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LARRY J. WILSON

Throughout history, man has utilized rivers for water supply, transportation, power generation, and waste disposal. This strong relationship has encouraged the location of human settlements near rivers and streams despite the risk of periodic flooding. The modern technology of transportation and public services has reduced the necessity for riverside locations, but the development of flood plains in urban areas has continued, resulting in the periodic loss of human life and property when flooding has occurred. Within the United States, flooding has taken over 5000 lives in the last fifty years and causes an estimated $1.25 billion in property damages annually.

This damage is the result of man's development of flood plain land interfering with the natural phenomenon of flooding. Unlike other natural "disasters" (tornadoes, hurricanes, lightning), the locus of flooding is identifiable and its occurrence is reasonably predictable. Those who suffer from flooding usually could be viewed as assuming the risk of injury or property damage. Yet, as will be discussed later, other factors necessitate governmental interference in the landowner's decision to place development within a flood plain.

THE NATURAL CHARACTERISTICS OF FLOODING

In order to understand the reasons for the Flood Disaster Act of 1973 and to evaluate the various alternatives available for reducing flood damage, it is necessary to understand the basic nature of flooding. Flooding is the normal response of a river when the capacity of the river channel is exceeded by the water from inflowing tributaries and runoff from adjacent land areas. When flooding occurs, the water spreads over the river valley floor and deposits sediment, which, over time, builds up the flood plain. The relative size of the river channel is determined by the climate and geology of the region. A river channel normally will have only a small amount of water flowing within it. On a few days each year, there is sufficient rainfall or snowmelt to fill the river to its banks. These moderate flood flows shape the course of the river throughout its valley.
On the average of every two years, weather conditions will produce enough precipitation to cause the river to overflow its banks and flood the valley to a depth equal to the average flow within the channel. A flood which would cover the entire valley to moderate depths would occur at a frequency of once every fifty years. The floods which ravaged Rapid City, South Dakota, and the East Coast in 1972 are estimated to occur once every two hundred years. The probability of flooding becomes less with the magnitude of the event.\(^3\) It is important to understand that the terminology of “100-year flood” refers to the law of averages and is not a guarantee that flooding will occur in 100-year intervals. Within a 100-year flood plain, the chance flooding will occur is 0.01 annually. Although it is unlikely, it is possible that 100-year level floods could occur two years in a row; there is a 1% possibility each year.

The factors which control the location of the flood plain within the river valley are the volume of water flowing in the river, its velocity, and the altitude of the adjacent land area relative to the river channel. The river valley is not flat by nature; zones adjacent to the river are more subject to flooding than zones at higher elevations. The nature of flooding allows zones of predictability for floods of different frequencies to be established. This identification of zones makes it possible to restrict development within areas of great risk and establish actuarial risks enabling a land owner to spread his risk through insurance.

There are additional characteristics of flooding which must be understood to evaluate any proposed solution to flood damages. First, any obstruction in the river or flood plain which slows the flow of water will force it to higher elevations. Essentially, any obstruction in the flood plain expands the area subject to flooding. Construction of a factory in a flood plain may subject adjacent landowners to a risk of flooding they would not previously have faced. Second, any flow obstruction in the river or flood plain tends to increase the velocity of the water while slowing its overall movement. This can be compared to squeezing a garden hose—the water will come out in a stronger but narrower stream. An increase in the velocity of flood waters caused by flood plain obstructions will result in greater damage to property and may also change the type of sediment deposited on the flood plain.

Another characteristic of flooding is seasonality, which has been defined as the concentration of the occurrence of flooding. The seasonality of flooding is directly related to the magnitude, intensity, duration, and frequency of flooding as well as other climatic conditions (i.e., frozen ground preventing absorption).\(^4\) Maximum seasonalities within the United States occur from midsummer to late spring, with periods of intense runoff resulting from combinations of snowmelt and heavy rainfall.\(^5\) While the seasonality of flooding is reasonably predictable, overreliance upon this predictability may result in disaster when a rare, “unseasonal” heavy precipitation occurs. For example in June, 1972, a ten inch rainfall in a twenty-four hour period led to the Rapid City tragedy.

