CHAPTER 12

EMBRACING TRANSDISCIPLINARITY

When I went to work with Ruth Patrick in 1948, she had been criticized for three things: (1) going beyond disciplinary boundaries, (2) accepting problems defined by society rather than by the academic community, and (3) using a team approach to study system-level problems. The chief academic criticism was that human life was too short to master everything within a single discipline and that going beyond a single discipline was irresponsible until one had complete mastery of it. This line of reasoning is actually relatively recent; in Leonardo da Vinci's day, scholars were admired when their intellect was challenged by a diverse array of subjects. Furthermore, the normal atmosphere was for those with different academic interests to exchange ideas; in addition, a scholar not doing so would be regarded as overly specialized, provincial, and narrow. This situation, of course, was during a period when learned people were scarce and higher education was the privilege of a relatively few people. As education became more egalitarian and the numbers of professors grew, the tendency was to move away from being a generalist toward specialization because the number of people with whom one could communicate was limited by time, life span, etc. Inevitably, this wish to keep abreast of developments in one's own area of specialization and the sanctions that accompanied not doing so overrode the curiosity about other areas of interest. Rites of passage (i.e., acquisition of the PhD, promotion and tenure, acquisition of extramural funding, and acceptance of a manuscript by a professional journal, to mention a few of the isolating mechanisms) depended upon mastery of the tribal language and customs, and survival depended on sufficient specialization to take advantage of a resource less available to non-specialists. In this way, scientists are not different from Darwin's finches, i.e., competition for limited resources was reduced by specialization and the consequent resource partitioning.

When I arrived at Virginia Polytechnic Institute and State University in 1968, some faculty members boasted of being theoretical, despite the university's motto "that we may serve." I found it astonishing that criticism of "applied" research existed in a land-grant university. I was, of course, encountering the same resistance that Patrick had encountered when accepting funding for solving a societal problem (environmental pollution) because the problem was defined differently than it would have been had it originated within a discipline. Panels or committees within a discipline chose which research should be funded, and, generally, research that best fit the disciplinary paradigm then in vogue was successful. However, entities with urgent problems care very little about disciplinary boundaries; they are seeking solutions to their problems.

The paucity of transdisciplinarity will become a critical issue of the first half of the 21st century. All the world's major problems (e.g., global climate change, sustainable use of the planet, population stabilization, resource allocation, carrying capacity) transcend the capabilities of any single discipline. Arguably, all issues and problems associated with sustainable use of the planet require transdisciplinarity. System-level studies are commonly referred to as "top-down," i.e., the system-level strategy has a major influence on the selection of components for detailed study. In the "bottom-up" approach, a judgment is made on which components (i.e., disciplines and/or subdisciplines) are studied in detail, and then the connections that make up the system are given serious attention. Clearly, system-level research would be more effective if top-down or bottom-up strategies were orchestrated from the outset.

To reach this desirable state, the first step is to stop "thinking in a box," i.e., begin to think of the well being of the system instead of disciplinary boundaries. This approach will require an enormous expansion of both spatial and temporal views of the planet's biospheric life support system, including its carrying capacity for humankind, both present and future generations. Progress toward sustainable use of the planet requires shared knowledge, which is seriously impaired by the present paucity of exchange among the disciplines. Progress is also hampered by discrediting of science when the evidence conflicts with political ideologies (e.g., global warming and climate change). Multidimensional thinking should place humankind on the path toward

sustainability. I will probably not live long enough to see this change well underway, but I am persuaded that the human species is capable of adapting to the quest for sustainability.

The evolution of reductionist thinking and the reemergence of multidisciplinarity have followed identifiable lines: (1) multidimensional thinking – hunter/gatherer era, (2) concentration on technology – agricultural and industrial revolutions, (3) fragmentation into disciplines – reductionist science era, (4) appearance of multidisciplinary "teams" – traditional disciplines study a single problem with little or no interaction during the study, (5) appearance of interdisciplinary teams/focus on a single problem: interactions between and among disciplines facilitates mid-course corrections that improve results, (6) emergence of multidimensional, transdisciplinary individuals (e.g., Lester R. Brown) and organizations (e.g., Earth Policy Institute) – present challenge is to develop a multidimensional perspective on both of humankind's life support systems, ecological and technological.

At the beginning of the 21st century, the technological/economic system appears to be thriving, but at the expense of the ecological system. However, the technological/economic system cannot survive without the resources and services of the ecological system. This challenge is unique in human history and will require a rate of social evolution much more rapid than in recent times.