



FLOODPLAIN MANAGEMENT

VOLUME 8, No.29

NEWSLETTER

AUTUMN 1990

OOPS!

(The Debris Line, September 1990)

In its natural state this river meandered some 103-miles through a chain of small lakes before emptying into a large lake. The floodplain associated with this river in the natural state was one-to two-miles wide and there were more than 50,000 acres of wetlands within its riverine area. In the 1890s, the river was made navigable but retained its serpentine nature. Ships could spend an entire day winding through the river meanders to reach a point which, by a straight line, was only a few miles from where it had started.

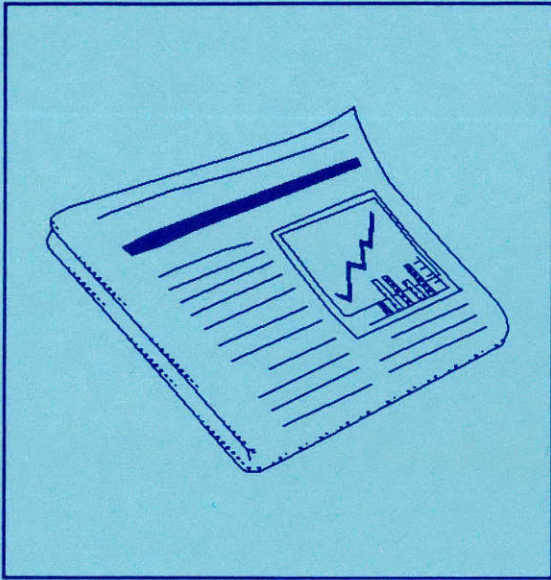
At the request of the state in the 1960s, the U.S. Corp of Engineers constructed a 300-foot wide, 56-mile-long canal straight through the riverine area in order to carry floodwater away from the center of the state. In so doing, the wetlands were drained and there was a reduction in the waterfowl population of approximately 90 percent.

The river is the Kissimmee and the major lake is Lake Okeechobee in the State of Florida. In 1976, only 5-years after the completion of the drainage project, the State of Florida passed the Kissimmee River

Restoration Act. In 1978, the COE initiated a feasibility study on the proposed restoration. The study concluded, in 1985, that the proposed restoration did not qualify for federal assistance. The State of Florida has, however, chosen to implement the restoration on its own. As the first phase of the restoration, a set of criteria has been developed as a guide to the restoration. This guide identifies the hydrologic characteristics which existed in the prechannelized river-floodplain and how the river functioned. Such factors as continuous and seasonal flow patterns, channel flow velocities, overbank flow, flow recession rates, and the frequencies of both aerial and time-wise distributions of floodplain inundation are included in the guide. The long term estimated restoration costs are \$276 million and the development of the restored river system could extend into the next century.

We need to know when projects are really floodplain management projects and we need to better identify the total (positive and negative) costs of these projects in order to avoid the problems which are now facing Florida. Floodplain management has to be more than just moving water.

DEC 21 1990



FLOOD INSURANCE RATES TO HOLD STEADY IN FISCAL 1991

There will be no rate increases for flood insurance in fiscal 1991, the third year in a row that the rates have remained stable. Harold T. Duryee, head of the FIA, said the decision to hold rates the same for coverage under the NFIP was based on results of an actuarial rate study that shows the NFIP can remain self-supporting in a historic loss year through fiscal 1991 without additional income.

The NFIP was created by Congress in 1968. The premium rates established at that time remained in effect for over a decade and throughout the inflationary period that followed. In 1981, the goal was established to make the NFIP self-supporting in an historical average loss year to reduce the financial burden of the program to the general taxpayer and to place more of the expense with those who benefit, the policyholders. To achieve this, a series of rate increases was initiated; the average premium for flood insurance grew from \$74 to the

current \$270. Duryee said the increase in the averages reflects both the rate increases and the growth in the average amount of coverage purchased. Prior to the initiation of the rate increases, the average coverage was \$45,000 per policy. Now, it is nearly \$80,000.

Duryee added one caveat to his comment on NFIP rate stability. "If the Congress instructs the FIA to carry out new projects or broaden coverage under the NFIP, then, barring appropriations to cover the costs of the projects or coverage, FIA will have to consider again raising premium rates for flood insurance."

At present, there are over two million policy holders protected by \$170 billion in coverage. In the last 11 years (1978-1988), the NFIP has paid out over \$2.5 billion to settle more than 349,000 claims for flood damage.



WHAT DO TEXAS AND OKLAHOMA HAVE IN COMMON?

