

Session No. 5

Course Title: Breaking the Disaster Cycle: Future Directions in Natural Hazard Mitigation

Session Title: Flood Insurance as Hazard Mitigation; Assessing NFIP Issues

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Time: 150 minutes + 15 minute break

Objectives:

- 5.1 Describe the extent of property damage from floods.
 - 5.2 Describe the trends in insured catastrophic losses from natural hazards
 - 5.3 Review the role of insurance, as part of a natural hazard mitigation system
 - 5.4 Understand the rationale for the use of federal flood insurance under the National Flood Insurance Program, as a hazard mitigation method
 - 5.5 Discuss the key elements of the flood insurance program: identification of flood hazard areas and risk, mitigation of flood losses through mandated local regulation of construction in floodplains, and provision of flood insurance at affordable rates.
 - 5.6 Discuss the extent of participation by communities in the Community Rating System.
 - 5.7 Identify the major problems with the existing flood insurance program.
 - 5.8 Participate in a role playing exercise to assess the effectiveness of flood insurance in mitigating flood hazards
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Scope:

The first part of the session describes the extent of losses from natural hazards, particularly flooding, and summarizes loss trends. This is followed by a review of the National Flood Insurance Program (NFIP), including its role in mitigating natural hazards as well as the key elements of the program. Following this summary is a discussion of some of the shortcomings of the program.

The second part of the session engages the students in a role-playing exercise designed to explore some of the key issues regarding the NFIP. Students will have the opportunity to challenge the underlying philosophy of the program, explore its impacts, and suggest strategies for improvement.

Reading:*Instructor and student reading:*

Kunreuther, Howard, and R.J. Roth, Sr. (eds) 1998. Ch. 2, Insurability Conditions and the Supply of Coverage, pp. 17-50; Ch. 6, The National Flood Insurance Program, pp. 125-154. *Paying the Price: The Status and Role of Insurance Against Natural Hazards in the United States*. Washington, D.C.: Joseph Henry Press. (<http://www.nap.edu/catalog/5784.html>)

FEMA. 2001. *Report on Costs and Benefits of Natural Hazard Mitigation: Land Use and Building Requirements in Floodplains: The National Flood Insurance Program*. Washington, D.C. (<http://www.fema.gov/MIT/>)

Burby, Raymond. 2001. "Flood Insurance and Floodplain Management: The U.S. Experience," *Environmental Hazards* 3, 111-122.

FEMA. Community Rating System. (<http://www.fema.gov/nfip/crs.htm>)

Additional instructor reading:

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

Handouts:

None.

Overheads:

- 5.1 Top Ten Natural Disasters in the U.S.
- 5.2 Billion Dollar U.S. Weather Disasters
- 5.3 Total Major Disaster Declarations
- 5.4 NFIP Policies in Force
- 5.5 NFIP Loss Payments: 1978 – 2000
- 5.6 NFIP Losses Paid: 1980 – 2000

General Requirements:

The instructor presents a lecture during the first part of the session. In the second part, the instructor engages the class in a role-playing exercise that is designed to examine some of the key issues regarding the National Flood Insurance Program or NFIP.

Remarks:

During previous classes, students examined both structural and nonstructural approaches to controlling floods and the evolution of hazard mitigation. They discussed the use of buyouts to move people out of harm's way. In this session, we will explore another nonstructural approach known as the National Flood Insurance Program. Supporters argue that the program helps reduce the vulnerability of future development to flooding and helps ensure that those living in areas subject to flooding will bear some of the costs. Critics claim that the program only encourages more people to build in areas subject to flooding.

5.1 Describe the extent of property damage from floods

Floods damage property. They knock houses off their foundations, swamp basements, coat living room floors with mud, destroy furniture, and in many cases render homes uninhabitable. They can also destroy or disrupt businesses, inundate sewage treatment plants and tear up streets, sidewalks and utilities. Of all natural disasters, floods cause the greatest damage, and most of the damage is to property.

In Grand Forks, North Dakota, for example, extensive flooding that occurred after the Red River spilled over the dikes in 1997 destroyed entire neighborhoods along the river. Floodwaters lapped against rooftops of houses in low-lying areas. Even after the waters receded, many homes were left uninhabitable by oil-contaminated floodwaters that had soaked into walls and floors. The flood also destroyed much of the downtown commercial area.

The U.S. Army Corps of Engineers estimates that floods cost the nation an average of \$5.1 billion in damage each year (Howard, 2000).

Flooding resulting from severe storms and other causes was the most frequently declared type of disaster in the 1990s, with more than \$7.3 billion committed by FEMA for response and recovery. According to FEMA, the most costly of these events were the Midwest Floods in 1993 (\$1.2 billion), the Red River Valley floods in 1997 (\$734 million), Tropical Storm Alberto in 1994 (\$544 million), Tropical Storm Allison in 2001 (\$879 million) and Hurricane Floyd in 1999 (1.1 billion). Among other major flooding events requiring more than \$100 million in FEMA flooding were the Northeast coastal storms in 1992, the Arizona floods in 1993, the Houston floods in 1994, the New Orleans floods in 1995, the Mid-Atlantic and Pacific Northwest floods in 1996, the Ohio River Valley floods in 1997, the Texas floods in 1998 and flooding in California in 1993, 1995 and 1998.

