How to manage forests in hurricane impact zones

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Forest Service researchers have developed an adaptive strategy to help natural resource managers in the southeastern United States both prepare for and respond to disturbance from major hurricanes. In an article published in the journal *Forest Ecology and Management*, John Stanturf, Scott Goodrick, and Ken Outcalt from the Forest Service Southern Research Station (SRS) unit in Athens, GA, report the results of a case study based on the effects of Hurricanes Katrina and Rita.

The past 10 hurricane seasons have been the most active on record, with climatologists predicting that heightened activity could continue for another 10 to 40 years. In early April, Colorado State University meteorologists predicted a very active 2007 hurricane season for the Atlantic coast, with 17 named storms, including 5 major hurricanes. The analysis included a 74 percent probability of a major hurricane hitting the U.S. coast before the season ends on November 30.

"Coastal areas in the southern United States are adapted to disturbance from both fire and high wind," says Stanturf, project leader of the SRS disturbance ecology unit based in Athens, GA. "But those adaptations only go so far in the face of a major hurricane. Forest owners and natural resource managers need strategies to deal with hurricane damage to coastal forests."

In early fall 2005, Hurricanes Katrina and Rita caused what may be the most costly natural disaster in U.S. history, with over 5.5 million acres of timberland in the coastal states of Texas, Louisiana, Mississippi, and

Alabama affected. Using available data on the damage from these storms, the researchers constructed an adaptive strategy that distinguishes event risk (hurricane occurrence) from the vulnerability of coastal forests and outcome risk (hurricane severity).

"There really isn't any way for managers to reduce the risk of a hurricane occurring or the severity of a hurricane when it hits," says Stanturf. "The long-term focus of managers should be on reducing the vulnerability of coastal ecosystems, particularly in those areas with higher event risk."

The researchers developed an approach that considers all the potential disturbances in an area—the threat matrix—then assesses the risks of severe hurricanes within this context. Activities following a hurricane event are divided into those dealing with immediate outcomes (short-term) and those managing the recovery (long-term).

"If disturbances such as major hurricanes are in the threat matrix of an area, policies and procedures should be in place to manage effects," says Stanturf. "The infrastructure to restore access and communication should be put into place before the storm hits to meet both the short-term goals of salvage and fire prevention and the long-term goal of reforestation and ecological recovery."

Stanturf and fellow authors use the case study of Hurricanes Katrina and Rita to illustrate the major decisions and actions that must be taken after a major event. These include rapid assessment of damage, protection of timber resources and recovery of value, management of second order events such as wildfire, protection of other resources such as endangered plants and animals, and best practices for proceeding with salvage.

"Stands within a hurricane damage zone that are not salvaged will require monitoring for up to 5 years to detect delayed mortality or the onset of insect infestations or diseases," says Stanturf. "Beyond the

initial flurry of cleanup and salvage logging, the recovery process will take many years, and require the investment of time and resources. The recovery period is a good time to look at how to reduce the vulnerability of forests."

Vulnerability can be lessened by converting to species that are less susceptible to hurricane damage, by controlling stand structure, and by dispersing harvesting and thinning operations. The authors simulated the potential damage to 9 theoretical stands of pine trees, looking at how each would react to hurricane wind speeds, to make recommendations for different situations.

"Our simple simulation of stem breakage potential suggests that stand spacing and tree height can be manipulated to reduce risk, and provides a start for managing forests for hurricane risk," says Stanturf. "Additional research is needed on the effects on vulnerability of fragmentation, harvest systems, and other aspects of stand structure."

Source: Southern Research Station - USDA Forest Service