

Shelter From the Storm

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One year after the destruction of life and property from Hurricane Sandy in the eastern United States, government agencies and the professions are trying to plan ahead. Federal and local governments are searching for cost-effective solutions to hold back the tide, to give us all Bob Dylan's apocryphal "shelter from the storm." Green infrastructure, sort of a casual term that very often includes much more than chlorophyll, is on the short list of many possible remedies. How can restoration ecologists play the most useful role?

Restored habitats play several useful roles in our coastal drama. They offer protection against tidal surge by dissipating energy and binding soil. They can act as filters, removing particulates and nutrients released from overwhelmed storm and sanitary sewer systems. They can act as windbreaks, absorbing energy before constructed elements fail. They are refuges for coastal wildlife as frantic as people to hide from the horrific weather. They serve as economic drivers, encouraging people to return to the coast to rebuild and to visit despite the physical damage around them. Finally, restored habitats retain a sense of place, the specialness of our coastal areas that inspires and encourages new ways to live successfully near the unpredictable sea.

We may no longer seek a return to *historic* habitats after storm events. The dark cloud on the horizon, literally, is the rapidly changing climate. Near our Editorial Office, New York City's new climate risk information, from June, 2013, reports that there is a good chance that sea level will rise here 4 to 8 inches by the 2020s and 11 to 24 inches by the 2050s. The high estimate of probable change is 31 inches by the 2050s. 31 inches! This hydraulic estimate is matched by a grim and sweltering temperature report. The number of additional days with the maximum temperature above 90° may be 26 to 31 days. Currently, we have 18 such days. In the winter the number of days below freezing will be reduced by 20. This is a rapidly changing climate and a rapidly rising tide. Plans to "restore" the vegetation here must be done with this quickly approaching climate regime in sharp focus.

Our actions for restoration must be so much more than understanding and jumpstarting native species

populations in place. The coming climatic and hydraulic changes remove critical ecological niche space—microhabitats for rooting, feeding, and nesting and necessary food web structure. First, with rising sea level there must be a migration of habitats *inland* from their locale of the past years. Is this ecological evacuation route available? With bulkheads, roads, and other dense infrastructure common in our coastal zones, even our halophilic species may get in a pickle before they find a new home. There must also be a migration *north* of habitats in the warming world. This change has received greater attention with experiments and other efforts to translocate dominant species and ecotypes at a rate that may keep pace with the warming of the land. Natural migration north must navigate a maze of obstacles put in place by people; is this really feasible? Can our beloved ant-dispersal seeds cross an interstate highway? (Grist for thought, as grist is crushed seeds!)

At a much smaller scale, any individual location that is wetter and warmer will require a different physiology for sustainable populations. The long concern about restoring local genotypes of plants and animals may be a ruse. Successful restoration may require new genotypes from different locales that can tolerate the much changed conditions of the coming few decades. The rate of change of the environment may be quicker than the generation time of the species to which we are devoted. As individual species fade out and others move in we will have novel community structures. Any one place near the coast may become quite different from the romantic view that habitats of the past must be reiterated in place to prove we have succeeded.

The past is not prologue for the landscape ecology of our coastal area. The future will be hot, crowded, and salty. As the ocean knocks its wet fist against the door of our landscapes, all vegetation and wildlife management and restoration actions must deal with a very different natural history. Landscape architects must be invited into this discussion, so that signed and sealed plans are forward looking, not nostalgic, in their defined palettes.

Government at all levels is now aware that human ecology and natural history are bound together. Actions by our profession must factor in significant physical changes with our records of the natural history past. Then we may have a future.

Recommended References

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