From 1990 to 1999, hurricanes and typhoons were the most costly of the 1990s weather-related events, for which FEMA has obligated almost \$8 billion. A total of 88 disaster declarations were issued for these storms, including a single-year record of 19 in 1999. For example, Hurricane Floyd struck North Carolina in 1999 and caused over \$5 billion in damage.

In the United States, damage to property from flooding has been increasing steadily, in part because of larger storms, but also because more and more people are moving to flood-prone areas. Under the National Flood Insurance Program, discussed below, homeowners in participating communities can purchase flood insurance for their homes and contents, although the majority of homes in flood-prone areas remain uninsured. As a result, many flood victims struggle to recover from damages caused by flooding. Increasingly, flood victims turn to the federal government to help shoulder the burden of disaster recovery. From 1990 to 2000, FEMA spent over \$20 billion to help people repair and rebuild their communities after disasters (Howard, 2000).

5.2. Describe the trends in insured catastrophic losses from natural hazards

The cost of natural disasters has been rising steadily. According to the National Oceanic and Atmospheric Administration or NOAA, from 1980 – 2001, the U.S. sustained 52 weather-related disasters in which overall damages and costs reached or exceeded \$1 billion (NOAA, 2002:2). Of these, 43 occurred since 1988, with total damages exceeding \$185 billion. This includes both insured and uninsured losses. The top ten natural disasters, ranked by FEMA relief costs, have all occurred since 1989. The Northridge earthquake (1994) tops the list at \$7 billion, followed by Hurricane Georges in 1998 (\$2.3 billion), Hurricane Andrew in 1992 (\$1.8 billion) and Hurricane Hugo in 1989 (\$1.3 billion). *Figure 5.1: Top Ten Natural Disasters in the U.S.*

From 1990 – 1999, FEMA spent more than \$25 billion for declared disasters and emergencies, compared to \$4.9 billion (in current dollars) in disaster aid for the 1980 – 1989 period. Of the 1990 – 1999 total, more than \$6.3 billion was provided for temporary housing, home repairs and other disaster-related needs for individuals and families, and \$14.8 billion to states and local governments for cleanup and restoration projects (FEMA, 2000). *Figure 5.2: Billion Dollar U.S. Weather Disasters*

In addition, the number of major disasters declared from 1990 – 2000 was nearly double those in the previous ten-year period: 460 vs. 237, respectively, and more than any other decade on record. The jump is caused primarily by the increasing amount of damages caused by natural disasters, but also the growing inclination of presidents to declare even relatively small hazard events a natural disaster (Platt, 1999:22). *Figure 5.3: Total Major Disaster Declarations*

According to Mileti, (1999), three main forces are at work.

- First, the earth's physical systems are constantly changing. For example, the warming of the global climate could produce more dramatic meteorological events such as storms, floods, droughts and extreme temperatures.
- Second, more people are at risk. The number of people living in earthquake-prone regions and coastal counties subject to hurricanes is growing. In addition, the average size and value of homes, particularly along the coast, has been increasing as well.
- Third, the built environment--which includes public utilities, transportation systems, communications, and homes and office buildings--is growing in density, making the potential losses from natural forces larger.

Mileti (1999) estimates that total dollar losses during the last two decades was around \$500 billion (in 1994 dollars). More than 80 percent of these costs stemmed from climatological events (e.g., hurricanes and floods). Only about 17% were insured.

Insured losses due to flooding have also increased over the last two decades. From 1980 – 1990, total losses paid for flood insurance claims averaged approximately \$303 million per year. From 1990 – 2000, the average annual losses were more than double that amount: \$610 million per year.

Historically, floods have been the most destructive natural hazard in terms of economic loss to the nation, according to FEMA. From fiscal years 1980 through 2000, the National Flood Insurance Program, described in sections below, paid about \$10 billion in insurance claims.

5.3 Review the role of insurance, as part of a natural hazard mitigation system

Traditionally, government response to natural disasters involved warning people before the disaster struck, providing emergency relief after the disaster, and building structures such as dams, levees and dikes to reduce the likelihood of a future disaster (Burby, et. al, 1997). Unfortunately, these efforts have proved inadequate in reducing the losses from natural disasters. Moreover, emergency relief programs, funded largely by federal and state governments, may actually make matters worse in the long run by discouraging people from taking steps necessary to reduce their vulnerability to natural hazards.

Flood insurance can reduce losses from natural hazards while providing incentives for people to reduce their vulnerability either by avoiding hazard-prone locations in the first place or by taking steps such as elevating their home to reduce their vulnerability. This assumes, of course, that insurance rates reflect the true risks of natural disaster. That is, insurance premiums must send accurate economic signals to consumers about the true cost of living in an area prone to natural hazards. If insurance premiums are subsidized, however, consumers will not pay the true cost and may decide, quite rationally, to locate in a floodplain, because it is cheaper than living elsewhere, all else being equal.

