :

relocation, Wisconsin

Abstract: The authors compared the cost of relocating the business district of Soldiers Grove, WI, from its original site with cost estimates for raising traditional flood protection structures. The authors concluded that the town’s choice (relocation) was the correct one. The authors reached their conclusion despite the almost identical cost estimates for both alternatives because of the implied modernization of the town and the environmental consequences that the traditional measures could have caused (these measures were coupled with a never-completed dam). The authors acknowledged that relocation may not be desirable or easy for larger communities.

McShane, John H. (1996). A watershed approach to flood hazard mitigation and resource protection: The President's floodplain management action plan. In *Proceedings from Watershed 96*, Baltimore, MD, June 8-12, 1996.

Available at <http://www.epa.gov/OWOW/watershed/Proceed/mcshane.html>

Keywords :

floodplain management, environmental restoration

Abstract: The author contends that until recently, federal policy encouraged and funded major flood-control projects, and thus contributed to the loss and degradation of the nation's floodplain resources. However, in recent years floodplain lands and waters have been recognized as ecologically productive, hydrologically important, and environmentally sensitive. Following the Midwest floods of 1993, the Federal Interagency Floodplain Management Task Force revised the Unified National Program for Floodplain Management to reflect the increased recognition of the importance of protecting and restoring the natural resources and functions of floodplains, as well as reducing the loss of life and property caused by floods. During that same time, the Executive Office of the President established the Floodplain Management Review Committee. The Committee prepared a report, *Sharing the Challenge: Floodplain Management Into the 21st Century*, which reinforced the findings of the Task Force. As a result, the author concluded that a *Floodplain Management Action Plan for the Nation* is needed.

Mileti, Dennis S. (1995). Factors related to flood warning response. Paper presented at the US-Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods, Perugia, Italy, November 13-17, 1995.

Keywords :

risk communication, awareness

Abstract: This paper synthesizes the social psychological process that explains how members of the public receive, process, and eventually come to take protective actions in response to the receipt of warnings of extreme floods. The author argues that effective public warnings must provide for public interaction and foster the search for information in addition to received warnings. The author states that risk communication to the public is an almost continual process when viewed globally.

Mileti, Dennis S. (1999). *Disaster by Design*. Washington, DC: National Academy of Sciences, Joseph Henry Press.

Available at: <http://books.nap.edu/books/0309063604/html/5.html#pagetop>

Keywords :

mitigation, public policy

Abstract: *Disaster by Design* is aimed at a general audience, including policymakers and practitioners. It synthesizes statements about hazards and human coping strategies. This book stemmed from the second national assessment on natural and related technological hazards and disasters and it contends that many disaster losses are the predictable result of interactions among three major systems: the physical environment, the social and demographic environments, and the buildings, roads, bridges, and other components of the constructed environment. Settlement of hazardous areas has destroyed local ecosystems that could have provided protection from flood and other natural perils (e.g., the draining of swamps in Florida). Furthermore, mitigation efforts themselves can degrade the environment and contribute to the next disaster (e.g., levees

built to provide flood protection can destroy riparian habitat and heighten downstream floods) and some efforts to head off damages from natural hazards only postpone them (e.g., dams or levees). The book suggests six objectives for sustainable mitigation of hazard risks (a) maintain and enhance environmental quality; (b) maintain and enhance people's quality of life; (c) foster local resiliency and responsibility; (d) recognize that vibrant local economies are essential; (e) ensure inter- and intra-generational equity; and (f) adopt local consensus building. The book concludes that in order "to support sustainable hazard mitigation, researchers and practitioners need to ask new questions as well as continue to investigate traditional topics. Important efforts will include interdisciplinary research and education, and the development of local hazard assessments, computer-generated decision-making aids, and holistic government policies. Future work must also focus on techniques for enlisting public and governmental support for making sustainable hazard mitigation a fundamental social value. Members of the hazards community will play a critical role in initiating the urgently needed nationwide conversation on attaining that goal."

Millemann, Beth. (1993). The National Flood Insurance Program. *Oceanus*, 36, 6-8.

Keywords :

development, liability, NFIP

Abstract: The author forecasted that the NFIP is going to be one of the biggest domestic liabilities in the United States. Scientists at the National Hurricane Center predicted that another storm cycle of "super hurricanes would mean claims of \$3.5 billion to \$4 billion. The NFIP fund had less than \$400 million, so any shortfall would have to be paid by the federal taxpayer. The author claims that the NFIP was originally intended to discourage overdevelopment of coastal areas, but it resulted in an explosion of coastal development in the 1970s and 1980s. The author claims that Congress attempted to overhaul the NFIP in 1992, but a coalition of powerful interest groups fought against it, and the legislation was not implemented.

Miller, B.A., A. Whitlock, and R.C. Hughes. (1996). Flood management: The TVA experience. *Water International*, 21(3), 119-30.

Keywords :

floodplain management, Tennessee Valley Authority, structural approaches, nonstructural approaches

Abstract: Increasing attention has been focused on the need for a more comprehensive approach to flood management that combines traditional structural approaches with elements of nonstructural floodplain management. For the past 50 years, the Tennessee Valley Authority (TVA) has met its responsibilities for flood control in the Tennessee River Basin through such a dual approach, combining a system of multipurpose dams and reservoirs with a floodplain management program to encourage appropriate shoreline development. This article provides an overview of TVA's flood management program including a description of the hydrologic conditions in the region, an overview of the reservoir system and its flood control capabilities, and a description of forecasting procedures and flood control operating strategy. The development and implementation of TVA's floodplain management program, and its role in reducing flood damages in the Tennessee Valley are also presented. The article closes with a discussion of the role of technological advances and agency streamlining on future operations.

Miller, H. Crane. (1975). *The National Flood Insurance Program and Coastal Real Estate Development: The Experience of Westerly, Charlestown, and South Kingstown, Rhode Island, 1975.* Putnam, CT: Cheney, Miller, Ellis and Associates, Inc.

Keywords :

development, Rhode Island, coastal areas

Abstract: The predominant force influencing sales and development of beach properties in Westerly, Charlestown, and South Kingstown, RI, is the availability of direct financing of such properties as a result of the availability of flood insurance. Bankers and realtors agree that the availability of flood insurance has created a broader base of property owners than previously, particularly among middle income individuals who can now afford beach properties because of direct financing available up to 70 percent of the property value. There is a definite cause/effect relationship between flood insurance and available direct financing and a less definite relationship between accelerated sales and flood insurance. The low cost of flood insurance is both affordable and negligible when compared with the risks involved and the protection afforded property owners. Flood insurance premiums in the early 1970s did not act as economic disincentives to development on the barrier beaches of the three towns.

Miller, H. Crane. (1975). Coastal floodplain management and the National Flood Insurance Program: A case study of three Rhode Island communities. *Environmental Comment*, 3(2), 2-14.

Keywords :

coastal areas, development, floodplain management, Rhode Island

Abstract: In this study of three communities, the author says that local banks voluntarily withdrew from the first mortgage market due to hurricane destruction in 1938 and 1954. Building, however, continued during this period since homeowners were able to get mortgages from lenders outside the local market. Once flood insurance was available to secure mortgages, however, local banks again began to issue mortgages on ocean front property. Because the demand for coastal property was high before the flood insurance program was enacted, the author argued that there was no clear evidence that the availability of flood insurance increased that demand. The author claims that flood insurance is perceived as a bonus by most property owners in the area. The author contends that there is some evidence that availability of flood insurance in coastal areas may work as a counter force against sound coastal management, by sustaining and even increasing property values.

Miller, H. Crane. (1977/1981). *Coastal Flood Hazards and the National Flood Insurance Program.* Washington, DC: FIA.

Keywords :

development, Rhode Island, property values

Abstract: This research was an attempt to test whether the findings in Miller's 1975 study of Rhode Island could be applied to the nation as a whole. The author chronicled a tremendous growth in coastal development in the 1960s and 1970s but the demand generally existed before the NFIP. The author concluded that: (a) adding the cost of insurance premiums to the property apparently neither increases nor decreases demand for coastal properties; (b) there was no evidence that floodplain management requirements on coastal development depressed demand for coastal property; (c) the greatest effect on property values during this period wasn't the NFIP

but rather market forces; and (d) in most coastal communities, the NFIP had not affected the basic investment decision on availability of financing.

Miller, H. Crane. (1983). *Shifting sands of coastal barrier development subsidies*. In *Preventing Coastal Flood Disasters: The Role of the States and Federal Response*. Madison, WI: Natural Hazards Research and Applications Information Center, Association of State Floodplain Managers.

Keywords :

development, coastal areas, subsidies

Abstract: The author contends that federal subsidies for infrastructure and disaster assistance have played a significant role in coastal development since the end of the Korean War. The author contends that in most cases, flood insurance was not the main force behind such development. Subsidies for bridge access, roads, water supplies, water treatment, and wastewater treatment had a more profound impact on development.

Miller, H. Crane. (1990). *On the Brink: Coastal Location and Relocation Choices*. Washington, DC: FEMA.

Keywords :

relocation, Upton-Jones Amendment, coastal areas, awareness

Abstract: This is another in a series of case studies by the author. Miller uses data from two coastal communities to explain why the relocation provisions of the Upton-Jones Amendment are used infrequently. Interviews and other analysis of the two communities led him to conclude that "...owners generally buy oceanfront property with knowledge of the risk and of the history of storms and other hazards in the area. People buy on the oceanfront because they 'want to be there,' find their risk acceptable, and often would locate there regardless of whether flood and wind insurance were available. Besides, they are far more likely than their riverine counterparts, to rebuild in the same location if a disaster destroys their home" (p. 5). Each of the owners that Miller interviewed carried high amounts of flood, wind and homeowners insurance. All said they realized they might lose their investment to erosion but felt the possibility a small one (p. 6). Retreating from the water's edge, even with some government subsidy, was not economical for most of the owners since they enjoyed a good secondary income by renting the ocean front property to seasonal visitors. For many, rental incomes, even when offset with the cost of insurance and repairs, made the property a good personal investment. "The amenities of an oceanfront location -- view, easy access to the beach, water recreation, nearby wetlands, peace and quiet where it exists -- seem to meet deeply felt emotional needs of people who own property there."

Miller, John B. (1998). *Floods People at Risk: Strategies for Prevention*. Collingdale, PA: DIANE Publishing Company.

Keywords :

floodplain management, Midwest floods of 1993

Abstract: This book draws on recent case examples and aims to provide authoritative scientific and technical information. It includes flood statistics; information on the Midwest floods of 1993; causes of floods; floodplain management, strategies for reducing loss of life and property; floodplain mapping; flood insurance; structural counter measures (such as dikes, flood control reservoirs, flood detention basins, and river training); nonstructural defense (such as

floodproofing, soil and water conservation, and flood forecasting; dam safety); and emergency response (including flood precautions, post-flood recovery and post-flood review).

Missouri State Emergency Management Agency (MSEMA). (1995). *Out of Harm's Way: Missouri's Flood Buyout Program*. Jefferson City, MO: MSEMA.

Keywords :

buyouts, mitigation, Missouri, relocation

Abstract: This report illustrates the success of the Missouri Buyout Program (MBP) and offers sufficient in-depth background for a public policy debate on continued funding of such programs. The MBP is a proactive and cost-effective program that stresses a collaborative effort among federal, state, and local governments. It is a voluntary program, providing residents a practical solution by relocating to homes outside of the floodplain. Once the properties are cleared, the publicly owned ground may then be used for open space purposes more consistent with the threat of repeat flooding. Included in this report were the following recommendations: the establishment of a programmatic buyout and hazard mitigation program with funding authorities independent of disaster declarations; maintaining flexibility in hazard mitigation programs to promote cost-effective and appropriate mitigation techniques, including the option of states receiving funds as a block grant; and the development of common procedures for federal buyouts and mitigation programs.

Mittler, Elliott. (1996). *Social consequences of flood mitigation*. In *1996 International Conference and Exposition on Natural Disaster Reduction*. Washington, DC: American Society of Civil Engineering.

Keywords :

buyouts, cost-benefit analysis, structural approaches, mitigation, socioeconomic impacts

Abstract: The federal government has sought both structural and nonstructural solutions to disastrous floods. The cost-benefit analyses that drive the choices of mitigation solutions, however, do not fully account for the social impacts of each decision. The NFIP's buyout plan aims to remove at-risk structures within the floodplain. The social consequences of this plan have not been studied; they may include changes to the core urban structure, loss of farmlands, and loss of passive recreation areas. Ultimately, these decisions favor those with money over those without. Even voluntary buyouts give the property owner poor choices: move out of one's home or stay and have the surrounding areas gradually reduced in economic and social value. This disproportionately affects those already living on the economic margin.

Mittler, Elliott. (1997). *An Assessment of Floodplain Management in Georgia's Flint River Basin*. Program on Environment and Behavior Monograph #59. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Keywords :

building codes, Flint River Basin, Georgia, relocation, buyouts, awareness, substantial damage

Abstract: This book, based on research funded by the FEMA with the Association of State Floodplain Managers, assesses federal, state, and local flood loss reduction efforts in the context of Georgia's floods of 1994. The assessment evaluates previous Flint River Basin studies; the political setting; federal, state, and local responses to the disaster in terms of recovery plans and mitigation programs; and the role of the NFIP in helping to reduce flood losses. It found that federal, state, and local governments worked successfully at implementing policies and programs

that will reduce future flood losses. Reasons for the positive outcome include the implementation and enforcement of preexisting federal recovery and mitigation policies; Georgia's adoption of the federal policies as the main elements in its recovery plan and subsequent efforts to establish state guidelines for acceptable local recovery plans; and the state's provision of trained building inspectors to local governments to ensure the implementation and enforcement of state building codes. Other findings included the following. First, FEMA's buyout and relocation policy is too limited and inflexible to accommodate complex local issues like those that arose in Albany, Georgia, such as failure to coordinate local and regional programs and a flawed method for determining buildings that were substantially damaged. Second, flood insurance was not widely purchased in the Flint River Basin. Those who purchased it tended to be underinsured, and disaster assistance was the primary source of federal funds to individual victims. Third, federal, state, and local officials made less-than-optimal decisions because they did not share important data or effectively use data collected by others.

Montz, Burrell E. (1983). The effects and effectiveness of flood insurance requirements: Agent perspectives. *The Environmental Professional*, 5, 116-23.

Keywords :

development, property values

Abstract: The author asked a local sample of diffusion agents (defined as mortgage lenders, real estate agents and property insurance agents) a variety of questions about their interaction with consumers who had purchased or were considering purchasing property in flood hazard areas. One of the questions was whether the agents felt the NFIP and local floodplain regulations made a difference in the demand for land in the floodplain. Generally, those who responded felt there was little or no effect of the NFIP on the local housing market. In other words, it neither decreased nor increased demand. They reported that when consumers first learn that a piece of property is in the hazard area, it seemed to concern them but ultimately did not deter them from the ultimate purchase decision. The extent to which their decision to go ahead was related to the comfort afforded by insurance availability is not clear from these findings.

Montz, Burrell and Eve C. Gruntfest. (1986). Changes in American urban floodplain occupancy since 1958: The experiences of nine cities. *Applied Geography*, 6, 325-38.

Keywords :

compliance, development, floodplain management, urban areas

Abstract: In 1958, researchers from the University of Chicago documented increases in the number of structures in the floodplains of 17 American cities, a phenomenon attributed to the prevalence of flood control structures. Because federal policies have shifted to managing floodplains, this paper updates the 1958 study for nine of the cities. Several trends are apparent. Development pressures determine floodplain encroachment; floodplain management regulations have been implemented where it was easiest to do so. Further, structural measures continue to dominate. Thus, while many local officials are becoming more aware of advantages of floodplain regulation, implementation and enforcement are inconsistent and uneven.

Montz, Burrell E. and Graham A. Tobin. (1988). The spatial and temporal variability of residential real estate values in response to flooding. *Disasters*, 12(4), 345-55.

Keywords :

economic modeling, property values

Abstract: A case study of two Californian communities that were flooded following a levee break represents a relationship between residential property values and the incidence of flooding. Analysis of the real estate market before and after the flood shows that the flood was capitalized into housing values, whereby both list and selling prices dropped immediately but have recently begun to recover. However, recovery of the market is not uniform throughout the floodplain. Houses that suffered from 18 inches of water recovered to near preflood values in less than one year. In contrast, houses that had approximately ten feet of water in them have not recovered to the same extent, indicating that capitalization and recovery do not occur evenly. These findings suggest that policies and programs should address these spatial and temporal differences in recovery, which are expected to vary with different flood frequencies and magnitudes.

Montz, Burrell E. and Graham A. Tobin. (1999). *The Effectiveness of the National Flood Insurance Program in Two Communities: Syracuse, NY and Tampa, FL.* Paper presented at the *Annual Meeting of the Association of State Floodplain Managers, Portland, OR, May 24-28, 1999.*

Keywords :

cost-benefit analysis, development, New York, Florida, property values, NFIP

Abstract: This study is based on a research design developed by Newton, Myers, and Monday (1996), which posed three questions related to floodplain activities over the last 30 years: (a) What has been the NFIP's effect on human occupancy of floodplains; (b) What has been the effect of the NFIP on net economic value of floodplain occupancy; and (c) What has been the NFIP's effect on the natural functions of watersheds. This two-city pilot project was aimed at obtaining a preliminary view of the impacts of NFIP and at refining a methodology for a broader national assessment. The results reported focus on the first two questions. The results suggest that there are differences in occupancy and economic value of floodplain and nonfloodplain areas since communities joined the NFIP. Some differences can be attributed to economic and demographic characteristics, but others cannot. With all but multiple-family residences, there is a tendency toward decreased investment in floodplains, but patterns differ between the two cities. In Syracuse, a decrease in the number of structures was evident, except with multiple family residences. In Tampa, there were increases in all floodplain land uses, but the absolute change in number of structures was higher in the nonfloodplain area. Thus, even with growth, there is a tendency toward less economic activity in the floodplain. The timing of this differs between cities. In Syracuse, joining NFIP coincided with a decrease in the number of structures, whereas in Tampa, the greatest increase in number of structures in the floodplain occurred at this time. While these changes could have come about before entrance into NFIP, the pace of investment decreased in the floodplain as community experience with NFIP increased, and this differs from nonfloodplain areas. It is clear, therefore, that these results are not removed from other forces that affect investment in development. In Syracuse, the study period includes times of economic downturn, and the decreases in numbers of structures could be attributable to that. However, if that were the case, the differences between floodplain and nonfloodplain areas would probably not exist. It appears that NFIP is making a difference, irrespective of the socio-economic characteristics of communities.

Moore, Jamie W. and Dorothy P. Moore. (1989). *The Army Corps of Engineers and the Evolution of Federal Flood Plain Management Policy.* Boulder, CO: Institute of Behavioral Science, University of Colorado.

Keywords :

floodplain management, Army Corps of Engineers, erosion

Abstract: This study examines the relationship between the Army Corps of Engineers and the development of federal programs of floodplain management. While the narrative primarily focuses on the Corps, any study of floodplain management must embrace many subjects. The decisive players in the theory and practice of flood damage abatement include the evolution of associated engineering technologies; political, social and economic impacts on the enactment of legislation; the workings of the political process; the organizational impulses directing agency decisions and practices; and changes in public opinion.

Moore, Martha T. (1998) Line in the sand over beach rebuilding. *USA Today*, May 22.

Keywords :

development, beach nourishment, Army Corps of Engineers

Abstract: Coastal states and towns say that beach replenishment is vital to keep tourists coming, to protect coastal property from storms, and to keep their economies healthy. But environmentalists oppose beach replenishment, saying it does not last, is environmentally questionable, and is bad fiscal policy. The federal government, which pays for 65 percent of beach replenishment through the Army Corps of Engineers, wants to cut back. Opponents of beach replenishment argue that federal subsidies should not pay to protect coastal properties. Environmentalists oppose building seawalls to protect beachfront property and building groins and jetties to try to hold beaches in place. They say the real villain in erosion is development and recommend moving buildings back from the oceanfront. Since 1965 an estimated \$3.5 billion has been spent on beach replacements according to a study by Duke University's Program for the Study of Developed Shorelines. The Corps of Engineers cites much lower numbers but says it is spending \$150 million a year on beach replacement. The Clinton administration proposed cutting these funds in the Water Resources Development Act; it would pay for 65 percent of the initial cost but only 35 percent for the following 50 years of maintenance. With federal budget cuts, shore communities would be faced with tough decisions on whether they can or want to pay more of the bill. Local decisions in five states are described.

Mrazik, Brian R. (1987). Flood risk analysis for the National Flood Insurance Program.

Application of frequency and risk in water resources. In *Proceedings of the International Symposium on Flood Frequency and Risk Analysis*.

Keywords :

floodplain management, mapping, modeling, risk assessment

Abstract: Flood frequency and risk analysis play a fundamental role in the insurance, floodplain management, and hazard mapping aspects of the NFIP. The analytic procedures commonly utilized in flood insurance studies of riverine floodplains include flood frequency analysis for gauged and ungauged streams and stage-frequency determinations. Coastal floodplain insurance studies include synthetic storm surge modeling, statistical analyses, and wave analyses. Consistency in flood frequency estimates over both time and space is needed to effectively administer the NFIP at national and local levels. Enhanced capability in risk analysis for flood-related hazards such as ice jams, erosion, levee failure, shifting channels, long-term lake level fluctuations, and mudflows is also needed to support the program's operations in these specialized hazard environments.

Muckleston, Keith W. (1983). The impact of floodplain regulations on residential land values in Oregon. *Water Resources Bulletin*, 19, 1-7.

Keywords :

development, mitigation, Oregon, property values

Abstract: Ambiguities about the relationship between floodplain regulations and residential land values in Oregon were investigated. Clarification of this relationship should facilitate the long-delayed implementation of a more comprehensive and successful approach to flood hazard mitigation than is presently employed. The suggestion that current floodplain regulations significantly depress appreciation rates of regulated lands relative to those of similar unregulated lands was rejected in most cases. When this suggestion was accepted, the circumstances rendered the conclusions tenuous. Problems and issues facing this type of research are presented in case studies of two of the research study areas. However, conclusions should remain tentative because the research could not be carried out under ideal conditions. The criteria for establishing uniform study areas could not be fully met, even though much attention was paid to this step in the research process. One problem is that considerable development had taken place in some of the study areas prior to the implementation of floodplain regulations. Under these conditions, a valid question regarding the relation between regulation and land values appears to be whether any possible negative aspects of land-use regulations are not outweighed by the positive attributes of flood insurance, which under the NFIP becomes available concurrent with the implementation of regulations.

Mueller, R.H. (1988). Feasibility of predicting 100-year floodway width and depth in the Tennessee Valley by multiple linear regression. In *Floodplain Harmony*, 6. Boulder, CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.

Keywords :

modeling, Tennessee Valley Authority

Abstract: One of the most serious impediments to effective administration of local flood damage reduction programs cited by community officials and state NFIP coordinating agencies is the lack of detailed flood data (flood depth and floodway width). The Tennessee Valley Authority is making an effort to develop equations for estimating flood depth and floodway width along natural, unobstructed stream reaches from common watershed characteristics using multiple linear regression. Results show that floodway width cannot be predicted with reasonable accuracy because of the inherent variability of floodway width along a given stream reach. The US Geological Survey and several state agencies have had success developing regional equations for predicting 100-year flood depths. Depth regression equations adequately cover most of the Tennessee Valley. The inherent variability of floodway width discourages use of regional regression equations for predicting it. The need for an easy-to-use method for predicting floodway width remains.

