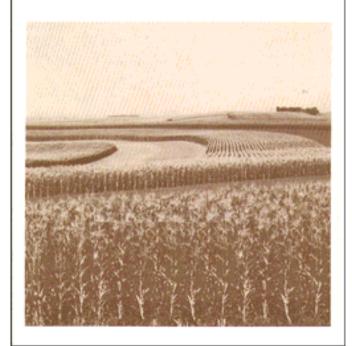
Impacts of Technology on U.S. Cropland and Rangeland Productivity

August 1982

NTIS order #PB83-125013

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





Library of Congress Catalog Card Number 82-600596

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

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 resource-ful 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.

Director

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

Until December 1981 * * From December 1981 Temporary assignment