Still, flood insurance helps ensure that those who live in vulnerable areas will pay at least some of the cost of flood disaster recovery. That is, flood insurance will shift some of the costs of recovery from general taxpayers to those who live in flood-prone areas.

Given the potential for catastrophic losses, insurers must be able to spread their losses widely or draw in reinsurance to reduce their exposure. Both of these options have proven difficult. Most people discount the risks of flooding and opt not to purchase insurance. In the nine-state region affected by the 1993 Midwest floods, for example, only about 20 percent of the structures in the floodplain were insured, a rate that is typical of the U.S. as a whole (Burby, et al, 1997). Also, reinsurers, (essentially, insurance for insurance companies), have shied away from the flood insurance market given the potential for such huge losses. Ninety percent of natural disasters in the United States are flood related, and the bulk of disaster costs have long been incurred in floods (Platt, 1999). As a result, the federal government entered the flood insurance market in 1968, as discussed below.

5.4 Understand the rationale for the use of federal flood insurance under the National Flood Insurance Program, as a hazard mitigation method

For most of the 20th century, our nation's policy toward controlling floods has focused primarily on taming rivers with structures such as dams, floodwalls and levees. While this structural approach undoubtedly reduced the severity of flooding in many communities, it also destroyed the natural capacity of floodplains to attenuate floods and gave people a false sense of security that previously flood-prone areas were safe for development (White 1945; Burby et al. 1985; Burby et al. 1988). In addition, it has been enormously expensive. Despite billions spent on flood control measures, flood losses continue to mount, as more people and property become exposed to flooding (Godschalk et al. 1999).

Mounting losses from flooding spurred Congress to reexamine our national flood control policies. In 1966, in the aftermath of Hurricane Betsy, a White House task force on federal flood control policy issued a report recommending changes in the federal government's approach to reducing flood hazards. The report, along with a companion report on flood insurance by the U.S. Department of Housing and Urban Development, suggested a more integrated approach that included measures such as local and use and building regulations as well as federal flood insurance to reduce the risks and costs posed by flood hazards. Fearful that the availability of federal flood insurance would stimulate a boom in development in floodplains, the task force recommended that local governments be required to adopt and enforce floodplain regulations as a condition of participation by their residents in a federal flood insurance program (Burby and Kaiser 1987).

In 1968, Congress acted on the recommendations of the two studies and established the National Flood Insurance Program or NFIP. Under the program, Congress makes affordable flood insurance available to property owners in communities that agree to adopt and enforce floodplain management regulations that meet the minimum criteria established by the Federal Emergency Management Agency. Such regulations typically include zoning, subdivision and building requirements designed to protect structures from flood damage. For example, a community may limit development in flood-prone areas or

by require structures to be elevated above base flood elevation. The goals of the NFIP are to transfer at least some of the costs of disaster assistance from general taxpayers to those who live in flood-prone areas and to ensure that future development in flood-prone areas meets minimum standards for flood-resistance.

At the time the NFIP was established, relatively few communities had adopted programs to limit or manage development in floodplains. According to Platt (1999), “While the nation spent huge sums to store, divert, and channelize floodwaters, land use regulations were seldom used to limit new development in areas of flood risk.” Moreover, the federal government was reluctant to regulate local land use. Instead, the NFIP provides incentives, in the form of federally-backed flood insurance, to encourage local communities to adopt regulations on land use in the floodplains. Until enactment of the Flood Disaster Protection Act of 1973, (discussed below), the program was entirely voluntary. Of course, private flood insurance is essentially unavailable.

Still, despite dangling the carrot of low-cost flood insurance in front of local governments, communities were slow to join the NFIP. In the wake of major flood disasters caused by events such as Tropical Storm Agnes in 1972, Congress adopted the Flood Disaster Protection Act in 1973. The act made the purchase of a flood insurance policy mandatory for any property owner receiving federally related financing involving flood prone property. Thus, the act prohibits federal agencies, including Federal Housing Authority, Veterans Affairs and the Small Business Administration from making or guaranteeing any loans for a building in a floodplain unless the building is covered by flood insurance. This prohibition does not apply to buildings in communities that do not participate in the NFIP. However, in such cases, the lender is required to notify the borrower that, in the event of a flood-related Presidentially declared disaster, Federal assistance will not be available to repair the building.

The 1973 act dramatically increased participation in the NFIP. As of 2002, nearly 20,000 communities now participate in the NFIP. Today there are over 4.3 million policies in force providing an excess of \$590 billion worth of coverage, making the federal government the largest single-line insurer in the world (FEMA, 2002 and Howard, 2000).
Figure 5.4: NFIP Policies in Force

5.5 Discuss the key elements of the flood insurance program:

In contrast to structural forms of flood control, the NFIP takes a different approach to hazard mitigation, one that relies on:

1. identifying flood hazard areas and risk,
2. providing flood insurance at affordable rates and
3. mitigating flood losses through mandated local regulation of construction in floodplains.

