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Illinois' Twelve Most Damaging Storms

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ABSTRACT

The 12 most damaging storms in Illinois during the 1949-2008 period produced losses totaling $4.1 billion. Property losses were 84 percent of the total and crop losses were the rest. Two recent storms, one in April 2006 caused by multiple hailstorms and one in 2008 caused by heavy rains and flooding, were the two most damaging storms in the 60-year period. A wide variety of storm conditions caused the 12 storms including high winds, hail, tornadoes, heavy rains, flooding, high winds, freezing rain, and heavy snowfall. Eight of the storms occurred in recent years, since 1990, and the 12-storm losses peaked in 1999-2008 when $2.1 billion occurred, 51 percent of the 60-year total. The recent increase in major storms may reflect increased societal vulnerability due to growth in population and wealth, plus urban expansion. The increase may also reflect the change in climate due to global warming.

INTRODUCTION

High quality storm damage data have been collected in the U.S. since 1948 by the property and crop insurance industry. Insurance experts have adjusted the losses in each year to make them comparable to current year dollar values. A national assessment of all types of data about losses related to hazards in the U.S. found these insurance data to be the best measures in the U.S. (NRC, 1999).

The insurance loss data for Illinois have been assembled and analyzed for the 1949-2008 period to identify the 12 most damaging storms in Illinois. All storms causing more than $25 million (2008 dollars) in losses were identified, and the state's total was 68 for the 60-year period. The goal of this study was to examine the 12 most damaging storms so as to define the types of storm-producing conditions, the magnitude of their losses, and their temporal distribution during the 60- year period. Those impacted by major storm disasters should benefit from this information so as to better design and engineer recovery and relief activities. Those impacted by such storms include the disaster victims, damaged business owners, community leaders, public officials, tax payers, and the insurance industry.

An earlier study of severe storms in the Midwest (Changnon, 2002) found increases in storm-related losses during the 1990s. That study recommended follow-up studies in later

years to see if the 1990s increase in losses continued. This might reflect a change in climate due to global warming.

STORM DIMENSIONS

The 12 most damaging storms in the state are listed in table 1. Most of the losses were to property. However, sizable crop losses also occurred from seven storms including those in April 1964, August 1987, July 1993, May 1998, May 2003, August 2007, and September 2008. Each of the 12 storms produced total property losses greater than $200 million. The 12-storm total loss was $4.148 billion. Crop losses totaled $660 million, which represented 16 percent of the total storm losses.

The most damaging storm was the result of numerous hailstorms on April 13-14, 2006. An unstable air mass developed across the Midwest on April 13 with upper air conditions conducive to the development of severe thunderstorms. Eight large hailstorms occurred including one supercell storm that spread hail along a path that was 16 to 20 kilometers wide as it traveled southeast from the Quad Cities, producing damages in Peoria, Bloomington, and Champaign (Changnon, 2009). In some areas, hailstones were 10 to 7.5 cm in diameter. Four other extensive hailstorms caused major damages in the Chicago area including in many suburbs. Losses in Illinois included $301 million to homes and personal property, $160 million to businesses, and $187 million to vehicles, and these totaled $$648 million (Changnon, 2009).

The second most damaging storm in Illinois occurred when the remnants of Hurricane Ike crossed the state on September 12-14, 2008. The deep low pressure center and strong inflow of moist air resulted in rainfall amounts of 5.5 to 8 centimeters across most of the northern half of the state. In the Chicago area rainfall amounts ranged from 5 to 7.5 inches in 12 hours, setting new records (Changnon, 2010). These rains created several damaging flash floods, followed by more widespread flooding along the Illinois and Mississippi Rivers.

The third most damaging storm in Illinois occurred on May 5, 1950. A deep low pressure system passed just north of Illinois, creating winds of 60 mph across central and northern Illinois and gusts exceeded 80 mph at several locations (Weather Bureau, 1950). Property was badly damaged in western and northern Illinois with many trees blown down, poles and wires downed, and numerous roofs removed. A bridge over the Illinois River was destroyed, and weather experts in 1950 estimated the storm losses as $500 million, slightly higher than the actual losses of $441 million (table 1).

Six different severe weather conditions were the cause of these 12 major storms. Three storms were due to a mixture of tornadoes, hail, and high winds. Two storms were caused only by hail and two others solely by high winds. Heavy rains and flooding caused two of the storms, and only one storm was due to winter storm conditions (snow and freezing rain). Assessment of the 68 storms causing $25 million or more in losses during 1949-2008 showed that the most frequent conditions were those with a mix of tornadoes, hail, and high winds. This storm type caused 22 storms.

Table 1. The twelve most damaging storms in Illinois during 1949-2008.