**GOVERNMENTAL RESPONSES TO FLOODING**

The damages caused by flooding have led to a variety of governmental programs which either attempt to control the natural flow of the water or restrict development in flood-prone areas. The most visible program within the United
States has been the flood prevention public works constructed by the U.S. Army Corps of Engineers. These projects have included stream channelization to remove obstructions and increase the flow of water, protective works such as dikes and levees, and multi-purpose flood control reservoirs. In recent years projects have cost approximately $1.5 billion annually in federal expenditures. (This figure does not include the state and local share of joint projects.) Corps of Engineers flood control projects have been severely criticized by environmentalists for their effect upon natural areas and wildlife. But a broader critique has been voiced in recent years: structural projects have failed to reduce flood damages.

THE FAILURE OF STRUCTURAL MEASURES

Despite the huge amount of money spent on public works for flood control, damages from flooding have continued to rise over the years. A corresponding increase in the cost of federal disaster programs has resulted. There are several reasons why structural flood control projects have failed:

- Development in Flood Plains Has Been Unrestricted

In many areas there are no restrictions placed upon flood plain landowners. This development has been encouraged by structural projects which appear to protect flood plain property, but may offer little protection to a particular landowner. For example, a landowner may rely upon the construction of an upstream flood control reservoir that was never designed to protect his land. Even if his land is protected from a “standard project flood”, an unusually large or unseasonal flood may cause damages. As was mentioned previously, any obstruction restricting the flow of flood waters increases the area subject to flooding. Thus, flood plain development encouraged by the construction of structural flood prevention projects may increase the danger of flooding to those who were formerly safe.

- Disruption of Drainage Patterns by Urbanization

Forests, meadows, marshes, swamps, and agricultural land serve an important role in nature by absorbing rainfall that would otherwise enter into rivers and streams. Urbanization has covered many of these areas with buildings and pavement, and has encouraged the draining and filling of wetlands. All of these factors prevent land from performing its natural absorption function and increase the speed and amount of precipitation entering a river. This water flow from urban areas increases both the occurrence of flooding and the amount of area subject to flood damage.6

- Structural Measures Inconsistent with Nature of Flooding

A multi-purpose reservoir is designed to provide recreation benefits and water supplies as well as protection from flooding by taking advantage of the seasonality of flooding. Water levels are lowered in winter and spring for the expected rainfall and snowmelts. In the summer, when the risk of flooding is lowest, the reservoir water level is raised for recreation. However, the unusual off-season flood may catch the reservoir off-guard and flooding may occur despite the presence of the project.

Levees and floodwalls are also inconsistent with the nature of flooding in that they prevent flood damages to a particular area while increasing the risk to
neighboring communities by restricting the natural flow of flood waters. The constriction of the river by flood works changes the flood plain in unprotected areas and increases the velocity of flood waters by narrowing the stream flow. There is some evidence that structural flood control measures and navigation works may actually increase the occurrence and severity of flooding. The record floods of recent years may be at least partially man-made.7

- **Structural Alternatives No Longer Economic Investments.**

Structural flood control measures have been severely criticized as unproductive public investments by many economists. Projects are usually evaluated by the political power of the lobby groups involved and the ability of individual Congressmen to gain a share of the water resources “pork barrel” rather than by the actual economic merits of the project. The Corps of Engineers has a strong incentive to overestimate the benefits and minimize the costs (environmental as well as economic) of a project since the level of its funding is dependent upon the number of projects that are constructed. Thus in estimating the benefit/cost ratio of proposed flood control projects, the Corps often uses an extremely low discount rate. At a time when many economists feel a discount rate of 10-14% would be realistic in evaluating the merits of proposed projects, the Corps often uses a rate of 3½%.8 Usually the public would get a much better return on its investment if the money were placed in a private savings account instead of being used to construct the project.