Under the NFIP, the federal government maps local flood hazard areas in communities where insurance will be provided. These maps, called flood hazard rate maps or FIRMs,

identify the areas within the 100-year flood boundary, which are termed Special Flood Hazard Areas (SFHAs). A 100-year flood refers to a flood level with a one percent or greater chance of being equaled or exceeded in any given year, not a flood that occurs once every 100 years.

Flood hazard areas are determined using statistical analysis of records of river flow, storm tides and rainfall, information obtained through consultation with the community, floodplain topographic surveys, and hydrologic and hydraulic analysis. The special flood hazard areas are subdivided into flood hazard zones (insurance risk rate zones) according to the level of risk. For example, FEMA designates certain shallow flooding areas as AO and AH zones, some riverine areas as A and AE zones, and Coastal areas subject to damage by waves and storm surge as V and VE. These zones are shown on the FIRMs and are used, (along with factors such as amount of coverage and building occupancy), to calculate flood insurance premium rates. Thus, in addition to identifying flood hazard areas, which is where land use and building regulations must apply, FIRMs provide data to calculate NFIP insurance premiums and help increase awareness of a community's flood hazards.

Flood insurance is available only in communities that enact floodplain management regulations that meet federal standards to reduce future vulnerability. Such regulations typically include zoning, subdivision and building requirements designed to protect structures from flood damage. For example, one of the key requirements of the program is that the lowest floor of a structure be elevated to or above the base flood level: the elevation at which there is a one percent chance of flooding in a given year. According to Rutherford Platt (1996), without such requirements, the NFIP could inadvertently subsidize new development in floodplains. Federal flood insurance is available to homeowners, renters and business owners in participating communities.

The NFIP takes a back door approach to managing land use in floodplains. In essence, the federal government struck a bargain with local communities: adopt and implement measures to reduce vulnerability of development in flood-prone areas, and in exchange, the federal government will make low-cost insurance available for existing structures and for future development as well. The rationale is that communities will not be motivated to manage development in floodplains without strong financial incentives from the federal government.

The NFIP is administered by the Federal Insurance and Mitigation Administration (FIMA) within FEMA. Private insurance companies sell flood insurance policies, backed by the federal government. The maximum coverage available is \$250,000 for a single-family home (plus up to \$100,000 for its contents), and \$500,000 for commercial buildings (\$500,000 for its contents). The average insurance premium for homeowners is about \$350 for \$124,000 of coverage.

FEMA estimates that flood damage is reduced by nearly \$1 billion a year through communities implementing sound floodplain management requirements and by property owners purchasing flood insurance. According to FEMA, buildings constructed in

compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance (<http://www.fema.gov/nfip>).

5.6 Discuss the extent of participation by communities in the Community Rating System

The NFIP requires participating communities to meet minimal federal standards for development in floodplains. In an effort to encourage communities to adopt floodplain management measures that go beyond the minimum requirements, Congress created the Community Rating System or CRS with the enactment of the National Flood Insurance Reform Act of 1994. The act expanded the role of federal agency lenders and regulators in enforcing the mandatory flood insurance purchase requirements and prohibited further flood disaster assistance for any property that is not covered by flood insurance.

Under the CRS, communities that adopt certain activities to lower their flood risk can receive discounts on flood insurance premiums. CRS awards points for different activities implemented: the greater the number of points earned, the greater the premium discount. There are three types of activities recognized under the CRS: activities that

- reduce flood losses,
- facilitate accurate insurance rating, and
- promote awareness of flood insurance.

The CRS recognizes 18 creditable activities, organized under four categories:

1. public information,
2. mapping and regulations,
3. flood damage reduction, and
4. flood preparedness.

Communities that implement all 18 measures can earn up to 45% discount off insurance premium rates. Currently, over 900 communities receive flood insurance premium discounts under the CRS for implementation of activities that go beyond the minimum required by the NFIP. Most of these have received a classification of either 9 (43% of participating governments) or 8 (39%). The best rating that has been achieved is a 3 by Tulsa, Oklahoma, which entitles property owners to a 35% reduction in the cost of flood insurance (Burby, 2001).

5.7 Identify the major problems with the existing flood insurance program

The risks of providing federal flood insurance were recognized before the program was created in 1968. The federal task force established in 1966 cautioned that:

A flood insurance program is a tool that should be used expertly or not at all. Correctly applied, it could promote wise use of floodplains. Incorrectly applied, it could exacerbate the whole problem (U.S. Congress, 1966:17).

