

THIS WEEK



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Spoils of war

Conflict poisons both land and sea, and lost natural resources lead to more violence. Ecology is an unlikely objective during wartime, but one that can help to secure peace.

Why is the cancer rate on the Puerto Rican island of Vieques higher than that in the surrounding Caribbean? And where did the bands of toxic mercury in the soils of Slovenia come from? An answer to both is warfare. Massive amounts of noxious munitions have been dumped off Vieques during training exercises by the US navy, and are linked to illnesses. And the mercury is a chemical legacy of artillery barrages along the Soca Front during the First World War.

Active fighting burns and crushes whole landscapes. Even greater harm can come from the chaos that surrounds war. When rules and regulations fall by the wayside, natural resources are plundered and poaching is rife. Deforestation rates have soared as successive conflicts have raged in Afghanistan, and Pakistani 'timber mafias' have looted valuable woods from the region.

Enter the warfare ecologists. By studying warfare's effects on the environment, and the environment's effects on war, these researchers hope to short-circuit the cycles of violence leading to natural-resource crises leading to violence. A paper on page 438 links El Niño weather events to civil conflicts, showing that the connections can be strong.

It is clear that humanity at the beginning of the twenty-first century is much better at violent conflict than at planet management. Certainly, the US Department of Defense's budget is 100 times that of the National Science Foundation. Inevitably, there is criticism that those who promote warfare ecology are simply looking to tap fat military budgets.

How can these ecologists respond to this cynicism? They can research the interplay between ecosystems and international aid and relief, and suggest smart technological fixes, such as solar panels in refugee camps, which improve safety there. After a war, they can restore ecosystem services necessary for continued peace, from clean water to locally grown food. And they can promote 'peace parks', protected areas that span borders, preserve nature, provide a feel-good common cause for local and national governments and create economic opportunities through tourism.

But there are troubling aspects to warfare ecology. Peter Smallwood, a biologist at the University of Richmond, Virginia, who has worked to establish a peace park in Afghanistan, points out that such projects are so enthusiastically supported by soldiers trying to win hearts and minds that they can blur the lines between civilian and military acts.

It is also an uncomfortable truth that war can be a boon to ecosystems and rare species. War zones, military bases and weapons labs around the world serve as de facto protected areas, many of which are now managed with biodiversity in mind. The demilitarized zone between North and South Korea has become a haven for endangered species such as red-crowned cranes (*Grus japonensis*). In Colombia, jungle areas held by guerrilla fighters are safe from development.

This does not mean that warfare ecologists must wish for conflicts to continue. Instead, they can prepare for peace, by partnering with conservation organizations to raise funds that can be mobilized when war zones open up.

The current financial climate sees even sacrosanct defence budgets feeling the pinch, and ecological research and nature protection could be among the early casualties. But warfare ecology should and will go on. Ecologists are used to making do, and there is always a war somewhere.

The field can be a grey area in which to work: a nebulous zone between propaganda and peacemaking, between mitigating harm and being seen as applying a public-relations gloss to violence. But ecology is most relevant to society when it studies the intersection between humans and the environment. And along with romance and music and endless curiosity, war remains one of humanity's most characteristic activities. ■

Go with the flow

Technology to track the path of a raindrop points the way to better environmental awareness.

It might seem impossible to get lost in the modern world with its ubiquity of digital maps, but there is more than one way to be lost. Truly knowing where you are goes beyond pinpointing your position. It means knowing where your water comes from and where it goes, where your electricity is generated and where your rubbish ends up. It means being aware of what plants and animals live nearby and what kind of soil lies beneath your feet.

For example, an undergraduate at a rainy Butler University in Indianapolis, Indiana, can use his or her smartphone to instantly calculate a route to the nearest Starbucks coffee shop. But chances are that he or she remains ignorant of how the rain flows through the city on its way to the White River, the Mississippi and, finally, the Gulf of Mexico.

Enter Raindrop, a phone application that combines sewer and watercourse maps with the software that makes getting a caffeine fix so easy. Tap the map and watch the path of a single raindrop flow from your location through streams, culverts and pipes into the river. The app, due to launch next month, was funded by the US National Oceanic and Atmospheric Administration and put together by a team led by ecologist Timothy Carter at Butler. It is currently limited to Indianapolis, but similar efforts could be designed for other cities.

A better appreciation of watercourses and other hidden networks can only strengthen human connections to ecosystems, biogeochemical cycles and resource flows, and will arguably make people more likely to support science and environmental causes. Making available the data that science and society produce in these innovative ways can help people to find themselves — even if they had no idea that they were lost. ■