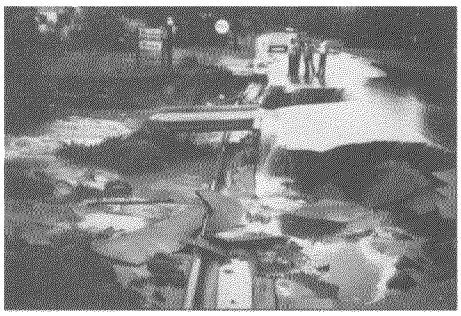
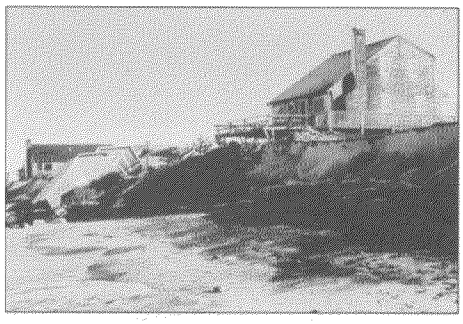
*Although less dramatic than urban or coastal flooding, rural flooding and consequent agricultural losses account for almost 50% of flood damages in the United States*

*Flooding along the Snohomish River, Washington State, November 1986.*



*Damages to infrastructure may account for as much as 25% of the total damages incurred during flooding*

*Bridge damaged by flooding, Jefferson Island, Louisiana, 1979.*



*In a 1971 study, the Corps found that approximately 24% of the nation's shoreline was significantly eroding Two-thirds of this land was privately owned*

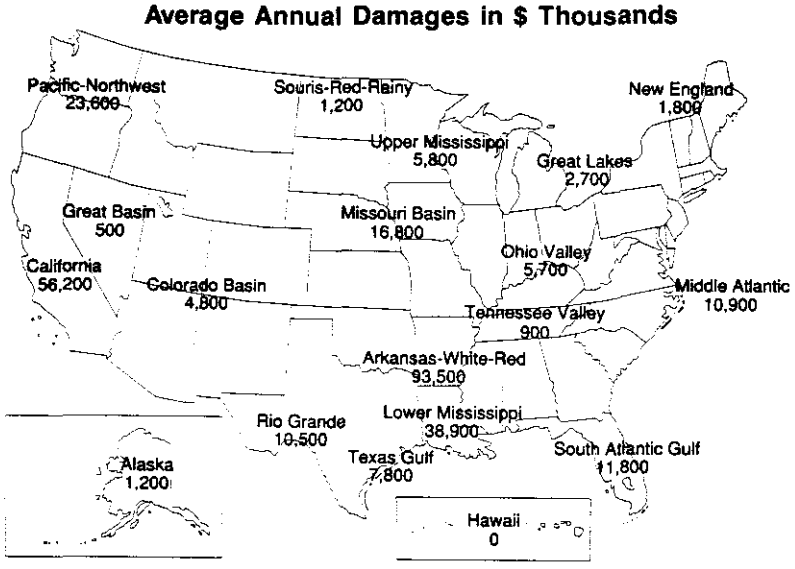
*Dune erosion and house collapse, Sandwich, Massachusetts*

## Loss of Life and Property

Between 1916 and 1985 there were, on average, 101 flood-related deaths annually; there is no indication that deaths are increasing or decreasing on a per capita basis. On the other hand, there definitely was an increase in flood damages over that 70-year period Per capita flood damages were almost 2.5 times as great from 1951 to 1985 as from 1916 through 1950, after adjusting for inflation. Property losses from floods appear to have been fairly constant in relation to the overall national economy. For example, flood losses in 1937 in the Ohio and lower Mississippi River basins ($440 million) amounted to .0049% of the GNP for that year. Flood damages in 1983 ($4 billion) amounted to only .0012% of GNP. Consistent, reliable data on historic flood deaths and damages are still not being collected. Information on the financial aid given by many federal and state agencies is not available in a form that separates flood-related damages from other types of natural and technological disasters. Nevertheless, there are numerous figures available to help establish the type and extent of damages suffered.