Myers, Mary Fran. (1995). The National Flood Insurance Program as a Nonstructural Mitigation Measure. Paper presented at the US- Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods, Perugia, Italy, November 13-17, 1995.

Keywords:

nonstructural approaches, NFIP

Abstract: This paper reviews the rationale behind the NFIP's creation, describes the program's purposes and how it operates in some 18,000 communities, highlights issues of concern about the program that impact its effectiveness, and recommends research that would result in information that could improve the NFIP's ability to reduce vulnerability to flood damages. The author concludes that in 1995, nearly 30 years after the creation of the NFIP, the program has had some positive effects in reducing the nation's susceptibility to flood damages. Yet, floods continue to be the most costly natural disaster in the United States. The author identifies three areas where more knowledge is needed: better data, a broader resource management, and post audits.

Myers, Mary Fran and Gilbert F. White. (1993). The challenge of the Mississippi floods. *Environment*, 35(10), 6-9, 25-35.

Keywords :

Midwest floods of 1993, Mississippi River, floodplain management, levees

Abstract: This article discusses the federal government's participation in flood management since 1825, the flooding in the upper Mississippi and lower Missouri basins from mid June through early August 1993, the impact of the flood on urban and rural families, the dilemma of whether to repair or rebuild damaged buildings and levees, new recognition of the values of floodplain management, and the need to include the idea of mitigation in the disaster cycle of preparedness, response, and recovery. It questions why so many levees failed. Sidebars list recommendations for floodplain management and significant events in the development of US flood control policy; charts depict the area's weather and water flow patterns; and a table presents preliminary estimates of damage to levees in the Mississippi River Basin in 1993.

Nakaya, Hiroaki. (2000). *Policy Proposal: A Split for Unity*. Washington, DC: FEMA.

Keywords :

insurance premiums, mapping, subsidies, Base Flood Elevation, NFIP, pre-FIRM structures

Abstract: This report analyzes the NFIP's operating results. It first attempts to correct a widespread misconception about the NFIP, namely, that the FIA gives taxpayer money to flood victims. Second, statutory background is examined concerning the concepts of moral hazard and adverse selection. Moral hazard is inherent in any insurance, and therefore must be accepted as a matter of degree. Third, financial analysis shows that post-FIRM policyholders living below Base Flood Elevation (BFE) have been overpaying, and both pre-FIRM and post-FIRM above BFE have been underpaying. Thus the problem arises of an internal transfer, or premium subsidy, within the NFIP. Fourth, two implications from this internal transfer problem are discussed. One is that the map modernization project needs much more attention. The other is that the lowest floor elevation information for pre-FIRM properties must be attained to determine the policyholder's premium, thus taking potential losses from a catastrophic year into consideration and making this group of policyholders financially self-sufficient. Last, splitting NFIP policyholders into two groups, those with actuarially based policies and those with policies with historical averages, is suggested. The split would set post-FIRM policyholders who are living below BFE free from the burden of overpaying premiums, and would more appropriately place this burden on those with historical average flood insurance, leading to a substantial premium hike. The only way out for those policyholders, under the participation requirement mentioned above, is to get elevation certificates, to conduct a thorough flood study, and to join actuarial-based flood insurance. In the historical average method, those people with less than average risk are forced to pay more than their fair share; by getting elevation certificates, they

would move to an actuarially based program. This rationale leads to an elimination of historical average insurance, and it introduces flood mitigation loans based on risk information. Without information on the lowest floor elevation and major leverage for map modernization, flood-related programs cannot achieve their goals.

Nash, J.E. and J. Amorocho. (1966). The accuracy of the prediction of floods of high return period. *Water Resources Research*, 2(2), 191-8.

Keywords :

modeling

Abstract: The purpose of this study is to find expressions for the standard error of estimate due to sampling variance only. Expressions in terms of sample size and parameters of the probability distribution are obtained for the standard errors of sample estimates of flood magnitudes corresponding to given return periods for normal and double exponential universes. The extrapolation of magnitude-frequency (or return period) relationships obtained from a finite sample when the form of the frequency distribution is known it shows not to be hazardous. These errors are shown to converge toward fixed proportions of the estimates for high return periods.

National Academy of Sciences. (1977). *Methodology for Calculating Wave Action Effects Associated with Storm Surges*. Washington, DC: National Academy Press.

Keywords :

mapping, zoning, coastal areas

Abstract: This report discusses methods for prediction of wave heights throughout Atlantic and Gulf Coast flood hazard areas. Methods are proposed for the estimation of wave heights at the shoreline during flood conditions in addition to methods for the estimation of wave dissipation and wave regeneration in coastal flood hazard areas. The methods presented in the report formed the basis for flood hazard mapping in coastal V zones and A zones.

National Academy of Sciences, Committee on Coastal Erosion Zone Management. (1989). *Managing Coastal Erosion through the National Flood Insurance Program*. Washington, DC: National Academy Press.

Keywords :

erosion, coastal areas, hazard identification

Abstract: In 1988, the FIA asked the National Research Council (NRC) to advise on appropriate erosion management strategies, supporting data needs, and applicable methodologies to administer these strategies through the NFIP. This report details the NRC's conclusions and recommendations with respect to erosion hazard reduction, including: (a) hazard delineation; (b) recommended methodologies; (c) standards for development; (d) the impacts of navigational and flood control projects on shore stability; (e) erosion control through coastal engineering; (f) sand and gravel mining; and (g) subsidence. The report also included recommendations for improving education, database development, and research. A key recommendation made in the report was the identification of coastlines subject to coastal erosion (E-zones) for the purposes of hazard delineation and determination of federal insurance ratings.

National Association of Flood and Stormwater Management Agencies (NAFSMA). (2000). *NAFSMA Position on Floodplain Management Issues Related to the NFIP and FEMA's Administration of Same*. Washington, DC: NAFSMA.

Keywords :

Community Rating System, mapping

Abstract: NAFSMA's mission is to advocate public policies that facilitate the achievement of the public service functions of its member agencies. NAFSMA has identified the following areas of concern with regard to the NFIP and how FEMA is managing this program as it affects the public service functions of its member agencies. NAFSMA's concerns include: (a) mapping issues; (b) institutional bias against structural flood management projects; and (c) the Community Rating System. The member agencies of the NAFSMA want to work with FEMA on the common goal of protecting the lives and property of American citizens. NAFSMA would like FEMA to recognize the association's commitment, its expertise, and its unique circumstances. In addition, NAFSMA would like its work products to be more readily accepted by FEMA. To do otherwise is to waste precious resources.

National Credit Union Administration. (1999). *Flood Insurance Compliance: Report to Congress 1995 to 1997*. Alexandria, VA: National Credit Union Administration.

Keywords :

compliance, mandatory purchase, lending institutions

Abstract: According to the Riegle Community Development and Regulatory Improvement Act of 1994, this report was submitted to Congress on the compliance by insured credit unions with the requirements of the NFIP. The report includes a description of the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process. Reports are included for three periods: 1994-1995; 1995-1997; and 1997-1999.

National Research Council. (1983). *Evaluation of Flood-Level Prediction Using Alluvial-River Models*. Washington, DC: National Research Council.

Keywords :

erosion, modeling, riverine areas, hundred-year flood standard, Base Flood Elevation, alluvial fans

Abstract: Many communities, primarily in the western states, have experienced problems with computing flood-water elevations for flood insurance purposes under the NFIP. These problems focused on modeling channel erosion and sedimentation using fixed-bed models for flood insurance studies in communities affected by rivers with movable beds or channels. The study involved application of six flow and sediment routing models for alluvial streams on reaches of selected rivers for which relatively complete data were available. The objective of this investigation was to determine whether river-bed degradation during flood passage has an effect on flood stage that should be incorporated into the calculation of floodzone limits. It was concluded that, except in cases of rivers which have been severely disturbed by human intervention through local degradation or aggradation, the use of erodible river-bed models instead of fixed bed models cannot be justified in flood insurance studies.

National Research Council. (1990). *Managing Coastal Erosion*. Washington, DC: National Academy Press.

Keywords :

erosion, coastal areas, public policy

Abstract: More and more of the nation's vast coastlines are being filled with homes and vacation resorts. The result is an increasing number of structures built on erosion-prone shores with many of these structures facing collapse or damage. In response to mounting property losses, Congress has given FEMA responsibility for incorporating coastal erosion into the NFIP. This book addresses the immediate question of how to develop an erosion insurance program as well as the larger issues raised by the continually changing face of our shorelines. *Managing Coastal Erosion* explores major questions surrounding a national policy on coastal erosion: Should the federal government be in the business of protecting developers and individuals who build in erosion-prone coastal areas? How should such a program be implemented? Can it prompt more responsible management of coastal areas? The volume provides federal policymakers, state floodplain and resource managers, civil engineers, environmental groups, marine specialists, development companies, and researchers with invaluable information about the natural processes of coastal erosion and the effect of human activity on those processes. The book also details the workings of the NFIP, lessons to be learned from numerous state coastal management programs, and much more.

National Research Council, Committee on Flood Control Alternatives in the American River Basin (1995). *Flood Risk Management and the American River Basin: An Evaluation*. Washington, DC: National Research Council.

Keywords :

American River, risk management, Army Corps of Engineers, California

Abstract: This book reviews the Army Corps of Engineers' (ACE) investigations of flood control options for the American River basin and evaluates flood control feasibility studies for the watershed, with attention to the contingency assumptions, hydrologic methods, and other analyses supporting the flood control options. This book provides detailed comments on many technical issues, including a careful review of the 1991 National Research Council report *American River Watershed Investigation*, and looks beyond the Sacramento case to broader questions about the nation's approach to flood risk management. It discusses how to utilize information available about flood hazard reduction alternatives for the American River basin, the potential benefits provided by various alternatives, the impacts of alternatives on environmental resources and ecosystems, and the trade-offs inherent in any choice among alternatives which does not lie in the realm of scientists and engineers, but in the arena of public decision making.

National Research Council, Committee on Assessing the Costs of Natural Disasters. (1999). *The Impacts of Natural Disasters: A Framework for Loss Estimation*. Washington, DC: National Research Council.

Keywords :

erosion, development, coastal areas

Abstract: This book explores major questions surrounding national policy on coastal erosion: Should the federal government be in the business of protecting developers and individuals who build in erosion-prone coastal areas? How should such a program be implemented? Can it prompt more responsible management of coastal areas? The volume provides federal policymakers, state floodplain and resource managers, civil engineers, environmental groups, marine specialists, development companies, and researchers with information about the natural processes of coastal erosion and the effect of human activity on those processes. The book also

details the workings of the NFIP as well as lessons to be learned from state coastal management programs.

National Research Council, Committee to Assess the US Army Corps of Engineers Water Resources Project Planning Procedures. (1999). *New Directions in Water Resources Planning for the US Army Corps of Engineers*. Washington, DC: National Academy Press.

Keywords :

Army Corps of Engineers, federal programs, nonstructural approaches, public policy, floodplain management, environmental restoration

Abstract: The Army Corps of Engineers (ACE) has long been one of the federal government's key agencies in planning the uses of the nation's waterways and water resources. Though responsible for a range of water-related programs, the ACE's two traditional programs have been flood damage reduction and navigation enhancement. The water resource needs of the nation have been shifting away from engineered control of watersheds toward restoration of ecosystem services and natural hydrologic variability. In response to these shifting needs, legislation was enacted in 1990 that initiated the ACE's involvement in ecological restoration, which is now on par with the ACE's traditional flood damage reduction and navigation roles. This book analyzes the ACE's efforts in ecological restoration, and provides broader recommendations on how the corps might streamline its planning process. The book also assesses the impacts of federal legislation on the ACE's planning and projects, and provides recommendations on how relevant federal policies might be altered in order to improve ACE planning. Another important shift affecting the ACE has been federal cost-sharing arrangements (enacted in 1986), mandating greater financial participation in the ACE's water projects by local cosponsors. The book describes how this has affected the ACE-sponsor relationship, and comments on how each group must adjust to new planning and political realities.

National Research Council, Committee on American River Flood Frequencies. (1999). *Improving American River Flood Frequency Analyses*. Washington, DC: National Academy Press.

Keywords :

American River, Army Corps of Engineers, modeling, risk assessment, California

Abstract: In 1996 the Army Corps of Engineers (ACE) completed a congressionally directed reevaluation of flood control options for California's American River. In response, Congress authorized a component of the recommended plan but not an adequate plan for the reduction of flood risk for the Sacramento area. Thus, evaluations of alternatives are still required, in particular because the American River experienced a major flood in January 1997. The 1997 flood suggested that it may be necessary to re-compute flow frequency relationships for the American River at Sacramento. In February 1998, the USACE published a revised unregulated rain flood flow frequency analysis for the American River at Fair Oaks. The analysis produced a flood frequency curve that indicates that large floods are appreciably more likely than previously thought. The report prompted controversy among local, state and federal government agencies, public interest groups, and others. This report provides an independent scientific assessment of flood frequency relationships for the American River at Sacramento. The 100-year flood estimate recommended by this study would result in removal of some flood-prone areas of Sacramento from the AR zone, which would result in suspension of building restrictions. However, the uncertainties in these estimates are large. Because the negative consequences of

falsely designating such flood-prone areas to be out of the regulatory floodplain would be catastrophic, the committee recommends the establishment of a new interagency effort for flood-risk assessment and management that would emphasize research focused on coordinated and cooperative flood risk reduction.

National Research Council, Committee on Beach Nourishment and Protection. (1999). *Beach Nourishment and Protection*. Washington, DC: National Research Council.

Keywords :

beach nourishment, Army Corps of Engineers, federal programs

Abstract: This book provides a basis for decision-making with recommendations regarding the utility of beach nourishment and the appropriate role of federal agencies. It also examines the economic and social role of beaches, the history of beach nourishment projects, and management strategies for shore protection; discusses the role of the Army Corps of Engineers and other federal agencies, with a close-up look at the NFIP; explores the state of the art in project design and prediction of outcomes, including the controversy over the use of traditional and nontraditional shore protection devices; addresses what is known about the environmental impacts of beach nourishment; and identifies what outcomes should be targeted for continued monitoring by project officials.

National Research Council, Committee on Risk-Based Analysis for Flood Damage Reduction. (2000). *Risk Analysis and Uncertainty in Flood Damage Reduction Studies*. Washington, DC: National Research Council.

Keywords :

risk assessment, hydrology, modeling, Army Corps of Engineers

Abstract: This study describes and evaluates the Army Corps of Engineers' use of risk-based analysis for the evaluation of hydrology, hydraulics, and economics in flood damage reduction studies. The study praises the Corps of Engineers for its adoption of risk analysis methods, but it also raises concern about several technical (modeling) issues. The committee recommended that the Corps: (a) use annual exceedance probability as the performance measure of engineering risk; (b) improve its analysis of hydrologic, hydraulic, geotechnical, and economic uncertainties; (c) focus greater attention on the probabilistic issues of identifying, estimating, and combining uncertainties; (d) strive to reduce the considerable variation in the estimates of water surface elevation when using different models of river hydraulics; (e) evaluate the risk-based performance of a levee as a spatially distributed system; (f) undertake statistically ex-post studies to compare predictions of geotechnical levee failure probabilities as well as ex-post studies of other flood-damage reduction structures; (g) calculate the risks associated with flooding and the benefits of a flood damage reduction project structure by structure, rather than conducting risk analysis on damage aggregated over groups of structures in damage reaches; (h) adopt a consistent terminology for communicating risk analysis concepts within the Corps and to the public; (i) simplify and improve the complex and somewhat confusing criteria for certifying levees for inclusion in the NFIP, and (10) move toward a more comprehensive decision-making approach in flood damage reduction studies.

National Review Committee. (1992). *Action Agenda for Managing the Nation's Floodplains: A Review of Floodplain Management in the United States: An Assessment Report*. Boulder,

CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.

Keywords :

floodplain management

Abstract: This report was prepared to supplement the committee's comments on a draft of *Floodplain Management in the United States: An Assessment Report*. It outlines what the committee regarded as the present situation with respect to floodplain management, how federal aims and activities have evolved, and desirable next steps. The floodplain management goals are twofold and interrelated: to reduce the vulnerability of all Americans to the danger and damage of floods and to preserve and enhance the natural values of the nation's floodplains. After listing the findings from the assessment, the committee recommends the following actions: (a) integrate flood loss vulnerability and protection of floodplain natural values into broader state and community development and resource management processes; (b) improve the data base for floodplain management; (c) Give weight to local conditions; (d) minimize conflicts among federal programs; (e) Reduce the vulnerability of existing buildings; and (f) improve professional skills and public education. The report provides a table of the federal agencies involved in floodplain management and the programs that each agency provides.

Natural and Beneficial Functions of the Floodplain Task Force. (2002). *The Natural and Beneficial Functions of Floodplains: Reducing Flood Losses by Protecting and Restoring the Floodplain Environment*. Washington, DC: Natural and Beneficial Functions of the Floodplain Task Force.

Keywords :

floodplain management, mitigation, environmental protection, federal programs

Abstract: Several federal agencies pooled their expertise to identify the natural functions of floodplains that reduce flood losses and recommend how the nation can further reduce flood losses through the protection and restoration of the natural functions of floodplains. Because floodplains reduce flooding and limit flood-related damages through their floodwater conveyance and storage functions, the task force advocated: 1) providing technical assistance to improve analytical approaches to floodplain management; 2) encouraging non-structural solutions to reduce flood damage; 3) improving coordination and partnership among all levels of government and other stakeholders; and 4) ensuring that Federal programs are working to achieve complementary floodplain management goals. The report concludes with eight case studies of successful floodplain management strategies around the US. Successful strategies include cooperation of government bodies at all levels, restoration of open space in floodplains, and collaboration among funding agencies. The appendix lists all federal programs relating to the natural and beneficial functions of floodplains.

Neal, David M. (1992). Hurricane Andrew churns up debate. *Forum for Applied Research and Public Policy*, 10(1), 26-9.

Keywords :

Hurricane Andrew, Hurricane Hugo, risk communication

Abstract: In the wake of Hurricane Hugo and the Loma Prieta Earthquake in 1989, the federal government developed a plan to guide future federal disaster response. The plan received final approval in April 1992, "only four months before it would receive a full-scale test from Hurricane Andrew," which struck south Florida in August. Despite the plan, Andrew's landfall

was attended by rampant confusion and miscommunication. FEMA bore the brunt of post-disaster criticism. FEMA's performance in the days following Andrew resulted in part from imperfections in the plan, which was overly bureaucratic and inflexible. To improve its emergency responsiveness, the federal government must simplify the presidential disaster-declaration process, continue to bolster the federal response plan, and help local governments boost their own preparedness while making them aware that federal disaster response can take several days even under the best circumstances.

Newsome, Sharon. (1990). Reform of the National Flood Insurance Program. In *Focus on Maryland's Forgotten Bays. Report on the Conference on the Outer Coastal Bays, May 5, 1990.*

Keywords :

development, Maryland, coastal areas

Abstract: The author, Vice-President for Resources Conservation for the National Wildlife Federation, says that the NFIP has not achieved its statutory mandate to guide new development out of hazard-prone floodplain areas. No empirical evidence is offered.

Nickson, Stephen. (2000). Risk management at home. *Risk Management, 47(9), 8-11.*

Keywords :

erosion, development, coastal areas

Abstract: This article reports the impact of coastal erosion on the risk management among homeowners in the United States. It discusses the implication of land development in high-risk coastal areas for property owners, the impact of management failure on tax rates and insurance premiums, and damage coverage in the NFIP policies.

North, Carol S. and Barry A. Hong. (2000). Project CREST: A new model for mental health intervention after a community disaster. *American Journal of Public Health, 90(7), 1057-9.*

Keywords :

Midwest floods of 1993, Missouri, mental health

Abstract: When the Mississippi River and its tributaries flooded St. Louis, MO, in the spring and summer of 1993, 250 mental health professionals stood ready to help the thousands whose lives the floods would affect. It turned out, however, that most of the flood victims sought instead the support of community leaders they knew and trusted. To meet the need for community-based disaster support, disaster intervention training that had been offered to mental health professionals during the summer of 1993 was adapted to train community resource personnel, ranging from clergy to police. The result was Project CREST (Community Resources for Education, Support, and Training). CREST's purpose is to maximize mental health resources within communities by equipping community leaders to provide initial crisis intervention and emotional relief services after community-wide disasters, when professional resources are often limited. CREST has also been adapted to other types of crisis intervention. Through Project CREST many people have received crisis intervention who otherwise would not have sought mental health care.

Norton, Clark F. (1988). *Federal Disaster Relief Legislation and Administration: A Summary.* Washington, DC: Congressional Research Service.

Keywords :

disaster assistance, history, legislation

Abstract: This report for Congress reviews provisions of federal disaster relief from the nineteenth century through April 1998. It discusses the ad hoc relief provided by Congress until the passage of the landmark “Major Disaster Relief Act of 1950”; it describes the provisions of that act and reviews subsequent developments leading to the 1970 and 1974 disaster relief acts and later amendments; and it identifies the executive agencies that have administered federal disaster relief programs over the years. Appendices identify the emergency and major disaster relief powers of the president authorized by the 1974 Act and present FEMA’s organization, which administers the program.

Nq, Y. (1992). Optimal investment in urban drainage: A framework for cost-benefit analysis. *Australian Economic Review*, 25(3), 19-28.

Keywords :

cost-benefit analysis, mitigation, urban areas

Abstract: This article addresses some basic issues (including distributional weights, discount rates, and the value of life) in the cost-benefit analysis of urban drainage and provides a framework for the estimation of the optimal amount of investment for flood mitigation.

According to the author, such evaluation should involve: (a) the estimation of the expected total damage from flooding in present-value terms before flood mitigation; (b) the computation of the reduction in expected total damage as the average recurrent interval of flooding increases; (c) estimating how this interval increases with the amount of investment in flood mitigation; and (d) choosing the optimal investment by equating marginal benefit and marginal cost.

Executive Office of the President, Office of Management and Budget (1998). *Federal Programs Offering Non-structural Flood Recovery and Floodplain Management Alternatives*. Washington, DC: Executive Office of the President.

Keywords :

floodplain management, nonstructural approaches, wetlands, federal programs, easements, floodproofing

Abstract: This handbook, produced in cooperation with various federal agencies, provides information about federal programs that support nonstructural approaches to floodplain management, including broad strategies and specific federal programs that could form the basis for a nonstructural response to a flood event. Programs are grouped by three primary strategies: (a) acquisition, relocation, elevation, and floodproofing of existing structures; (b) rural land easements and acquisitions; and (c) restoration of wetlands. Programs offering technical assistance for floodplain management are also reviewed. Summaries of 36 federal programs include information about each program’s objective, agencies involved, form of assistance, program target, eligibility requirements, cost-sharing requirements, available funding, repayment requirements, application procedures, and contacts. The agencies that offer these programs include FEMA, the Army Corps of Engineers, National Park Service, Natural Resources Conservation Service, Environmental Protection Agency, Department of Housing and Urban Development, Small Business Administration, Economic Development Administration, Fish and Wildlife Service, and Commodity Credit Corporation.

Office of Technology Assessment (OTA). (1984). *Wetlands: Their Use and Regulation*. Washington, DC: OTA.