- **Structural Measures Inconsistent with “Free Market” Analysis**

Under a free market economic analysis, there is no reason why the federal government should acquire upstream property to construct a project that protects private landowners downstream. Flooding is a predictable risk inherent in the ownership of flood plain land and those who purchase flood-prone land should bear that risk rather than the public at large. Charles L. Schultze (former Director of the U.S. Bureau of the Budget) and other economists at the Brookings Institution had the following to say about the economics of flood control projects:

In the case of flood control, economic benefits are measured as the costs of flood damage to private investments located in flood plains that would have occurred without the project. But in all too many cases, the flood plains should never have been developed intensively to begin with—the protection simply encourages uneconomic investments there. What is needed is not an open-ended policy of protecting any and all such investments, but a national policy of regulating investments in flood plain lands, through zoning and other devices.9

**THE FLOOD DISASTER PROTECTION ACT OF 1973**

In recent years, the federal government has taken an increasing role in providing relief for those with property losses due to flooding. Prior to 1963, the sole relief available to flood victims was special federal disaster loans. The private insurance industry had not made flood insurance available due to the high risks and the lack of underwriting standards. In 1956, Congress provided a flood insurance program, but failed to appropriate funding for its implementation. In 1965, Congress
directed the Department of Housing and Urban Development to conduct a flood insurance feasibility study. The report, sent to Congress in 1968, found that a national flood insurance program was feasible. The study showed that the federal government could subsidize premium rates for properties already existing in high-risk areas, but only if actuarial rates were charged for future construction. In addition, the program would require sound land use practices and control measures that would reduce or avoid future losses. In 1968, Congress enacted the National Flood Insurance Program which provided subsidized insurance to owners of flood-prone property. Although the Act required communities with flood-prone areas to enact a flood plain ordinance, it contained no provisions to mandate such action. The penalty for a community which failed to establish a flood plain management program was ineligibility for the Federal Flood Insurance. Another disincentive to participation was a provision that denied federal disaster funds to those in participating communities who failed to purchase flood insurance. The lack of enforcement provisions made the National Flood Insurance Act of 1968 largely ineffectual. The national losses from flooding continued to mount.

A combination of events led to the enactment of the Flood Disaster Protection Act of 1973. In the face of a declining economy and pressure from environmentalists, Congress began to question the huge expenditures being made annually for structural flood control measures. In the period from 1936 to 1973, the federal government spent an estimated $9 billion on flood protection works. Despite these expenditures, the annual losses from flooding continued to increase, primarily as a result of unwise development of the nation's flood plains.

It took tragedy to spur Congress into action. In June, 1972, a flash flood took 236 lives and destroyed 1000 homes in Rapid City, South Dakota. The amount of property damage was estimated to exceed $100 million. The collapse of the Canyon Lake Dam above the city complicated the disaster, which was described in the following account:

About 80 blocks of paving had been ripped up by the flood, mud covered a fifth of the city, drinking water was polluted, telephone and electricity were out and thousands were homeless, hungry or in need of clothing. The search for bodies was difficult. Rescue workers expect to find bodies as far as 50 miles downstream from Rapid City.

Later in the same month, Hurricane Agnes released torrential rains from Florida to New York. The storm caused 112 deaths, $1.8 billion in property damage, and left 400,000 homeless over eleven states. The U.S. Weather Bureau placed the occurrence of a storm of that magnitude at once in every 200 years or .5 per cent annually. More significantly, the damage caused by Agnes could not be prevented by structural measures; even if all the projects planned for the region had been in place, the storm would still have caused over a billion dollars in property damage. Structural measures to afford protection from a storm with the intensity of Agnes are not likely to be built. It was estimated that in order to protect the Susquehanna River Basin from another Hurricane Agnes, an additional 522 new dams would have to be constructed, which in turn, would necessitate the acquisition of twice the available land area.
In total, there were 45 presidentially-declared flood disasters in 1972. In 1973, there was severe flooding along the Mississippi. At St. Louis, the river was above flood stage for a record 77 consecutive days. After two years of severe flooding, Congress was finally convinced that the federal policy towards flooding was due for a revision. On December 31, 1973, the Flood Disaster Protection Act was approved by Congress.

Significant Provisions of the Act

The Flood Disaster Protection Act of 1973 greatly broadened the scope and effect of the National Flood Insurance Program. Congress declared the Act to have the following purposes:

1. **Substantially increase the limits of coverage authorized under the National Flood Insurance Program**

   The Flood Disaster Protection Act of 1973 substantially increased the available limits of both subsidized and unsubsidized flood insurance coverage. It doubled the structure and contents limits on single family dwellings, and the contents limits on multi-family dwellings. The Act also tripled the non-residential structural coverage and increased the limits on non-residential structures from $5000 to $100,000 on both subsidized and unsubsidized coverages. These provisions should enable owners of property in flood-prone areas to obtain insurance with coverage more nearly approximating the actual value of the structure.