According to Ray Burby, stringent building codes for new construction in floodplains have diverted significant development away from flood-prone areas (Burby, et al., 1998). Others claim that the availability of subsidized flood insurance has actually encouraged people to build in areas prone to flooding. Approximately 30 percent of policies are subsidized. According to Faber (1996), subsidizing insurance only encourages more people to develop in floodplains. If policyholders had to pay the true (i.e., higher) costs of flood insurance, fewer people would choose to develop in floodplains. Thus, rather than discourage floodplain development, the program has instead acted as a financial safety net to encourage development in flood-prone areas.

According to FEMA, the NFIP is self-supporting for the *average* historical loss year. That is, insurance losses and administrative costs are covered, on average, by insurance premiums. In years when losses are heavy, however, the NFIP often must dip into the Federal Treasury to cover all its costs. For example, during the 8-year period from fiscal years 1993 – 2000, the program experienced losses from floods that were greater than premiums collected from policyholders. Cumulative operating losses to the program (program income less costs) totaled about \$843 million during this 8-year period. During fiscal years 1999 and 2000, however, revenues exceeded costs by about \$720 million, which enabled the program to repay funds borrowed from the U.S. Treasury (GAO, 2001). *Figure 5.5: NFIP Loss Payments: 1978 – 2000*

A recent report by the U.S. General Accounting Office stated that the NFIP is not actuarially sound: the program does not collect sufficient premium income to build reserves to meet long-term future expected flood losses. This is by design. Congress authorized subsidized insurance rates to be made available for policies covering structures built before a community's Flood Insurance Rate Map was prepared in order to encourage communities to join the program. These pre-FIRM properties are generally more flood-prone than structures built after a FIRM was prepared because they were not built according to the programs building standards. Pre-FIRM structures suffer, on average, about five times more damage than post-FIRM structures (GAO, 2001). The problem is that basing premiums on an average historical loss year does not allow the program to build sufficient reserves to cover a possible catastrophic loss year in the future. When big losses occur, the program often has to turn to the U.S. Treasury to bail them out. *Figure 5.6: NFIP Losses Paid: 1980 – 2000*

In many communities, it is not uncommon for flood-damaged homes to be repaired or rebuilt, only to be damaged or destroyed again by a subsequent flood. These so-called "repetitively-damaged" properties account for a disproportionate share of the losses incurred by the NFIP. According to a study by the National Wildlife Federation, repetitive loss structures represent only two percent of the properties covered by flood insurance policies, but account for 25 percent of the losses and claimed 40 percent of all NFIP flood loss payments for the 18-year period from 1978 and 1995 (Conrad, 1998). Total cost of payments made to the 74,501 repetitive loss properties during this period totaled \$2.58 billion. Nearly one out of every ten repetitive loss homes has had cumulative flood loss claims that exceeded the value of the house. Two states top the list

in repetitive losses: Louisiana and Texas. Over half of all nationwide repetitive loss property insurance payments have been made in these two states.

Another problem, as with any insurance, is adverse selection—those who purchase insurance are probably the most likely to experience damage from flooding.

Congress authorized the flood insurance program to require the preparation of floodplain management plans as a condition for local government participation in the program, but the NFIP has been timid in requiring plans or planning. The CRS began in 1990 to offer a weak incentive for the preparation of plans (up to a 2% reduction in premiums), but after 10 years, only 110 of over 19,000 participating communities had taken advantage of the incentive and prepared plans (Burby, 2001).

Finally, although the requirements of the NFIP have helped to reduce flood damages to *new* structures built in floodplains, several studies have shown that floodplain regulations have generally been ineffective in reducing flood losses to *existing* uses (Burby and Kaiser, 1987). Other measures, therefore, are needed, such as acquiring repetitively damaged properties under programs such as the Hazard Mitigation Grant Program and the Flood Mitigation Assistance Program, discussed previously. In addition, local governments can establish their own programs to purchase homes in flood-prone areas, as Tulsa, Oklahoma has done for years, and to develop programs to discourage development in flood-hazard areas. For example, local governments could choose not to extend infrastructure (roads, water and sewer, etc.) to areas prone to flooding.

5.8 Participate in a role playing exercise to assess the effectiveness of flood insurance in mitigating flood hazards

The purpose of the exercise is to examine, through role playing, the effectiveness of flood insurance in mitigating flood hazards and the need for additional measures to reduce the town's vulnerability. In this exercise, students will be assigned to a particular role (note: to ensure that all students participate, several students may be assigned the same role).

The Situation

The town of Two Rivers has a long history of flooding. Although damages are sometimes severe, residents repeatedly repair or rebuild their homes. The town somewhat reluctantly joined the NFIP about 10 years ago and has always taken a hands-off approach to development in the floodplain. However, it has struggled to pay its share of disaster recovery costs, which include temporary housing, debris removal, emergency services, and matching funds for federal assistance. Dozens of homes suffering severe damage were rebuilt with flood insurance. Many of the town's low-lying, flood-prone lands support strong neighborhoods of primarily low-income residents.

Issues: Development subsidies (e.g., flood insurance), repetitive flooding, public vs. private costs of disasters.

The town would like to develop a long-term hazard mitigation strategy that involves a gradual, strategic retreat from the floodplain. Residents in flood-prone areas counter that they should be allowed to stay put, since they have been there for years and since most residents can pay for repairs through flood insurance payments.