Keywords :

wetlands

Abstract: The Office of Technology Assessment (OTA) collected data from the scientific literature, government reports, and responses to questionnaires about wetland use from 37 out of 38 Corps districts, from 48 states, and from 11 out of 20 trade associations surveyed. The OTA also conducted case studies of wetland trends in 13 states, minor studies in eight states, and many federal and state personnel and industry representatives. As a result of its studies, OTA has identified three issues related to wetlands management. First, should federal involvement in protecting wetlands be increased or decreased? Second, should the federal government improve its policymaking capability through a systematic collection and analysis of additional information about wetlands? Finally, should the federal government develop a more integrated approach for managing the use of wetlands?

Office of Thrift Supervision (OTS). (1997, 1999). *Flood Insurance Compliance: Report to Congress for September 1997 to August 1999*. Washington, DC: OTS, Department of Treasury.

Keywords :

compliance, mandatory purchase, lending institutions

Abstract: These reports were submitted to Congress in accordance with the requirements of the National Flood Insurance Reform Act of 1994. The report describes the methods used to determine compliance, the number of insured credit unions examined during the reporting year, a listing and total number of insured credit unions found not to be in compliance, actions taken to correct incidents of noncompliance, and an analysis of compliance, including a discussion of trends, patterns, problems, and recommendations regarding reasonable actions to improve the efficiency of the examination process. In its final report (1999), the OTS observed that savings associations increased their overall compliance level from 84 percent to 90 percent from September 1, 1994 to August 31, 1999. OTS anticipates further increases in the future due to increased awareness of the importance of compliance with flood insurance regulations.

Olsen, J.R., P.A. Beling, J.H. Lambert, and Y.Y. Haimes. (1998). *Input-output economic evaluation of systems of levees*. *Journal of Water Resources Planning and Management-ASCE*, 124(5), 237-45.

Keywords :

economic impacts, economic modeling, levees, California, Midwest floods of 1993

Abstract: Large-scale flooding in northern California and the Midwest floods of 1993 demonstrate that floodplain management should be conducted for regions rather than for individual floodplains. Economic activities connect each floodplain to other floodplains and to areas not affected by flooding. A method is presented to estimate the economic effects of flooding over a region of interacting floodplains and other lands by incorporating a Leontief economic input-output model with a probabilistic description of the potential overtopping in a system of levees. Expected economic damages may be greater if flooding reduces the availability of floodplain products that are used as inputs to other sectors of the economy. The model is used to evaluate the economic risk for an example of a distributed system of levees.

Olsen, J. R., P.A. Beling, and J.H. Lambert. (2000). Dynamic models for floodplain management. *Journal of Water Resources Planning and Management—ASCE*, 126(3), 167-75.

Keywords :

buyouts, development, floodplain management, modeling, Pennsylvania, levees

Abstract: A dynamic model of floodplain management is developed that addresses nonstationary conditions, including land-use changes, channel modifications, economic development, and climate change and variability. The dynamic approach permits zoning, levee construction, and other decisions to be made sequentially, rather than only at the present. The dynamic model is formulated as a Markov decision process. A single-floodplain, single-objective, stationary model is extended to include multiple floodplains, nonstationarity, and multiple objectives. Linear programming is used for solution, though the problem may be large. The model is applied to a problem at Chester Creek, PA. The optimal policy for levee building or replacement depends on whether a flood has just occurred and on the costs of buying out property owners and rebuilding homes and levees. Two cases of nonstationarity are examined, future bridge construction and future hydrologic changes. With nonstationarity, buyout of property owners following levee overtopping is an optimal policy since increased future flooding reduces the expected benefits of structural flood measures. When economic development is included with management costs and flood damages in a multiobjective formulation, the optimal policies include building larger levees and increasing floodplain development.

Olson, Jerome M. (1983). Observations on community based flood hazard mitigation in the United States. *Disasters*, 7(2), 83-5.

Keywords :

development

Abstract: The author contends that there is insufficient evidence to demonstrate whether the NFIP is guiding proposed development away from flood hazard areas or whether it was contributing to the absolute decline in average annual flood losses. Yet, the author said, anecdotal evidence suggests both may be occurring.

Ouellette, Pierre, Daniel Leblanc, Nassir El-Jabi, and Jean Rousselle. (1988). Cost-benefit analysis of flood-plain zoning. *Journal of Water Resources Planning and Management*, 114(3), 326-34.

Keywords :

cost-benefit analysis, economic modeling, zoning, flood damage

Abstract: The economic yield of a floodplain zoning program is measured by cost-benefit analysis. The methodology entails the use of a probabilistic hydroeconomic model to evaluate expected flood damages with and without zoning. The application shows that this type of program, albeit cost-effective overall, may be unacceptable for various reasons to the various parties involved. While the program is cost-effective for all parties of the society, it is redistributive. Landowners are the main beneficiaries, while the cost-benefit ratio for governments is consistently less than one. Owing, however, to market imperfections, landowners gain no advantage from promoting such programs. This is an explanation why such programs are not implemented more widely.

Owens, Robert W. and Joe R. Roberts. (1991). Appraising floodplain properties. *Appraisal Journal*, 59(2), 191-8.

Keywords :

property values

Abstract: The risk of flooding can represent a potentially significant value determinant in property appraisal. This article addresses a number of important, if not well-known, factors relevant to the appraisal of a floodplain property. The authors provide information on the NFIP and suggest guidelines for appraising a floodplain property.

Park, W.M. and W.L. Miller. (1982). Flood risk perceptions and overdevelopment in the floodplain. *Water Resources Bulletin*, 18, 89-94.

Keywords :

development, Indiana, floodplain management, property values

Abstract: There is a long-standing hypothesis that imperfect information about potential flood hazard, an expectation of liberal disaster relief, and anticipation of future structural protection have resulted in overdevelopment of floodplains. Data for a case study from Logansport, Indiana were analyzed using multiple regression techniques in an effort to investigate this hypothesis. The effect of the introduction of the NFIP on residential property values was investigated in order to determine whether property values in floodplains were fully discounted for expected flood damages. The case study analysis showed that property values in the floodplain were less than fully discounted for the existing flooding potential prior to the introduction of the NFIP. Low-cost information such as lot elevation and distance from the river were found to affect sale price, apparently due to its role in the formation of perceptions about the potential for flooding. Policy alternatives for floodplain management that would provide better information on flooding potential and eliminate the perverse incentives created by the expectation of liberal disaster relief include simple zoning and actuarial insurance. Simple delineation of the 100-year floodplain with zoning restrictions would involve relatively low implementation costs, while the development of actuarially accurate premiums for flood insurance would be relatively costly. In any case, the study results indicate that unless policy changes eliminating the perverse incentives of past policies are adopted, overdevelopment of floodplains will continue.

Pasterick, Edward T. (1998). The National Flood Insurance Program. In Howard Kunreuther and Richard J. Roth, Jr., eds. *Paying the Price: The Status and Role of Insurance against Natural Disasters in the United States*. Washington, DC: The Joseph Henry Press.

Keywords :

NFIP

Abstract: The author overviews the NFIP, beginning with a short history. He then discusses the three components of the program's structure (risk identification, hazard mitigation, and insurance), and explains how the components need to be integrated through the cooperation of the federal government, state and local governments, and the insurance industry. The next section of this chapter describes the various initiatives of the NFIP, including the National Flood Insurers Association, the Write-Your-Own Program, and the Community Rating System. He concludes with a discussion of issues facing the NFIP and offers some solutions to those issues. Among others, Pasterick concludes that although the NFIP has been able to integrate its three critical components in the past, within the current (1998) FEMA structure the risk

identification and mitigation responsibilities are organizationally separated from the insurance operation. Continued coordination under this structure will require a level of effort beyond that needed when the three components were in the same office. Pasterick also notes that a major issue to be addressed in the area of mitigation is the matter of existing structures. Consensus on this issue is needed in order to make any policy effective. Pasterick also notes the NFIP's low market penetration. He lists five reasons for this low market penetration: (a) many floodplain residents underestimate the seriousness and likelihood of flooding; (b) lenders have not been especially zealous in requiring the purchase of flood insurance as the law requires; (c) policies for flood insurance are difficult for insurance agents to write and, therefore, to market aggressively because they are single-peril policies and are viewed as more costly than other lines of coverage; (d) many potential consumers expect that federal disaster assistance will adequately provide for post-flood recovery; and (e) many people are simply misinformed or unaware of the availability of flood insurance.

Peacock, Walter Gillis. (1997). Cross-national and comparative disaster research. *International Journal of Mass Emergencies and Disasters*, 15(1), 117-33.

Keywords :

national disasters, methodology

Abstract: Distinguishing characteristics and issues of comparative and cross-cultural research, problems and opportunities, and an assessment of future prospects are offered and related to disaster research. No single approach is advocated; rather, various approaches (case study to cross-national, contemporary to historical, and qualitative to quantitative) are recommended. Methodological issues including model specification, problems of aggregation, intra- versus international variation, and secondary versus primary data collection are addressed. Particular attention is devoted to issues of equivalence related to conceptualization, data comparability, operationalization and measurement, conversion, standardization, and units of observation. The need for systematic efforts to develop research tools that can be utilized to measure critical concepts such as recovery, restoration, risk, and mitigation is identified. Finally, discipline-based, yet disaster relevant, cross-national and comparative research agendas consistent with a broader ecological perspective targeting disasters, development, and the social production of vulnerability are advocated.

Perry, Ronald W. (1994). A model of evacuation compliance behavior. In Russell R. Dynes and Kathleen J. Tierney, eds. *Disasters, Collective Behavior, and Social Organization*, 85-98. Newark, DE: University of Delaware Press.

Keywords :

risk communications, modeling, Texas, Washington, disaster planning

Abstract: This study develops a model of evacuation compliance behavior based on secondary empirical analyses of three disasters - a flood in Abilene, TX, a hazardous materials incident in Mt. Vernon, WA, and the eruption of Mt. St. Helens in Washington. Following a brief discussion of the theoretical modeling process, factors influencing individuals' evacuation decisions are identified: warning confirmation, source credibility and content; perceived risk; possession of an adaptive plan; and family context. The data support the assertion that families evacuate only after all members are present or known to be safe. The author suggests that the creation of an adaptive plan (through warning information, prior experience, and/or preplanning) would facilitate compliance with evacuation warnings, as does the belief that the impending disaster would result

in direct personal harm. The author also found that evacuation is also promoted by the credibility of the source of information. The author conclude that the most effective warning messages are specific concerning the danger, consequences, timing, and response strategies in the face of disaster.

Perry, Ronald W., Michael K. Lindell, and Marjorie R. Greene. (1982). Crisis communications: Ethnic differentials in interpreting and acting on disaster warnings. *Social Behavior and Personality*, 10(1), 97-104.

Keywords :

communication

Abstract: This article examines the problem of communicating information about floods to multiethnic communities. Data were gathered from interviews of a probability sample of recipients of flood evacuation warnings (N = 200) from a small western US town with a large proportion of Mexican-Americans. Analyses revealed that they: (a) were more skeptical than whites about warning messages, no matter how specific the message; (b) interpreted the same warning messages as indicating lower levels of personal danger; and (c) were less likely to undertake a protective action (i.e., evacuate) than whites.

Philippi, Nancy S. (1994). *Revisiting Flood Control: An Examination of Federal Flood Control Policy in Light of the 1993 Flood Event on the Upper Mississippi River*. Chicago, IL: Wetland Research, Inc.

Keywords :

development, Midwest floods of 1993, mitigation

Abstract: This article examines the Midwest floods of 1993 by providing a history and detailed description of the event and pertinent mitigation policies. It describes three case histories from which the author concludes that the programs that pursue the intended goals of the US flood control policy are flawed. (Such intended goals are to protect development where it is economically justified, to prevent and reduce damageable development, and to compensate those who suffer blamelessly and excessively from flooding.) The author argues that mitigation programs to reduce flood damages are still a minor part of the NFIP. The author complains that the NFIP provides protection to private properties without calculating the cumulative costs of providing that protection, and that the “overly generous” payments in compensation for agricultural flood damages eliminate the risk and make it highly profitable to farm the floodplain. However, the author warns the readers that “these are the general conclusions that can be drawn from the three case histories described in this report. Whether these cases are merely aberrations from the norm or whether they truly reflect the state of these programs is beyond our scope to determine.”

Philippi, Nancy S. (1995). Plugging the gaps in flood-control policy. *Issues in Science and Technology*, 11 (Winter), 71-8.

Keywords :

disaster assistance, flood control, public policy

Abstract: The author claims that US flood-control policy (as of 1995) wastes money, promotes behavior that exacerbates the problem, distributes relief disproportionately, and damages the environment. The author also claims that although better policies are neither expensive nor technologically difficult, they require the resolution of some sticky issues, equity and firmness in

their execution, and, most important, the political backbone to make flood-control decisions before an emergency arises. New policy should reduce ad hoc disaster aid, establish a means test for distributing it, and use the savings to reduce damages and restore wetlands; incorporate disaster funding into the annual budget process; tighten existing flood- and crop-insurance programs; limit new structural protection to key facilities and examine the economic justification for repairing existing ones; and promote more and better flood research.

Philippi, Nancy S. (1996). *Flooding Management: Ecologic and Economic Perspectives*. Austin, TX: Environmental Intelligence Unit, R.G. Landes Company.

Keywords :

floodplain management

Abstract: This book synthesizes the past development and status of floodplain management in 1995. It describes the nature of flooding, its causes, and its importance in the ecological cycle. It defines the conflict of interest between ecological and economic values inherent in floodplain management. Philippi reviews the historical and logical development of floodplain management policy. She also identifies the problems encountered in the execution of agreed-upon floodplain management objectives and it describes some scenarios, successful and otherwise, that future floodplain management may follow.

Pielke, Roger A., Jr. and Mary W. Downton. (2000). *Precipitation and damaging floods: Trends in the United States, 1932-97*. *Journal of Climate*, 13, 3525-37.

Keywords :

flood damage, modeling, flood causes

Abstract: This paper presents a conceptual framework for the systematic assessment of the factors that condition observed trends in flood damage. Using the framework, it assesses the role that variability in precipitation has in damaging floods in the United States at national and regional levels. Three measures of flood damage each lead to different conclusions about the nature of the flood problem. At a national level, the precipitation measures most closely related to flood damage are the number of two-day heavy rainfall events and the number of wet days. This study indicates that growth in recent decades in total damage is related to both climate factors and societal factors. At the regional level, this study reports a stronger relationship between precipitation measures and flood damage and indicates that different measures of precipitation are most closely related to damage in different regions. This study indicates that climate plays an important, but by no means determining, role in the growth of flood in the United States in recent decades.

Pielke, Jr., R.A., M.W. Downton, and J.Z. Barnard Miller. (2002). *Flood Damage in the United States, 1926-2000: A Reanalysis of National Weather Service Estimates*. Boulder, CO: UCAR.

Keywords :

flood damage

Abstract: This study is a reanalysis of flood damage estimates collected by the National Weather Service (NWS) between 1925 and 2000. The NWS data are estimates of direct physical damage due to flooding that results from rainfall or snowmelt. They are obtained from diverse sources, compiled soon after each flood event, and not verified by comparison with actual expenditures. Therefore, a primary objective of the study was to examine the scope, accuracy, and consistency

of the NWS damage estimates to improve the data sets and offer recommendations on how they can be appropriately used and interpreted. Evaluation of the accuracy of the estimates led to the following conclusions: individual damage estimates for small floods or for local jurisdictions within a larger flood area tend to be extremely inaccurate, damage estimates become more accurate at higher levels of aggregation, and floods causing moderate damage are occasionally omitted, or their damage greatly underestimated in the NWS data sets. In summary, the NWS flood damage estimates do not represent an accurate accounting of actual costs, nor do they include all of the losses that might be attributable to flooding. Rather, they are rough estimates of direct physical damage to property, crops, and public infrastructure.

Piper, Daniel. (1971). *Analysis of Alternative Procedures for the Evaluation of Agricultural Flood Control Benefits: Volume II*. Alexandria, VA: Economic Research Service, US Department of Agriculture. Report submitted to the US Army Engineer Institute for Water Resources.

Keywords :

agriculture, modeling

Abstract: This article presents alternative procedures for the evaluation of agricultural flood control benefits. The proposed analyses are based on the application of a regional linear programming model.

Plasencia, Doug. (1994). *Sharing the Challenge: Future impacts and next steps*. *Water Resources Update*, 97(Autumn), 14-6.

Keywords :

floodplain management

Abstract: This article highlights four recommendations from *Sharing the Challenge* (commonly called the Galloway report) that lay the framework for continued policy evolution and development. The first recommendation is improved federal coordination in floodplain management programs and policy. Next, a more strategic and managed system of delivering flood programs across a broad geographic region is needed to replace the current system. Third, the executive order on floodplain management, issued in 1977, should be revisited and modified to reflect policy developments, including the identification of a monitoring and enforcement mechanism. Finally, alternative means of quantifying federal interests in the environment and other policy areas are needed to resolve some of the confusion surrounding the criteria for justifying projects.

Platt, Rutherford H. (1985). *Congress and the coast*. *Environment*, 27(6), 12-7, 34-40.

Keywords :

Coastal Barrier Resource System, legislation

Abstract: Written not long after passage of the Coastal Barrier Resources Act (CBRA), this article notes that the act did not expressly prohibit the right of private owners to develop their property on the coast. It simply denies some but not all federal benefit, such as flood insurance, when they decide to develop. The act did not touch other forms of federal help such as federal disaster assistance to repair infrastructure and income tax write-offs for casualty losses and accelerated depreciation after a loss. The author argues that by increasing the risk in these areas, the act may have increased pressure for private development of adjoining areas that are still entitled to the full spectrum of federal benefits, such as flood insurance.

Platt, Rutherford H. (1986). Metropolitan flood loss reduction through regional special districts. *Journal of the American Planning Association*, 52(4), 467-79.

Keywords :

floodplain management, public policy

Abstract: Flood damage is increasing in US metropolitan areas because of urbanization in small watersheds and floodplains and because of inadequate storm drainage. The NFIP is a necessary but insufficient response to the problem. Additional measures and programs tailored to the particular region are needed since each area has different flood problems and operates in a different legal and political framework. Three regional districts were examined and their attempts at solving the problems associated with flooding were described. All three districts reflect a viewpoint that may be emulated elsewhere: metropolitan floods are an area-wide phenomenon requiring a regional response. Local floodplain management, state, and federal mitigation efforts are necessary, but regional districts fill a functional and administrative gap in the hierarchy of public authority. Regional districts interact with other governmental organizations as well as act independently, as exemplified by the described detention policies of the Harris (located near Houston) and Chicago districts. A regional district also may perform a particular function more competently than another unit of government as shown by the example of the Denver district's floodplain maps. The fiscal autonomy of the regional district allows it to take needed actions promptly and at no cost to the federal or state taxpayer. It is concluded that regional districts are effective in reducing flood losses.

Platt, Rutherford H., ed. (1987). *Regional Management of Metropolitan Floodplains*. Boulder, CO: University of Colorado, Institute of Behavioral Science.

Keywords :

public policy, urban areas, Canada, Great Britain, Australia, Germany, Japan

Abstract: This report examines responses to metropolitan flooding at a regional level, that is, on a scale broader than individual municipalities, but narrower than the state. Unlike municipalities and states however, regions usually lack easily identifiable political surrogates. Governance of metropolitan regions is a patchwork quilt of traditional units of government - local, county, and state supplemented by a variety of programmatic adjustments. Such adjustments include regional planning entities, special districts and authorities, intergovernmental agreements, boundary changes, and the modernizing of existing county units. Part one of this volume describes three stages of research on regional experiences in the United States. Part two consists of five case studies, conducted simultaneously with the domestic ones, concerning response to metropolitan flooding in Canada, Great Britain, Australia, Germany, and Japan. These studies illustrate the effects of differing legal and political contexts, as well as diverse hydrologic regimes, on governmental response to metropolitan flooding.

Platt, Rutherford H. (1995). Sharing the Challenge: Floodplain management into the 21st century. *Environment*, 37(1), 25-9.

Keywords :

floodplain management, Midwest floods of 1993, Mississippi River, levees

Abstract: The author reports on the floodplain management policies of the Mississippi River Basin. He reexamines flood control policies and discusses the disaster brought about by improper flood management. He asserts that the Midwest floods of 1993 were exacerbated by the filling of

wetlands for agricultural construction of levees. He discusses decisions about the rebuilding of levees and the stress on interagency and intergovernmental cooperation.

Platt, Rutherford H, David Salvesen, and George H. Baldwin II. (1999). Did Public Regulations Matter? Rebuilding the North Carolina Coast after Hurricane Fran. *Coastal Management*, 30(3), 249-69.

Keywords :

Hurricane Bertha, Hurricane Fran, mitigation, North Carolina

Abstract: For a quarter century, North Carolina has sought to manage new oceanfront development under its 1974 Coastal Area Management Act. The results of these planning efforts were put to the test in 1996 when Hurricanes Bertha and Fran struck the state within a two-month period. With beaches and dunes impaired by Bertha, Fran inflicted widespread devastation along the southerly half of the state's open ocean coast. The rebuilding process was fueled by federal disaster assistance of many kinds, including emergency dune replacement, flood insurance payments, and loans from the Small Business Administration to homeowners. This report looks at the rebuilding of the North Carolina coast after Hurricane Fran and reviews how well or poorly traditional approaches to coastal hazards management have worked and whether public regulations have discouraged or encouraged redevelopment in high hazard coastal areas. The author reports that as of 1998, there has been extensive rebuilding of pre-Fran structures at a larger scale, but in some cases with greater safety from future storms through higher architectural elevation and setbacks along eroding shores. Such mitigation, however, has been required only for structures determined to be "substantially damaged," and that key determination, among others, is largely made by local officials. There is a perception in some quarters that politics and generous federal disaster benefits have undermined the effectiveness of the state's longstanding commitment to coastal hazard mitigation.

Platt, Rutherford H. (1999). *Disasters and Democracy: The Politics of Extreme Natural Events*. Washington, DC: Island Press.

Keywords :

natural disasters, public policy

Abstract: This book is concerned with political response to natural disasters, however they may arise. Specifically, the author is interested in the changing role of the federal government from distant observer to immediate responder, principal financier of disaster costs, and, more recently, champion of hazard mitigation. The book raises the question as to whether federalizing the costs of disasters is helping lighten the overall burden of disasters or, perversely, whether it is making matters worse. Additionally, have the availability of federal disaster assistance, flood insurance, and other benefits inadvertently contributed to a false sense of security, roughly equivalent to the discovery in the 1960s that federal flood control projects were stimulating development in protected floodplains?

Pompe, J.J. and J. Rinehart. (1995). The value of beach nourishment to property owners: Storm damage reduction benefits. *Review of Regional Studies*, 25(3), 271-8.

Keywords :

beach nourishment, economic modeling, South Carolina, flood damage

Abstract: This study offers a method for estimating the benefits of reducing damages from storms accruing to property owners from beach nourishment. The authors use a hedonic pricing

model to estimate the increased protection value that wider beaches provide for single-family homes in two oceanfront communities in South Carolina. These storm damage reduction benefits accrue not only to oceanfront property that suffers the most damage but also to properties farther back. The authors found that a proposed Army Corps of Engineers' nourishment project would produce approximately \$63.8 million of cumulative benefits to owners of single-family houses, which translated into a cost-benefit ratio of 1.96.

Potter, Kenneth W. (1994). Estimating potential reduction in flood benefits of restored wetlands. *Water Resources Update*, 97(Autumn), 34-7.