(Oklahoma Water News, August 1990)

PLAYAS: A Little History

The most elusive of all water resources is the playa lake, a round, saucer-shaped depression that relies on the whims of nature for replenishment. But if the lakes are elusive, perhaps information on them is even more so. One researcher declared that finding information on playas is "like trying to read a newspaper from the confetti swept off the floor after a carnival."

Adding still more mystery to the playas is their ephemeral (or transient) nature, holding water only during and after rainy seasons unless they are nourished by irrigation runoff. Playas are the phantoms of the High Plains, appearing and disappearing with rainy spells in Cimarron, Texas and Beaver Counties. After a thunderstorm, nearly 600 water-filled playa basins spangle the Ogallala region of Oklahoma, but only a handful survive for significant periods. Because the region receives only 15 to 22 inches of annual precipitation, and rain falls erratically as localized thunderstorms, playas are not dependable sources of water.

In the mid-1800's, western explorers and scouts discovered playas to be useful camping spots. Others, including Stephen H. Long, famed explorer and railroad engineer, found them to be impediments to horse and wagon travel. If a cartographer crossed the region during a wet season, the resulting

map would indicate abundant water. But those following the map's reference points during a dry season would encounter little water, if any. Journalist John Russell Bartlett traveled through the Oklahoma Panhandle for two days without finding water, passing several dry playas with such names as Mustang Ponds and Wild China Ponds.

Panhandle's unique saucer lakes gather rainfall and runoff

Playas form much like puddles during a rain, collecting runoff in areas where no external drainage exists, and there are typically no defined waterways entering or leaving them. The drainage area of a single playa lake varies from a few square miles to as much as 50 square miles.

The shallow depressions vary in diameter from a few hundred feet to several miles, but their water-surface area is seldom wider than one mile. Depths vary from a few feet to 40 feet, and this feature combined with large surfaces and arid climate make the basins prey to evaporation and seepage. At least 50 percent of playa water is lost to evaporation, and 10 to 15 percent (perhaps as little as a half-inch annually) percolates downward as recharge to the Ogallala Aquifer.

Oklahoma's exceptional playa is Wildhorse Lake, a vast playa modified by its Texas County owners to store irrigation water throughout the year. Originally covering 120 acres, the natural lake was deepened by a 30-acre hole that reduces the water surface to 34 acres and collects water from a 22,000-acre watershed.

Geologists conclude that playa depressions were formed by wind erosion during dry

periods. Windblown material is 30 to 40 feet deep, and below that lies a layer of mixed fine sand and clay called caliche that acts as a seal against leakage. Thousands of years of scouring by sands borne on the persistent prairie winds and some alternate periods of leaching eroded the calcareous cement of the underlying caliche to carve out the hollows. Formation of playas probably occurred during two periods-5,000 and 17,000 years ago.

In general terms, playas are classified according to their persistence. Those considered perennial contain water more than nine months of the year; intermittent ones, three to nine months; and ephemeral playas last less than three months. Rainfall received in March, April and May is critical to the playas' life expectancy.

Oklahoma playas overlie the prolific Ogallala Aquifer, a Tertiary geologic formation consisting of sand, siltstone, clay, lenses of gravel, thin limestone and caliche. Surface soils of the Panhandle vary from shallow, sandy soils with outcrops of shale and sandstone to deep clay loams over heavy clay loams to areas of thick sandy loams. Prob

ably the most extensive study of Oklahoma's playa lakes was the Llano Estacado Playa Lake Water Resources Study performed by the Bureau of Reclamation and published in 1982. The study covered 85,000 square miles of the Ogallala Aquifer. Although most of the study lay in Texas and New Mexico, researchers also considered Oklahoma's Panhandle and other areas. The study in the three Panhandle counties during the wet period identified 585 playa lakes with a total of 9,572 acres of water-surface. However, by the dry season, the number of lakes and their area had shrunk dramatically. According to the Llano Estacado Study, not a single playa in Cimarron County held any water during the arid period.

The value of water in such a dry region is nearly inestimable and certainly that water held in playa lake storage is the landowner's cheapest water supply. There is no doubt that humans and livestock benefit enormously, but wildlife are also beneficiaries. Lying on the Central Flyway, playas, wet or dry, offer ideal ecological settings by providing diversity to a habitat that is almost entirely cropland or pasture.

IS THAT DEVELOPMENT SAFE FROM FLOODING?

CHECK ALL DATA SOURCES

(Arizona FLOOD MANAGEMENT NEWS)

Most readers are aware of flood insurance studies prepared by the Federal Insurance Administration (FIA) for use by community officials and other decision makers involved in flood damage reduction measures. But

what if a particular community, area, or stream reach is not covered by a study? Here this problem and another that is becoming more common are addressed.