The town council has called a public hearing to discuss the pros and cons of its participation in the NFIP and the need for a new approach, given the town's history of repeated flooding. A new approach may involve either or both (a) more stringent land use regulations designed to discourage further development in the floodplains (and increase its CRS rating) and (b) a strategic retreat from the floodplain through public acquisition of flood-prone homes and lots. The Mayor (course instructor) will moderate the hearing and discussion, allowing about 4 minutes to each resident to state his/her opinion. After all participants have spoken, the town council, comprised of 5 students, will convene for 5-10 minutes before recommending a hazard mitigation strategy for the town (see description of town council role below). The council will then defend (explain) its decision.

Roles:

Homeowner with older home in floodplain – You have lived in your current home all your life. Your home, which was built by your grandparents, has been flooded several times, but insurance has covered the cost of repairs. You are willing to endure the turmoil and loss caused by occasional floods for the privilege of living along the river, to which you feel a special emotional and spiritual bond.

Property owner with land in floodplain - You own several acres of land in the floodplain. You bought the property as an investment years ago and hope to develop the property in the near future. You prefer no restrictions on your land and would like to be able to purchase flood insurance to cover your investment should flooding occur.

Environmentalist – Your position is that the floodplains should remain undeveloped and that government programs, such as the NFIP, only encourage unwise development in floodplains. You would like to remove all subsidies encouraging development in floodplains and feel that the town should steer growth to flood-free areas. You would also like to see the floodplain converted, eventually, to wildlife habitat and open space.

State hazard mitigation planner – Your long-term goal is to reduce the number of people and properties at risk. You see the best way to achieve this objective is to acquire homes in flood-prone areas. You support the NFIP but would like to find a way to discourage further development in flood hazard areas. The state has some funds to buy homes in flood-prone areas, but funding is limited.

Local planner – You would like to reduce the vulnerability of the community to flooding, but are limited in the tools you can use. The town council is against using restrictions on land use. In fact, two of the five council members have suggested that the town withdraw from the NFIP altogether. Your position is that limiting land use in flood hazard areas is

fiscally responsible and will save the town money in the long run. You support the NFIP, but would like to look for ways to limit future growth in floodplains and to use the floodplains for other purposes, such as open space.

Local taxpayer (not living in floodplain) - You are fiscally conservative and see no reason why taxpayers should support homeowner's decisions to live in flood-prone areas. You are against the NFIP (you pay full price for all of your car, life and homeowner insurance policies) and believe that if people want to live in flood hazard areas then they should bear the full risks and costs.

Town Council (5 members) – Two council members are former members of the John Locke Foundation, which opposes government intervention into the market. These two reluctantly voted for the town to participate in the NFIP. They support the program because it will help some of the town's lower income families, but decry the requirement that the town adopt ordinances that regulate future development in flood hazard areas. The other three council members support the town's participation for different reasons. One owns property in the floodplains and stands to benefit financially from the town's continued participation, while the other two believe that the town has an obligation to protect people from natural hazards and that the NFIP provides the basis for regulation of future development in the floodplain.

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Figure 5.1 Top Ten Natural Disasters (Ranked By FEMA Relief Costs)

| Event | Year | FEMA Funding* |
|---|-------------|----------------------------|
| Northridge Earthquake (CA) | 1994 | \$6.999 billion |
| Hurricane Georges (AL, FL, LA, MS, PR, VI) | 1998 | \$2.333 billion |
| Hurricane Andrew (FL, LA) | 1992 | \$1.849 billion |
| Hurricane Hugo (NC, SC, PR, VI) | 1989 | \$1.308 billion |
| Midwest Floods (IL, IA, KS, MN, MO, NE, ND, SD, WI) | 1993 | \$1.141 billion |
| Hurricane Floyd (CT, DE, FL, ME, MD, NH, NJ, NY, NC, PA, SC, VT, VA) | 1999 | \$1.085 billion |
| Tropical Storm Allison (FL, LA, MS, PA, TX) | 2001 | \$879.5 million |
| Loma Prieta Earthquake (CA) | 1989 | \$865.5 million |
| Red River Valley Floods (MN, ND, SD) | 1997 | \$734.0 million |
| Hurricane Fran (MD, NC, PA, VA, WV) | 1996 | \$621.2 million |

*Amount obligated from the President's Disaster Relief Fund for FEMA's assistance programs, hazard mitigation grants, federal mission assignments, contractual services and administrative costs as of February 28, 2002. Figures do not include funding provided by other participating federal agencies, such as the disaster loan programs of the Small Business Administration and the Agriculture Department's Farm Service Agency. **Note:** Funding amounts are stated in current dollars.

