

# Forestry in the Anthropocene

**H**uman activity has had enormous effects on the species composition of floras and faunas, creating new ecological biomes worldwide. A principal challenge in forestry research and conservation is how to deal with these novel ecosystems. Most attention to this phenomenon is centered on the negative effects of species introductions and the need to stem the tide of species invasion. However, we need to scientifically understand new ecosystems and learn to recognize adaptive species combinations that will function sustainably in changing environmental conditions.

In 1965, George E. Hutchinson famously published *The Ecological Theater and the Evolutionary Play*, helping to launch influential discussion about the feedback between ecology and evolution. The idea is that ecology governs evolution by “tailoring” organisms to fit niches. But human activity has become both theater manager and stage agent in this framework, spurring the movement of species across historical biogeographical boundaries into new situations and ecosystems. Human activity is also changing environmental conditions—including climate, biogeochemistry, and geomorphology—on a planetary scale. In short, human activity is tweaking the theater and plot of Hutchinson’s play, thereby changing the speed of evolution.

In particular, the global forestry situation has changed dramatically over the the last several decades. The role of forests in mitigating climate change is foremost in the minds of most conservationists and for scientists responsible for global ecosystem models. Forests are now valued as much for their diverse ecological services as they are for their wood production. As such, efforts have been increasing to sustain the world’s forests. In the tropics, which contain over half of the world’s forests and a disproportionate amount of global biodiversity, over half of the forest area is now “secondary” regenerating forest, replacing trees that have been lost to agricultural activities. The amount of global land covered by cultivated plantation forests is now at a historical high—roughly 200 mil-

lion ha. And urban forests are now recognized for their role in supporting the quality of life in cities where over half of the world’s population lives.

These changes in the forest landscape, coupled with the accelerated movement of species across biogeographical barriers, are creating novel ecosystems that we don’t fully understand. What are our options? Because the planet and its biota are already responding naturally to Anthropocene conditions, should we accept the change passively, revert natural processes to historical conditions, or intervene when conditions and opportunity for success appear favorable?

Research is the most effective tool for finding the answers. For forests, the major questions include how they respond to Anthropocene conditions and how they mitigate anthropogenic disturbances. Without abandoning current research, priorities include focusing on novel forests, urban environments, and anthropogenic biomes. Good examples of forward-thinking research can be found in tropical islands such as the Seychelles and Puerto Rico, where conservation of native and novel forests is being tackled through tight coupling of science and

conservation. So far, research has identified areas within these insular landscapes where native forests function with little human modification, and where new combinations of species, including introduced ones, function sustainably in spite of anthropogenic disturbances. Thus, while keeping an eye on troublesome invasive species, we must also understand their ecological roles, ecological services, and legitimate place in the natural landscape.

Professional foresters and ecologists must share the responsibility of forest research and conservation with other professions from the natural and social sciences through new combinations of science such as eco-hydrology and social-ecological sciences. Because of the uncertainty of Anthropocene conditions, research that looks at new sustainable ecosystem dynamics and conservation actions must come together as never before.

—Ariel E. Lugo



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