

Researchers develop models to improve environmental conservation on military bases

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Military installations in the United States are home to a surprisingly large number of threatened and endangered species, leaving the Department of Defense (DoD) with the critical dual responsibilities of ensuring that it provides the finest military readiness training to American service members and also that it protects the species that call those facilities home.

It is also mandated by the DoD's Natural Resources Conservation program and the mission of its Readiness and Environmental Protection Integration (REPI) program that these two objectives be carried out in a cost effective manner.

New research from the University of Delaware shows that by utilizing economic and optimization models—originally developed by the military in World War II—and changing up the way in which programs are selected, the DoD can generate a 21 percent increase in military readiness and [environmental protection](#) or achieve the same benefits they are currently receiving at a cost savings of 37 percent.

The research was led by Kent Messer, the Unidel Howard Cosgrove Chair for the Environment, director of the Center for Experimental and Applied Economics (CEAE) in the University's College of Agriculture and Natural Resources (CANR) and co-director of the United States Department of Agriculture (USDA)-funded national Center for Behavioral and Experimental Agri-Environmental Research (CBEAR), and Maik Kecinski, a post-doctoral researcher in the Department of

Applied Economics and Statistics, and was recently published in the journal *Land Economics*.

With 425 military installations comprising approximately 25 million acres, and with over 320 listed species living on those installations—such as the endangered red cockaded woodpecker that thrives in the longleaf pine habitat of Fort Bragg in North Carolina—the need is great for an organization like REPI to partner with conservation organizations and other government agencies to maintain and preserve surrounding land, with REPI successfully protecting 315,000 acres with \$890 million in funding through 2013.

To conduct their study, the UD researchers used a 2010 data set from the Office of the Secretary of Defense focused on 44 projects considered for funding from the Army, the Air Force and the Navy to expand posts and bases utilizing a budget of \$54 million.

Kecinski said that the way the military currently chooses projects is based on a method called "benefit targeting."

"All of these 44 projects come with a benefit score. The problem with this benefit scoring is that they don't look at the cost. You could have this insanely good project that has 99 points but it costs \$40 million, so they would select this project, but you might also be able to get a project that has 95 points and you'd get it for \$2 million," said Kecinski. "You could get so much more in terms of the total score if you consider the cost."

Things that are factored into benefit scores are a military readiness score, in terms of how appropriate the land is for military uses and how the land stands from an environmental perspective, such as the condition of the species that live there.

There is also a viability of agreement score, which considers how likely is it that the person who owns the land would actually sell the land for the amount the military offers.

Kecinski said that the REPI program likely had biologists, soil scientists, hydrologists and experts in other environmental areas go over the land and give it a score.

"You bunch all of these benefits together and you come up with a total benefit score for each of these projects," said Kecinski. "What the military does then, without thinking of the cost of each project, they purely look at the benefits and then they start out. We have \$54 million so the first project we're going to select is the one that's going to have the biggest benefits, and then if this project costs \$54 million, hypothetically speaking, they're done."

Kecinski said that it typically doesn't cost \$54 million for a single project but that they go down the list, checking off the projects with the highest benefit scores until they have no money left.

The researchers used cost-effectiveness analysis, binary linear programming and goal programming to compare against the benefit targeting method used by the military and found that in all cases, large increases in environmental and military benefits could be achieved.

"By doing something as simple as dividing the benefits by the cost and not just looking at benefits, you can protect the same amount that benefit targeting does and save 37 percent of the costs, which is huge," Kecinski said. "We're talking about tens of millions of dollars. Or you can spend all of your money and get a 21 percent increase in military readiness and environmental protection.

"Oftentimes in economics, you consider difficult choices that hurt the

environment. Such as should we cut down this tree and destroy some habitat in exchange for more money. This case with the [military](#) is the opposite. The money is there. The only question is how can we use it to protect as much as possible?"

Provided by University of Delaware

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