Source: http://www.fema.gov/library/df_8.shtm

Figure 5.2

Billion Dollar U.S. Weather Disasters Since 1980

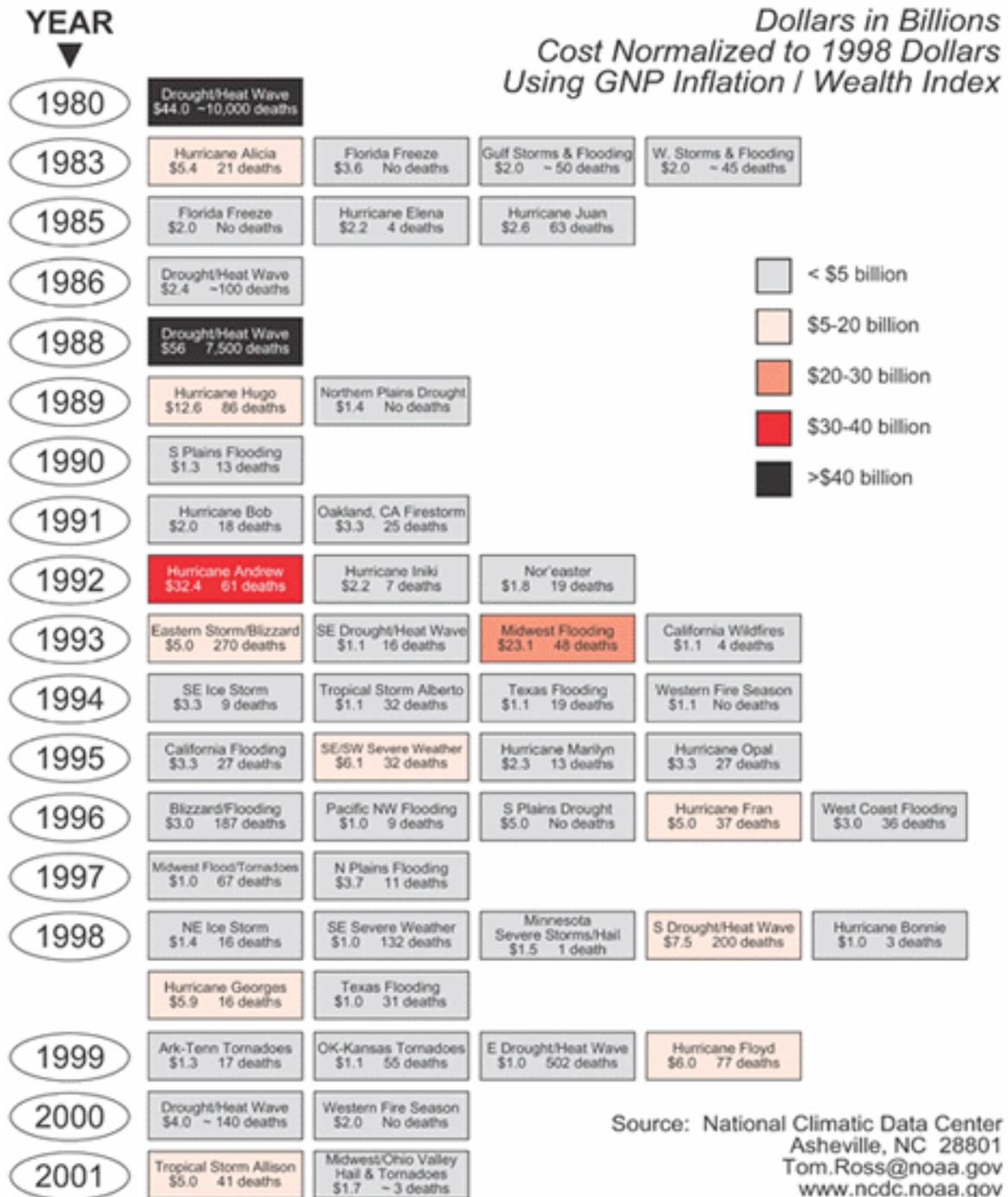
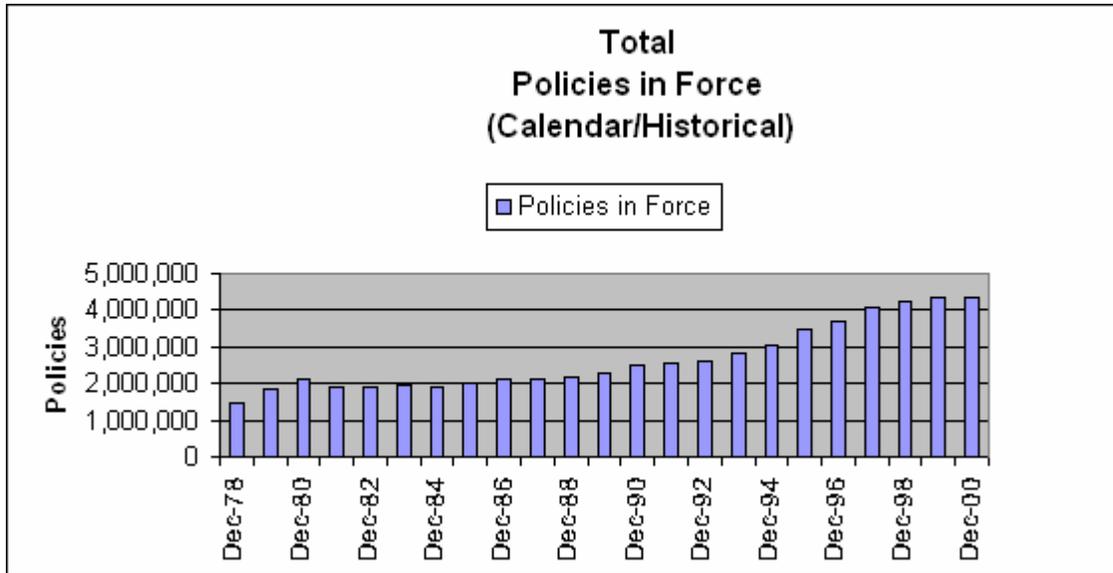