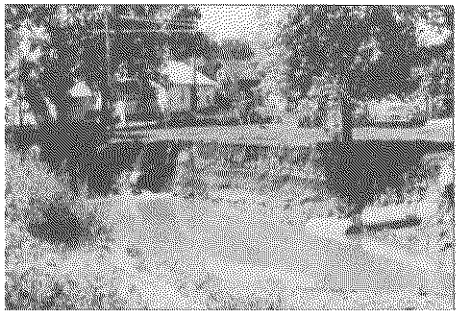
- Floods account for more losses than any other natural disaster in the United States (with the exception of drought losses during certain years or long-term periods). In most years flood damages constitute the bulk of federal financial aid for disasters.
- From 1981 to 1985, about 23% of all Presidentially declared disasters involved coastal flooding, and about 49% of federal disaster aid obligations were attributable to coastal damage.
- A total of $2.6 billion in flood insurance claims were paid out by the National Flood Insurance Program from 1978 to 1987. Over 31% were for flooding in areas outside the 100-year floodplain—the result of rapid urbanization that exceeds the capacity of managers to remap and regulate, or to manage stormwater.
- The Federal Highway Administration provided $442.3 million in emergency relief from 1986 through 1989.
- About half of the nation's annual flood damages are agricultural losses.
- The Small Business Administration issued $78.7 million in economic injury disaster loans and $67.9 million in physical disaster loans in fiscal year 1989.
- On irrigated cropland, flooding can damage irrigation facilities, such as ditches, pipelines, and sprinklers Sediment deposited by flood waters can reduce long-term yield by covering fertile land with infertile deposits and can damage existing crops by interfering with their growth. These losses range from $150 to $500 million annually
- A review of eight disasters from the 1950s and 1960s found that damages to infrastructure accounted for about 25% of the total damages Other estimates put that figure at 10–19%.
- Over three-fourths of all Presidentially declared disasters involve flash flooding; flash floods have been the cause of most weather-related deaths in the United States.
- A study of streambank erosion estimated $295 million in average annual damages Neither the damages from nor costs of coastal erosion have been estimated.
- Total national losses from lake level fluctuations exceeded $250 million from 1981–1986.
- The overall damages and cleanup costs from the 1980 eruption of Mt. St. Helens, which caused catastrophic flooding and mudflows, were estimated at $1.2 billion; over $875 million was needed to restore land, clean up rivers, and provide flood protection to area communities.
- Three tsunamis have resulted in losses in recent times. 173 deaths in Hawaii in 1946, 61 deaths in Hawaii in 1960; and 107 deaths in Alaska, 4 in Oregon, and 11 in California in 1964, plus $100 million damage on the West Coast

**Streambank Erosion**
**Average Annual Damages in $ Thousands**




U.S. Total = $294,600,000

*Source:* U.S. Army Corps of Engineers



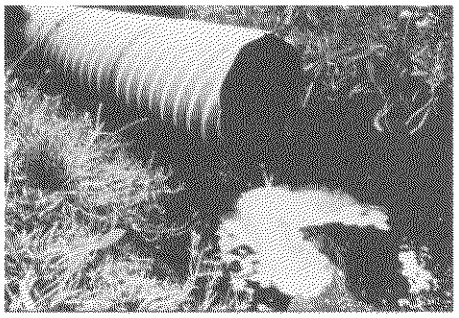
*The Corps estimates that in the United States there are 574,500 miles of stream bank with erosion problems—142,100 with serious problems. About 78% of all stream bank erosion takes place west of the main stem of the Mississippi River.*

## Loss of Natural and Cultural Resources

All three types of floodplain resources—water, living, and cultural—are threatened by human use of the floodplain, whether for urban development or seemingly benign agriculture or forestry. Furthermore, because floodplains are integrated natural systems, tampering with any one of the component natural processes may often lead to trouble. Increased runoff resulting from widespread clearing of vegetation, destruction of wetlands, dune removal, paving, roofing, and other activities can increase flood peaks, stream erosion, and sediment transfer. Blocking runoff or interrupting the movement of groundwater can raise flood profiles, increase pollution, and interfere with groundwater balances and the distribution of sediment. Fertilizers, septic systems, chemical and petroleum spills, and leached materials from waste disposal areas can degrade the surface and groundwater resources of floodplains. Recreational and commercial river traffic often seriously contributes to streambank erosion. Increased sediment can bury food sources and spawning areas and pollution can poison plants, animals, and other living things. Development can remove shelter and food, and prevent fish and other wildlife from moving through their habitat. Erosion of coastal wetlands and filling of wetlands destroys habitat. In many cases, developed floodplains do not have the aesthetic and recreational attributes of natural ones. Improper agricultural and forestry practices can be just as destructive of natural floodplain values as poorly planned urban development.

The nature of the value of natural floodplains makes the damage to them difficult to quantify, but the losses have been assessed even if no economic value has been assigned.

- Over 90% of the United States' coastal barriers are subject to flooding and erosion because of their seaward exposure, inherent instability, and relatively low-lying topography. In spite of these risks, 14% of the area of coastal barriers is urbanized (compared to only 3% of the entire mainland), including Atlantic City, Ocean City, Virginia Beach, and Miami. This development also interferes with the natural ability of the barriers to absorb storm energies, thereby reducing protection for mainland populations and development as well.



*Human occupation and use of a floodplain threatens its natural resources in many ways. Significant among these is the potential for increased pollution due to improper waste disposal, spills, and various forms of nonpoint source pollution.*