2. **Provide for the expeditious identification of, and the dissemination of information concerning, flood-prone areas**

   Under the Flood Disaster Protection Act, as it is being implemented, communities with flood-prone areas will be issued maps by the Flood Insurance Administration (Department of Housing and Urban Development) which will identify the areas within the community having a special flood hazard. The standard enacted by Congress is the area subject to a 100-year flood as determined by previous flood records. This standard was chosen by Congress primarily because of its use in other federal programs, but was severely criticized as inadequate during hearings on the legislation. Together with the map, the community receives a letter of explanation, application forms, and program information. The community can challenge both its initial classification as “flood-prone” and the extent of the hazard areas as determined by the map. The challenge to the initial classification must be made within six months of receiving the map, but a community can submit data to challenge the hazard areas shown on the FIA’s map at any time. The Flood Insurance Administration then reviews the data and amends the map, if it is warranted. After a community qualifies for the Flood Insurance Program, the Flood Insurance Administration will conduct a detailed engineering study which refines the boundary lines of the special hazard area. The map will be furnished to the community to aid in the enactment of a flood plain ordinance and is also used to establish actuarial rates for property within the flood plain. In addition, the Governor of each state designates a state agency to coordinate the flood insurance program within the state, and to assist communities in establishing flood plain management programs and qualifying for the flood insurance program.
(3) Requires State or local communities, as a condition of future federal financial assistance, to participate in the flood insurance program and adopt adequate flood plain ordinances with effective enforcement provisions consistent with standards to reduce or avoid future flood losses;

This is probably the most significant of the Flood Disaster Protection Act's provisions. Any community found to be flood-prone by the FIA must qualify for participation in the National Flood Insurance Program or face the sanction of federal or federally-related financial assistance being denied for the construction or acquisition of buildings within the community's designated hazard area. "Assistance" has been defined to include direct federal assistance such as grants, SBA and FMHA loans, VA and FHA mortgage loans, and conventional financing for federally insured, regulated, or supervised lending institutions (i.e. banks insured by FDIC or regulated by the Federal Reserve Board). This provision essentially precludes financing for any building in a flood hazard area unless the community participates in the Flood Insurance Program. The deadline for participation was July 1, 1975 or one year after the community received its initial notification from the Flood Insurance Administration, whichever date was later. However, under the Flood Disaster Act, the denial of federal or federally-related financing only applies within the flood hazard area, not to buildings outside of the area.

In order to qualify for the Flood Insurance Program, an affected community must enact flood plain management regulations meeting the minimum standards established by the FIA. The community must require building permits for all new construction and substantial improvements and review the permit to assure that the site chosen is reasonably free from flooding. The community must also require that any new construction within the hazard area must be elevated or flood-proofed according to federal standards. The flood plain management program is not required to be retroactive; only if there is substantial (over 50%) improvement or repair would the ordinance apply to existing structures. The Act resolves the "takings issue" by providing that the regulations may be established in any manner which is legally enforceable within the community: apparently, to qualify for the program, a community would not be required to compensate landowners should the minimal standards be considered a "taking" under local law.

(4) Require the purchase of flood insurance by property owners who are being assisted by federal programs or by federally supervised, regulated, or insured agencies or institutions in the acquisition or improvement of land or facilities located or to be located in identified areas having special flood hazards.

Under the National Flood Insurance Program established in 1968, the National Flood Insurers Association was established. The NFIA is an association of private insurance companies formed specifically to provide flood insurance under the cooperative government-private industry program. The NFIA appoints a servicing company, usually on a statewide basis, to provide information both to the public and insurance agents, to process all policies, and to handle the adjustment of claims for loss payments. Anyone attempting to purchase or build upon property within the special hazard area as determined by the Flood Insurance Administration must purchase a flood insurance policy from an agent representing the NFIA in order
to obtain any federally-related financing. The building to be constructed must also meet the federal standards for elevation or floodproofing in order to obtain insurance.