Figure 5.3 Total Major Disaster Declarations

| Year | Total Disaster Declarations |
|----------------------|------------------------------------|
| 1980 | 23 |
| 1981 | 15 |
| 1982 | 24 |
| 1983 | 21 |
| 1984 | 34 |
| 1985 | 27 |
| 1986 | 28 |
| 1987 | 23 |
| 1988 | 11 |
| 1989 | 31 |
| 1990 | 38 |
| 1991 | 43 |
| 1992 | 45 |
| 1993 | 32 |
| 1994 | 36 |
| 1995 | 32 |
| 1996 | 75 |
| 1997 | 44 |
| 1998 | 65 |
| 1999 | 50 |
| 2000 | 45 |
| 2001 | 45 |
| Total | 787 |
| Average | 35 |

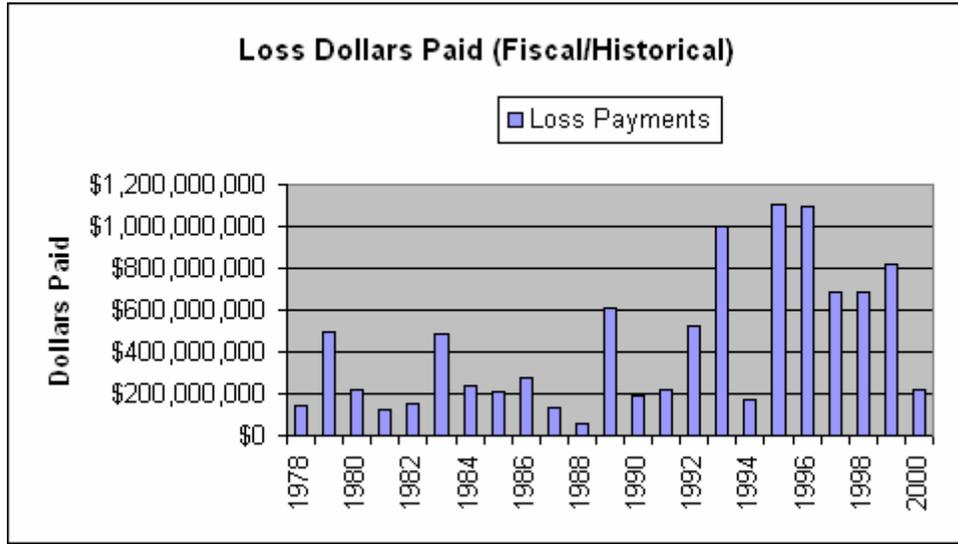
Source: http://www.fema.gov/library/dis_graph.shtm

Figure 5.4 NFIP Policies in Force



Source: www.fima.gov

Figure 5.5 NFIP Loss Payments: 1978-2000



Source: www.fima.gov

Figure 5.6 NFIP Losses Paid: 1980 - 2000

| Fiscal Year Ending | Loss Dollars Paid |
|---------------------------|--------------------------|
| Sep-80 | \$219,449,804 |
| Sep-81 | \$127,170,169 |
| Sep-82 | \$148,618,700 |
| Sep-83 | \$484,549,022 |
| Sep-84 | \$242,600,803 |
| Sep-85 | \$206,214,919 |
| Sep-86 | \$280,733,903 |
| Sep-87 | \$130,397,209 |
| Sep-88 | \$61,220,128 |
| Sep-89 | \$608,847,765 |
| Sep-90 | \$186,334,357 |
| Sep-91 | \$217,290,773 |
| Sep-92 | \$527,356,189 |
| Sep-93 | \$1,004,523,352 |
| Sep-94 | \$170,831,977 |
| Sep-95 | \$1,104,353,956 |
| Sep-96 | \$1,090,606,379 |
| Sep-97 | \$683,520,585 |
| Sep-98 | \$689,071,293 |
| Sep-99 | \$822,758,563 |
| Sep-00 | \$215,848,369 |
| Total | \$9,242,298,213 |

Source: www.fema.gov/nfip/fy00lsdl.htm