Two problems often arise when the flood hazard potential of a site-specific development is being investigated. First, detailed flood hazard data are not always available for every site. Decision makers may need to investigate several sources before obtain-

ing the best data, or in establishing that no data are available. Secondly, because increasing flood damages occur outside of traditionally designated 100-year floodplains, it may be appropriate to consider using a higher flood standard in siting or constructing proposed activities that would be significantly impacted if flooded. The FIA has published data through the National Flood Insurance Program (NFIP), for maps that serve as the bases for flood hazard identification, and enactment and enforcement of local floodplain regulations. The Flood Boundary-Floodway Map (published with the Flood Insurance Study) should be investigated first.

Because of budget, program policy and program benefit considerations, FIA maps may not show the entire flood hazard potential in each community. Predetermined cutoff points have been established for detailed flood hazard studies including stream reaches with drainage areas of less than one square mile and stream reaches not experiencing or expected to experience development pressure at the time of the study. There still exist many areas, including streams within communities where flood insurance studies have been prepared, without their flood hazard potential identified. All areas subject to flooding are not indicated on these maps for many of the above reasons, or due to lack of data.

With all this in mind, those responsible for investigations and decisions regarding the flood hazard of a particular site or land parcel should not be satisfied with flood hazard data shown solely on FIA maps. Rather, if the flood hazard of the stream reach in question has not been identified in detail (through a flood insurance study), they should seek other data to ensure that

floodplain investment will not be subject to flood damage.

Other sources of floodplain information meriting investigation include the files and studies of other federal agencies such as the U.S. Army Corps of Engineers, the Soil Conservation Service, and the U.S. Geological Survey, which have collectively prepared flood hazard studies for several thousand communities and areas and through technical assistance programs and investigations. These agencies have collected or developed floodplain information for numerous sites and areas. For information on availability of floodplain data, contact the appropriate agency office. Some state agencies and private engineering and planning consultants also have information on past flood experiences and are very knowledgeable about areas subject to high-risk flood hazards.

Although the 100-year flood is generally used as the regulatory standard by communities participating in the NFIP, investigations of actual flood experiences and recent studies of flood insurance claims, have revealed that significant damage is occurring to structures located in the 500-year floodplain, often in areas FIA maps show as minimal flooding (Zone C) areas. In addition to seeking the best available data from several sources, decision makers should ensure that proposed developments are planned with the effects of flood higher than the 100-year flood being explicitly considered and minimized to the fullest extent practicable. Utilizing an alternate site outside flood hazard areas, minimizing exposure to flood losses by elevating structures or sites, or using other flood damage reduction techniques may afford better flood protection. These measures may best protect investments from flood damage.

COMMUNITY RATING SYSTEM

Does the title **Community Rating System** look familiar? It should! Several articles have appeared in prior issues of this publication in an attempt to keep you informed about the development of the Community Rating System (CRS).

Also, you may have received a flyer from the Federal Insurance Administration (FIA) regarding three Community Rating System workshops held in Texas in May 1990. We certainly hope that you took advantage of the free registration offered, and that you or someone from your Community attended one of the workshops.

Why has so much emphasis been placed on the CRS and the importance of attending a CRS Workshop?

It is because we have learned from Community Assistance Visits and telephone contacts with local communities that many of the smaller jurisdictions do not believe they can qualify for enough community credit points to make the effort worthwhile. **This may not be true!** Applications for participation in the CRS will be accepted by the FEMA Region VI office in Denton through December 15, 1990. CRS classification takes effect October 1, 1991. Any community that participates in the National Flood Insurance Program (NFIP) may apply for CRS classification to obtain flood insurance premium rate credits for its residents.

While participation in the CRS is voluntary, every community in the NFIP will receive a classification rating on October 1,

1991. There are ten community classes in the CRS, ranging from most credit for Class 1 communities to no credit for Class 10. On October 1, 1991 all communities that have not applied for CRS classification are automatically Class 10 communities. By applying for the CRS you will have the opportunity to reduce the cost of insurance premiums for your community and receive credit for floodplain management activities you have been performing for some time without recognition.

The CRS concept is based on the fact that the fire insurance public protection class given to a community has been a very strong incentive for local officials to maintain or improve their fire protection program. Local government officials ensure that their fire alerting systems, communications, water supply and distribution, and overall fire department facilities, including staffing, training and equipment meet or exceed the insurance industry's minimum criteria in order to maintain favorable property protection rate classes for their communities. Through the CRS, the Federal Insurance Administration hopes to reduce flood losses, facilitate accurate insurance rating, and promote awareness of flood insurance.