Keywords :

modeling, wetlands, environmental restoration

Abstract: In the United States, most flood-related analysis is based on the simulation of a small number of design events. This paper discusses the limitations of the use of design events to evaluate wetland restoration. For example, because design events are based on hydrologic modeling of discrete events rather than on continuous hydrologic modeling, they do not account for the prestorm water stored in the wetland system, for the wide variations that can occur in individual flood events in the spatial and temporal stormflow conveyance. The article outlines an alternative methodology for evaluating flood-mitigation benefits of specific restoration projects. Continuous simulation is an alternative approach that overcomes many of the drawbacks of design event methods.

PR News. (1997). FEMA's far-reaching public affairs efforts mitigate flood of concerns. *PR News*, 53.

Keywords :

risk communication, marketing, Cover America

Abstract: The FIA launched a significant public affairs program to prepare for a period of high flood potential. Elements of the program include a TV spot, snow melt messages, radio announcements, news conferences, and roundtable symposia to address questions from individuals living in areas where policy coverage has been sparse. Previously, FIA relied on its "Cover America" ad campaign and miniconferences designed for the public, regional press, local and state officials, and lenders in major floodplains. FIA's new approach couples public-based issues with industry concerns and includes simple grassroots tactics designed to dispel myths (like the belief that flood insurance is an automatic part of any homeowner's policy) to offering insurers commissions if they write policies on behalf of the government. The article also describes the Environmental Protection Agency's (EPA) public affairs campaign for its Superfund clean-up program for hazardous environmental sites. The EPA uses broadcast faxes, the Internet, hotlinks, and e-mail delivery of press releases disseminate information about Superfund sites. In addition, community involvement coordinators (about 12 based at each Superfund site) host local meetings, go door to door to talk to residents during emergency removals or long-term cleanups, set up community advisory groups, and make informational materials available.

PricewaterhouseCoopers. (1999). *Study of the Economic Effects of Charging Actuarially Based Premium Rates for Pre-FIRM structures*. Washington, DC: FEMA.

Keywords :

economic impacts, insurance premiums, pre-FIRM structures

Abstract: This report presents the results of a study on the economic effects of charging actuarially based premiums for pre-FIRM structures located in SFHAs. Among others, the study concludes that the number of pre-FIRM properties is expected to decline; that flood insurance premiums would rise substantially for pre-FIRM structures exposed to considerable flood risk; and that there would be a decrease in the national participation rate (proportion of structures with flood insurance).

Progression Group. (2000). *An Analysis of Marketing ROI for the National Flood Insurance Program of FEMA*. Washington, DC: FEMA.

Keywords :

marketing

Abstract: This report suggests the sales impact of media vehicles is variable in terms of timing, geography, and the media vehicle. Major findings indicate that advertising drives 21 percent of new policy sales, \$1,000 in advertising has sold an average of 13 policies, floods drive 12 percent of new policy sales revenue, direct mail is the most efficient medium, ad media are inefficient in high risk areas, cable TV and magazines have fallen significantly below their peak efficiency levels due to their volume of spending, spikes in the effectiveness of print media relatively quickly, ads placed 12 months before or 8 months after a flood get a 20 percent sales lift, potential sales efficiencies differ tremendously by geographical area, and legislation can have a significant impact on policy sales.

Quinn, Rebecca C. (1996). *Floodplain management insures against losses. FORUM for Applied Research and Public Policy*, 11.

Keywords :

risk perception, awareness, insurance

Abstract: The former NFIP coordinator for the state of Maryland says that flood insurance has failed because homeowners think floods would not happen to them, and, even if insured, they often rebuild in the same vulnerable zones. The NFIP proposes offering mitigation insurance, which pays the owner of an insured, flood-damaged structure an additional settlement to help pay for mitigation measures to prevent or reduce future flood damage.

Rasmussen, J.L. (1994). *Floodplain management into the 21st century: A blueprint for change—Sharing the challenge. Water International*, 19(4), 166-76.

Keywords :

floodplain management, Midwest floods of 1993, Mississippi River

Abstract: The article is a summary of the Interagency Floodplain Management Review Committee's Report to the Clinton administration's Floodplain Management Task Force. The author was a member of the committee, which proposed a better way to manage the nation's floodplains. The report not only describes the nature and extent of the Midwest floods of 1993 and government efforts to cope with the event, but also presents a blueprint for change. This blueprint is directed at both the upper Mississippi River Basin and the nation as a whole. Its foundation is a sharing of responsibilities and accountability among all levels of government, business, and private citizens. It provides for a balance among the many competing river and floodplain uses; it recognizes, however, that all existing floodplain activity simply cannot be discarded as inappropriate. The committee believes that, if implemented, the recommended approach will bring about changes necessary to reduce flood vulnerability to both the infrequent

major flood events and the more frequent smaller ones. Implementation also will reduce the environmental, social, and economic burdens imposed by current conditions on both public and private sectors. The committee's report includes an action plan delineating proposed responsibilities and time lines for execution of recommendations, a fiscal impact statement, and the findings of the preliminary Scientific Assessment and Strategy Team report.

Rasmussen, Jerry L. (1994). Environmental restoration - Floodplains vs. potholes. *Water Resources Update Issue*, 97(Autumn), 29-33.

Keywords :

environmental protection, riverine areas, floodplain management, Mississippi River, environmental restoration

Abstract: Riverine habitats and ecosystems can be self-renewing and ecosystem integrity can be effectively restored in the form of aquatic habitat restoration focus areas, aimed primarily at preserving native riverine species. Restoration and maintenance of habitats that simulate natural conditions are critical to the restoration and management of native aquatic species and may be the last best chance to address riverine endangered species needs. Specific features proposed by Senator Max Baucus's Floodplain Management Bill are described as critical to near-term aquatic ecosystem restoration in the Mississippi River Basin. Included are the following: (a) comprehensive upper Mississippi River evaluation; (b) river basin management planning; (c) habitat projects and resource monitoring; (d) congressional recognition of environmental and recreational resources; (e) environmental improvement; and (f) aquatic ecosystem restoration.

Reeve, D.E. (1998). Coastal flood risk assessment. *Journal of Waterway, Port, Coastal and Ocean Engineering*, 124(5), 219-28.

Keywords :

flood control, modeling, risk assessment

Abstract: The author investigates the theoretical use of probabilistic techniques in risk assessment for sea defenses. The focus is on the estimation of the probability of flooding caused by wave overtopping and the uncertainties resulting from this. Different probabilistic techniques are compared, and new and current methods are contrasted. The outcomes of different methods were found to be in agreement on weak structures, but they sometimes differed for more resilient structures.

Rettger, Michael J. (1977). *An Economic Analysis of Alternative Federal Flood Damage Assistance Programs*. Washington, DC: Office of Water Research and Technology.

Keywords :

economic modeling, New York, federal programs

Abstract: An economic analysis of alternative flood relief programs is presented based on the simulated flooding experience of the Binghamton, NY, metropolitan area. The theory of consumer choice under conditions of uncertainty is used to develop evaluation criteria for flood insurance and disaster loan programs, based on the benefits and costs of each program to both the public and the private sectors. A simulation model provides data for empirical implementation of the program analysis. The flood relief simulator is applied to a variety of possible assistance programs, including the NFIP and the Small Business Administration's Disaster Loan Program. Model results suggest that program designs cause substantial variations

in costs, not only in terms of total outlay but also in the distribution of costs between the government and individuals.

Rettger, Michael J. and Richard N. Boisvert. (1979). Flood insurance or disaster loans: An economic evaluation. *American Journal of Agricultural Economics*, 61(3), 496-505.

Keywords :

economic modeling, federal programs

Abstract: This study uses simulated data to perform an economic comparison between flood insurance (as provided by the NFIP) and disaster loans. Disaster loans were the prevailing form of assistance in the 1950s, when the Small Business Administration was the primary source of federal aid. Results were inconclusive since they varied according to model assumptions. Variations in premium and interest rate subsidies had major effects on the distribution of total cost between the public and private sector.

Richardson, Harry W., Peter Gordon, and Myung-Jin Jun. (1991). *The Economic Impact of FEMA Flood Protection and Insurance Requirements on Ten Cities in the Los Angeles County Floodplain*. Los Angeles, CA: University of Southern California, Planning Institute.

Keywords :

compliance, development, California

Abstract: The authors analyze the expected economic repercussions in the period 1992-2005 of new construction standards and flood insurance requirements on ten cities in the Los Angeles county floodplain. The authors looked at three variables they felt may cause adverse local and regional economic impact: deferred construction, higher costs associated with compliance requirements for development, and flood insurance premiums that may drain resources from other forms of spending (in part offset by a stimulus to the insurance industry). The authors surmise that the program will significantly discourage development in the floodplain. They conclude that the adverse economic impacts on the ten cities in the floodplain of FEMA flood protection and insurance requirements are massive.

Richman, Sheldon L. (1994). Federal flood insurance: Managing risk or creating it? *Regulation*, 16(3), 15-17.

Keywords :

development, subsidies

Abstract: The author contends that the Midwest floods of 1993 “demonstrate the self-defeating nature of the federal government's handling of natural disasters” and that federal policies subsidize the cost of living in risky areas such as floodplains. The NFIP runs a deficit, has not constricted coastal development, and pays a third of payments to 3 percent of claimants. While federal officials and the insurance industry maintain that floods are not an insurable risk, some private policies are available though expensive. Deregulated private insurance is an alternative. Some insurers defend the NFIP because they make money but incur no risk by selling policies. Senator John Kerry introduced S. 1405, which would prohibit new federal insurance policies in high-risk erosion areas, but this bill does not go far enough and would expand federal control and violate property rights. The author believes that citizens should be free to do what they wish with their property and should accept the consequences.

Riley, Ann L. (1994). The greening of federal flood-control policies: The Wildcat-San Pablo Creeks case. In Rutherford H. Platt, Rowan A. Rowntree, and Pamela C. Muick, eds. *The Ecological City: Preserving and Restoring Urban Biodiversity*. Amherst, MA: University of Massachusetts Press.

Keywords :

California, environmental restoration, flood control, urban areas

Abstract: Local flood-control projects along streams and rivers have long been dominated by designs that use concrete and hydraulic engineering that is rectilinear and non-ecological.

However, an urban flood-control project may be designed to restore natural habitat and enhance the environment while reducing the threat from floods. The thirty-six year history of planning for the Wildcat and San Pablo creeks in North Richmond, CA may result in an environmentally sensitive flood control project if the current design is successfully implemented and managed over time. This experience offers many lessons for similar projects elsewhere.

Robb, John A. (1994). Economic and environmental challenges. *Water Resources Update*, 97(Autumn), 17-20.

Keywords :

environmental protection, flood control

Abstract: The chairman of the Upper Mississippi Flood Control Association (UMFCA) writes that flood control is the cornerstone of a river transportation infrastructure that permits navigation, economic development, and environmental and social stability. The environmental challenge for today is to find a way to provide for all four of these essential parts in a compatible way without destroying or preventing future enhancement and development of any of the others. The challenge is complicated by the political environment (i.e., pro-environmentalist) and financial reality. The UMFCA remains a strong supporter of navigation improvements, the continued protection of private property, economic development, and environmental protection. It believes that the balanced system of flood control and natural flooding areas, now in place, along the navigable rivers is the best environmental and wildlife producing system that has ever existed.

Robert, Benoit, Simon Forget, and Jean Rousselle. (2001). *The Effectiveness of Flood Damage Reduction Measures in the Montreal Region*. Risk and Performance Group, Department of Civil, Geological and Mining Engineering, Ecole Polytechnique de Montreal.

Keywords :

Floodplain management, economic impacts, mitigation, Quebec, Canada

Abstract: This study assesses the effectiveness of two flood damage reduction measures -- designation and diking of floodplains. The study was carried out in four Quebec municipalities located on the shores of Lac des Deux-Montagnes and Rivière des Mille-Iles, namely Sainte-Marthe-sur-le-Lac, Saint-Eustache, Rosemère and Bois-des-Filion. Criteria for selecting the study areas were: area of the flood-risk zone, presence or absence of dikes, presence or absence of buildings, and availability of data. The study areas were selected with the help of flood risk maps of the Greater Montreal region. In each area, information on the number of buildings and their economic value was taken from the municipality's property assessment database. Trends in the occupancy and value of floodplains were identified and compared. The results of the study show that, as in other regions of Canada, measures to reduce flood damage based on designation

and mapping of floodplains have had no impact on occupancy, have failed to reduce flood damages, and have not halted increases in such damages.

Robert, Benoit, Claude Marche, and Jean Rousselle. (2001). *Computerization and Use of Flood Impact Curves.*

Keywords :

modeling

Abstract: A variety of methods are currently being used to assess the impact of flood risk. Computerized tools primarily consider property damage and generate estimates of the population potentially affected. CONSEQ, a tool that complements DOMINO, automatically generates impact curves following a specific procedure and as such it provides for the most exhaustive assessment possible of direct, tangible damage. Intangible damage and municipal requirements in areas downstream from hydroelectric facilities are also considered. In this paper, the authors present DOMINO and CONSEQ and the methodology for impact studies combined with the use of these tools. The needs of municipal emergency planning managers will also be identified in order to generate key impact curves. The application of the results to emergency measures and the incorporation of the curves into a retaining reservoir management plan will also be outlined. Curves generated in studies on hydroelectric facilities will be presented in support of the above.

Robinson, Michael E. (1989). *The National Flood Insurance Program and Floodplain Development. Unpublished working paper. Washington, DC: FEMA.*

Keywords :

building codes, development, wetlands, NFIP

Abstract: Robinson identifies six points that are important in any discussion of the impact of the NFIP in development: (a) because new construction is actuarially rated, there is no insurance "subsidy" for property that was not already in place when the community was first mapped; (b) added costs associated with NFIP building standards and insurance premiums should discourage floodplain development "provided that alternative flood free locations are available"; (c) in a few instances, the NFIP may "enable" development by making lenders more willing to loan or invest in development. However, given the added costs associated with NFIP's building standards, this would most likely occur only when the proposed development has high recreational value or where undeveloped flood free property is scarce; (d) wetland losses are primarily due to agricultural and commercial or industrial development neither of which are affected by the availability of flood insurance; (e) the NFIP's requirement that communities designate a regulatory floodway and prohibit development within that floodway that would cause any increase in flood heights provides significant protection to river corridors; and (f) the NFIP's building standards improve the overall quality of development when it does occur. He concludes that "empirical evidence does not support a conclusion that flood insurance is critical to coastal development."

Roenigk, Dale J. (1993). *Federal disaster relief and local government financial condition. International Journal of Mass Emergencies and Disasters, 11(2), 207-25.*

Keywords :

disaster assistance

Abstract: Federal relief for local governments following natural disasters is provided under the assumption that without aid disasters might overwhelm local resources thus slowing recovery.

Using loss data for a sample of counties experiencing disasters in the mid-1980s, this paper provides evidence that the financial condition of local governments was not improved by receiving federal aid. Additionally, the paper shows that the initial financial impacts of disasters may be negative, but that within two years the net effect is positive.

Rosen, H. and M. Reuss, eds. (1986). *Flood Control in Urban Areas: Past, Present and Future: Proceedings of a National Symposium*, New Orleans, LA, September 26, 1986. Chicago, IL: Public Works Historical Society.

Keywords :

history, urban areas, flood control

Abstract: This book summarizes the proceedings of the National Symposium, Flood Control Challenge: Past, Present, and Future held in September 26, 1986. This symposium commemorated the fiftieth anniversary of the 1936 Flood Control Act and was sponsored by the Public Works Historical Society and the Army Corps of Engineers in cooperation with the American Public Works Association's Institute of Water Resources and Council on Emergency Management. The proceedings are arranged in three parts; Part I: The 1936 Flood Control Act, Part II: Impact on Rural and Urban Areas, and Part III: The Economics of Flood Control. Chapters of particular interest are: "Evolution and future of flood control" by T.M. Schad; "Flood control in urban areas: past, present, and future" by B. Steinberg; and "When may a post-audit teach lessons?" by Gilbert F. White.

Rucker, Robert E. (1986). *Rationality and legitimation: A study of the National Flood Insurance Program*. *Dissertation Abstracts International*, 46(10).

Keywords :

history, NFIP

Abstract: The dissertation analyzes the historical development and present workings of the NFIP. The NFIP is the result of the US government's continued involvement in flood control. This involvement goes back to the early 1800s. The NFIP is a response to the inability of structural measures to prevent increases in flood damages. The historical data were analyzed for themes and sensitizing concepts which were then used to guide the second stage of data gathering using field work based on interviews, observations of public and private meetings, and current periodicals. This primary data were analyzed using the themes, sensitizing concepts, and Jurgen Habermas's theoretical work on late capitalism. The case demonstrated problems of rational administration, economics, and legitimation as the federal government has implemented the NFIP.

Salveson, David Anton. (2002). *Land Use Change in the Coastal Barrier Resources System: The Effects of Conservation and Development Advocacy Coalitions*. (Ph.D. dissertation, University of North Carolina at Chapel Hill).

Keywords:

Coastal Barriers Resource System, coastal areas, development

Abstract:

Using 5 case studies of selected Coastal Barrier Resources System (CBRS) units as well as surveys of state coastal managers and key informants, the author asked a.) the extent to which the Coastal Barriers Resources Act (CBRA) has limited development in CBRS units; b.) the ways in which policies and actions of state and local governments affect the development of CBRS units;

and c.) the extent to which advocacy coalitions account for the difference in the level of development among certain CBRS units. Salveson concludes that the CBRA, by itself, will not prevent development from occurring in CBRA-designated areas. In fact, it appears that development in CBRS units will occur if (1) development pressure is strong enough to overcome the disincentives posed by CBRA, and (2) state and local governments facilitate development in CBRS units. On coastal barriers that are readily accessible, where the real estate market is strong, and where most of the nonCBRS areas have already been developed, CBRA may only be delaying the inevitable. However, government policies and advocacy coalitions can play a crucial role in shaping development in CBRS units. The paper suggests the following policy revisions: a.) the authority to ensure that federal agency actions are consistent with the act's objectives should be delegated to a single agency; b.) appoint an official arbiter for interagency disputes; c.) incorporate CBRA's goals into local coastal zone management plans; d.) improve outreach; and e.) Limit federal spending for infrastructure on coastal barriers if it will encourage development in a CBRS unit.

Scanlon, T. Joseph. (1988). Winners and losers: Some thoughts about the political economy of disaster. *International Journal of Mass Emergencies and Disasters*, 6(1), 47-63.

Keywords :

economic impacts

Abstract: While it is obvious disasters are negative events causing injury and death, damage, and destruction, macroeconomic studies show little long-term economic effects from disaster. That is because disasters create both losers and winners, and these balance out. Who loses and who wins is not random but a result of public policy decisions. The losers include individuals who are injured, lose their jobs, lose their homes, lose a wage earner, or lose a place of residence. The winners include individuals who earn extra money because they are involved in emergency response or restoration. They include wage earners and their families as well as some businesses, but not others. They include communities that, because of substantial assistance, end up better off because of the disaster. Winners and losers are created by decisions about where to build a dam or who should receive what sort of assistance. This article is not based on new research but on an analysis of existing material. The author concludes that more research is needed on the economic effects on individuals, businesses and communities, and on the economic impact of policy decisions.

Schmidt, Charles W. (2000). Lessons from the flood: Will Floyd change livestock farming? *Environmental Health Perspectives*, 108(2), A74-7.

Keywords :

Hurricane Floyd, North Carolina, agriculture, environmental protection

Abstract: Regulatory and policy implications for the swine industry in North Carolina in the aftermath of Hurricane Floyd are discussed. The swine industry was responsible for most of the flood-related environmental damage sustained during Hurricane Floyd. As part of an emergency waste-management plan, waste-management systems that sustained more than 50 percent damage will not be permitted to rebuild in the 100-year floodplain. Environmentalists and others contend that the massive hog farms should not be located in a low-lying area that is vulnerable to flooding and ecologically sensitive, but state officials are unwilling to provide any definitive answers as to whether regulatory changes to swine farming will ensue to accommodate future flood conditions.

Seydlitz, Ruth J., William Spencer, Shirley Laska, and Elizabeth Triche. (1991). The effects of newspaper reports on the public's response to a natural hazard event. *International Journal of Mass Emergencies and Disasters*, 9(1), 5-29.

Keywords :

risk communication, risk perception, Mississippi River, Louisiana, media

Abstract: The literature on environmental hazards suggests that media reports constitute a major source of information on which people base their responses. However, the effect of media reports on responses is neither direct nor simple. Variables such as prior experience, the responses of others, selectivity in attention, and characteristics of the content of media reports interact to influence responses. On the basis of the extant literature on media and hazards, the authors constructed a model of the effect of media reports on the public's response to a natural hazard event. We test various hypotheses derived from this model by examining a salt water intrusion in the Mississippi River that affected drinking water in the New Orleans metropolitan area in the summer of 1988. Using time series analysis, the article examines the effect of various characteristics of local newspaper stories on bottled water sales throughout the intrusion period. The results suggest that in the absence of personal experience, people are more likely to respond to media reports regardless of personal relevance or seriousness of the consequences of the hazard events reported by the media. When people possess personal experience, they are more selective in their attention and response to media reports. The results also suggest that people used media reports of others' behaviors as cues to appropriate responses. Finally, the report concludes with a discussion of the conceptual and methodological implications of these results for future research.

Shabman, Leonard. (1994). Responding to the 1993 flood: The restoration option. *Water Resources Update*, 95(Spring), 26-30.

Keywords :

wetlands, environmental restoration, public policy

Abstract: This article takes a critical perspective on the restoration of floodplains. It describes how the nation's goals for its wetlands and floodplains have changed over time from development to preservation and, now, to ecosystem restoration. It states that effective policy analysis must go beyond the easy rhetoric of saying that the 1993 flood revealed "failed policies." Analyses must demonstrate that continued agricultural land use imposes costs that are greater than their values, and that the society is willing and able to implement policies to restore the lands. It comments on analytic and financing challenges for advancing a national restoration agenda and concludes that the policy question posed by the 1993 flood is whether the nation wishes to reverse the long standing policies that have encouraged the occupancy of floodplains and the drainage of wetlands and pursue a restoration agenda.

Shabman, Leonard and Kurt Stephenson. (1992). The possibility of community-wide flood control benefits evidence from voting behavior in a bond referendum. *Water Resources Research*, 28(4), 959-64.

Keywords :

attitudes, Virginia, flood control

Abstract: Voting behavior in a referendum on flood control in Roanoke, Virginia, provides evidence that people living and working outside the flood-prone area are willing to pay for the

construction of flood control projects. This voting behavior supports the argument that flood control benefits exist at the community level. In providing the cost sharing required under recent federal legislation, local government financing that distributes project costs over the whole population of a local jurisdiction, and not just those persons living or working in protected areas, may increase both economic efficiency and expand communities' financial capacity to pay for such projects.

Shabman, Leonard and Kurt Stephenson. (1996). Searching for the correct benefit estimate: Empirical evidence for an alternative perspective. *Land Economics*, 72(4), 433-49.

Keywords :

property values, cost-benefit analysis, economic modeling, public policy

Abstract: This paper contrasts the results of the contingent valuation, hedonic price, and property damages avoided valuation techniques. Each technique was used to estimate the value of flood risk reduction from the construction of a flood control project. Voting behavior in a referendum called specifically for the provision of the project was used to further interpret the results from the three valuation studies. The authors found substantial differences between the estimates. The authors suggest economists should apply the estimation technique that best facilitates a collective choice process. An acceptable benefit estimation technique does not have to measure all possible effects in direct accord with theoretical willingness-to-pay logic, instead the decision-participants must believe that the estimate reflects some salient feature of a choice. It also means that the estimate needs to be understood to those who might use it. For instance, the Property Damages Avoided (PDA) technique could be a useful benefit estimation technique for a variety of reasons (understandable logic, understandable limitations), none of which is based on the argument that it is an accurate or comprehensive measure of the benefits of flood control. In contrast, while contingent valuation methods (CVM) are theoretically capable of establishing the willingness-to-pay for the entire range of environmental use. CVM may provide little useful policy information, sometimes even generating more controversy than application in decision-making. The authors conclude that to be effective in the public policy, economists have to become more attentive to what techniques, advice, and analyses are useful to those involved in making choices. Policy economists will be ineffective if they cling to the notion that there exists a "correct" benefit estimate and that their professional responsibility is to measure it no matter what.

