BIG PROJECTS, BIG PROBLEMS

BORIS ZEIDE

School of Forest Resources, University of Arkansas at Monticello, Arkansas Agricultural Experiment Station, Monticello, AR 71656 U.S.A.

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Abstract. Our environmental concerns prompt launching large monitoring programs. Examining the history and accomplishments of similar endeavors is the best way to avoid errors. One lesson taught by the oldest and largest survey of national renewable resources in the United States, the Forest Inventory and Analysis Program, is that the program itself is not capable of learning from its errors. Among other problems that beset big programs are unrealistic promises. It is not possible to inventory "every animal and plant species in the United States and their habitats" as the newly created National Biological Survey vows to do. Even if it were possible, this would hardly help to attain the ultimate goal of the Survey, survival of all species. In his request to fund the Survey, Secretary of the Interior, Bruce Babbitt, compared the conflict between economic development and environmental integrity with train wrecks. This metaphor is as brilliant as it is deceitful. Its brilliance, attested by the success with the press and legislature, is in a vivid and blithe image suggesting that, given sufficient information, the conflict could be averted. After all, railroad accidents are rare and avoidable exceptions. This hopeful situation cannot be honestly compared with the plight of our environment. The crucial piece of information - that there is no spare track for economic development - is readily available. Our population and economic growth take place in the same space that has already been fully occupied by other species. To be trustworthy, monitoring programs should face the reality that development necessitates environmental degradation.

1. Introduction

Efficiency of environmental monitoring and assessment gains when it is conducted on a large scale. Ecological processes are closely interconnected and warming of equatorial surface waters somewhere off the Peru coast may have tangible repercussions for life in the United States. In no other area of ecology are there as many large programs as in environmental monitoring. Among them are The Ecosystem Management Program, The Southern Global Change Program, the National Wetlands Inventory, and the newly created National Biological Survey. These programs are designed to be wide-ranging enterprises and involve hundreds, if not thousands, of workers.

The large scale and good intentions of these programs instill respect and even veneration. Where does this feeling come from? Each of us is prone to err. We would expect that the probability of error decreases when two people work together. When thousands of researchers are involved, checking and rechecking each other's work, there is virtually no way to go awry. Although entire nations sometimes run amok, nothing like this could ever happen in our sober scientific undertakings.

There is another view. Natural selection is selection of individuals. Evolution optimizes behavior of an individual organism, and not a group. There is no mechanism, comparable in efficiency and might to natural selection, that leads to social
evolution. As a result, the level of organization of our groups is immeasurably lower than that of a single individual. Peter’s principle elucidates a mechanism of the persistent failures of big programs: “In a hierarchy every employee tends to rise to his level of incompetence.” Even though this mechanism involves people, basically it is impersonal. The fault is in the system, and not in the people.

2. Forest Inventory and Analysis Program

To facilitate the success of current large-scale programs, it is useful to examine the history and accomplishments of similar endeavors. The Forest Service Forest Inventory and Analysis Program (FIA), initially known as the Forest Survey, is the most relevant program to study. It is the oldest and largest systematic survey of national renewable resources. This program was engendered by the fear enunciated by Pinchot (1919) that ‘forest devastation’ was increasing with ‘appalling rapidity’, putting in danger ‘our prosperity in peace and safety in war’. Forest inventory was a first step in his far-reaching plans: ‘the need for governmental control on private timberlands is now self-evident’. One of the results was the McSweeney–McNary Forest Research Act of 1928 that mandated the federal forest inventory. This fear of devastation was soon relieved, but the inventory is still with us.

Inventory results are widely used in state, regional, and national economic planning. The demand is so great that the U.S. Congress recently mandated the Forest Service to ‘increase the frequency of forest inventories’ (The Forest Ecosystems and Atmospheric Research Act of 1988, PL 100–521). With Congress involved, inventory business will continue as usual but, as directed, more frequently. Given the 60 years of measurements, these inventory data should also be indispensable to research that involves forest and related resources.

Although FIA’s prime responsibility is to maintain a comprehensive inventory of national forests, it is capable of revealing the unexpected. Many foresters were surprised in 1985 when the Forest Service discovered a drastic reduction of pine growth in the southeastern United States. This discovery has attracted attention to the quality of the forest inventory and the Forest Service was requested to release the original data for reevaluation by independent analysts. A brief summary of the findings is given below.

2.1. FIA Data

Having being invited to reexamine the data of FIA, I selected the data set collected in natural loblolly pine stands of the Georgia Piedmont and Mountains because this set is the largest both in number of plots and number of inventories (it is the only set that contains the sixth inventory); it deals with the most important species of southern pine; and it figured prominently in the previous reports on forest decline. The methods, techniques, and protocols used for data collection are similar to those employed throughout the country.