

3

Human Causes of Global Change

All the human causes of global environmental change happen through a subset of proximate causes, which directly alter aspects of the environment in ways that have global effects. We begin this chapter by outlining and illustrating an approach to accounting for the major proximate causes of global change, and then proceed to the more difficult issue of explaining them. Three case studies illustrate the various ways human actions can contribute to global change and provide concrete background for the more theoretical discussion that follows. We have identified specific research needs throughout that discussion. We conclude by stating some principles that follow from current knowledge and some implications for research.

IDENTIFYING THE MAJOR PROXIMATE CAUSES

The important proximate human causes of global change are those with enough impact to significantly alter properties of the global environment of potential concern to humanity. The global environmental properties now of greatest concern include the radiative balance of the earth, the number of living species, and the influx of ultraviolet (UV-B) radiation to the earth's surface (see also National Research Council, 1990b). In the future, however, the properties of concern to humanity are likely to change—ultraviolet radiation, after all, has been of global concern only since the 1960s. Consequently, researchers need a general system for