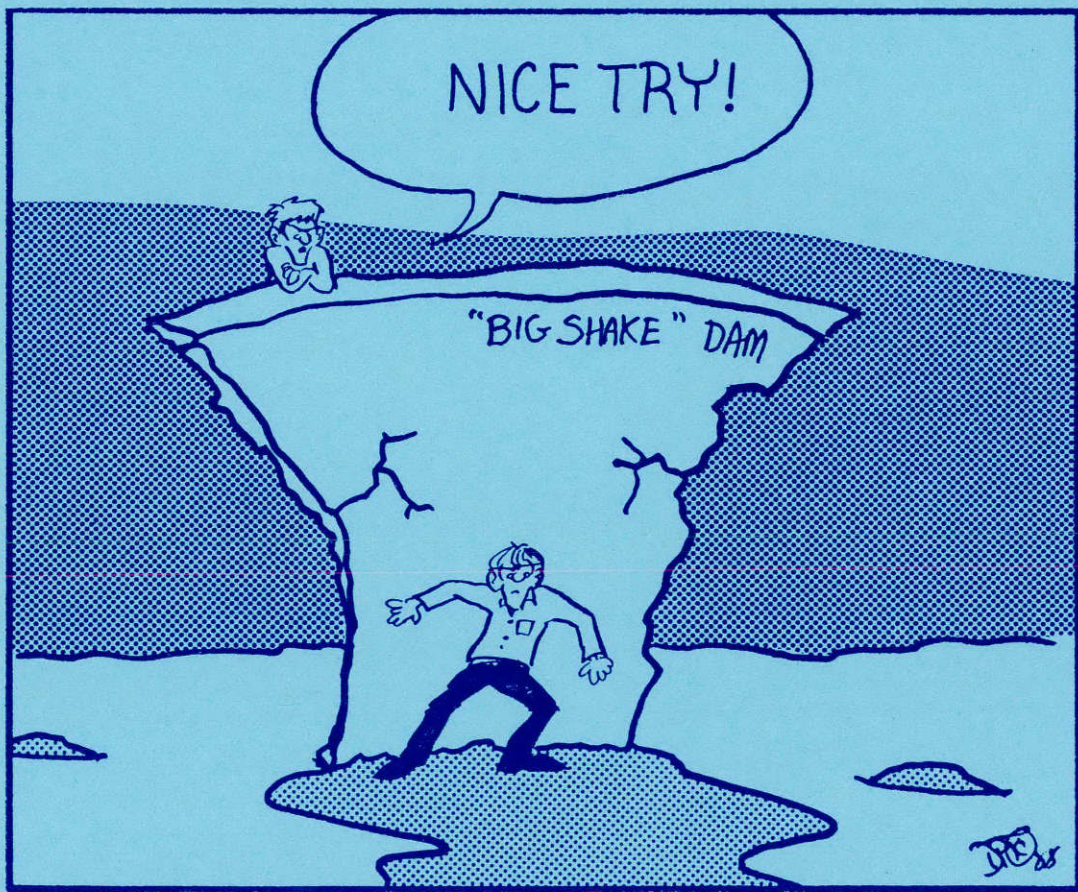
Information disseminated earlier was clarified at the workshop. For example, the prerequisite requirement that FEMA elevation certificates be on file for the post-firm structures identified as being in a special flood hazard area on the Flood Insurance Rate Map (FIRM). There is a prerequisite requirement for use of the elevation certificates, however, that prerequisite is defined in the CRS manual as **"the community will start using the FEMA elevation certificates on the date they make application**

FEMA elevation certificate can be used for computer data processing. **Extra credit** will be provided to those communities employing the FEMA elevation certificates **prior** to application for participation in the CRS or to those communities that retroactively transfer the information from past record keeping into the FEMA elevation certificates.

Those who attended the workshop learned to identify the documentation needed to apply for the CRS, understand the documentation for each credit activity, know the application

calendar, and understand how credit points are determined. Also, reference materials were provided to each attendee to assist in calculating credit points to determine the classification benefits of making an application.

