Guest Field Note

The diffusion of diseases carried by vectors, such as the *Aedes* mosquito that transmits dengue, is not solely a result of the environmental factors in a place. I use disease ecology to understand the ways in which environmental, social, and cultural factors interact to produce disease in a place. Through a combination of fieldwork and geographic information systems (GIS) modeling, I studied the environmental habitat of the *Aedes* mosquito in Hawaii and the social and cultural factors that stimulated the outbreak of dengue in Hawaii.

When I went into the field in Hawaii, I observed the diversity of the physical geography of Hawaii, from deserts to rainforests. I saw the specific local environments of the dengue outbreak area, and I examined the puddles in streams (Fig. 1.15A) in which the mosquitoes likely bred during the 2001–2002 dengue outbreak. I talked to public health officials who worked so hard to control the dengue outbreak so that I better understood the local environmental factors contributing to the disease. I visited a family that had been heavily affected by dengue, and I saw their home, which, by their choice, lacked walls or screens on all sides. In talking with the family, I came to understand the social and cultural factors that affected the outbreak of dengue in Hawaii.

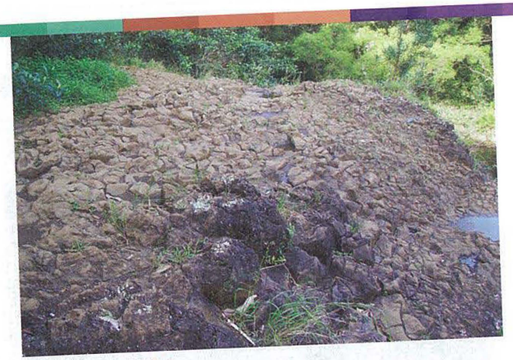

Figure 1.15 A
Maui, Hawaii. *Aedes* mosquitoes breed in artificial and natural water containers, such as the standing puddles left behind when streams dry up during a drought as shown in this photograph along the northeast coast of Maui.

I created a GIS model of mosquito habitat that considered not only total precipitation in Hawaii (Fig. 1.15B), but also seasonal variations in precipitation (Fig. 1.15C) and temperature (Fig. 1.15D), to help explain where the *Aedes* mosquito is able to breed and survive on the islands. I also studied seasonal fluctuations in streams and population distributions in creating my model of dengue potential areas (Fig. 1.15E).

The GIS model I created can now be altered by public officials in Hawaii to reflect precipitation and temperature variations each year or to incorporate new layers of environmental, social, and cultural data. Officials will be able to better predict locations of dengue outbreaks so they can focus their efforts to combat the spread of the disease.

Credit: Korine N. Kolivras, Virginia Tech

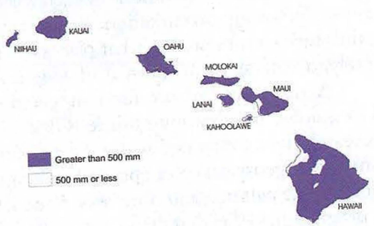

Figure 1.15 B
Total annual precipitation.

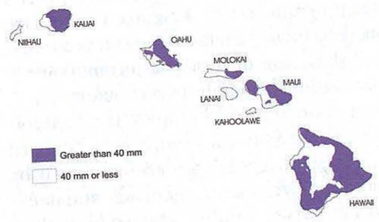

Figure 1.15 C
Average June precipitation.

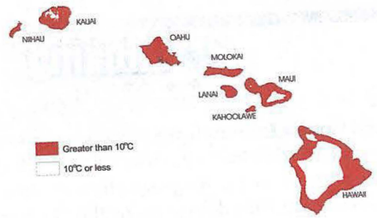

Figure 1.15 D
Average February minimum temperature.

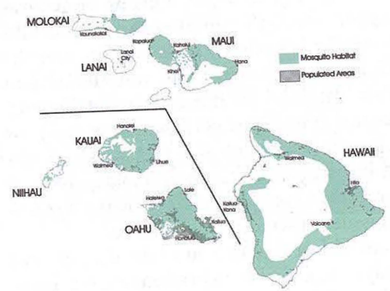

Figure 1.15 E
Dengue potential areas.

