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# Patch Dynamics

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## FOREWORD

A century from now, humanity will live in a managed—or mismanaged—global garden.

We are debating the need to preserve tropical forests. Farming of the sea is providing an increasing part of our fish supply. We are beginning to control atmospheric emissions. In a hundred years these separate aspects will need to be integrated into a single management system. We shall use novel farming practices and genetic engineering of bacteria to manipulate the methane production of rice fields world-wide. The continental shelf, especially off Asia, will be developed to provide food, energy, and, probably, living space. The capture of any remaining wild marine animals will be regulated like deer hunting.

To make such intensive management possible will require massive improvements in data collection and analysis, and especially in our concepts.

A century hence we will live on a wired earth. Like the weather stations that form a network over the land's surface, the oceans of the next century will have a three-dimensional lattice of sensing stations. The crust of the earth will also receive the same comprehensive monitoring now devoted to weather. Thus earth, air, and sea will be continuously sensed and their interactions modeled in order to anticipate major events such as El Niño, hurricanes, earthquakes, volcanoes, and climatic fluctuations.

As the peoples of Asia, Latin America, and Africa approach the levels of wealth of Europe and North America, environmental fatalism and modest demands for food will be replaced by impatience with the accidents of nature and intolerance of mismanagement of the environment—particularly the living resources that are the focus of our material and altruistic concerns. The need for careful global management will become irresistible. Our control of physical perturbations and chemical inputs to the environment will be judged by the consequences to living organisms as individual species and as interacting systems. Above all, our human ability to affect life in all sectors, aquatic or terrestrial, brings these aspects together.

The problem is: How can we provide the factual and theoretical foundation needed to begin to move from our present, fragmented knowledge and our limited abilities to a managed, wired—and beautiful—global garden a century from now?

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