



Roof blown off house



Impassable sidewalk



Trees and lines down



Prospect Nova Scotia

For many of us, the fall season is a time of thanksgiving as we celebrate rich, bountiful harvests, and marvel at the colors of the autumn whilst pursuing outdoor activities in comfortable temperatures. We rejoice with a renewed sense of optimism as the year winds to a close and a new one begins. For some, however, these months are difficult, with hurricane season in full force. This fear is very real for residents of the Caribbean, the southern U.S. states and Canada's Atlantic region, which lie in the path of danger.

SEEKING SHELTER

hurricanes in focus

By Paul Kovacs and Ian Campbell of the
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This has been an especially bad year for hurricanes south of Canada's border. Major storms have hit the Caribbean and southern U.S. states hard, and often blazing a long trail of death and destruction. U.S. and Caribbean insurance losses this year may be the largest on record and are certainly the worst since Hurricane Andrew struck in 1992. The region was rocked by three major hurricanes in just six weeks and the season is not yet over.

Dating back to 1995, researchers have noted multi-decadal periods of intense and more frequent hurricanes that affect the Atlantic region. Persistent upper atmospheric wind patterns and oceanographic phenomena, such as "thermohaline circulation" and warm water temperatures, are responsible for cycles of more frequent, intense hurricanes. In fact, these patterns are expected to remain aligned for at least another decade.

Atmospheric steering currents this year have pushed storms further west and inland, into the Caribbean and southern U.S. As such, hurricanes, which bring storm surges (a dome of ocean water that can be 5.5m at its peak and 100/200kms wide), extreme waves and surf, torrential rains that cause flash floods and sustained high winds, wreak havoc on densely populated, low lying areas.

HURRICANE FORCE

Hurricanes can sustain themselves for weeks. Upon reaching cooler water or land, however, they lose intensity. Before a storm attains hurricane status, it passes through the tropical storm stage, with wind speeds ranging between 63km/h to 118 km/h. Hurricane wind speeds exceed 118m/h. The ocean water temperature normally must be at least 26C degrees or higher for this natural hazard to form and

intensify. Most hurricane activity occurs from August to October.

A distinctive feature of a hurricane is the central core called the “eye”, where winds are relatively calm and skies can be cloud-free. Surrounding the eye is a region (eye-wall) of the most intense winds and rainfall. This recognizable feature allows these devastating storms to be easily spotted by satellite or radar observing stations (such as the Canadian Hurricane Centre located in Dartmouth, Nova Scotia). Being able to detect these storms, predict their evolution and track them, enables a d v a n c e warning and e m e r g e n c y preparedness activities to be undertaken by citizens potentially affected by the storm. This has significantly reduced hurricane fatalities, injuries, and property damage in developed countries like Canada and the U.S. However, there are still a large number of lives lost in countries lacking adequate warning systems.

CANADIAN TEMPESTS

Severe windstorms from hurricanes in Canada tend to be less frequent, yet they still caused a great deal of damage. Dozens of these major storms have wreaked havoc in Atlantic Canada over the years. The greatest loss of life was due to disasters at sea more than 100 years ago. Perhaps the greatest international attention to a Canadian and New England disaster was the “1869 Saxby Gale”.

Atlantic storms have led to damage across the Atlantic provinces but also sometimes into Quebec and Ontario. Residents of southern Ontario mark this year the 50th anniversary of “Hurricane Hazel” (October 15-16, 1954). Canada’s “storm of the century” battered the province and left in its wake a terrible toll – 81 people dead, \$100 million in property damage (in 1954 dollars) and thousands homeless. Residents of Nova Scotia and Prince Edward Island are also marking their own dubious anniversary – that of “Hurricane Juan” (September 29,

2003) which left seven people dead and caused \$113 million in insured losses in Canada’s Atlantic region – the largest insured loss ever recorded in the region.

Canada’s property and casualty insurers have taken important steps to lessen communities’ exposure to natural disasters, extreme weather and weather-related events. The Institute for Catastrophic Loss Reduction (ICLR) was created in 1997 to minimize the effects of natural disasters by reducing vulnerability through mitigation efforts. Multi-disciplinary research is a foundation for ICLR’s work to build communities that are more resilient to disasters. Funding is provided by the insurance community,



Fallen tree in Halifax

the University of Western Ontario and the Ontario Research and Development Challenge Fund.

MITIGATION RESEARCH

A significant ICLR project involves Professor Mike Bartlett and a team of researchers at the University of Western Ontario who are actively working on new strategies to protect homes and property from the destructive and unpredictable forces of nature. Tests have been successfully conducted on scale-model houses in Western’s “Boundary Layer Wind Tunnel”. The research team is now proceeding with the creation of a unique 13,000 cubic meter testing facility that will allow for the application of more realistic and extreme environmental loading due to wind, snow and rain, in a controlled manner on full-size houses and light-frame structures.

This \$7 million research project (dubbed the “Three Little Pigs” facility) will permit, for the first time anywhere, the application of realistically simulated time and spatially varying wind loads to full-scale houses and light-frame structures (including sheet steel buildings), in a controlled manner and up to the point of failure. This will enable researchers to assess the integrity of the overall structure of the building, the pathways by which the load is transmitted through the structure to the ground and the performance of

individual building components as part of the whole construction. Simulated snow loading will also be investigated.

The “Three Little Pigs” facility will allow alternative construction methods and materials to be rigorously evaluated. Simulated full-scale wind loading will be controlled so that geometrically similar structures made of different materials can be accurately compared. In addition, the facility (to be constructed in 2005) will be used to assess factors influencing the onset of moisture due to wind-driven rain and the development of harmful mold growth under realistic environmental conditions. Further, information on human error during the construction process will be collected and its impact on the potential damage and failure will be analyzed.



House under construction



Mobile home in Sambro Nova Scotia

PROTECTIVE MEASURES

In addition, ICLR’s project identifies building practices for new homes that will reduce the risk of hazard damage. The Institute has also published information that explains what people can do to protect their home. This information is available on the ICLR website (www.ICLR.org). For example, some simple preventative measures that homeowners can take to prevent hurricane damage include:

- Installing storm shutters to cover all exposed windows and glass surfaces;
- Covering window glass with a protective film so that it will not shatter if broken;
- Replacing gravel-rock landscaping material with shredded bark;
- Keeping trees and shrubs trimmed and removing weak branches;
- Securing or storing patio furniture and outside barbecues; and
- Cleaning leaves and debris from roof gutters, and removing vulnerable property from basement floors.

Perhaps the greatest tragedy of all is that many disaster losses can be prevented if people take time to plan ahead. Simple, low-cost actions taken today can lessen future losses. Only by reducing our vulnerability will Canadians exposed to Atlantic hurricanes minimize the likelihood that these powerful beasts result in disasters.