Rank	Losses, $ millions	Weather Conditions	Date
1	648	Hail	4/13-14/06
2	502	Heavy rains and floods	9/12-14/08
3	441	High winds	5/4/50
4	401	Snow, freezing rain, high winds	4/4-6/03
5	336	Heavy rains and floods	4/13-15/92
6	321	Tornado, hail, high winds	5/2-4/03
7	297	Floods, hail, high winds	7/8-9/93
8	273	High winds	8/23-24/07
9	248	Floods, hail, high winds	8/13/87
10	243	Tornado, hail, high winds	4/2-3/74
11	235	Hail	4/2/64
12	203	Tornadoes, hail, high winds	5/27-28/98

TEMPORAL DISTRIBUTIONS

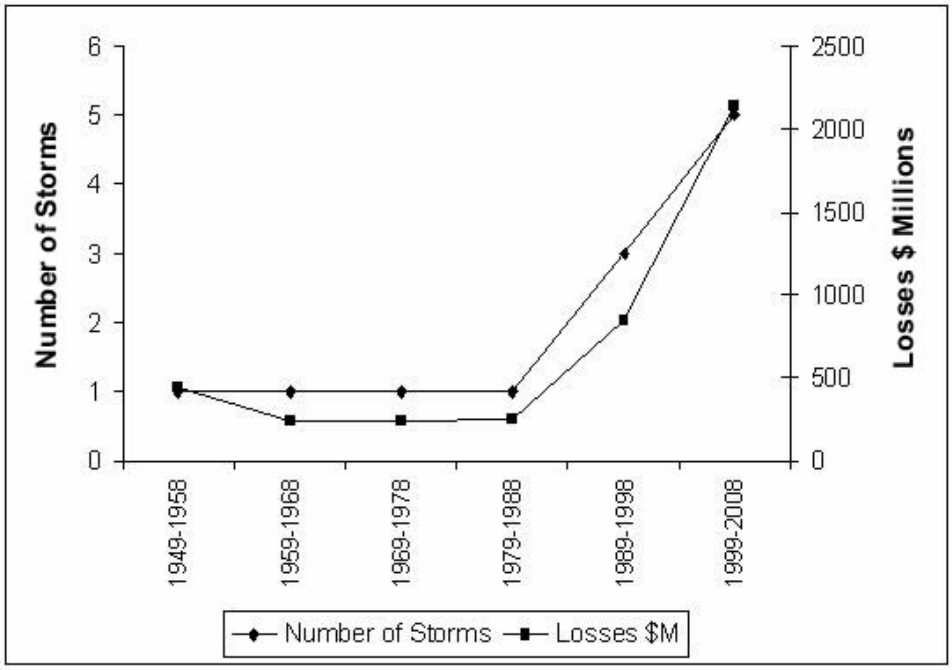
Assessment of the dates of the 12 storms showed that April led with 5 storms. May had 3, July 1, August had 2, and September 1. The frequency of storms by decades is shown in table 2, along with the amounts of loss.

Table 2. Number of storms and losses for six decades during 1949-2008.

Decade	Number of Storms	Losses, $ millions
1949-1958	1	441
1959-1968	1	235
1969-1978	1	243
1979-1988	1	248
1989-1998	3	836
1999-2008	5	2,145

The frequency of storms shows a marked increase with time beginning in 1989 (fig. 1). The frequency of the state's 12 most costly storms peaked at five in the 1999-2008 decade. Assessment of losses (fig. 1) also shows a dramatic increase after 1989. Very large losses occurred in the latest decade, 1999-2008. Three of the five storms during 1999-2008 occurred in the last three years, 2006-2008. Results show that increases in storms and their losses have continued after the 1990s, revealing the outcome after the earlier recommendation for a follow-up study (Changnon, 2002).

Figure 1. Temporal distribution of 12 most damaging storms and their losses during 1949-2008.



SUMMARY

The 12 most costly storms in Illinois during the 60-year period ending in 2008 were identified. Most of the damage was to property, and crop losses accounted for only 16 percent of the total loss of the 12 storms which was $4.148 billion. A wide variety of storm conditions caused the 12 events. Three storms resulted from a mixture of tornadoes, hail, and high winds. Two storms were due solely to hail and two solely to high winds. Heavy rains and floods caused two storms, and winter conditions (snow and freezing rain) caused one storm. The storms occurred mainly in the warm season. April had five storms, May had three, July had one, August had one, and September had one.

The temporal distribution of the 12 storms during the 1949-2008 period revealed distinct upward time trends in both storm incidences and their losses. Eight storms occurred in the 1989-2008 period, and losses in this period totaled $2.98 billion, 72 percent of the 60-year total. The distribution showed the highest values in the last 10 years, 1999-2008, an outcome that could reflect effects of global warming on the state's climate (Working Group II, 2007). The ever increasing losses could also be a result of the expanding societal vulnerability including growing population and wealth, plus expanding urban areas in Illinois which allow more storm damages to occur (Changnon, 2002). Regardless, the increases suggest Illinois should become prepared for more costly storm losses in the future.

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