**Advantages of the Revised Federal Policy on Flooding**

Many experts in land use, economics, ecology and geology have long argued that the logical method for preventing flood damage is to keep development that would obstruct the flow of water out of the flood plain and let the river go its natural course. This concept forms the basis for the Flood Disaster Act of 1973 and the revised federal flood insurance program. In so far as the program correlates with the actual risks of flooding, the federally-mandated flood plain management program has the following advantages over previous programs:

- **Consistent with Nature of Flooding**

  As discussed earlier, any development obstructing the flow of flood waters increases the risk of flooding elsewhere. Levees and floodwalls also have this effect. Even flood control reservoirs often fail to control the rare off-season flood. The flood plain management program does not attempt to "outguess" nature and bring her under control, but instead focuses upon man's activities—a much easier task.

- **Consistent with "Free Enterprise" Analysis**

  Structural measures tend to bail flood plain landowners out of bad investments; their construction encourages speculation and lobbying by property owners who will achieve windfall profits if their land comes under protection. Flood plain management prevents a flood plain owner from shifting the risk of flooding to an adjacent landowner or to the public at large. Flood insurance is essentially subsidized protection for development already in the flood plain and allows affected landowners to join together to spread the risks of flood damage.

- **Reduces Expenditures by Government for Structural Projects and Flood Disaster Relief**

  The revised Federal Flood Insurance Program essentially establishes a status quo on floodplain development. This should break the cycle of development—>flood damage—>protection—>reliance—>development. The previous federal disaster programs relieved those who were damaged by flooding, but did nothing to prevent rebuilding in the same hazardous site.

- **Provides Consumer Protection to Homebuyers**

  By requiring communities with flood-prone areas to implement flood plain management programs, the Flood Disaster Protection Act also provides protection for those who might unknowingly rent or purchase property in an area subject to flooding.

- **Maintains Valuable Agricultural Land and Open Space**

  Much of the prime agricultural land in the United States is located in the nation's river valleys and often is subject to flooding. Agricultural use is one of the
acceptable uses under a flood plain management program. Thus the Flood Disaster Act should aid in the preservation of agricultural land by restricting the development that can occur in flood plains. In urban areas, the proper management of flood plains not only reduces damage from flooding, but provides open space, recreational sites, and access to river-oriented sports. Development of flood plains for public recreational use requires governmental acquisition in most cases. In many instances, cities can use revenue-sharing funds to purchase flood plain areas as the city of Lafayette, Indiana, did in establishing a municipal golf course on the banks of the Wabash River.

**FUTURE OF FEDERAL FLOOD INSURANCE PROGRAM**

The Flood Disaster Act of 1973 as it expands the National Flood Insurance Program represents a significant step forward in establishing a rational policy towards flood loss prevention. Although it is too early to evaluate the program on its merits since its implementation is barely under way, there are potential problems which may hinder the effectiveness of the program:

1. **Inadequate sanction for community’s failure to enact flood plain management program**

   The federal “stick” may be inadequate since the sanctions provided by the Flood Disaster Act only apply to areas determined to be under a special hazard classification, not to the community as a whole.18

2. **Inadequate standards**

   The “100-year” flood standard established by the Act may be inadequate given the magnitude of the flooding which occurred in 1972 and 1973.

3. **“Identification” of the special hazard area may prove to be a difficult and recurring task**

   As was discussed earlier, the flood plain is a transient entity. For example, a study by a team of researchers at the University of Massachusetts examined flood plains in three towns north of Boston. They found that due to urbanization and the resulting increases in impermeable surfaces in the area, what would have been the 100-year flood plain in 1952 was reduced to a 20-year flood plain by 1971.19

Flood plain management is only part of a sound overall land use planning program based upon ecological principles. Other factors involved with the natural process of flooding must also be considered. The preservation of wetlands, the maintenance of drainage areas within urban areas, and the reservation of forests and grasslands to absorb rainfall will also reduce flood damages. The Flood Disaster Act of 1973 is a positive beginning toward a federal policy on land use that recognizes the need to utilize land according to its natural capabilities, not according to man’s caprice.
FOOTNOTES


3Ibid.

4Id. at 585.

5Science Digest, March, 1973, at 56.


10Senate Report No. 93-583 (Comm. on Banking, Housing, and Urban Affairs) at 2 (1973).

11Ibid; but see “Planning For Floods”, a film by the Environmental Defense Fund in which it was stated that since 1923 the federal government had spent $24 billion on flood control projects.

12Time, June 26, 1972, at 23.


15Belt, supra note 7, at 681.


18Senate Report No. 93-583, supra.