Impacts of Technology on U.S. Cropland and Rangeland Productivity

August 1982

NTIS order #PB83-125013
Foreword

This Nation’s impressive agricultural success is the product of many factors: abundant resources of land and water, a favorable climate, and a history of resourceful farmers and technological innovation. We meet not only our own needs but supply a substantial portion of the agricultural products used elsewhere in the world. As demand increases, so must agricultural productivity. Part of the necessary growth may come from farming additional acreage. But most of the increase will depend on intensifying production with improved agricultural technologies. The question is, however, whether farmland and rangeland resources can sustain such intensive use.

Land is a renewable resource, though one that is highly susceptible to degradation by erosion, salinization, compaction, ground water depletion, and other processes. When such processes are not adequately managed, land productivity can be mined like a nonrenewable resource. But this need not occur. For most agricultural land, various conservation options are available. Traditionally, however, farmers and ranchers have viewed many of the conservation technologies as uneconomical. Must conservation and production always be opposed, or can technology be used to help meet both goals?

This report describes the major processes degrading land productivity, assesses whether productivity is sustainable using current agricultural technologies, reviews a range of new technologies with potentials to maintain productivity and profitability simultaneously, and presents a series of options for congressional consideration. The study was requested by the Senate Committee on Environment and Public Works and endorsed by the House Agriculture Committee, the Senate Appropriations Committee, and the Subcommittee on Parks, Recreation, and Natural Resources of the Senate Committee on Energy and Natural Resources.

The Office of Technology Assessment greatly appreciates the contributions of the advisory panel assembled for this study, the authors of the technical papers, and the many other advisors and reviewers who assisted us, including farmers, ranchers, agricultural scientists in industries and universities, and experts in other Government agencies. Their guidance and comments helped develop a comprehensive report. As with all OTA studies, however, the content of the report is the sole responsibility of the Office.
Impacts of Technology on U.S. Cropland and Rangeland Productivity Advisory Panel

David Pimentel, Chairman
Department of Entomology, Cornell University

Delmar Akerlund
Akerlund Farm Biological Enterprises
Valley, Nebr.

Steve Brunson
National Association of Conservation Districts

William Dietrich
Green Giant Co.

James V. Drew
School of Agriculture and Land Resources
Management and Agricultural Experiment Station
University of Alaska

George R. Hawkes
Product Environmental Affairs
Ortho-Chevron Chemical Co.

Earl O. Heady
Department of Economics
Iowa State University

John H. Herman
Attorney at Law
Dayton, Herman, Graham & Getts

Maureen K. Hinkle
National Audubon Society

William H. Hinton
Farmer
Fleetwood, Pa.

Garry D. McKenzie
Division of Polar Programs
National Science Foundation

William R. Meiners
Resource Planning and Management Associates, Inc.
Meridian, Idaho

John Moland, Jr.
Center for Social Research
Southern University

Richard E. Rominger
Department of Food and Agriculture
State of California

Edwin L. Schmidt
Department of Soil Science
University of Minnesota

F. C. Stickler
Product and Market Planning
Deere & Co.

Glover B. Triplett, Jr.
Department of Agronomy
Ohio Agricultural Research and Development Center

Ralph Wong
Rancher
Marana, Ariz.
OTA Land Productivity Project Staff

Joyce C. Lashof* and H. David Banta, ** Assistant Director, OTA
Health and Life Sciences Division

Walter E. Parham, Program Manager
Food and Renewable Resources Program

Bruce A. Ross-Sheriff, Project Director

Chris Elfring, Analyst and Editor
Barbara Lausche, Senior Analyst
Jessica Marshall, Intern~
Monica Roll, Intern
Elizabeth A. J. Williams, Senior Analyst

Administrative Staff

Phyllis Balan, Administrative Assistant
Marilyn Cassady Constance Clem Elizabeth Galloway
Nellie Hammond Aneke Raneyt Gillian Raneyt Yvonne Wellst

OTA Publishing Staff

John C. Holmes, Publishing Officer

John Bergling Kathie S. Boss Debra M. Datcher Joe Henson

* * From December 1981
~ ~ Temporary assignment