

Current residential development research is a poor foundation for sustainable development

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The density and extent of residential development effect species richness and occurrence. Credit: Sarah Reed

Globally, residential development is a leading driver of natural resource consumption, native species decline and fossil fuel emissions.

Today, residential development covers one out of every four acres of the land in the United States, and is predicted to more than double by 2100.

In many communities, local governments and planners are adopting

sustainable development practices to address residential development impacts on human well-being and the environment. These sustainable development practices include considerations of a healthy environment, a robust economy, and an equitable society.

But a new paper from Colorado State University, the Wildlife Conservation Society, and others shows that residential development research is lacking when it comes to achieving key sustainability objectives because in most cases it is limited by a single discipline perspective rather than considering sustainable development's components holistically.

The authors reviewed 566 studies conducted between 1961 and 2011 on the environmental, economic, and social impacts of residential development and open-space preservation in the U.S. They considered where the research efforts were lacking, and how they could be improved to inform sustainability in communities.

They found that less than three percent of all the studies employed at least two of the three disciplines. No studies included all three. In addition, studies from different disciplines measured different impacts of residential development. For example, most environmental and social studies focused on negative impacts of residential development on natural and human systems, respectively, while economic studies focused on positive effects of open space on home and land values.

"The problem with a single-discipline perspective is that we are missing some novel insights and important trade-offs that are only apparent when we look at environmental, economic, and social effects simultaneously," said WCS Associate Conservationist and CSU Faculty Affiliate, Sarah Reed.

One such multidisciplinary study identified that future development

scenarios that are aesthetically appealing to residents are also more ecologically beneficial, leading the authors to speculate that the scenarios may be undervalued in terms of their joint benefits to those groups. "Ultimately," says Reed, "these interdisciplinary discoveries will be most helpful for designing sustainable communities."

The authors say the lack of interdisciplinary studies to date may be partly attributable to institutional barriers, the disciplinary nature of most journals, and nature of tools available that shape research efforts.

The majority of studies focused on environmental aspects of residential development, and predominantly looked at species abundance and richness, community composition, and habitat.

"Increasingly, we know how plants and animals respond to development patterns, but we don't fully understand why. Are some animals attracted or repelled by development because of changes in food availability, predation intensity, or competition with introduced species? The answers to these questions could help us provide better habitat for human sensitive species in areas undergoing development," said lead author and CSU Assistant Professor, Department of Fish, Wildlife and Conservation Biology, Liba Pejchar.

Less than 5 percent of studies in the sample focused on ecosystem processes such as nutrient cycling and carbon storage."Different patterns of residential development may well influence human and wildlife health by changing the flow of important ecosystem services. These services, such as clean and abundant water, and the spread or reduction of infectious diseases, remain poorly understood in residential landscapes," Pejchar added.

To move beyond current understanding and limitations in research focus, the authors propose an action agenda that includes developing additional

long-term research sites in urbanizing regions, and securing additional sources for funding.

"Many of these studies were conducted in the same places, over the same time periods, and funded by the same organizations," says Reed. "We are missing important opportunities to collaborate across disciplines and improve sustainable development practices in communities throughout the country."

More information: "Consequences of residential development for biodiversity and human well-being," appears currently in the journal *Frontiers in Ecology and the Environment*.

Provided by Wildlife Conservation Society

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