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Long-Term Ecological Impacts of Hurricanes

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This year, three large hurricanes hit the US, leading to major ecological and economic impacts. Their short-term impacts are well established, but the long-term ecological impacts from these large hurricane events are less well known. We provide a summary of these effects below.

Physical Damages

- Direct damage to trees, especially clusters of tropical hardwood trees. Full recovery can take decades.
- Direct damage to already-ailing coastal wetlands, coral reefs, natural reef habitats, mangrove forests, and seagrass beds. Full recovery of these ecosystems can also take decades.
- Losses of biodiversity in the above referenced ecosystems.

Introduction of Toxic Materials to the Environment

- Flooding from storm surges and other forms of flooding can lead to industrial sites releasing toxic materials into coastal wetlands and salt marshes that can linger for decades.
- Flooding of homes, businesses, and storage areas can lead to release of toxic materials.

Increases in Invasive Species

- Hurricane-force winds spread invasive species and shear tops off large native trees, allowing more sunlight to reach invasive plant species that may be growing in the forest or swamp floor.
- The increased space from tree and branch loss lead to pockets that become filled by more prolific seed-producing invasive species rather than slower-growing native trees.

Detrimental Impacts to Endangered Species

- Key populations of endangered species can be pushed past the point of recovery by large-scale hurricanes. For example, the Cozumel Thrasher and Puerto Rican Parrot were brought to the edge of extinction by the 1988 and 1989 hurricanes in Mexico and Puerto Rico, respectively.

Freshwater Intrusion

- Flooding brings large amounts of freshwater on top of the heavier ocean saltwater, trapping the saltier water below, where it cannot come into contact with the atmosphere and replenish its oxygen. The combination of low salinity and oxygen depletion in marine salt waters is devastating for marine life.
- Large volumes of agricultural runoff can contaminate delicate and biodiverse estuaries and trigger algal blooms, which kill both fish and seagrass meadows, threatening commercial fisheries and endangered species.

Potential Benefits of Hurricanes

- Flush out coastal marine systems leading to healthier regeneration, especially for seagrass and sponge communities.
- Increase larger predatory fish (snapper, grouper, etc.) populations in shallow water following the storm that feed on battered and disoriented prey. However, this phenomenon can expose these ecosystems to overfishing..

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