



September 18, 2007

SCIENTIST AT WORK | PHUNG TUU BOI

## Through the Forest, a Clearer View of the Needs of a People

By CHRISTIE ASCHWANDEN

A LUOI VALLEY, [Vietnam](#) — Phung Tuu Boi reaches down to inspect one of the spiny shrubs lined up in a row before him. A few feet away, a cow grazes serenely in this emerald valley in the hills of central Vietnam.

Mr. Boi, a forester and director of the Center for Assistance in Nature Conservation and Community Development in Hanoi, points to the cow. “See this?” he says. “Very, very bad.”

An invisible poison clings to the soil beneath the cow’s muddy hoofs. During a short stretch of the Vietnam War this patch of ground served as an American Special Forces air base, and while the soldiers departed long ago, a potent dioxin from the Agent Orange that they stored and sprayed here lingers still.

Mr. Boi, a lively, passionate man whose enormous smile rarely leaves his face, has dedicated his career to repairing the ecological damage left by what people here call the American War. And while he has had much success in the last 30 years, his task is far from over.

When Mr. Boi began working here in 1975, he found an ecosystem decimated by war. Aerial spraying of defoliants like Agent Orange had destroyed large swaths of forest. Without live roots to anchor the soil, monsoon rains washed away the topsoil and its nutrients, allowing invasive grasses to take over and prevent forest regeneration.

A botanist by training, Mr. Boi’s initial goal was to reforest the denuded land. But he soon realized the forest ecosystem was not the only thing struggling to recover from Agent Orange.

The Pako, Ta Oi, Catu and Kinh people of A Luoi valley (called A Shau during the war) eke out a meager existence in a region with one of Vietnam’s shortest growing seasons. (This reporter visited the valley on a grant from the Pulitzer Center on Crisis Reporting.) These tribal groups, who live in one-room huts with dirt floors and no indoor plumbing, depend on forest products to survive, and Mr. Boi came to recognize that his work was as vital to them as to the tigers and elephants whose habitat he was working to restore.

Mr. Boi enlisted the help of the Australian acacia tree. The acacia grows up to six and a half feet per year and, after five years, can be harvested to make paper and furniture. The tree also improves the soil and quickly provides the canopy that trees need to take root.

“It’s a good model for forest restoration,” said Chris Dickinson, a conservation biologist and technical adviser with the World Wildlife Fund for Nature in Hue, Vietnam, adding that the acacia “grows on poor nutrients and can shade out the grasses.”

The trees also provide residents with a cash crop. “The demand for acacia is seemingly insatiable,” Dr. Dickinson said. “Ikea uses it for garden furniture.”

Mr. Boi has used this humble acacia tree to reforest thousands of hectares in central Vietnam. Emboldened by these successes, he has applied his botanical model of remediation to tackle a far more difficult problem.

Though dioxin has dropped to relatively low levels in areas that were aerially sprayed during the war, studies by Canadian scientists have shown that numerous highly contaminated spots remain at certain places where American forces stored Agent Orange.

The cow that caught Mr. Boi’s attention grazes on one such “hot spot,” the former A So air base in Dong Son, where scientists from Hatfield Consultants in Vancouver, British Columbia, have measured soil levels of TCDD, the dioxin in Agent Orange, more than 200 times greater than the residential standard set forth by the United States Environmental Protection Agency.

Dioxin takes decades to break down. Remediating this site would require millions of dollars, and when it comes to financing, the more heavily populated hot spots in Danang and Bien Hoa take precedence.

If the Dong Son hot spot were in New Jersey or Florida, a barbed wire fence and a warning might be enough to deter people from entering the area, but such solutions break down in the face of extreme poverty. “You put up a fence, and the people are so poor that anything they can get their hands on, they’ll take down and use,” said Wayne Dwernychuk, an environmental scientist who did studies for Hatfield Consultants.

“Their economy is geared to agriculture,” Dr. Dwernychuk said. “If you take that land out of the production cycle, it’s very hard to rationalize to them when they don’t see the problem.”

He added that the chemical that taints this soil could not be seen, smelled or tasted.

Pointing to the former air base’s most contaminated site, Mr. Boi said: “The local people are poor and uneducated, and they don’t understand. Children come here to play and they collect insects

and other things to eat.”

Dioxin accumulates in animal fats, and the molecules also glom onto soil particles that can be ingested through inadequately washed root crops like manioc. Poor sanitation and a [diet](#) that relies on fowl that peck on tainted soil keep dioxin exposure a constant threat. Dr. Dwernychuk and his colleagues have found elevated TCDD levels in the blood and breast milk of local residents, evidence that the chemical continues to make its way into the food chain.

Nguyen Van Phom, the mayor of Dong Son, blames dioxin for the health problems he says plague 60 of the 240 families in the village. Whether these conditions, which include limb deformities and [deafness](#), are the result of dioxin remains unproved, though the [Institute of Medicine](#) at the [National Academy of Sciences](#) has linked Agent Orange exposure in American veterans to an increased risk of some health problems, including [cancer](#) and [diabetes](#).

The Canadian studies prompted the Vietnamese government to move more than two dozen families off the most contaminated ground, but efforts to educate residents about the risks have proved difficult. Most cannot read and many speak only faltering Vietnamese, relying instead on tribal dialects.

Mr. Boi has developed a low-tech solution to overcome these problems: a fence made of trees covered with cactus-sharp needles to deter humans and animals alike. Mr. Boi hopes this so-called green fence will not only discourage trespassers, but also provide them with an economic incentive to leave the barrier intact. Once mature, the trees he has chosen to make up the fence, *Gleditschia australis*, produce a fruit that residents can sell to make soaps and medicinals. *Gleditschia*, a type of honey locust, is disease and insect resistant, and its thorns and soft wood should deter residents from cutting it down for firewood.

The green fence promises a workable solution to a costly problem, said William H. Farland, a former scientist with the [Environmental Protection Agency](#) who is vice president for research at [Colorado State University](#). “It’s very expensive to clean dioxin up to background levels,” Dr. Farland said. “The main issue is to prevent human exposure, not just to clean up the soils.”

While a full remediation project would cost millions of dollars, Mr. Boi estimated that his project could be done for just \$30,000. Last December, with the help of a \$10,000 grant from the [World Bank](#) and the aid of about a dozen farmers, Mr. Boi planted the first 10,000 seeding trees. But despite its auspicious start, the project has hit a few snags.

Though hardy, the locust trees failed to thrive in soil stripped of its nutrients by rains that followed defoliation decades ago, and a spate of intense storms flooded the site shortly after planting, drowning many of the seedlings. With their thorns still small, the trees that survived made

attractive food for wandering livestock. Today, only a single row of small trees remain.

In the face of these challenges, no one would fault Mr. Boi for returning to his comfortable office in Hanoi and moving on to something else. But he views this setback as nothing more than a necessary learning experience. With the lessons gleaned from his initial failure, he has developed a new plan.

Before his next round of planting, Mr. Boi will bolster the soil with fertilizers. Then he will plant larger seedlings, and in addition to the original locust fence, he will add rows of acacia on either side to create a three-layer fence. The acacia will help protect the locust trees, improve the soil and provide another cash crop for residents, Mr. Boi says, pointing to a photo schemata of the fence that he carries with him everywhere, sharing with anyone who will listen.

Mr. Boi needs \$20,000 more to finish the fence. He has received no government financing and has resorted to spending his own money to keep the project alive. But Mr. Boi refuses to give up, even if it means digging deeper into his own pockets. Success is his only option. If he gives up on this project, the cows will continue to graze on tainted soil, and another generation of children will grow up eating insects caked with dioxin-rich dirt.

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