Unless you attended the workshop, you may be ill-prepared to answer the questions that are surely going to be asked by your local government officials! So, if you have questions about the CRS, please telephone the FEMA Region VI, CRS Coordinator, Wayne Fairley, at (817)898-9124



FLOOD FOLLIES

By David Terry

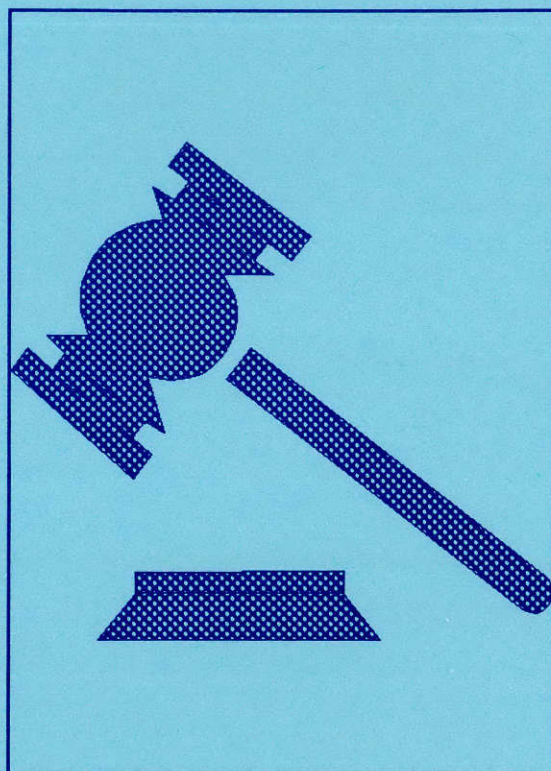
WHEN FLOOD INSURANCE IS MANDATORY

(Arizona FLOOD MANAGEMENT NEWS)

All federally regulated lending institutions lending money for purchasing or improving buildings located in special flood hazard areas (SFHAs) must require the borrower to obtain flood insurance. This is the law.

Section 102, of the Flood Disaster Protection Act of 1973 contains the mandatory purchase provisions. The most important factors to keep in mind are:

- o The mandatory requirements do not pertain to buildings in nonparticipating communities or flood zones outside of SFHAs, (i.e., B, C, D and X zones). However, the lending institution, as part of its lending policy, may require the borrower to purchase flood insurance for those areas outside of SFHAs, or in a greater amount than required by statute.
- o Because the NFIP does not insure land, the provisions of the Act only apply to buildings.
- o The lender is not required by federal legislation to make the borrower purchase flood insurance for more than the amount of the loan or more than twice the amount of insurance available under the Emergency Program. Currently, this would amount to \$70,000, for a single family building and \$200,000 for other buildings.



- o In determining the amount of insurance that should be required, it is prudent to encourage sufficient coverage to protect both the lender and the borrower in the event of a total loss. Coverage cannot exceed the maximum amount available and should not exceed the insurable value of the building.

To assist agents and lenders in gaining a more in-depth understanding of the provisions of the statute regarding mandatory purchase, the NFIP conducts agent and lender seminars in numerous locations throughout the United States and its territories. You are encouraged to contact the NFIP, toll free, at 1-800-638-6620, to obtain dates and locations of seminars nearest you.

SUBSTANTIAL IMPROVEMENT and the NFIP

One of the basic requirements of floodplain management under the NFIP is to protect new or substantially improved structures from the 100-year flood.

The following questions and answers may help shed some light on this often misunderstood requirement.

1. Q. WHAT IS SUBSTANTIAL IMPROVEMENT?

A. Substantial improvement, as defined in 44 Code of Federal Regulations Section 59.1 means:

"any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either,

- (a) before the improvement or repair is started, or
- (b) if the structure has been damaged and is being restored, before the damage occurred.

For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either

- 1) any project for improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions or
- 2) any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places."

2. Q. WHY WAS THE 50% FIGURE CHOSEN AS THE SUBSTANTIAL IMPROVEMENT THRESHOLD?

A. The 50% threshold was chosen as a compromise between the extremes of

- 1) prohibiting all investment to structures in flood hazard areas which does not meet minimum FEMA floodplain management requirements for elevation and
- 2) allowing structures to be improved in any fashion without meeting any regulatory standards.

In the first alternative there is the potential for causing hardship to those who have located in flood hazard areas without knowledge of risk. These individuals would not be able to improve their structures as damage or age contributed to

their deterioration. The second alternative provides no mechanism to ensure that increased investment in flood hazard areas will receive needed protection from the flood risk, thus contributing to the increased peril to life and property. The threshold is thus a compromise at a half-way point and was chosen because it conforms with similar building code and zoning standards that also use a 50% threshold.

3. Q. WHAT ARE SOME EXAMPLES OF THE WAYS IN WHICH STRUCTURES CAN BE SUBSTANTIALLY IMPROVED?

- A. Generally, structures are substantially improved in one of three ways:
- 1) Rehabilitations - are improvements made to an existing structure which do not affect the external dimensions of the structure;
 - 2) Additions - are improvements that increase the square footage of a structure. Commonly this includes the structural attachment of a bedroom, kitchen, den, recreational room, or other type of addition to an existing structure;
 - 3) Substantial Damage - structures are considered substantial improvements when they incur substantial damage.