Sheaffer and Roland Inc. (1976). *Case study of Padre Island National Seashore: Supporting Study for Barrier Island Development Near Four National Seashores (1981)*. Geneva, IL: Sheaffer and Roland Inc.

Keywords :

development, Hurricane Beulah, Texas, subsidies. wind

Abstract: This study provides a chronology of events that influenced a surge of development in the most southern portions of Padre Island, TX. The availability of flood insurance through the NFIP is one of several factors identified in the growth of neighboring communities. At about the same time as the NFIP was enacted, the state legislature created the Texas Catastrophe Property Insurance Association (now known as the Texas Windstorm Insurance Association) that guaranteed windstorm and hail insurance to Texas coastal communities. Of the two programs, the windstorm pool coverage clearly presented the largest exposure. Also, the authors said that another large influence on development came in the aftermath of Hurricane Beulah, in 1967.

This hurricane destroyed mostly substandard structures, clearing the way (literally) for more storm-proof development. The authors concluded that while the NFIP was the first occurrence of federal subsidization in South Padre Island development, the impact of the availability of flood insurance is difficult to discriminate from the impact of the availability of wind and hail insurance and the impact of Hurricane Beulah.

Sheaffer and Roland Inc. (1981). *Barrier Island Development near Four National Seashores*. Washington, DC: Council on Environment Quality, FEMA, Department of Interior, and Department of Commerce.

Keywords :

Alabama, development, Florida, Georgia, Mississippi, North Carolina, Texas, coastal barriers

Abstract: This study looked at barrier islands in six states (AL, FL, GA, MS, NC, and TX). The authors concluded that federal policies at the time supported development, effectively leveraging private development money by shifting the public sector portions of the costs of bridges, roads, causeways, water supply systems, wastewater treatment systems, shore protection, disaster relief, and flood insurance. Among these, the key factors in such development were bridges, causeways and road access. The availability of flood insurance was not a key factor.

Shepard, Richard C. (1994). *Floodplain development: Lessons learned from the great flood of 1993*. *Urban Land*, 53(3), 19-24, 42, 44.

Keywords :

Midwest floods of 1993, hundred-year flood standard, property values

Abstract: This article by a real estate counselor says that the Midwest floods of 1993 “caught many business executives off guard -- unaware of the flooding danger, the need for flood insurance, or what steps they should take in a flood emergency.” Shepard takes exception with the use of the term “100-year floodplain” saying it is misleading and creates a false sense of security. He says that while it is difficult to quantify the effect of flood or fear of flooding on the real estate market, property values take a "major hit" after a flood. He said it would take rebuilding levees to the 500-year floodplain level to reinstate market values of land to the levels prior to the Great Flood.

Shilling, James D., C.E. Sirmans, and John D. Benjamin. (1989). *Flood insurance, wealth redistribution, and urban property values*. *Journal of Urban Economics*, 26(1), 43-53.

Keywords :

property values, subsidies, pre-FIRM structures, urban areas

Abstract: Using pricing models, the authors test the impact of property values of NFIP subsidized and unsubsidized insurance rates. The authors identify what they describe as a perverse effect of the way the NFIP was introduced. Because of the delays in completing technical studies needed to publish maps, many communities remained in the emergency phase of the program for many years. Construction during this time was designated pre-FIRM and, therefore, qualified for subsidized premiums in perpetuity. The effect was reinforced by the fact that mandatory floodplain management measures did not have to be in place until the maps were completed. The authors said this results in a wealth transfer or redistribution because of the increased value of property that is eligible for the subsidized rates.

Sierra Club. (2000). *Report: Permitting Disaster in America*. Madison, WI: Sierra Club Midwest Office.

Available at: <http://www.sierraclub.org/wetlands/reports/flooding/>

Keywords :

wetlands, nonstructural approaches, Army Corps of Engineers, environmental protection

Abstract: This report explains that the Army Corps of Engineers' plan limits permits for development of wetlands, destruction of wetlands, and more floodplain sprawl. The Sierra Club believes new Corps of Engineers' rules will limit wetland development, help keep many people from harm's way, and protect sensitive wildlife habitat. The Sierra Club also said that the Corps of Engineers has more work to do "before the program completely meets the President's goals of guaranteeing full environmental review and public notice of development plans in floodplains." The Sierra Club said that in the past, "rubber stamp" wetland permits allowed developers to build in 78,000 acres of wetlands, enough to store 78 billion gallons of floodwater, between 1988-96. ("Rubber stamp" is what environmentalists call existing rules that govern sprawl development, mining, road-building and other activities in wetlands.). The Sierra Club is pleased that the permits have been limited to a half-acre. Robin Mann, chair of the Sierra Club's wetlands committee said that such a reduction "is a significant step forward," and that "the program contains other protections that will help slow the destructive channeling, relocating, and mining of our streams."

Siffin, William J. (1981). *Bureaucracy, entrepreneurship, and natural resources: Witless policy and Barrier Islands*. *Cato Journal*, 1(1), 293-311.

Keywords :

coastal barriers, development, coastal areas

Abstract: The author claims that urbanization of barrier islands are a direct result of flood insurance, since it eliminates a major constraint on the development of vulnerable barrier islands by subsidizing property loss risks. The author also claims that a number of other federal programs cumulatively stimulate barrier island development.

Simmons, K. M. and J.D. Kruse. (2000). *Market value of mitigation and perceived risk: Empirical results*. *Journal of Economics*, 26(1), 41-51.

Keywords :

mitigation, Texas, wind

Abstract: This paper explores the value of windstorm mitigation in a Gulf Coast city. Policymakers have long assumed that agents will not voluntarily mitigate for a natural disaster. Consequently, policy has focused on coercive measures. The study contains detailed information on the inclusion of storm-blinds, a specific hurricane mitigation feature. Homes with storm-blinds command a premium compared to homes without this feature, thereby questioning the assumption held by policymakers. This result, however, is limited to homes located on the island portion of the community indicating that agents differentiate the risk from one area to another.

Simmons, Malcolm. (1988). *The Evolving National Flood Insurance Program*. Washington, DC: Congressional Research Service.

Keywords :

coastal barriers, development, coastal areas, NFIP

Abstract: This brief overview of the NFIP explains: “One of the more volatile issues for the NFIP has been whether it should provide any form of incentive for development of coastal barriers. It became apparent to Congress that a variety of factors were producing growing pressure for the development of these fragile areas. These factors not only included construction of infrastructure but also the availability of flood insurance through the NFIP. Eliminating the availability of federal flood insurance for new construction in these areas would remove one of these developmental incentives.”

Sims, John H. and Duane D. Baumann. (1987). The adoption of residential flood mitigation measures: What price success? *Economic Geography*, 63(3), 259-72.

Keywords :

risk communication, mitigation

Abstract: The authors compared the success of then existing flood programs to persuade persons at risk to take protective measures against flooding. The study shows that information can be an effective component in the reduction of potential flood damage. It also shows that an effective program need not be expensive or elaborate (this is not to conclude that any type of minimal information program will be effective).

Singer, Saul Jay. (1990). Flooding the Fifth Amendment: The National Flood Insurance Program and the “Takings” clause. *Boston College Environmental Affairs Law Review*, 17(2), 323-71.

Keywords :

takings, legal proceedings, NFIP

Abstract: The author examines the potential impact of US Supreme Court rulings on the constitutionality of the NFIP. Between early 1987 and 1990, the Supreme Court decided three important cases involving the key question of what constitutes a taking of interests in real property under the Constitution. The author discusses the Fifth Amendment debate over the NFIP’s takings clause, the nature and extent of flood hazards in the United States, and a brief history of the NFIP. The author concludes that there are few “new” practical results emerging from the Supreme Court’s 1987 “takings trilogy” that impact on the NFIP. As the result of the takings trilogy, it is expected that the courts will scrutinize more closely both the regulatory purpose underlying laws affecting land use and the nexus relationship of statutes to purported regulatory goals. However, the NFIP has little cause for the constitutional fear engendered in some circles by the three decisions. Considering the hundreds of flood hazard-related land-use regulations upheld by the courts compared to the handful of those overturned, it is more than likely that the courts will continue to sustain soundly conceived and fairly administered floodplain regulations and loss-mitigation statutes.

Smith, David J., John C. Purvis, and Arthur Felts. (1995). Risk communication: The role of the South Carolina State Climatology Office. *Bulletin of the American Meteorological Society*, 76, 2423-31.

Keywords :

risk communication, Hurricane Hugo, South Carolina, weather

Abstract: The federally supported state climatologist program ended in 1972. Thereafter, most states supported these endeavors in coordination with the National Climatic Data Center, but the current state programs vary widely. One of the functions of state climate programs that evolved

since 1972 is acting as a liaison between the National Weather Service and various state agencies. This role was most apparent and controversial in coordinating state and local government response to severe weather and extreme climate anomalies such as drought, flood, winter storms, and tropical cyclones. The activities of the climate office in South Carolina during Hurricane Hugo in September 1989 and the October 1990 floods revealed how these interactions occur in one state that mandated these activities. The state climate office had to react to shifting weather conditions and to variable political conditions that affect public organizations. The climate office in South Carolina acts to interpret weather information, develop scenarios and predictions, and to assist in postevent damage surveys. This review was presented to acknowledge and document the expanding role of the state climate office in South Carolina in response to state and local government needs for weather forecast interpretation and expert guidance in the event of severe weather.

Smith, D.I. (1998). Urban flood damage under greenhouse conditions: What does it mean for policy? *Australian Journal of Emergency Management*, 13(2) 56-61.

Keywords :

Australia, weather, flood causes

Abstract: The last decade has seen the first tentative steps to assess the socio-economic impacts of greenhouse-induced climates on communities. This article estimates possible flood damages for three flood prone urban communities in Australia using climate change scenarios adopted by the Intergovernmental Panel on Climate Change (IPCC) in 1996. According to the models, all three locations would see a marked increase in the average annual direct flood damage under the worst-case scenario (doubling of present-day CO₂ levels). Furthermore, more frequent flooding could potentially cause a sharp increase in the number of flood prone structures. In response to these estimates, the authors discuss two possible approaches to greenhouse policy: the “no regrets” option and the “precautionary principle.” The “no regrets” option can be regarded as measures worth doing anyway, whereas the “precautionary principle” can be regarded as additional investment that would not have otherwise been invested. The authors recommend policy changes based on the “no regrets” and “precautionary principle” despite the uncertainties and lack of local detail in the greenhouse scenarios and the problems of estimating the frequency of extreme events.

Sparks, Richard E. and Ruth Sparks. (1994). After floods: Restoring ecosystems. *USA Today Magazine*, 123, 40-3.

Keywords :

environmental restoration, floodplain management, agriculture, cost-benefit analysis, riverine areas, Mississippi River

Abstract: This article focuses on the proposals for an aquatic ecosystem restoration of the floodplains in the United States. It offers an alternative to rebuilding of agricultural levees and discusses the restoration of the natural services of floodplains. It reviews the modification of federal programs to protect life, property, and the improvement of the Upper Mississippi River ecosystems. The article suggests that although floodplain agriculture may be profitable from a farmer’s perspective, no one really knows whether it is sustainable and cost-efficient from a national perspective. This article questions whether it is necessary to subsidize flood protection on floodprone lands and irrigation on arid lands when production is so high on prime farmland with more moderate moisture conditions that farmers are paid not to grow crops. The article

contends that “Now that most of the wetlands in the Midwest have been drained and virtually all the rivers have been degraded by excessive erosion or sedimentation, there is increasing public demand to preserve what is left and restore at least some of what has been lost.” Finally, the article concludes that “Aquatic ecosystem restoration should be part of a revised and more effective national flood management program.”

Speyrer, J.F and W.R. Ragas. (1991). Housing prices and flood risk: An examination using spline regression. *Journal of Real Estate Finance and Economics*, 4(4), 395-407.

Keywords :

economic modeling, property values, Louisiana

Abstract: This article examines the impact of flood risk and mandatory flood insurance on property values. Using a large data set of almost 2,000 homes sold in the New Orleans, Louisiana, area from 1971 through 1986, the analysis confirms the finding of earlier studies that location in a floodplain does reduce property values. The present study, using spline variables to adjust for locational variation in the data and an improved measure of insurance cost, reveals that much of this reduction can be attributed to mandatory flood insurance coverage. Moreover, while unexpected flooding does increase the insurance cost capitalization, repeated flooding does not seem to reduce property values further.

Stakhiv, Eugene Z. (1995). Floodplain Planning and Management for Extreme Floods. Paper presented at the US- Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods, Perugia, Italy, November 13-17, 1995.

Keywords :

floodplain management, Midwest floods of 1993, public policy

Abstract: This paper presents a brief overview of the Midwest floods of 1993 as the context for understanding the Army Corps of Engineers’ responses to the policy and programmatic recommendations in the aftermath of the flood. The paper argues that generally, what is lacking for good decision-making is basic information, rather than research. Public policies are being made in the absence of good information in the form of data about flood damages, degree of inundation, severity and frequency of flooding. The author argues that research is needed to improve and refine existing methods rather than creating entirely new approaches or methods: “much of the research and analysis that is required to act on the recommendations of the ‘Galloway Report’ is to improve the administration and effectiveness of existing programs.”

Stedinger, Jerry R. (1997). Expected probability and annual damage estimators. *Journal of Water Resources Planning and Management*, 123(2), 125-35.

Keywords :

modeling, risk assessment, Army Corps of Engineers

Abstract: Controversy continues over the relative merits of traditional frequency estimators and the “expected probability” estimator of flood risk that incorporates an adjustment for parameter uncertainty. Both have solid theoretical motivation, but address different concerns. The description of hydrologic risk and uncertainty provided by new risk and uncertainty procedures adopted by the Army Corps of Engineers, and risk-based design procedures developed by others, are shown to be equivalent to the expected probability model in simple cases. A 1995 National Research Council (NRC) report recommended against use of the expected probability model for evaluating expected annual damages and the probability of flooding; in particular, the NRC

analysis and the 1989 Amell analysis demonstrated that expected probability estimators yield risk and damage estimators that generally have large positive biases. Historical arguments and related issues are reviewed. Resolution of this controversy and success of the new Corps of Engineers' risk and uncertainty procedures require a clear framework for understanding what is meant by risk, variability, and uncertainty. Such risk analyses can better represent a community's vulnerability to flooding and the large uncertainty in estimates of expected damages and residual flood risk.

Suhayda, J.N. (1997). Modeling impacts of Louisiana barrier islands on wetland hydrology. *Journal of Coastal Research*, 13(3), 686-93.

Keywords :

coastal barriers, development, Louisiana, modeling, coastal areas, Base Flood Elevation, Hurricane Andrew

Abstract: Management and restoration of natural systems requires the quantitative assessment of the impact and cost effectiveness of management alternatives. This paper describes the methodology used in Louisiana to evaluate the role of barrier islands in influencing wetland hydrology and some preliminary results. The objective of the evaluation was to determine the effect of barrier island geometry on the duration and depth of inundation of coastal wetlands under average and extreme conditions. The model selected for use was the overland flooding model developed by FEMA to predict hurricane flood elevations for the NFIP. The model uses an explicit, two-dimensional, spaced-staggered, finite-difference scheme to simulate the flow of water caused by tides and wind systems. The current size of the inlets between the islands is several times the equilibrium area based upon the tidal prisms. Slight reductions in the cross sectional areas of the inlets between the islands had only a very minor effect on reducing the depth and duration of wetland flooding. If the barrier islands were removed from the model, the depth and duration of tidal flooding slightly increased. Under extreme conditions, the island height and inlet size had a significant effect on the depth and duration of wetland flooding. Hurricane Andrew produced a maximum surge elevation at Cocodrie of about 2.7 m. The predicted surge elevation at Cocodrie would have been about .3 m higher if the present barrier islands were destroyed and would have been as much as 1.2 to 1.5 m lower if the barrier islands were raised and the inlets narrowed.

Technical Mapping Advisory Council. (1998). *Technical Mapping Advisory Council 1998 Annual Report*. Washington, DC: FEMA.

Keywords :

mapping, Base Flood Elevation

Abstract: This is the third annual report of the Technical Mapping Advisory Council, which provides advice and assistance to FEMA in determining how to best meet the needs of various users of mapping products. The council's main topic of discussion during 1998 was the Map Modernization Plan (MMP) and the relationship of the plan to the council's congressional mandate. The council voted to strongly support modernizing FEMA's Flood Hazard Mapping Program and identified individuals to work with the FEMA-designated managers for the 37 MMP objectives. A second major topic considered by the council was flood hazard maps, including map standards and various activities related to map development, distribution, and use. The council also debated several issues related to Letters of Map Amendment and appointed a subcommittee on this topic. In addition, the council was an active member of a task force to

revise the Elevation Certificate, creating several drafts, tabulating comments, and field-testing a new version. The annual report includes sections on activities and accomplishments, issues, recommendations, future directions, progress, and appendixes.

Technical Mapping Advisory Council. (2000). *1999 Annual Report. Report to James Lee Witt, Director of the FEMA*. Washington, DC: FEMA.

Keywords :

mapping, zoning

Abstract: In 1994 Congress passed the National Flood Insurance Reform Act and directed the FEMA to establish the Technical Mapping Advisory Council. The council was directed to provide recommendations to FEMA on ways to improve FIRMs and the mapping process. The council began its work in 1996 and has produced three previous annual reports. Each report has included recommendations to improve maps and the mapping process. The council recommended that FEMA take the following steps: (a) encourage and support use of future land-use conditions in calculating floods and delineating floodplain limits; (b) improve floodplain delineations that were derived by approximate study methods and mapped as Unnumbered A-Zones; (c) support the use of the recently issued study guidelines for mapping alluvial fans; (d) develop and implement procedures for including data in products about multiple hazards that pose flood risks and continue to participate in the Open GIS Consortium to provide links to other sites containing retrievable data affecting flood risks; and (e); establish an indexing and retrieval system for archived data.

Technical Mapping Advisory Council. (2000). *Final report to the Honorable James Lee Witt, Director, FEMA: A Summary of Accomplishments and Recommendations*. Washington, DC: FEMA (FEMA).

Keywords :

mapping

Abstract: This report responds to a mandate to evaluate and recommend improvements to the production, distribution, and use of FIRMs and other mapping products prepared by FEMA in support of the NFIP. The Council had four recommendations that they deemed “most important”: (a) acquiring additional financial and technical resources for map programs; (b) building constituent interest and public support for modernizing the mapping program using a process that includes public education and public outreach; (c) building partnerships among various federal, state, and local governments, universities, and the private sector to accomplish NFIP objectives; and (d) creating a fully digital environment for floodplain mapping and all related information.

Tenenbaum, David. (1994). *Rethinking the river*. *Nature Conservancy*, 44(4), 11-5.

Keywords :

Midwest floods of 1993, Mississippi River, environmental impacts

Abstract: This paper examines the ecological impacts of the Mississippi River flood of 1993 and the rethinking of river management practices that has resulted. It provides a map of the flood area that shows the occurrence of rare wildlife found in or near the region’s rivers.

Thampapillai, Dodo and Warren F. Musgrave. (1985). *Flood damage mitigation: A review of structural and nonstructural measures and alternative decision frameworks*. *Water Resources Research*, 21(4), 411-24.

Keywords :

mitigation

Abstract: Literature from diverse sources such as public expenditure economics, management science, geography, agriculture, and engineering reveals a wide range of decision frameworks for deriving strategies for flood mitigation. These different types of decision frameworks are reviewed in this paper. The aim is to provide an understanding of these frameworks, along with their relative adequacies and inadequacies. Such an understanding reveals the directions along which the formulation of a more adequate framework should proceed. However, the formulation of a given decision framework is influenced by the types of economic benefits associated with the flood mitigation measures considered in that framework. Hence the various flood mitigation measures are reviewed prior to the various decision frameworks.

Thompson, Kay D., Jerry R. Stedinger, and David C. Heath. (1997). Evaluation and presentation of dam failure and flood risks. *Journal of Water Resources Planning and Management*, 123(July/August), 216-27.

Keywords :

modeling, risk assessment, dams

Abstract: Safety studies for existing dams have found that some do not satisfy current estimates of the probable maximum flood. An event or influence diagram can describe the random factors that contribute to major inflow floods and that determine reservoir operation and possible downstream damages during a flood event. This allows calculation of the probability of dam failure and the distributions of damages and loss of life using combinations of various analytical and Monte Carlo methods. This paper discusses the efficiency of different evaluation methods: event trees, simple Monte Carlo sampling, Latin hypercube sampling, importance sampling, and an analytical/stratified Monte Carlo (A/SMC) method. The analysis suggests that the A/SMC method and importance sampling have great potential for the efficient estimation of dam failure risks. Numerical examples employ the distributions of damages and loss of life to show the character of trade-offs presented by different decisions and illustrate problems with the partitioned multi-objective risk method. The use of partial expected damage and loss of life functions is recommended to show the importance of low-probability/high-consequence events.

Thunberg, E. and Leonard Shabman. (1991). Determinants of landowner's willingness to pay for flood hazard reduction. *Water Resources Bulletin*, 27, 657-65.

Keywords :

flood control, attitudes, Virginia

Abstract: Estimated benefits of flood control projects are typically limited to avoided property damages. However, the possibility that there are benefits from reduced psychological stress among floodplain occupants and benefits to the community has long been recognized. A survey of landowners residing in a floodplain in Roanoke, Virginia, found that nonproperty considerations did help explain their expressed willingness to pay for flood control. Of particular importance was the respondents' concern for disruption of the community caused by possible flooding.

Tibbetts, John. (1994). Waterproofing the Midwest. *Planning*, 60(4), 8-14.

Keywords :

buyouts, floodplain management, Missouri

Abstract: This article describes the efforts of officials in the Midwest to reduce flood damage by updating local and federal laws on floodplain zoning. The author reports on the inundation of Calhoun County, MO. He provides estimates of crop losses due to floods, and discusses both provisions under county zoning code and the enforcement of regulations through building permit procedures. He concludes by reviewing the buyout process as a focus of planners in the Midwest.

Tiedemann, Herbert. (1999). *Flood Causes, Effects and Risk Assessment*. Collingdale, PA: DIANE Publishing Company.

Keywords :

risk assessment

Abstract: This book provides a descriptive guide to assessing the risk of the flood peril, particularly focusing on river floods. It is designed to help insurers to evaluate and differentiate risks to be covered. The necessary capability in risk assessment requires an understanding of the phenomena and the essential parameters that lead to flood and that influence damage and losses. This book includes recent significant flood events; methodology of risk assessment; hazard; vulnerability; flood protection; insurance and reinsurance aspects; other causes of flood; rainfall data for selected places; list of major historical floods; and flood related web sites.

Timberg, Craig. (2000). Flood-plagued Virginia town tries upward mobility. *The Washington Post*, December 28.