WHY ARE GEOGRAPHERS CONCERNED WITH SCALE AND CONNECTEDNESS?

Geographers study places and patterns at a variety of scales, including local, regional, national, and global. Scale has two meanings in geography: the first is the distance on a map compared to the distance on the Earth, and the second is the spatial extent of something. Throughout the book, when we refer to scale we are using the second of these definitions. Geographers' interest in this type of scale derives from the fact that phenomena found at one scale are usually influenced by what is happening at other scales; to explain a geographic pattern or process, then, requires looking across scales. Moreover, the scale of our research or analysis matters because we can make different observations at different scales. We can study a single phenomenon across different scales in order to see how what is happening at the global scale affects localities and how what is happening at a local scale affects the globe. Or we can study a phenomenon at a particular scale and then ask how processes at other scales affect what we are studying.

The scale at which we study a geographic phenomenon tells us what level of detail we can expect to see. We also see different patterns at different scales. For example, when we study the distribution of material wealth at the scale of the globe (see Fig. 1.3), we see that the countries in western Europe, Canada, the United States, Japan, and Australia are the wealthiest, and the countries of Subsaharan Africa and Southeast Asia are the poorest. Does that mean everyone in the United States is wealthy and everyone in Indonesia is poor? Certainly not, but on a global-scale map of states, that is how the data appear.

When you shift scales to North America and examine the data for States of the United States and the provinces of Canada (Fig. 1.16), you see that the wealthiest areas are on the coasts and the poorest are in the interior and in the extreme northeast and south. The State of Alaska and the province of the Northwest Territories have high gross per capita incomes that stem largely from oil revenues that are shared among the residents.

By shifting scales again to just one city, for example, metropolitan Washington, D.C. (Fig. 1.17), you observe that suburbs west, northwest, and southwest of the city are the wealthiest and that suburbs to the east and southeast have lower income levels. In the city itself, a clear dichotomy of wealth divides the northwest neighborhoods from the rest of the city. Shifting scales again to the individual, if we conducted fieldwork in Washington, D.C., and interviewed people who live below the poverty line, we would quickly find that each person's experience of poverty and reasons for being in poverty vary-making it difficult to generalize. We would find some trends, such as how women in poverty who have children cope differently than single men or how illegal immigrants cope differently from legal immigrants, but no two individual cases are the same.

Because the level of detail and the patterns observed change as the scale changes, geographers must be sensitive to their scale of analysis and also be wary of researchers who make generalizations about a people or a place at a particular scale without considering other scales of analysis.

Geographers' concern with scale goes beyond an interest in the scale of individual phenomena to a concern with how processes operating at different scales influence one another. If you want to understand the conflict between the Tutsi and the Hutu people in Rwanda, for example, you cannot look solely at this African country. The Rwandan conflict was influenced by developments at a variety of different scales, including patterns of migration and interaction in Central Africa, the economic and political relations between Rwanda and parts of Europe, and the variable impacts of globalization-economic, political, and cultural.

Geographers are also interested in how people use scale politically. Locally based political movements, such as the Zapatistas in southern Mexico, have learned to **rescale** their actions-to involve players at other scales and create a global outcry of support for their position. By taking their political campaign from the local scale to the national scale through, for example, protests against the North American Free Trade Agreement (NAFTA), and then effectively using the Internet to wage a global campaign, the Zapatistas gained attention from the world media, a feat relatively few local political movements achieve.

Geographer Victoria Lawson uses the term *jumping scale* to describe such rescaling activities. She compares the ways in which Western countries, multinational corporations, and the World Trade Organization take products and ideas created in Western places and by Western corporations and globalize all rights to profits from them through intellectual property law. Efforts to push European and American views of intellectual property on the globe negate other local and regional views of products and ideas. To the West, rice is a product that can be owned, privatized, and bought and sold. To East Asians, rice is integral to culture, and new rice strains and new ideas about growing rice can help build community, not just profit. Lawson explains that taking a single regional view and jumping scale to globalize it can serve to legitimate that view and negates other regional and local views.

Regions

Geographers often divide the world into regions for analysis. Many colleges offer a course in world regional