(Although this document primarily addresses substantial damaged structures, it should be noted that substantial improvement occurs much more commonly in non-disaster, everyday situations through the rehabilitation of, or addition to structures).

4. Q. IN TERMS OF NFIP REGULATIONS, IF A STRUCTURE IS DETERMINED TO BE A SUBSTANTIAL IMPROVEMENT WHAT MUST HAPPEN TO THAT STRUCTURE?

- A. A substantially improved structure must be brought into compliance with NFIP regulations and requirements in the local ordinance for new construction; that is, it must be elevated (or floodproofed if it is a non-residential structure) to or above the level of the 100-year or base flood.

5. Q. WHAT IS A SUBSTANTIALLY DAMAGED STRUCTURE?

- A. A building is considered to be substantially damaged when it sustains damage from any cause, whereby the cost of fully restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before damage occurred.

6. Q. IN TERMS OF NFIP REGULATIONS, IF A STRUCTURE IS DETERMINED TO BE SUBSTANTIALLY DAMAGED WHAT MUST HAPPEN TO THAT STRUCTURE?

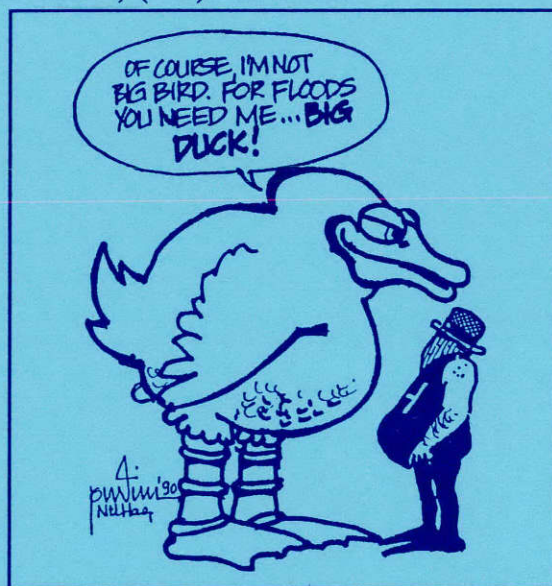
- A. All structures that are determined to be substantially damaged are automatically considered to be substantial improvements. In other words, if the cost necessary to fully repair the structure to its before damaged condition is equal to or greater than 50% of that structure's market value before damages, then the structure must be elevated (or floodproofed if it is non-residential) to or above the level of the base flood.
7. Q. WHEN A STRUCTURE IS COMPLETELY DESTROYED AND A NEW STRUCTURE IS TO BE BUILT ON THE OLD FOUNDATION OR SLAB, IS THAT STRUCTURE CONSIDERED A SUBSTANTIAL IMPROVEMENT OR NEW CONSTRUCTION?
- A. It is considered a substantial improvement. However, it really does not matter whether it is referred to as new construction or a substantial improvement because in either case the structure will have to be elevated (or floodproofed if non-residential) to or above the elevation of the base flood.

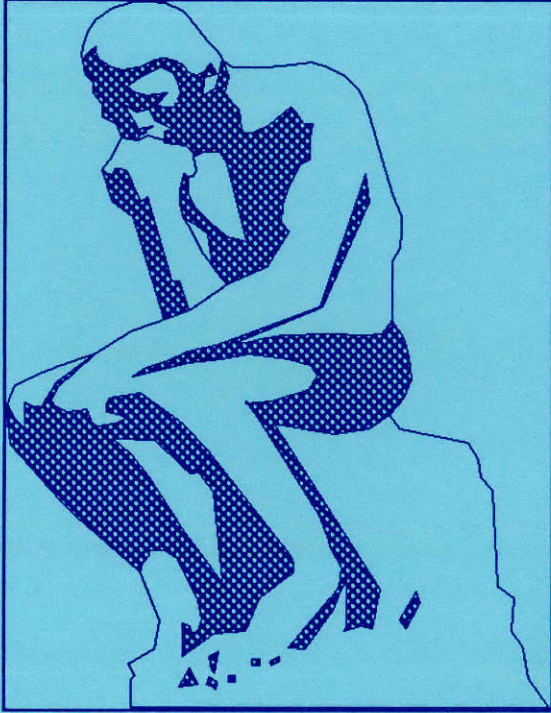
Big Bird Preparing for Floods

Big Bird is at it again. The Children's Television Workshop is using Big Bird, other Sesame Street characters, and Willard Scott to help educate children about floods. Big Bird GET READY for FLOODS™ training kit follows on the footsteps of the successful and widely popular Big Bird GET READY for Hurricanes™ and Big Bird GET READY for Earthquakes™ kits.