Keywords :

relocation, Virginia

Abstract: The Army Corps of Engineers and the Virginia Department of Transportation are funding a \$177 million project to relocate the downtown of Grundy, VA, to higher ground. This town in a distressed area of southwestern Virginia has been subject to recurrent destructive flooding from the Levisa River. The project will demolish old buildings and replace them with a four-lane highway doubling as a flood wall. A new downtown will be built across the river where a mountain now stands. Many hope that relocation will signify a new, high-tech beginning for the town, with Virginia Tech's plans for bringing superfast wireless Internet technology to the reconstructed downtown. Opponents of the project think it will harm the town's sense of history and make rents for the new buildings unaffordable.

Tobin, Graham A. (1995). The levee love-affair: A stormy relationship. *Water Resources Bulletin*, 31(3), 359-67.

Keywords :

floodplain management, Midwest floods of 1993, levees

Abstract: A history of flood control in the United States shows an undying affair with levees. This love affair, however, was put to the test by the record flooding in the summer of 1993. About 70 percent of levees in the upper Midwest failed during this time, leading to extensive damage to both farmland and urban areas. Consequently, there were repeated calls to re-assess policies for floodplain management. The report of the Interagency Floodplain Management Review Committee is one outcome of this and it forms the basis of this commentary on levees. In many respects, levees are effective flood control measures, being relatively cheap to implement and easy to build. At the same time, levees have negative impacts, affecting the hydrological regime both up and down stream, and often exacerbating flooding in other places. Furthermore, technical weaknesses in design, planning, construction, and maintenance have all contributed to

failures of levees. While the report recommends changes in floodplain management to address some of these issues, it is difficult to see how these will materialize given the current political, economic, and social climate.

Tobin, Graham A. and Burrell E. Montz. (1988). Catastrophic flooding and the response of the real estate market. *Social Science Journal*, 25(2), 167-77.

Keywords :

California, property values

Abstract: This study examines the impact of flooding on residential property values. It reviews the literature and produces a theoretical conceptualization which is then applied to the analysis of the 1986 flood in Linda and Oliverhurst, in Yuba County, CA. The authors found support for the premise that flood frequency affects the capitalization process. In other words, that the flood is initially capitalized into housing values, but because of the infrequent nature of the hazard, values are expected to rise, although the time for recovery is not certain.

Tobin, Graham A. and Burrell E. Montz. (1990). Response of the real estate market to frequent flooding: The case of Des Plaines, Illinois. *Bulletin of the Illinois Geographical Society*, Fall, 11-21.

Keywords :

Illinois, property values

Abstract: This article investigates two questions: How does the residential real estate market respond to a high probability of flooding? Is there an identifiable pattern that might result in a predictive model of changing floodplain and land values? The authors contend that the more floods experienced the greater is the impact on the housing market. Using data from Des Plaines, IL in the form of flood histories, data on impacts of recent flooding and on longer-term trends in the housing market, the researchers found that flood frequency is a valid spatial variable, demonstrated by variation in the recovery periods of housing prices consistent with variation in the flood frequency in those markets. Thus, the researchers concluded that flood frequency is an important variable to consider in evaluating the impacts of floods.

Tobin, Graham A. and Burrell E. Montz. (1994). The flood hazard and dynamics of the residential land market. *Water Resources Bulletin*, 30, 673-85.

Keywords :

economic modeling , property values

Abstract: Literature on the flood hazard/residential land market relationship is full of contradictory findings, many of which are counterintuitive to the belief that flooding has a negative impact on house prices. This research advances a conceptual framework through which these relationships might be re-examined. Based on the expected utility model, the theoretical framework integrates the economic notion of capitalization with spatial and temporal characteristics of the flood hazard. Four communities with different flood regimes are used to test the effect of flooding on the residential real estate market. Results show that: (a) there is an identifiable relationship between characteristics of the flood hazard and changes in house values; (b) the length of the recovery period is dependent on characteristics and expectations of flooding, attributes of the real estate market, and availability of capital to fuel recovery; and (c) dynamics of the urban market and spatial extent of the flood hazard influence these relationships. Further

research is now necessary to examine these findings under different spatial, temporal, hydrologic, and socioeconomic conditions.

Tobin, Graham A. and Burrell E. Montz. (1997). The impacts of a second catastrophic flood on property values in Linda and Olivehurst, California. Boulder, CO: Natural Hazards Center, University of Colorado.

Available at: <http://www.colorado.edu/hazards/qr/qr95.html>

Keywords :

California, property values

Abstract: The authors assessed the relationship between flooding and property values in Linda and Olivehurst, CA, an area that suffered several floods (with impacts first studied in 1986). Following a theoretical framework developed by Tobin and Newton (1986) the authors found that properties that experienced the first flooding did eventually recover to near pre-flood levels, but the length of time required for recovery varied with depth of flooding (houses with lower flood levels recovered more quickly). Thus, the flood created submarkets that remained identifiable over the long term in part because not all properties in the areas with the greatest flood depths were repaired (the remainders that exist in the communities influence recovery and this perpetuates the submarkets). The 1997 flood further compounded the situation.

Tobin, Graham A. and Thomas G. Newton. (1986). A theoretical framework of flood induced changes in urban land values. *Water Resources Bulletin*, 22(1), 67-71.

Keywords :

property values, urban areas

Abstract: By integrating literature from flood hazard research and urban economics, the authors developed a theoretical structure to explain changes in residential land values following flood events. The negative aspects of the flood hazard are shown to be capitalized in the value of the property. Land values will vary both spatially across the floodplain and temporally depending on the frequency, severity, and spatial characteristics of the flood event. This approach allows for the recovery of the land market value, a novelty at that time. This theoretical approach was applied later in several studies (e.g., Tobin and Montz, 1988).

Toulmin, Llewellyn M., Charles J. Givans, and Deborah L. Steel. (1989). The impact of intergovernmental distance on disaster communications. *International Journal of Mass Emergencies and Disasters*, 7(2), 116-32.

Keywords :

public policy, disaster planning

Abstract: Previous research into disaster communications, while fairly extensive, has been limited primarily to sociological analysis and organizational theory. This body of research, however, has not explored disaster communications in a federal, international, or other multilevel governmental response system. This paper expands upon existing research to present a new theory of intergovernmental disaster communications based on the concept of intergovernmental distance. (Intergovernmental distance refers to distance in terms of differing procedures and approaches used by organizations in different functional areas at various levels of government.) The theory postulates that the organizational distance created by these differences becomes a critical factor that must be addressed during a disaster. The study employs three sets of dimensions. The first uses two subdimensions and examines distances between functional areas

at various levels of government. The second uses three dimensional and considers distances between functional area and central management. The third is multidimensional. It uses a multiple regression equation to analyze intergovernmental distance. The study concludes by addressing the policy implications of the findings, especially the need to overcome inherent intergovernmental distance through disaster planning, the need to recognize the exponential increase in communications problems caused by increases in the number of disaster responders, and the need to determine whether the marginal benefits contributed by each new responder exceed the marginal communications and coordination costs each responder imposes.

Treaster, Joseph B. (2000). Not all water damage is equal in eyes of insurers. *New York Times*, August 15.

Keywords :

insurance, New Jersey, disaster assistance

Abstract: Most people in northern New Jersey whose homes were damaged by flooding had homeowners' insurance, but few had flood insurance because this area was not a high-risk flood area. Whether the damage is covered by homeowners' insurance depends on the insurance companies' determination of what caused the damage—flood, wind, or water. Homeowners cannot count on help from federal disaster assistance because most floods are too small to qualify for such help.

Tripp, James T.B. (1994). Flooding: Who is to blame? *USA Today Magazine*, 123, 30-3.

Keywords :

floodplain management, Midwest floods of 1993, wetlands, agriculture, Mississippi River

Abstract: This article focuses on the proposal to reform policies affecting the Mississippi River's floodplains in the wake of the damage caused by the Midwest floods of 1993. It discusses the impact of the flood on agricultural and urban property owners, the construction of mainstream levees, and the conversion of floodplain wetlands to agriculture. The article concludes that the conversion of floodplain wetlands to agriculture throughout the Mississippi River Basin has been extensive. Eighty percent of the floodplain wetlands of the Lower Mississippi River have been cleared and converted to cropland. Clearing rates in much of the Upper Basin and the Missouri River system have been comparable. It also suggests that the Mississippi River flood control system of dams, levees, and river training works is tremendous, but not sustainable over the long term: "People have gone too far in severing the river and its tributaries from their floodplains. The message from the floods is that the Mississippi River wants to recapture the floodplains that were historically part of the river. It lies in wait for major flood events to do this." The article concludes: "A program of floodplain restoration would go a long way towards creating a much more sustainable, low-cost flood management system in the Mississippi River Basin than exists today." The article also focuses on the economics behind such a floodplain policy. It suggests that the Army Corps of Engineers must reform how it spends federal dollars on flood control works in the basin, while the federal government expands the Wetland Reserve Program created by the 1990 Farm Act in the Mississippi Basin.

Tucker, L. Scott. (1979). *Flood Insurance and Flood Plain Zoning: Water Problems of Urbanizing Areas*. Henniker, NH: New England College.

Keywords :

floodplain management, mapping, risk assessment, zoning

Abstract: A review of the NFIP concludes that sufficient progress is being made that both regulation and insurance should be continued. The regulatory program in developed floodplains has had a limited effect on flooding, erosion control, and water supply; results have been more successful in developing floodplains. Persistent problems with respect to the protection of floodplains include: (a) the lack of awareness of flood problems by residents; (b) lack of adequate data on numbers of people living in floodplains, how many are aware that they live in floodplains, and other questions related to the overcoming of perception-awareness-resistance problems; (c) effectiveness of floodplain regulation; (d) difficulty in the administration of effective local programs in the face of local political problems; and (e) definition of floodplains using existing hydrology when future flows will be greater due to urbanization. Though generally successful, NFIP results were mixed. Ways have not been found to manage risk in the fringe areas where there is no NFIP (some 30 to 50 percent of flood damage may be in these areas). Additional problems needing attention include the slow rate of NFIP mapping, the need for more economics modeling in the analysis of alternatives, the considerable differences between communities and among house types, questions concerning the needed levels of flood risk reduction, and the need for alternative approaches such as seed money to purchase flood-prone properties.

Tyler, Kimberly A. (2000). The effects of an acute stressor on depressive symptoms among older adults. *Research on Aging*, 22(2), 143-65.

Keywords :

Midwest floods of 1993, mental health

Abstract: This study uses longitudinal data to examine the potential moderating effects of social support and age among older adults exposed to an acute stressor. Using a sample of 651 older persons, data were gathered in the spring of 1992 and in the fall of 1993, approximately 60 days after the peak impact of flooding in the Midwest. Results indicate a positive association between pre- and post-flood depression and a negative association between social support and post-flood depression. For the youngest of the two older age groups, there is also a positive association between flood exposure and post-flood depression, controlling for prior levels of depression. Age interactions reveal that social support moderates the effects of flood exposure on depression only for the younger age group.

USA Today. (2000). How your dollars let others live at the beach. *USA Today*, July 27.

Keywords :

beach nourishment, development, coastal areas, repetitive losses

Abstract: This editorial frames the series of articles in *USA Today* on the growth of the population on the Atlantic and Gulf coasts, with the view that federal aid helps drive migration to these areas and taxpayers are left with increasing disaster-relief costs when the weather turns bad. Efforts to reduce subsidies have been met with stiff resistance from lawmakers representing coastal areas. The Clinton administration's effort to eliminate disaster relief for beaches was blocked, and FEMA's effort to get Congress to stop spending money on replacing beaches and dunes was also defeated. FEMA is taking steps to stop rampant abuse of the flood-insurance program. The bill in Congress that would limit property owners to two flood claims has little chance of passing.

US Army Corps of Engineers. (1975). *Guidelines for Identifying Coastal High Hazard Zones*. Galveston, TX: US Army Corps of Engineers.

Keywords :

coastal areas, zoning, mapping, hurricanes

Abstract: These guidelines outline a suggested procedure for identifying areas along the Atlantic and Gulf coasts that are subject to inundation by a hurricane surge and that are subject to significant wave action, for which specific building restrictions and special flood insurance rates are warranted. The experience and analytical methods of the USACE provided impetus for the guidelines. The guidelines were the first to identify the “3-foot breaking wave” as having the capability for damaging buildings, which was later used by the NFIP to distinguish V zones from A zones.

US Army Corps of Engineers. (1994). *Procedures for Evaluating Wetlands Non-market Values and Functions*. Washington, DC: US Army Corps of Engineers.

Keywords :

property values, wetlands, Army Corps of Engineers

Abstract: This technical note provides a framework for evaluating the economic value of wetlands. More precisely, this note provides a guide for determining of the effects of a proposed action on a wetland site. It emphasizes the importance for estimating economic value of establishing the relationship and significance of the wetland’s site economic services within a larger economic context. The note points out that the evaluation of flood control benefits requires estimating flood damages with and without the wetland’s flood control capacity. These benefits can be determined by establishing the relationships between wetland flood storage capacity and flood damages downstream and the cost of providing alternative flood control structures or provisions for flood control.

US Army Corps of Engineers. (1995). *Flood Proofing Regulations*. Washington, DC: US Army Corps of Engineers.

Keywords :

building codes, floodproofing, Army Corps of Engineers

Abstract: This publication supercedes the two previously published editions (1972, 1992) that have been distributed worldwide as an administrative and technical model for code design and enforcement of floodproofing. This version of the report includes the updates made in 1992, which reflected almost 20 years of field experience, research, and advances in engineering and building practices. The 1992 revision made numerous technical and editorial changes to requirements for floodplain management. This publication makes some clarifying changes to the 1992 edition, but retains the format of the original 1972 document. It specifies the floodproofing measures and techniques that can be followed to regulate private and public building construction in riverine and flood hazard areas. It contains implications for changes in existing building and house codes and provides for a diversity of floodproofing methods and techniques.

US Army Corps of Engineers. (1995). *Floodplain Management Assessment of the Upper Mississippi River and Lower Missouri Rivers and Tributaries*. Washington, DC: US Army Corps of Engineers.

Keywords :

floodplain management, Midwest floods of 1993, Mississippi River, Missouri River

Abstract: This report compares impacts and costs of implementing a wide array of alternative policies, programs, and structural measures by assuming they had been in place at the time of the Midwest Floods of 1993. It explores three scenarios of changes in flood insurance, state and local floodplain regulation, flood hazard mitigation and disaster assistance, wetland restoration, and agricultural support policies. The data collected for this report were almost exclusively data that were already available, such as the economic damages from the 1993 flood. The feedback received during coordination of this assessment highlights contrasting views regarding the use of the floodplain. The report does not resolve all of the issues or recommend an overall best plan. Rather, it serves as another tool in understanding the relative impacts of various potential actions.

US Army Corps of Engineers. (1996). *Risk-Based Analysis for Flood Damage Reduction Studies*. (Vol. Manual EM 1110-2-1619). Hyattsville, MD: US Army Corps of Engineers.

Keywords :

cost-benefit analysis, mitigation, Army Corps of Engineers, risk communication

Abstract: Procedures described in this manual lead to the estimation of expected costs and benefits of proposed flood damage reduction measures, a description of the uncertainty in those estimates, and quantitative and qualitative representations of the likelihood and consequences of exceeding capacity of selected measures. The Corps suggests that the careful communication of analysis results will better inform the public about what to expect from projects to reduce flood damage and thus ultimately lead to better decision making.

US Army Corps of Engineers, National Flood Proofing Committee. (1998). *Flood Proofing Performance: Successes & Failures*. Washington, DC: US Army Corps of Engineers.

Keywords :

building codes, floodproofing

Abstract: This report examines how structural floodproofing measures have performed when tested by actual floods. Data were collected from 12 floods throughout the United States by an engineer who reviewed the damage and building performance data on each structure. The report identifies specific floodproofing measures and whether they failed or succeeded. The report noted more failures than successes and offered specific construction lessons in floodproofing structures.

US Congress. (1992). *A Descriptive Analysis of Federal Relief, Insurance, and Loss Reduction Programs for Natural Hazards: Report to the Subcommittee on Policy Research and Insurance of the Committee on Banking, Finance, and Urban Affairs*. Washington, DC: US Government Printing Office.

Keywords :

federal programs, disaster assistance, cost-benefit analysis

Abstract: This report summarizes current federal disaster relief policies, existing and proposed insurance and loss control programs, and briefly discusses their evolution. A major theme in the report is whether the federal programs for dealing with natural disasters are operating in cost-effective manners. Disaster relief policies present relatively straightforward issues for debate, including eligibility for assistance and the parameters of that assistance. Proposed insurance options, by comparison, require the consideration of additional issues, for example, the achievement of actuarial soundness. Actuarial soundness is one measure of the insurance program's cost-effectiveness. Insurance programs must also consider the issue of participation

and whether the availability of disaster relief may serve as a disincentive to some to participate in insurance programs.

US Department of Housing and Urban Development (HUD) and FEMA. (1981). *Evaluation of the Economic, Social and Environmental Effects of Floodplain Regulations*. Washington, DC: HUD and FEMA.

Keywords :

development, floodplain management, hundred-year flood standard

Abstract: This study quantifies the economic, social and environmental effects of regulating the 100-year floodplain. Twenty-three case study communities were selected for analysis according to location, flood hazard type, community size, and economic condition. Effects of floodplain regulations were evaluated by projecting development for 1980 and 1990 under three regulatory scenarios: (a) no regulations, allowing the free market to determine the 100-year floodplain use; (b) moderate regulations similar to those in effect at the time the report was published; and (c) stringent regulations forbidding new development and substantial improvements to existing structures and “correcting” past land-use decisions that interfere with natural functions of the 100-year floodplain. The study concluded that, with no regulation, average annual flood losses increase sharply (29 percent by 1980; 71 percent by 1990). Under moderate regulation, the losses in Scenario I would be decreased by 87 percent in 1980, and by 85 percent in 1990. Regulations that prevent development produce a small, but measurable absolute decline in average annual flood losses (1 percent by 1990). Also, with no regulation, the total number of housing units in the 100-year floodplain would increase 13 percent by 1980 and 35 percent by 1990; population would increase in the 100-year floodplain 12 percent by 1980 and 29 percent by 1990. With moderate regulation, this increase in housing would be reduced by 37 percent in 1980 and by 78 percent by 1990; the increase in population would decrease by 43 percent in 1980 and 41 percent in 1990. With stringent regulation, housing units in the 100-year floodplain would decline 1 percent by 1980 and 6 percent by 1990. Finally, with no regulation there would be a continuing, unlimited conversion of floodplain open land to urban uses, an additional 37 percent rise by 1990. Moderate regulation would reduce this increase to 1 percent by 1990. Stringent regulation would not allow any further development of the floodplain, would begin to remove existing development, and would result in a 2-percent reduction of developed acres.

US General Accounting Office (GAO). (1975). *National Attempts to Reduce Losses from Floods by Planning for and Controlling the Uses of Flood-Prone Lands*. Washington, DC: GAO.

Keywords :

Unified National Program

Abstract: This review was conducted to inform Congress about the effectiveness of a unified national program for reducing losses due to floods, as proposed by a task force established by the President in 1966. The GAO found that there has been little progress toward curtailing disastrous flood losses by planning for and controlling the uses of flood-prone lands. Development of such lands has continued, making the program’ objective more difficult to achieve. The main reasons cited for the lack of progress were: (a) the lack of adequate evaluation of federal agencies; (b) the lack of adequate technical assistance from federal agencies on planning and regulating the use of flood-prone lands; (c) the need for better monitoring and leadership for federal flood control

efforts; and (d) the need for more cooperation between federal, state and local governments to minimize flood losses.

US General Accounting Office (GAO). (1975). *Tulsa, Oklahoma's Participation in the National Flood Insurance Program*. Washington, DC: GAO.

Keywords:

compliance, Oklahoma, NFIP

Abstract: The GAO evaluated the nature and extent of development in Tulsa's Mingo Creek floodplain between February 15, 1972 (when the city adopted floodplain management regulations) and December 15, 1974. This report examines the effectiveness of federal, state, and local monitoring procedures designed to prevent improper development. The GAO identified all loans for acquisition or construction of property in the Mingo Creek floodplain to determine whether mandatory flood insurance was required and had been obtained. The GAO also examined NFIP policies, procedures, and legislative history. The final aspect of the study included interviews with federal, state, and local officials responsible for implementing the program as well as officials at financial institutions and the National Flood Insurers Association Serving Office. The GAO recommended five changes to increase the NFIP's effectiveness: (a) approve legislation that would prohibit federally regulated financial institutions from purchasing mortgages in the secondary market on properties that are required to but do not have flood insurance; (b) require communities to demonstrate adequate procedures for enforcing floodplain management regulations as part of admission into the NFIP; (c) establish a monitoring system to ensure that communities comply with adopted regulations; (d) clarify FIA regulations on communities proposing changes to floodplain levels; and (e) require future development in floodplains to be 1 foot above the 100-year flood level. This report includes FIA's response to each of the recommendations and actions to be taken.

US General Accounting Office (GAO). (1976). *Report to Congress: Formidable Administrative Problems Challenge Achieving National Flood Insurance Program Objectives*. Washington, DC: GAO.

Keywords:

compliance, mandatory purchase, mapping, legislation, NFIP

Abstract: This report examines efforts of the Department of Housing and Urban Development (HUD) to implement the Flood Disaster Protection Act of 1973. The GAO's extensive analysis of the NFIP for this report included: a review of pertinent policies, procedures, studies, and legislative history; interviews with federal, state, and local officials and FIA contractors responsible for implementing the NFIP; and visits to nine communities in five states to review local efforts to implement program requirements. The GAO found that: (a) flood insurance studies and rate maps were not being produced a rate to meet the August 1, 1983 deadline for having all flood-prone communities as part of the regular NFIP; (b) FIA needs to better monitor community efforts to adopt and enforce floodplain management regulations; (c) flood insurance was generally being obtained when any federal financial assistance was required (about 90 percent of mortgage transactions tested); (d) federal policy on secondary market purchases is often inconsistent and needs to be clarified. The report includes responses from HUD, FIA, and other federal agencies impacted by the recommendations in the report.

US General Accounting Office (GAO). (1979). *Report to HUD Secretary: Efforts to Reduce Flood Losses: FIA's Flood Insurance Program*. Washington, DC: GAO.

Keywords:

compliance, mapping, NFIP, hundred-year flood standard

Abstract: This report was conducted to identify problems affecting program administration and the attainment of legislative objectives. The GAO interviewed FIA officials at headquarters and three regional offices. The GAO also meet with state and local floodplain officials and obtained information from federal agencies and several private sector experts. The GAO found that problems identified in earlier studies still existed, including the failure of the mapping program to have all communities mapped by 1983. The report then identifies FIA policies that appear to be contrary to the objective of minimizing future flood damages, such as allowing the replacement of structures in the floodway. The GAO also found that communities required more help in the implementation of the NFIP, particularly technical assistance and that improvements in the monitoring program are needed. The report also recommends that the 100-year floodplain as the single national standard be evaluated. For each of the problems identified the GAO recommended possible changes to the program. In almost all cases FIA agreed to investigate the feasibility of implementing the GAO's recommendations.

US General Accounting Office (GAO). (1980). *Federal Disaster Assistance: What Should the Policy Be?* Washington, DC: GAO.

