

in February 1855, this paper was published in England on the opposite face of the globe the same year in the September issue of *Annals and Magazine of Natural History* (1). During the 7 months between writing and publication, Wallace's manuscript underwent a 15,000-mile sea voyage.

TOMAS FEININGER

Casilla 2759,
Escuela Politécnica Nacional,
Quito, Ecuador

References

1. A. R. Wallace, *Natural Selection and Tropical Nature* (Macmillan, London, 1891), p. 3.

Realistic Space Goals

The title of Constance Holden's report "Space shuttle: Despite doubters, project will probably fly" (News and Comment, 27 April, p. 395) is somewhat misleading. The shuttle issue has barely scratched public visibility; so far, \$400 million—only 5 percent of research and development or 1 percent of the entire program—has been spent, with another \$475 million requested for fiscal year 1974. As the figure rises and when there has been time to rationally assess the program, I believe the space shuttle will suffer the same fate as Dyna-Soar, the Manned Orbiting Laboratory, and the supersonic transport (SST).

The space shuttle is the largest non-defense technological program now under way in the United States, with research and development costs alone estimated at more than \$8 billion—12 times that requested for the SST. Although the shuttle's potential environmental impact is relatively slight, making it a more subtle public issue, the cost alone represents an enormous drain on technological resources. The space shuttle would be as helpful as a white elephant to the balance of payments, to national security, to energy and environmental problems, to exploratory enthusiasm, or to any other goal near and dear to the American people.

The Nixon Administration's recent cuts of the annual NASA budget to \$3 billion, combined with the rapidly escalating annual expenditures for the space shuttle, imply a nearly *threefold* decrease in space sciences and applications funds (down to 11 percent of the NASA budget) over the next 5 years, according to figures recently released by NASA. The cancellation or

suspension of the High Energy Astrophysical Observatory, the Grand Tour of the outer planets, Venus Pioneer, and some communications satellites might be just the beginning. Scientists may start to ponder the reality that you can't do everything in space and that something must give. A little more thought should reveal that something to be the space shuttle.

The space shuttle is merely a transportation system. What payloads could we possibly put into the space shuttle if the funds to develop them have essentially disappeared over the next 5 years? Senator James Abourezk (D-S.D.) of the Aeronautical and Space Sciences Committee will be presenting an amendment which would restore \$131 million taken out of space sciences and applications for the next fiscal year and reduce the space shuttle budget by that amount. Since the benefit-cost ratio is hanging on a precarious tendon, and stretching the program any further would prove uneconomical, this legislation will hopefully force NASA and the Administration to re-examine their space transportation needs and fit these needs to realistic goals over the coming years.

BRIAN O'LEARY

School of Natural Sciences and
Humanities, Hampshire College,
Amherst, Massachusetts 01002

Pollution Control

The discussion by Freeman and Haveman (28 July 1972, p. 322) of residuals charges provides a useful comparison between economic incentives and regulation-enforcement as strategies for pollution control. At the same time, some serious administrative problems are dismissed with little more than passing comment. Two specific points come to mind.

Freeman and Haveman justifiably note the deficiencies of existing control boards that are removed from popular political control, yet they call for the establishment of regional authorities to deal with air and water pollution and solid wastes. Environmental groups typically complain that authorities are "authoritarian" in their mode of operation. Although authorities are not unique in being criticized for ignoring popular sentiment, one must conclude that opposition to regional authorities is at least partially based on an unwillingness to centralize power in the hands of

powerful bureaucrats. It is possible that the successful use of effluent fees by the *Genossenschaften* in Germany is partially related to the willingness of the German population to submit to centralized controls.

The authors also note that "for most of the more significant and ubiquitous pollutants the measurement technology is available and its cost is reasonable *relative* (italics added) to the other costs and benefits associated with pollution control." Although this is an essentially accurate statement, expensive monitoring equipment is often improperly located for ambient readings, is poorly maintained, and is otherwise neglected because it is not often utilized for day-to-day decision-making. Thus our data will get better—or better utilized—only when our agency decisions utilize the data.

I concur with the authors' request for carefully prepared experiments in environmental management. This cause is not served by the casual dismissal of criticisms.

GEORGE HAGEVIK

Department of Urban Planning and
Policy Development,
Rutgers University,
New Brunswick, New Jersey 08903

"Our passing comment" on the establishment of regional authorities for air and water quality management included a reference to another publication, in which we discuss the political and institutional problems associated with comprehensive planning and management of water resources (1). In that paper we discussed the need for the policy-makers in such authorities to be representatives who are "directly elected by those who are affected by the decisions which they make" and who "represent a wide variety of disparate interests within geographically defined constituencies."

If the advantages of comprehensive planning are to be realized, these questions of constitutional and political structure must be faced, whether public policy is based on a strategy of residuals charges or one of regulation-enforcement.

A. MYRICK FREEMAN III

ROBERT H. HAVEMAN

Department of Economics,
University of Wisconsin,
Madison 53706

References

1. A. M. Freeman III and R. H. Haveman, *Public Policy* 19, 53 (1971).