Games, songs, and stories are used to teach children about floods and how to safely respond to them. The kit contains an informational booklet for children and their parents, a cassette tape with songs and stories presented by Sesame Street regulars, and a "You're All Wet!" match-the-message card game. The game messages -- "If a flood is coming, I have to get away from the water to a place that's safe and high" and "Playing in storm drains is not safe, so I stay away from them" -- provide a fun way for parents

and children to learn flood safety and preparedness tips. Individual free copies are available by contacting Adrienne Lesser, Children's Television Workshop, Department NH, One Lincoln Plaza, New York, NY 10025, (212) 595-3456.





DISASTER RELIEF PROCESS: Change It?

Raymond J. Burby of the University of North Carolina has looked at it and his comments are below:

REFORMING RELIEF - an invited comment

(Source: Natural Hazards Observer,
September 1990)

State and local governments lose nearly \$1 billion a year as result of earthquakes, floods, hurricanes, and other natural hazards. The federal program put in place to deal with this problem - the public assistance provisions of disaster relief - is inefficient,

inequitable, and only marginally effective in fostering mitigation and reducing governments' susceptibility to loss. Evidence to support their assertions and possible reforms to cure these problems are presented below.

Efficiency

Disaster relief is inefficient because it gives federal funds to local governments for losses so small that there is little economic benefit from the relief afforded. Two-thirds of 6,800 local governments receiving federal disaster assistance during the first seven years of the 1980's for example, lost less than \$50,000 in the presidentially declared disasters for which they received aid. In most communities, losses per capita were less than \$10. There is no evidence nor any theoretical justification for believing that individuals would be risk averse to such small losses when they are shared among other members of their community. Clearly, there are no economic efficiency benefits gained when disaster relief spreads losses even further across all taxpayers in the nation. Federal assistance for minor losses can only be regarded as transfer payments, and there is little reason to believe that the equity consequences are, on balance, positive.

In fact, a majority of the local governments that experience losses in presidentially declared disasters can cover their costs for response and recovery using already budgeted contingency funds. In research conducted by the author and associates, almost 500 cities and counties sampled showed that typical locality losses of \$14 per capita could be covered through funds on hand. Sixty-eight percent of the sample that received disaster assistance, however, got federal aid for losses that were less than their

problems where local resources clearly are adequate. The policy conclusion is clear: federal policy should only address those cases with significantly higher per capita losses than is now the case.

Equity

Federal disaster relief is inequitable in three respects. First, it provides aid to all governments experiencing losses - no matter how small - in a presidentially declared disaster, but denies aid to all local governments experiencing losses - no matter how large - in a disaster that does not receive a presidential declaration. But our research found no evidence that losses to cities and counties were significantly higher in localities receiving aid than in those where aid was denied, or that on average, those receiving aid were less able to recover using their own resources than those where aid was denied.

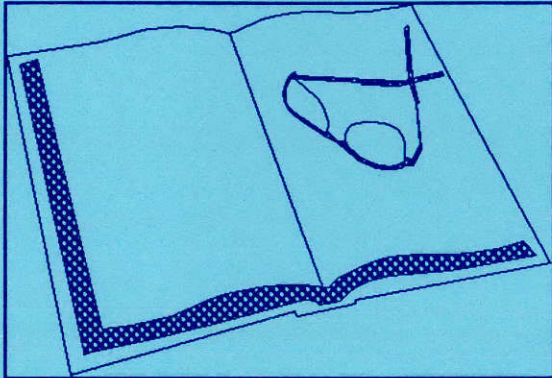
Second, the federal assistance program ignores the fact that losses to local governments are shared by all of the citizens of a disaster-stricken locality through the local tax system that provides funds for public expenditures. By reimbursing the same proportion losses of large cities and counties (where losses are spread widely) as small cities and counties (where losses are concentrated on fewer individuals), federal relief discriminates against the citizens of smaller local governments. For example, our research found that on a per capita basis, losses net of federal aid were three times higher in cities under 5,000 population than cities over 100,000 population. There is no justification for a policy that requires citizens of smaller communities to bear significantly higher losses in natural disasters than citizens of larger communities.