Keywords :

disaster assistance, federal programs, agriculture

Abstract: This report examines the federal financial role in disaster assistance to determine what it and the relevant guiding principles should be. It discusses the five major disaster assistance programs, which are: the Small Business Administration's disaster loan program, the Farmer Home Administration's emergency loan program, the Disaster Payments Program (Department of Agriculture), the Federal Crop Insurance Program (administered by the Federal Crop Insurance Corporation), and the NFIP. These five program provide three generic types forms of subsidized assistance: loans, grants, and insurance. GAO believes the following general criteria should be recognized in designing disaster assistance programs: (a) minimize incentives for poor locational decisions; (b) likes should be treated alike within programs, across programs, and over time; and (c) no individual or group should be able to improve on their predisaster condition unless it would reduce future government cost.

US General Accounting Office (GAO). (1982). *National Flood Insurance: Marginal Impact on Floodplain Development, Administrative Improvements Needed*. Washington, DC: GAO.

Keywords :

coastal areas, development, coastal barriers

Abstract: Researchers compared the rate of community development and availability of flood insurance in six coastal and barrier island communities as case studies. They looked at ten years of data on the number of new housing units authorized for each community and interviewed 115 people. None of the interviewees said they viewed flood insurance as the principal factor in development but almost all said it aided development since it was a "sweetener" in lessening investment risks. Many of those interviewed said that the availability of flood insurance had affected their community by increasing financial security and by forcing higher construction standards. Both factors were viewed as "enhancing" development. Nothing in the program

effectively discourages new development. With the increasing growth in coastal areas, researchers felt the risk of loss was inevitably growing and concluded that there is no assurance that the structures would safely survive a major storm, so it may be bad public policy to continue to provide coverage in coastal areas. The report also notes that a multitude of factors influences a builder to construct, an individual to occupy a structure, or a businessman to locate in a coastal or barrier island community. These factors include demand for location on highly desirable beach property, viability of local economies and availability of community infrastructure. The report observed that the NFIP offers a “marginal added incentive” to development: “many people believe that development would still take place in most communities without flood insurance but at a slower pace, by more creditworthy individuals, and for less costly and durable structures.”

US General Accounting Office (GAO). (1983). *Approaches for Converting National Flood Insurance Program Communities from the Emergency Phase to the Regular Phase.*

Washington, DC: GAO.

Keywords :

mapping

Abstract: The GAO reports that FEMA will not meet the August 1983 deadline contained in the Flood Insurance Act of 1968 for providing FIRMs for all flood-prone communities. The primary reasons for such a failure are the unexpected magnitude of the undertaking and the nonuse of less costly and time-consuming alternative techniques for producing rate maps. The GAO concluded that Congress should consider and select an optimal approach to complete the mapping project.

US General Accounting Office (GAO). (1983). *Effect of Premium Increases on Achieving the National Flood Insurance Program's Objectives.* Washington, DC: GAO.

Keywords :

insurance premiums, insurance purchase decision

Abstract: In response to a congressional request, GAO reviewed the impact that recent rate increases had on individual and community participation in the NFIP. GAO found that in the first two years after the FEMA raised rates in January 1981, individual participation declined. Participation fell from a peak of about 2,014,500 policies in December 1980 to about 1,860,400 in November 1982. GAO identified several factors in addition to the rate increases that could have contributed to the decline in individual participation. These factors included: (a) the decline in the housing market during the last few years; (b) the smaller number of floods and flood losses experienced in the last few years; and (c) the general economic recession. During this period, six small communities left the program. GAO found that none of the six communities left the program because of the rate increases. Rather, their reasons for leaving the program included the building restrictions imposed by the floodplain management criteria, a belief that there was not a need for flood insurance, and communities' dislike of having the federal government tell them what they could and could not do in their flood-prone areas.

US General Accounting Office (GAO). (1983). *National Flood Insurance: Major Changes Needed if It Is to Operate without a Federal Subsidy.* Washington, DC: GAO.

Keywords :

insurance premiums, subsidies, economic modeling

Abstract: In this report, GAO reported that the NFIP had not collected sufficient premiums to cover the cost of providing the insurance of about 1.9 million policyholders living in flood-prone

areas. To compensate for the inadequate premium income, FIA borrowed \$854 million from the Department of the Treasury between 1970 and 1980. This report says that FEMA had relied on a combination of models and judgment to set the insurance rates, but methodological and data weaknesses in this approach had produced an overly complex rate structure that had not generated sufficient income to cover the costs of providing insurance or build up a reserve. The report notes FEMA's intention to eliminate the federal subsidy by 1988. This report recommended the Congress to consider telling FEMA whether it agreed with the agency's shift toward rate increases or coverage reductions. This report also recommended that FEMA establish a monitoring program to detect any adverse impact that increases in chargeable rates or decreases in coverage may have on the program's objectives.

US General Accounting Office (GAO). (1986). *Flood Insurance: Federal Emergency Management Agency's Basement Coverage Liability*. Washington, DC: GAO.

Keywords:

basements, insurance coverage

Abstract: Effective October 1983, FIA limited insurance coverage for basements in order to reduce the NFIP's future flood claim payments. The limitation was initiated because FIA believed that flooding of basements represents a risk inconsistent with a sound insurance program and that the program should respond only to the basic needs of its policyholders. This report was written in response to congressional requests about: (a) FIA's authority to make such a policy change; (b) the procedure used to justify the policy; (c) the legality of the notification process; and (d) why other alternatives were rejected. GAO found that FEMA had authority to decide what should be insured, the nature and limits of loss or damage, the classification of risks by type, and risk limitations and rejections. After reviewing the analysis used to make the decision about limiting basement coverage, the GAO found that two of the three reports used did not mention basement flooding and while the examination of claim data may not have overstated loss claims due to basement coverage, FIA should have used more complete methods, including a survey of closed claims. GAO then examined the notification of policyholders about the new limitations placed on basement coverage, finding that federal courts had ruled the procedure was legally adequate. This report also presents information about why FIA did not select the other five alternatives for modifying basement coverage.

US General Accounting Office (GAO). (1987). *Flood Insurance: Information on the Mandatory Purchase Requirement*. Washington, DC: GAO.

Keywords:

compliance, lending institutions, mandatory purchase, Maine, Texas

Abstract: Pursuant to a congressional request, GAO reviewed property owners' and lenders' compliance with the mandatory flood insurance provisions of the Flood Disaster Protection Act of 1973. In compiling this report, the GAO conducted an extensive review of legislation and regulations pertaining to the mandatory purchase requirement, including information provided to lending institutions to guide them in the process. The GAO also conducted interviews with officials from FEMA, lending institutions, and regulatory agencies. The GAO found that: (a) samples of properties for which flood insurance was required in Maine and, about 22 percent and 79 percent, respectively, were not covered; (b) the Federal Deposit Insurance Corporation reported that, in 95 percent of the cases it examined in the last three years, the properties were covered by the required flood insurance; (c) of the lenders the Federal Reserve System examined

for compliance in 1988, 83 percent had no violations of flood insurance regulations; (d) many homeowners in SFHAs find flood insurance premiums too expensive and allow their policies to lapse; (e) lenders reported that FIRMs were difficult to read, not always accurate, and expensive to maintain; and (f) the FIA took such actions as publishing guidance, sponsoring conferences, and collecting and reporting compliance information to improve compliance with the provision.

US General Accounting Office (GAO). (1987). *Flood Insurance: Private Companies' Participation in the Write Your Own Program*. Washington, DC: GAO.

Keywords:

Write Your Own programs, insurance industry

Abstract: In response to a congressional request, GAO reviewed the status of the Write Your Own (WYO) program. Through interviews with officials at FIA, FEMA's Office of Inspector General, Computer Sciences Corporation (the contractor that manages the WYO companies), and WYO companies as well as a review of legislative history and program files, the GAO determined: (a) as of September 1986, there were over 1 million WYO policies, about half of all NFIP policies; (b) The relationship between allowances retained from policy premiums for administrative costs and benefits to the federal government is uncertain. FIA does not require the companies to keep records of their actual costs to implement the program, but most indicated that they incurred administrative expenses for various activities, including marketing; and (c) FIA is still in the process of implementing statistical reporting requirements, on-site reviews, and audits to ensure that WYO companies sell and service policies in accordance with program requirements. GAO found that FIA's monitoring indicates that most companies have satisfactorily implemented the program. WYO companies expressed concern about the WYO program. WYO companies did not want to compete with the FIA's direct sales program, they also felt that FIA did not provide enough advance notice on insurance premium changes and that they would need to increase insurance rates in order to meet the program's long-range goal of having them share claims costs.

US General Accounting Office (GAO). (1988). *Flood Insurance: Statistics on the National Flood Insurance Program*. Washington, DC: GAO.

Keywords:

coastal areas, NFIP, liability, repetitive losses

Abstract: The GAO compiled this fact sheet in response to a request for more information about the federal government's role in protecting coastal resources and the exposure of the government to undesired levels of liability. The statistics were produced by GAO using information provided by FEMA, the numbers were not independently verified. The statistics presented fall into six categories: (a) NFIP's annual operating income/deficit; (b) number of policies in coastal areas and Great Lakes' states; (c) total and repetitive losses; (d) flood-damaged property purchases by FEMA; (e) damages in excess of the maximum flood insurance available; and (f) the annual average premiums and losses on policies for property in coastal high-hazard areas. In 1987 the NFIP had about 2.1 million policies in place, worth about \$162 billion. In the period from 1978 to 1987 the NFIP had a cumulative net operating deficit of about \$652 million, with losses totaling about \$2.4 billion.

US General Accounting Office (GAO). (1991). *Federal, State, and Local Responses to Natural Disasters Need Improvement*. Washington, DC: GAO.

Keywords :

Hurricane Hugo, disaster planning

Abstract: This report examines how FEMA and other federal agencies responded to California's Loma Prieta earthquake and to Hurricane Hugo, which struck the US Virgin Islands, Puerto Rico, and the Carolinas. The report contends that "preparedness is the most critical aspect of emergency management because it affects states' ability to respond to disaster....Preparedness problems were linked to weaknesses in state and local programs, as well as in FEMA's assistance and overall guidance. These problems included inadequate planning had training for recovery, low participation by elected officials in training and exercises, inadequate or no standard operating procedures for response and recovery activities, failure to correct problems identified during earlier training expresses, a limited number of staff having the necessary disaster assistance skills, and inadequate coordination between several federal agencies."

US General Accounting Office (GAO). (1992). *Coastal Barriers: Development Occurring Despite Prohibitions against Federal Assistance*. Washington, DC: GAO.

Keywords :

Coastal Barrier Resource System, development., compliance, legislation

Abstract: The GAO says that while the Coastal Barrier Resources Act (CBRA) of 1982 and its successor, the Coastal Barrier Improvement Act of 1990 had effectively discouraged development in some areas, a few had undergone significant new development and more was planned. The report notes that one part of the problem was lax compliance, noting that the NFIP did not have controls in place to assure that private insurers under the "Write Your Own" program were complying. Based on sampling in five units, the GAO projected that the NFIP had written coverage for 9 percent of the homeowners in CBRA.

US General Accounting Office (GAO). (1993). *Disaster Management: Improving the Nation's Response to Catastrophic Disasters*. Washington, DC: GAO.

Keywords :

Hurricane Andrew, Hurricane Iniki, Hurricane Hugo, Florida, Hawaii, federal programs natural disasters

Abstract: The nation's management of disasters was strongly criticized after Hurricane Andrew leveled much of South Florida and Hurricane Iniki devastated Kauai in 1992. Even before these storms, the federal government's response to major disasters like Hurricane Hugo and the Loma Prieta earthquake drew intense criticism. The "GAO has testified repeatedly in 1993 on the inadequacy of the federal strategy for responding to disasters. This report summarizes GAO's analyses, conclusions, and recommendations."

US General Accounting Office (GAO). (1994). *Federal Disaster Insurance: Goals are Good, but Insurance Programs Would Expose the Federal Government to Large Potential Losses. Testimony before Senate Committee on Commerce, Science, and Transportation*. Washington, DC: GAO.

Keywords :

liability, insurance

Abstract: This testimony reports some major concerns of the GAO about the design and structure of a proposed reinsurance program. While some of the concerns involve technical details, such as the definition of losses, others arise from incentives created by the bill that could

lead some insurers to engage in inappropriate business practices. GAO's greatest concern, however, is the way losses are to be shared between the federal reinsurance fund established by the bill and the insurance industry. The basis for determining when the fund becomes liable for payment of disaster losses could be subject to insurers' manipulation that could result in substantial increases in the fund's liability.

US General Accounting Office (GAO). (1994). *Flood Insurance: Financial Resources May Not be Sufficient to Meet Future Expected Losses*. Washington, DC: GAO.

Keywords :

subsidies, insurance premiums, liability, NFIP

Abstract: This report addresses the actuarial soundness of the NFIP. The GAO found that it is intentionally not actuarially sound because the Congress authorized subsidized insurance rates to be made available for policies covering certain structures, and, as of 1993, about 41 percent of policies were subsidized. With respect to the potential financial impacts of increasing subsidized flood insurance rates and enhancing program participation, both were determined to be potentially harmful. Increasing premiums would encourage policyholders to cancel their insurance and seek assistance through other federal disaster relief programs. However, encouraging participation in the flood insurance program would increase the amount of subsidized insurance rates, thereby worsening the NFIP's financial condition. Finally, the GAO describes the procedures used to set the program's insurance rates.

US General Accounting Office (GAO). (1995). *Disaster Assistance: Information on Expenditures and Proposals to Improve Effectiveness and Reduce Future Costs. Testimony before Senate Subcommittee on Veterans' Affairs, Housing and Urban Development, and Independent Agencies, Committee on Appropriations*. Washington, DC: GAO.

Keywords :

disaster assistance

Abstract: The report discusses ways to enhance the effectiveness of a number of federal disaster assistance programs, identifies proposals to lower future federal costs, and addresses the accuracy of financial information in FEMA's Disaster Relief Fund. There were three main conclusions. First, there are ways to improve federal disaster assistance programs, including greater flexibility on FEMA's part in providing grant funding, enabling military reserve components to provide disaster assistance, and clarifying the conditions under which FEMA would pay more than the replacement cost to restore certain structures. Second, proposals have been made to modify and lower the costs of federal disaster assistance, including more explicit and/or stringent criteria for disaster assistance, emphasizing hazard mitigation through incentives, and relying more on insurance. Third, problems exist with FEMA's current accounting systems, such as field office systems that are neither integrated nor linked to FEMA's central accounting system.

US General Accounting Office (GAO). (1995). *Midwest Flood: Information on the Performance, Effects, and Control of Levees*. Washington, DC: GAO.

Keywords :

Midwest floods of 1993, Army Corps of Engineers, levees

Abstract: In response to the Midwest floods of 1993 in nine states, the GAO was asked to examine the operation of levees. This report addresses the extent to which: (a) the Army Corps

of Engineers' flood control levees prevented flooding and reduced damage during the event; (b) the federal levees increased the height of the flooding and added to the damage; and (c) federal, state, and local governments exercise control over the design, construction, placement, and maintenance of nonfederal levees. The GAO found that most Corps' levees prevented flooding and reduced damage, levees increased flood levels but are one of many factors affecting the extent of flooding, and that federal, state, and local governments exercise some control over nonfederal levees.

US General Accounting Office (GAO). (1996). *Disaster Assistance: Improvements Needed in Determining Eligibility for Public Assistance. Report to the Chairman, Senate Subcommittee on VA, HUD and Independent Agencies, Committee on Appropriations.* Washington, DC: GAO.

Keywords :

public assistance

Abstract: The GAO was asked to review FEMA's criteria for determining eligibility for public assistance; determine how FEMA ensures that public assistance funds are expended only for eligible items, and identify changes in eligibility that could lower the costs of public assistance in the future. The GAO reports that FEMA's criteria for determining public assistance are ambiguous, and that FEMA has systematically updated or disseminated to regional officials its policy changes affecting eligibility. FEMA relies principally on states to ensure that expenditures are limited to eligible items. Program officials in FEMA's ten regional offices identified a variety of options that, if implemented, could reduce the cost of the public assistance program, including placing limits on the appeals process, eliminating eligibility for some facilities that generate revenue, lack required insurance, or are not delivering government services, and limiting the impact of codes and standards.

US General Accounting Office (GAO). (1998). *Disaster Assistance: Information on Federal Disaster Mitigation Efforts. Testimony before the House of Representatives Subcommittee on Water Resources and Environment, Committee on Transportation and Infrastructure.* Washington, DC: GAO.

Keywords :

enforcement, mitigation, risk assessment

Abstract: This testimony briefly discusses why state and local governments and individuals do not always undertake disaster mitigation efforts. Reasons include local sensitivity to measures such as building codes enforcement and land-use planning, conflict between mitigation and developmental goals, and individuals' perceptions that a disaster has a low possibility of occurring. FEMA's efforts to encourage mitigation include grants and training for state and local governments, funding for mitigating damage to public facilities and purchasing and converting flood-prone properties to open space, federal flood insurance, and programs targeted at reducing the loss of life and property from earthquakes and fires. The effort for ensuring the cost-effective use of federal dollars for hazard mitigation is hampered by the need for better data to estimate risks and by the fact that funds for hazard mitigation are provided through a number of different programs and agencies—some limited to particular hazards. However, savings from such programs depends upon the incidence of future disasters and the extent to which the federal government would bear the resulting losses.

US General Accounting Office (GAO). (1999). *Disaster assistance: FEMA Can Improve its Cost-Effectiveness Determination for Mitigation Grants. Testimony before the House of Representatives Subcommittee on Oversight, Investigations, and Emergency Management, Committee on Transportation and Infrastructure. Washington, DC: GAO.*

Keywords :

cost-benefit analysis, mitigation, Hazard Mitigation Grant Program

Abstract: The statement describes the approaches FEMA and the states use to ensure that the Hazard Mitigation Grant Program's awards are targeted to cost-effective mitigation projects. It presents the GAO's findings as to whether the approaches ensure that the mitigation measures are cost-effective. The GAO found that not all the states conducted cost-benefit analyses to determine projects' cost-effectiveness. Although FEMA does use cost-benefit analysis as its primary approach for ensuring cost-effectiveness, it also exempts certain types of projects from this analysis because of difficulties in quantifying their benefits and the time needed to gather data for conducting the analyses. The GAO determined that the hazard mitigation projects receiving the majority of the funding are cost effective. However, projects receiving one-third of the funding were exempt from cost-benefit analysis, despite the absence of established analytical basis supporting the exemption of the majority of these projects.

US General Accounting Office (GAO). (1999). *Disaster Assistance: Opportunities to Improve Cost-effectiveness Determinations for Mitigation Grants. Washington, DC: GAO.*

Keywords :

Hazard Mitigation Grant Program, mitigation, cost-benefit analysis

Abstract: The GAO reviewed how FEMA, together with individual states, ensures the cost-effectiveness of projects under the mitigation grant program. GAO found that the states and FEMA work together to help ensure that program grants are awarded for cost-effective projects. The states in GAO's review established procedures and priorities for identifying and selecting mitigation projects, but not all states did a formal analysis of a project's cost-effectiveness before submitting an application for the project to FEMA.

US General Accounting Office (GAO). (1999). *Flood Insurance: Information on Financial Aspects of the National Flood Insurance Program. Testimony before the House of Representatives Subcommittee on Housing and Community Opportunity, Committee on Banking and Financial Services. Washington, DC: GAO.*

Keywords :

insurance premiums, subsidies, liability, NFIP

Abstract: The statement provides information on three main areas related to the financial condition of the NFIP. First, GAO reports that the NFIP has experienced losses from floods that were greater than the premiums collected from policyholders and that cumulative operating losses totaled about \$1.56 billion during the six-year (1993-98) period. Second, two major factors contributed to these financial difficulties: the program is not actuarially sound because it does not collect sufficient premium income to build reserves to meet the long-term future expected flood losses, and the cost of multiple-loss properties to the program is large. Third, the FIA has studies under way to assess the economic impact of eliminating subsidized flood insurance rates for policies covering certain structures, and it has taken other actions recently (i.e., mitigation strategies to reduce or prevent future losses due to floods) that may affect the program's financial health.

US General Accounting Office (GAO). (1999). *Tennessee Valley Authority: Future Study of Lake Levels Should Involve Public and Consider Costs and Benefits*. Washington, DC: GAO.

Keywords :

cost-benefit analysis, Tennessee Valley Authority, dams, strategic planning

Abstract: The Tennessee Valley Authority (TVA), a government corporation, has harnessed the Tennessee River and its tributaries to serve various purposes from recreation to flood control to hydroelectric power production. Thirteen of TVA's projects along the river, known as multipurpose tributary projects, consist of dams and lakes on the river's tributaries, such as the Douglas and Cherokee projects and provide multiple public benefits. In operating its integrated system TVA often finds that the multiple purposes served by the project can conflict and/or compete with each other. This report discusses: (a) the purposes served by TVA's multipurpose tributary projects and how TVA operates them within its integrated system; (b) the operational changes TVA made to these projects as a result of its December 1990 review of its project operations and the major factors influencing these changes; (c) the steps TVA has taken since 1990 to address requests for changes in the way it operates these projects; and (d) TVA's plans for future changes in the way it operates these projects.

US General Accounting Office (GAO). (2000). *Issues Related to the Development of FEMA's Insurance Requirements*. Washington, DC: GAO.

Keywords :

insurance

Abstract: This report describes the evaluation results of FEMA's efforts to develop draft insurance regulations. The major findings are as follows: (a) FEMA took a number of steps to obtain and incorporate input on the content of its draft and, based on this input, made changes to its draft regulation; (b) FEMA failed to comply fully with Executive Order 12866 because it had not performed an analysis of the expected costs and benefits of the draft regulation and had not prepared a comprehensive analysis of other alternatives; (c) many of the problems observed were related to processes FEMA followed in developing draft regulations. The processes appeared to be the result of weaknesses in FEMA's internal rulemaking processes and procedures. For example, FEMA had not designated a regulatory policy officer, and its internal guidance and procedures governing the formulation of proposed rulemaking had not been updated in more than ten years.

US General Accounting Office (GAO). (2001). *Flood Insurance: Emerging Opportunity to Better Measure Certain Results of the National Flood Insurance Program. Testimony Before the Senate Subcommittee on Veterans' Affairs, Housing and Urban Development, and Independent Agencies, Committee on Appropriations*. Washington, DC: GAO.

Keywords:

compliance

Abstract: Ms. Jay Etta Hecker, Director of GAO Physical Infrastructure Issues, reports that while FEMA does have several performance goals used to evaluate the NFIP's effectiveness, the agency does not assess participation rates of residents living in flood-prone areas. By collecting data on the number of insured and uninsured structures in flood-prone areas, FEMA could assess how effectively the program is penetrating areas at risk of flood damage and better target marketing efforts. However, Ms. Hecker points out, "before participation rates can be used to

measure the success of the NFIP, better data are needed on the total number of structures in flood-prone areas.” Currently, data on the number of structures are incomplete and inaccurate. She notes that FEMA is working to improve the quality of these data.

US Senate Bipartisan Task Force on Funding Disaster Relief. (1995). *Federal Disaster Assistance: Report of the Senate Task Force on Funding Disaster Relief*. Washington, DC: 104th Congress.

Keywords :

disaster assistance

Abstract: This report concludes that Congress needs to improve financial preparedness for catastrophic events. It notes that Congress provided \$3 billion to cover unmet costs in the NFIP, excluding money spent to repair or rebuild damaged federal facilities. The report contains information on federal disaster assistance programs and funding; assistance from state and local funding and private insurance; the effectiveness of federal programs; and proposals to modify federal disaster assistance; and options for modifying the budget process.

US Senate, Committee on Banking and Currency. (1966). *Insurance and Other Programs for Financial Assistance to Flood Victims*. Washington, DC: US Government Printing Office.

NOTE: This report reproduces “A Report from the Secretary of the Department of Housing and Urban Development to the President, as required by the Southeast Hurricane Disaster Relief Act of 1965 (Public Law 89-339), 89th Congress, H.R. 11539, November 8, 1965.

Keywords :

history , insurance, legislation, NFIP, public policy

Abstract: In response to a directive of the Hurricane Disaster Relief Act of 1965, a report was compiled to address the need to provide flood insurance or other assistance following floods and other natural disasters. The report describes specific characteristics of floods that require consideration for any proposed program. The report finds that floods are identifiable by specified local areas but unpredictable in terms of timing and magnitude and ultimately inevitable. Any potential flood insurance program should consist of basic elements including accurate assessment of risks, compensation of risk bearers, subsidy of premiums, if publicly desirable, incentives to policyholders to reduce risks, incentives to states and local governments for wise management of flood-prone areas, and continuous appraisals. The four program administrative options included a wholly private system (“unlikely based on past experience”), private industry program with major federal help (“most likely alternative, if mutually satisfactory terms can be agreed upon”); private industry operating government program (“raises questions of public policy”), and all federal program (“would require relatively large federal administrative staff”). The final recommendations of the committee included the establishment of a NFIP with “government assistance or participation to the extent necessary to assure a workable method of pooling risks, minimizing costs and distributing burdens equally among the property-owners protected by such insurance and the general taxpayers” in cooperation with state, local and private industry. It was recommended that the existing federal flood program be modified to meet the necessary elements reviewed in the report. Controls in assistance for uninsured residents of a flood disaster were noted, with the recommendation for further study.

Ullmann, Owen. (2000). Facing mother nature's fury: Despite danger and potential cost, people "build castles in the sand." *USA Today*, July 24.

Keywords :

coastal areas, erosion, property values, development

Abstract: The population of coastal counties (41 million) has outpaced total US population growth by 15 percent, according to *USA Today*. As developers fill in wetlands, more structures are becoming vulnerable to storm surges. A FEMA report estimates losses at nearly \$1 billion a year from damage due to erosion and rising sea levels. Disaster experts predict that property damage in coastal areas could soar from an average of \$5 billion a year during the 1990s to \$50 billion a year by 2030, with the taxpayers paying most of the cost. Deductibles for private insurance coverage are also higher. More hurricanes are expected. Other threats include a rising sea level, beach erosion, inland flooding, and evacuation gridlock.

Ullmann, Owen. (2000). Growth pressure keeps building. *USA Today*, July 27.

Keywords :

coastal barriers, development, South Carolina, coastal areas

Abstract: Developers in Folly Beach, SC, won the right to build more houses on this fragile barrier island. Efforts by city and state officials to limit growth led to a series of legal battles with property owners, who are encouraged to build by taxpayer-financed disaster aid and beach replacement efforts. In one court ruling, the city lost a battle to halt development of the island's northeastern tip. Residents want to build seawalls and have the Army Corps of Engineers build groins, which environmentalists say could harm a nearby pelican preserve.

Ullmann, Owen. (2000). High-risk life, high expense to taxpayers federal disaster aid makes it feasible to build in harm's way. *USA Today*, July 24.

Keywords :

Coastal Barrier Resource System, development, mitigation, coastal areas

Abstract: Federal disaster programs inadvertently encourage people to build in high-risk coastal areas, and taxpayers pay most of the cost (\$5 billion a year). FEMA has tried to block federal spending, but Congress has been reluctant to make reforms. Congress also rejected FEMA's request for more funds for a project that requires property owners to elevate properties to make them less flood-prone. One proposal would allow no more than two claims (repeat claims account for 36 percent of all payments), and others would bar insurance for vacation homes and rental properties. Environmentalists want to ban people from building close to the shore, but the US Supreme Court ruled that states must compensate owners by paying the market value of their land if they ban development on private property. The Coastal Barrier Resources Act of 1982 was designed to discourage development on sections of barrier islands, but it spurred development in other coastal locations, creating expensive communities.

Ullmann, Owen, Paul Overberg, and Rick Hampson. (2000). Growth reshapes coasts: A wave of development overwhelms the shore. *USA Today*, July 21.

Keywords :

development, Massachusetts, South Carolina

Abstract: *USA Today* examined development in 1,000 counties along the Gulf and East coasts and found them growing significantly faster than the rest of the country in population, employment, and gross domestic product. One in seven Americans live along the East and Gulf

coasts, and beach economies are growing fast as jobs, businesses, and services follow this migration. Urban planners say that growth along these coasts will continue for 10 to 20 years, fed by demographic, economic, and social trends, such as the aging of the baby boomers with financial resources to fulfill their retirement dreams, telecommuting opportunities, improved transportation, and the quest for a better lifestyle. The article discusses the changing character of Cape Cod, MA, and Beaufort County, SC, with some attendant problems such as lack of affordable housing, water pollution, and strains on local government.

Van Putten, Mark. (1997). Seeking solutions to the floods of tears. *National Wildlife*, 35(August/September), 5.

Keywords :

buyouts, development

Abstract: The author contends that encouraging development and rebuilding in areas with a high risk of future disaster fosters long-term reliance on government. The author proposes buyout programs to transform flood-prone neighborhoods into open space. The author argues that buyouts can shift people to higher ground, are fiscally responsible, and produce real environmental benefits.

Van Putten, Mark. (1999). Higher ground. *Bioscience*, 49(10), 759.

Keywords :

floodplain management, wetlands

Abstract: This article presents the author's opinion regarding floodplain management in the United States. He discusses the impact of more intense and numerous hurricanes on the environment of floodplains, the effect floodplain loss has on wildlife, and the efforts of the US Emergency Wetland Reserve Program to preserve these areas.

Vermont Agency of Natural Resources. (1999). *Options for State Flood Control Policies and a Flood Control Program*. Waterbury, VT: Vermont General Assembly, Vermont Agency of Natural Resources, Vermont Department of Environmental Conservation, and Vermont Water Quality Division.

Keywords :

flood control, Vermont, floodplain management

Abstract: This report focuses on how Vermont should prepare for floods, prevent flood damage, and clean up after the flooding is over. NFIP has worked well in the state as little flood damage has occurred to structures built under this program. The shortcomings of this program are that it is not in effect in all Vermont towns and, where it is in effect, it does not cover all flood-prone areas. The program does well with mapping flood-prone areas adjacent to larger rivers and streams, but it does not sufficiently account for flooding in smaller tributaries and flooding that results in the formation of ice jams or debris jams. This report suggests a more aggressive application of the FEMA's 1995 mitigation policy that provides federal funding for building more expensive, but properly designed, replacements for inadequate structures (undersized culverts, etc.) lost or damaged during floods.

Vlachos, Evan. (1995). Socio-economic Impacts and Consequences of Extreme Floods. Paper presented at the US-Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods, Perugia, Italy, November 13-17, 1995.

Keywords :

development, socioeconomic impacts

Abstract: The author argues that population, expansion, rapid urbanization, the increasing occupation of floodplains, and competing and conflicting developmental demands have exacerbated the impacts of floods on society and the environment. He contends that floods as a sociological phenomenon extend beyond hydrological conditions. The author argues that there is a need for more integrated, anticipatory and far-reaching water policies and strategies.

Wahl, Richard W. (1994). The Mississippi flood. *Environment*, 36(5), 2-4.

Keywords :

floodplain management

Abstract: The author comments on the “The Challenge of the Mississippi Flood,” by Myers and White (1993) in *Environment*. He contends that unless the incentives that have been associated with floodplain management and assistance are modified, the US public is doomed to revisit expensive relief efforts as often as disasters occur. The author points out that implicit in much of Myers and White’s article is that, although federal objectives should be different (more focus on nonstructural measures and restoration of wildlife habitat), federal expenditures should play a prominent role. The author contends that if incentives are properly structured, however, many of these programs would not be federally funded at all. The author claims that “most of the structures and lands affected by last summer's floods are privately owned, and private insurance should be priced to cover the appropriate level of risk. Forcing the adoption of private insurance would likely spawn entirely new creative approaches to reducing risks.”

Warrick, Joby. (1999). Seeking an end to a flood of claims. *National Wildlife*, 37(4), 30-4.

Keywords :

buyouts, repetitive losses, environmental restoration

Abstract: The author reports that some communities in the United States are opting to move homeowners to higher ground, after years of repeatedly rebuilding houses. He identifies US states and territories with repetitive flood-damage claims, and discusses criticisms against the NFIP. The author draws on a study performed by the National Wildlife Federation (*Higher Ground*) to contend that restoring floodplains to their natural function helps limit the damage from future floods, while protecting water quality and creating prime space for recreation and wildlife. The author complains that “old habits are dying slowly,” but argues that things are changing: “last summer, the Army Corps of Engineers broke with decades of flood-fighting tradition by announcing plans to promote buyouts and wetlands restoration.”

Wachtendorf, Tricia. (2000). When disasters defy borders: What we can learn from the Red River flood about transnational disasters. *Australian Journal of Emergency Management*, 15(3) 36-41.

Keywords :

Minnesota, North Dakota, Manitoba, Canada, Red River, federal programs, public policy

Abstract: The 1997 Red River Basin flood resulted in catastrophic damages to residential, commercial, industrial, agricultural, and public properties in large portions of the basin in Minnesota, North Dakota, and Manitoba. This article examines the interaction between American and Canadian organizations during and after the flood. The author conducted in-depth interviews with 62 key government officials and non-governmental representatives from

principle organizations on both sides of the border and attended several flood-related public meetings in Manitoba and North Dakota. Selected recommendations (among several others) for transnational interaction in the Red River Basin include: (1) organizations in each country must be able to maintain the ability to make decisions and take responsibility for actions taken within their own jurisdictions; (2) organizations should be given support and encouraged to integrate new technologies into their cross-border emergency communications procedures and trained to maximize the benefits of these resources; and (3) private and public sector organizations should discuss ways their skills might be transferable across the border in an emergency situation and seek opportunities where mutual aid is beneficial and appropriate.

West, Carol T. and David G. Lenze. (1994). Modeling the regional impact of natural disaster and recovery: A general framework and an application to Hurricane Andrew. *International Regional Science Review*, 17(2), 121-50.

Keywords :

economic impacts, Florida, Hurricane Andrew, economic modeling,

Abstract: Two common features of natural disasters are intense regional impact and the call immediately after the event to estimate the economic impact of recovery and reconstruction. The broad purpose of this paper is to help fill the gap in the regional science literature that addresses this issue. Initially, the impact estimation problem is presented conceptually. Using a general regional model, direct disaster impacts on exogenous variables, endogenous variables, and model linkages are identified. The conceptual problem is adapted for practical application. This translation has two aspects: (a) modifying the direct impacts for a specific model (common variants from the schematic are considered) and (b) estimating those impacts from available data. One component of the latter identifies primary sources of information typically available at the time of a natural disaster and indicates how secondary data may be used to complement, cross-check, and expand those data. A second component identifies areas of no information or high uncertainty and discusses treatment of that information gap in empirical analysis. A final section applies the research to the problem of estimating the impact of Hurricane Andrew on Florida's economy.

Whipple, William J. (1969). Optimizing investment in flood control and floodplain zoning. *Water Resources Research*, 5(4), 761-6.

Keywords :

structural approaches, zoning

Abstract: This article compares floodplain zoning against structural flood control. The author observe that optimization of investment between these alternatives requires consideration of project-induced development (economic development that would not occur if the project were not built) and site income (the return to the owner of new construction in the floodplain net of the cost of development). The author claims that previously existing methods that do not account for damages to project-induced growth may give unduly high cost-benefit ratios. The author expects that a combination of flood control and zoning will be most productive.

White, Gilbert F. (1994). Decision or procrastination in floodplain management. *Water Resources Update*, 97(Autumn) 52-5.

Keywords :

federal programs, Midwest floods of 1993

Abstract: In order to avoid a repetition of the Midwest floods of 1993 or in other regions of the nation, we will have to act positively on at least five major issues. First, the operating policies of federal agencies must be coordinated with each other and with the integrating role on the ground of appropriate state agencies. Second, the present policies of providing federal disaster relief will need to be revised to emphasize mitigation. Third, government and private insurance against flood losses must be offered in a more coherent fashion. Fourth, the prosecution of federal and cooperative programs for management of the floodplains and watersheds must be planned upon the basis of integrated criteria and studies that take account of the natural values of wetlands and floodplains. And last, we need a more discerning and continuing executive and legislative audit of how well policy directives are translated into action.

White, Gilbert F. (1999) Water Science and Technology: Some Lessons from the 20th Century. *Abel Wolman Memorial Lecture*. Washington, DC: National Academy of Sciences and National Research Council.

Keywords :

Hurricane Fran, public policy

Abstract: The author presents criteria that he believes would, if applied, lead to the selection of high-priority goals for achieving wise management of water resources. He states that the science and technology community needs to address systematically, and with increasing intensity, at least four deficiencies in water and related environmental management. First, there is a need to fully recognize the complex social aims that are inherent in managing any one resource or combination of resources. While public policy is slowly coming to take account of the many social and environmental relationships, it still largely ignores some of them, particularly at the intersection of social and environmental systems. Second, the criteria used to evaluate those relationships are frequently narrow, and while measures such as flood damage reduction of the magnitude of communicable diseases are used, they do not reflect other important costs and benefits needed to guide public policy. Third, notwithstanding continued interest in comprehensive river basin planning and watershed studies, there still is no widely accepted national framework for planning and carrying out such studies in suitably delimited areas with responsible participation by representatives of a full range of concerned stakeholders, including citizens and local, state, and national agencies. Fourth, even after a century of vigorous and promising activity in the study and management of human interactions with water and other elements of the environment, the United States still lacks a program to appraise the results of such efforts rigorously in the lives of people and ecosystems. Severe problems of social organization and process stand in the way of achieving such improvements in each segment of water management. In each there is need for imaginative research to extend the limiting conditions of both organization and knowledge. The time is ripe for a unified effort.

White, Gilbert F. and E.J. Haas. (1975). *Assessment of Research on Natural Hazards*. Cambridge, Massachusetts: MIT Press.

Keywords :

natural hazards, risk assessment

Abstract: This book focuses on natural hazards. It summarizes research on natural disasters in the United States, discusses future disasters, the nation's response to extreme geophysical events, acceptable levels of risk, adjustment choices, possible improvements, application of research,

methods of estimating research results, common adjustment research themes, new research strategies, and last, hazards and their distinctive opportunities.

White House Office on Environmental Policy. (1993). *Protecting America's Wetlands: A Fair, Flexible, and Effective Approach*. Washington, DC: White House Office on Environmental Policy.

Keywords :

wetlands, environmental protection, environmental restoration

Abstract: The policy positions contained in this paper strongly support the effective protection and restoration of the nation's wetlands, while advocating much-needed reforms to increase the fairness and flexibility of federal regulatory programs. Five principles for federal wetlands policy were proposed: (a) the Clinton administration supports the interim goal of no overall net loss of the nation's remaining wetlands and the long-term goal of increasing the quality and quantity of the Nation's wetlands resource base; (b) regulatory programs must be fair, flexible, and predictable and must be administered in a way that avoids unnecessary impacts on private property and the regulated public; (c) non-regulatory programs must be encouraged; (d) the federal government should expand partnerships with state, tribal, and local governments, the private sector, and individual citizens and approach wetlands protection and restoration in an ecosystem/watershed context; and (e) federal policy on wetlands should be based on the best scientific information available.

White, W.R., ed. (1990). *International Conference on River Flood Hydraulics*. Wallingford, Oxon, UK: Hydraulics Research Limited.

Keywords :

hydrology, modeling, riverine areas

Abstract: This book documents the proceedings of the International Conference on River Flood Hydraulics in Wallingford, England. The purpose of the conference was to promulgate new ideas and to bring together international experts in the field. The aim of the conference was to link current experimental and analytical research to the needs of engineering practice. The topics selected for the conference covered areas of international research interest and practical importance with a view to providing a forum for advancing the art of river engineering. The major topics covered by the conference were: (a) flood analysis and prediction; (b) field data; (c) hydraulics of flood flows; (d) sediment transport and morphological effects; (e) physical and numerical modeling; and (f) engineering design, maintenance, and operation of schemes.

Wild, Richard A. (1989). *Disseminating flood hazard information at the local level: An approach for the 1990s*. In *Floodplain Harmony*. Boulder, CO: Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado.

Keywords :

awareness, floodplain management, mapping, risk assessment

Abstract: This report proposes achieving community awareness-development through a state-by-state database to coordinate flood hazard information to facilitate dissemination of that information. The NFIP was created to mitigate future flood losses and to provide protection for property owners from potential losses. The NFIP was established as a risk assessment and mapping program, and the data generated as part of this program were to be used to develop

actuarial flood insurance rates and local floodplain management programs. Technological advances in the field of computer science have facilitated the cost-effective accumulation, manipulation, and transfer of database information and the production of reports by noncomputer-literate people. An inventory of Letters of Map Amendments (LOMAs) and Letters of Map Revision (LOMRs) was prepared based on fill, which is an example of the type of information that could be included in the comprehensive database. The inventory was developed as information that could be merged into the digital system of street addresses being investigated by FEMA. In the future, additional mechanisms will be developed for identifying, compiling, and disseminating available flood-hazard-related information that will be included in the proposed comprehensive database of flood hazard information from federal, state, and local sources. At the discretion of FEMA, the databases will be compiled in the following order: (a) LOMRs not based on fill; (b) physical map revisions; and (c) federal insurance studies.

Wind, H.G., T.M. Nierop, C.J. de Blois, and J.L. de Kok. (1999). Analysis of flood damages from the 1993 and 1995 Meuse floods. *Water Resources Research*, 35(11), 3459-65.

Keywords :

Meuse River, modeling, flood damage

Abstract: This paper addresses uncertainties pertaining to damage assessments made for the flooding of the Meuse River in 1993 and 1995. The analysis is based on flood damage data that were collected by damage experts and consist of large sample sizes within each municipality. The most interesting aspect of these two floods is that although the volume of flooding and the inundated area were comparable in order of magnitude, the flood damage estimates in 1995 were 35 percent lower than in 1993. The authors concluded that part of the reduction in flood damage during the 1995 flood was due to a reduction in the damage to household goods. This may be explained by a marginal increase in flood warning time and experiences gained from the flood of 1993. As flood damage assessments are the cornerstone in the evaluation of mitigation schemes, empirical data of previous floods should be used to improve the foundations of the methods to assess flood damages.

Wright, James M. (1994). Coping with the flood: The next phase. *Water Resources Update*, 95(Spring), 5-10.

Keywords :

floodplain management

Abstract: The article describes the evolution of approaches to floodplain management in the United States. The evolution has come from the gradual merger of three policy streams—flood control, resources protection, and disaster assistance—and it includes a shifting of responsibility from the state and local level to the federal level. Recent accomplishments include the employment of new approaches and programs to deal with flood problems, the emergence of the NFIP as the dominant federal activity for dealing with floods, and growing public awareness. The author recommends six general areas for improvement in the future: (a) achieve a proper accounting of flood risk in decision making; (b) further investigate flood loss reduction and resource protection strategies; (c) build floodplain management capability at all government levels; (d) achieve the intent of the NFIP; (e) avoid political responses to flood disasters; and (f) employ new approaches.

Wright, James M. (2000). *The Nation's Responses to Flood Disasters: A Historical Account*. Madison, WI: Association of State Floodplain Managers.

Keywords :

history, legislation

Abstract: This report explores the forces and events that have shaped floodplain management policy and practice. It begins in the early nineteenth century, with the debates about federal involvement in flood control and then documents the Flood Control Acts of 1917, 1928, and 1936 which demonstrate an increasing federal role in flood control. As the United States became more urbanized, the potential for flood damage increased faster than it could be controlled, and a broader approach to the problem became necessary. The Tennessee Valley Authority, Corps of Engineers, US Geological Survey, and several states all played roles in establishing regulations for floodplain management. In 1968 Congress established the NFIP, and with it began, among other things, national floodplain mapping, stricter land-use regulations, buyout programs, and the privatization of some flood insurance policies. In 1987 the Federal Interagency Floodplain Management Task Force initiated an assessment of the nation's program for floodplain management. The assessment was completed in 1992 with the publication of a two-volume report, *Floodplain Management in the United States: An Assessment Report*, and based on the report, the Task Force developed a revision to a Unified National Program for Floodplain Management in 1993 to reflect trends affecting floodplain management, and to include findings in the 1992 assessment. Many observers in the 1990s believed that still more changes were necessary in national policies, as well as public awareness of the risks of living in flood-prone areas.

Yakowitz, Sidney. (1985). Markov flow models and the flood warning problem. *Water Resources Research*, 21(1), 81-8.

Keywords :

modeling, riverine areas

Abstract: Let $\{Y_j\}$ represent periodically sampled river discharge values. For simplicity, say that a flood occurs at epoch $n+1$ if, for some fixed T , $Y_{n+1} > T$. Assume that at epoch n , the decision maker must decide whether or not to issue a flood warning, this decision being based on the past flow record $\{Y_j\}_{j < n}$. Finally, assume that costs have been assigned to the two types of mistakes: the "false alarm" event and the event that a flood occurs when no warning was issued. It is argued that outside the Gaussian assumption, standard time series methodology is inappropriate for the flood-warning problem. The purpose of this paper is to relate recent progress based on alternate principles. A nonparametric inference procedure is described that converges to the optimal decision function for the flood warning problem as the length of the historical record increases for any stationary G2-ergodic Markov process. Under additional assumptions, rates can be established and shown to be optimal in a certain sense. The new methodology is compared with autoregressive moving average predictors on simulated and actual river flow data.

Zhao, B. and L.W. Mays. (1996). Uncertainty and risk analyses for FEMA alluvial-fan method. *Journal of Hydraulic Engineering*, 122(6).

Keywords :

alluvial fans, Arizona, modeling, risk assessment, hundred-year flood standard

Abstract: Alluvial fans along mountain bases pose quite interesting problems for the design of hydraulic structures and highway crossings and for flood insurance studies. FEMA's alluvial fan method is subject to uncertainties because it is an approximate method. In this paper, Rosenblueth's point-estimate is applied to the alluvial fan method to compute the mean and standard deviation for the 100-year discharge at any point on the fan and the mean and standard deviation for the fan area width. The mean and standard deviation for the 100-year discharge are used to obtain the risk that the 100-year discharge will exceed the discharge capacity of hydraulic structures on the fan. The mean and standard deviation for the fan area width are used to estimate the risk that a given location on the fan will be within the hazard flood zone. The HEC-1 rainfall-runoff computer model is used to compute inputs to the FEMA method. The proposed uncertainty and risk analyses are applied to an alluvial fan in north Scottsdale, AZ.

Zimmerman, Rae. (1979). The effect of floodplain location on property values: Three towns in northeastern New Jersey. *Water Resources Bulletin*, 15(6), 1653-65.

Keywords :

New Jersey, property values

Abstract: The author says one way to evaluate the success of policies to reduce construction in the floodplain could be evaluated by comparing property values in and outside of the floodplain. All other things being equal, if there is no difference in the values, then the floodplain presents no deterrent to development. He evaluated the effect of flood hazards on property values in three selected cities in New Jersey before the NFIP was fully operational in those communities. He found no significant difference in property values. The author predicted that NFIP, by attempting to reduce incentives to development, "will be facing a very difficult situation since part of its strategy involves altering the market mechanism in such a way as to reduce the marginal value to new development relative to the average value of existing structures in the floodplain."

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