Third, citizens in areas less prone to disasters and served by governments more cautious in the location and design of public facilities subsidize citizens of disaster prone localities and those where local officials have not been prudent in facility design and location. Again the policy conclusion is clear: the provision of disaster relief should be based on the size of individual governments' losses, not just the size of aggregate area-wide losses, as is now the case. Relief should be based on losses per capita rather than on a fixed proportion of aggregate losses, and subsidies to disaster-prone and imprudent localities should be reduced or eliminated.

Mitigation

Federal disaster relief provides citizens with a form of insurance against losses to infrastructure and other governmental property. Like any sound insurance program, it should foster investment in measures that reduce the risk of loss. Our research indicates that this is occurring, but on a small scale. Local governments that experienced a disaster and receive federal aid during the first seven years of the 1980s are now more likely to have in place measures to reduce future losses than local governments that experienced a disaster and did not receive federal aid. That appears counter intuitive (most experts believe relief leads local governments to underinvest in mitigation); but, on reflection it is not. Beginning in 1974, federal legislation and administrative policies have linked disaster relief to state and local efforts to reduce future losses, and those measures are having some effect. But, again, the effect is small. Most local governments, both aided and unaided by disaster relief, are in fact doing very little either to reduce the threat of loss by adopt-

But, again, the effect is small. Most local governments, both aided and unaided by disaster relief, are in fact doing very little either to reduce the threat of loss by adopting various loss reduction measures or to reduce the fiscal consequences of loss by purchasing flood or earthquake insurance.



Proposed Reform

There is ample evidence of the need to reform the public assistance provisions of the federal disaster relief program. To be efficient, equitable, and effective, a revised disaster relief program should have four elements:

1. It should be available to all local governments and thus be independent of the presidential disaster declaration process used to provide aid to individuals and businesses.
2. It should provide federal aid for 100% of losses above a relatively high threshold of loss (\$50 per capita adjusted for local ability to pay seems appropriate, but the actual amount requires further analysis).
3. It should make available (but not require) insurance for local govern-

ment losses (to all types of infrastructure from all types of hazards) below that threshold and above some minimum amount below which local government would be wholly responsible for losses (\$10 per capita seems appropriate for this purpose).

4. Like the National Flood Insurance Program, it should condition eligibility for aid and insurance on the adoption of a loss-reducing plan and a program that meets minimum federal standards.

The proposed retention of relief for truly catastrophic losses (rather than sole reliance on a federal insurance program) stems from the need to cover the staggering, multibillion dollar losses to infrastructure that would occur in an extraordinary event, such as a magnitude 7.9 earthquake centered near a metropolitan area.

Making aid available on the basis of an impact ratio (losses per capita), rather than through the current disaster declaration process, would improve equity by providing assistance to small communities severely impacted by natural disasters that are not large enough to merit a presidential declaration. Because of differing abilities to pay, a per capita loss measure should accommodate income differentials across communities - possibly by multiplying losses per capita by the ratio of community per capita income to national per capita income.

By instituting a high deductible, income transfers through relief would be limited to only those communities that experience truly catastrophic losses. Such a program would reduce the drain on the national treasury due to disaster relief (we estimate that a \$50 loss

reduce the drain on the national treasury due to disaster relief (we estimate that a \$50 loss per capita threshold for relief would reduce the public assistance portion of relief costs to cities and counties by about 90%), and would recognize that natural tendency for Congress and the American people to provide assistance to those in need. By paying 100% of losses over \$50 per capita, administration of relief would be simplified, and much of the current wrangling among federal, state, and local officials over which losses are and are not eligible for aid would be eliminated.

The provision of insurance at actuarially sound rates would provide an economically more efficient means of spreading risk than disaster relief. If a community's citizens are not particularly risk averse, however, this proposal would allow them to forego the cost of insurance and to deal with the risk of loss in other ways. However, by using relief to cover extremely large losses (over \$50 per capita) and requiring localities to bear on their own the numerically more frequent small losses (under \$10 per capita), insurance rates would probably be easily affordable for most communities.

Requiring local governments to absorb losses of less than \$10 per capita reflects communities' ability to pay for losses on their own (thus eliminating unnecessary and inequitable subsidies) and would stimulate local attention to loss reduction. Because local governments, like individuals, tend to discount the possibility of ever experiencing a loss, however, relief and insurance should not be available as a matter of right, but only to those governments that exercise due prudence in managing their capital stock.

The proposal sketched here addresses and arguably, solves all of the flaws uncovered in our study of the public assistance provisions of the disaster relief program. While it needs further study and elaboration, this proposal is offered here to stimulate discussion and encourage federal agencies to invest in the research needed to move forward with these ideas.

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REMEMBER

Your community receives one copy of this Newsletter. Please circulate to all key personnel with responsibilities in Floodplain Management or Emergency Management.

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