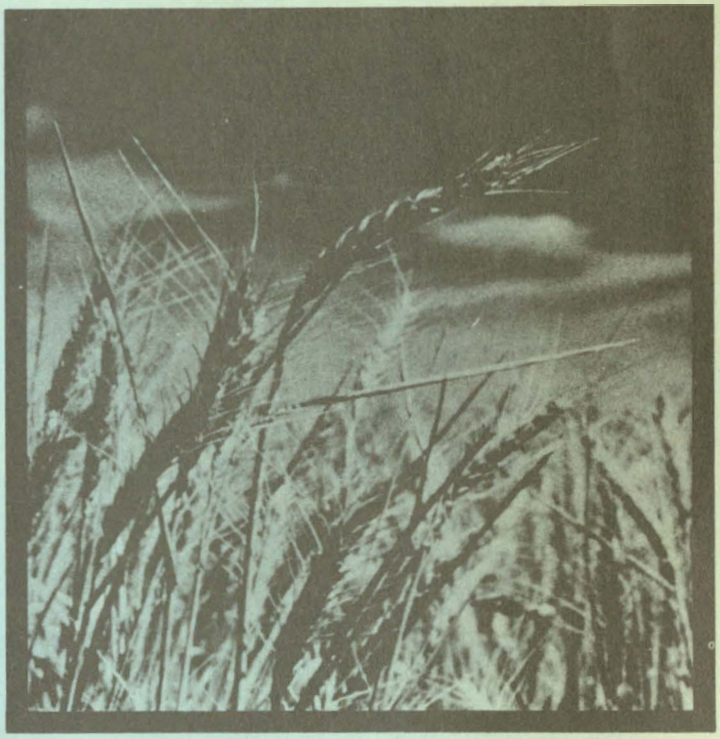
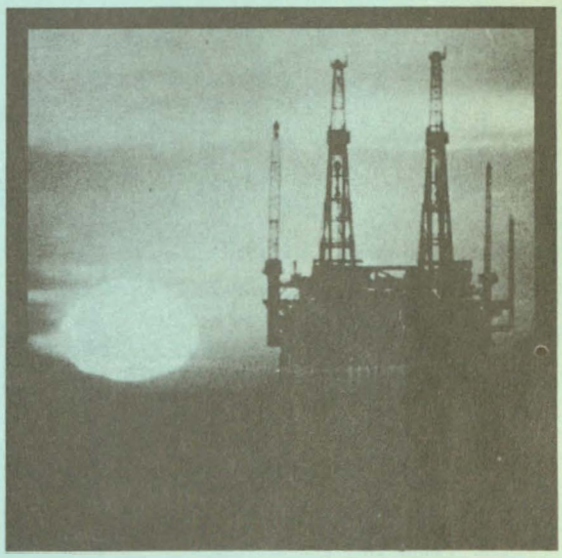
CEAS Activities





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Environmental Data and Information Service
Center for Environmental Assessment Services

CENTER FOR ENVIRONMENTAL

ASSESSMENT SERVICES

ACTIVITIES

FY-81

Table of Contents

I. INTRODUCTION

The goal of the Center for Environmental Assessment Services (CEAS) is to produce quantitative impact assessments of the effects of weather, climate, and marine events on agriculture, energy, water, and other key sectors of the U.S. economy. These impact assessments are provided to decision makers in federal and state governments and private companies.

A major aim of CEAS is to improve the nation's economic health by assisting the business and manufacturing community in understanding the effects of anomalous weather and marine conditions on private sector planning and operations. CEAS accomplishes this goal with an in-house interdisciplinary team that is capable of accessing data from EDIS Centers and other government and private sources and using it with current impact assessment models. The Center produces quantitative environmental and economic assessments. Current CEAS activities include worldwide crop models, marine environmental impact assessments for the Strategic Petroleum Reserve and the Northeast Monitoring Program, and energy consumption modeling.

II. LEGISLATIVE JUSTIFICATION FOR CENTER

Primary EDIS/CEAS activities involve providing users with tailored information for decisions in commerce, industry, and agriculture; providing data management and analysis support to national and international environmental programs; and assessment of the impact of environmental fluctuations on food and energy.

CEAS provides data synthesis as mandated by 1) the National Ocean Pollution Research Development and Monitoring Act, PL 95-273, which requires assessments of impacts caused by hydrocarbons, heavy metals and other toxic chemicals in the marine environment on commercial activity; and 2) the National Climate Act (PL 95-367), which recognizes the importance of environmental impact assessments and their impact on the national economy.

III. RESPONSE TO THE EDIS MISSION AND PLAN

The EDIS mission consists of disseminating environmental data and information tailored to user needs, providing data management and analysis support to environmental programs, and determining the environmental impact of climate and weather on crops, energy consumption and the quality of life. CEAS supports many of these elements of the EDIS mission.

CEAS addresses five national problems and priorities identified in the EDIS Plan. They include: the economy, energy, world food supplies, water resources, and human health.

To accomplish these five EDIS priorities there must be collaboration between governmental (federal, state, local) and private sector decision makers. CEAS provides a small cadre of trained scientists who can delineate the impact of the environment on regional and national development programs. This same group also has experience in delineating the impact of natural events (weather and climate) on human activity from a global perspective.

THE ECONOMY

The U.S. economy currently is faced with declining productivity in primary industries, a negative balance of payments, growing foreign competition, and increasing strain on scarce resources such as energy and water. This situation is aggravated by climatic anomalies such as the recent severe winters that reduced labor productivity and increased capital and operating costs for major U.S. industries. U.S. climatic variations are estimated to directly impact up to 7% of the Gross National Product or $140 billion. Data-based assessments of such impacts can provide enormous economic benefits to private and public planners. CEAS currently is providing largely qualitative assessments in these areas, and is working to develop quantitative assessments.

ENERGY

Energy Development

The planning, site selection, design, construction, and operation of off-shore energy development facilities require information on the impact of climate and marine elements on energy facilities. Such climatological events include: winds, waves, currents, seabed characteristics, visibility, air and sea temperatures, atmospheric pressure, storms and storm surges, seismicity, erosion, and silting. EDIS/CEAS has prepared such assessments for the Mid-Atlantic Bight, the Georges Bank, and the California Outer Continental Shelf areas to support Department of the Interior programs for the development of gas and oil resources. New synthetic fuels programs and stepped-up nuclear powerplant construction will generate an increasing demand for such products and services.

Energy Demand and Planning

During the heating season, CEAS issues temperature-based projections of natural gas demand for multistate regions of the country on a monthly and seasonal basis. These projections are forwarded to the Department of Energy (DOE) and to other federal agencies responsible for energy use and planning, to state energy agencies, and to industry. CEAS also provides national, regional, and state climatic statistics used to estimate actual heating and cooling energy consumption.

WORLD FOOD SUPPLIES

CEAS has developed climate/crop-yield models for major grain exporting countries. These models provide the U.S. Department of Agriculture with infor-

mation to make decisions on grain export policies critical to the nation's balance of payments. Assessment products and subsistence climate/crop yield models also have been developed for Lesser Developed Countries in the Caribbean, Africa, and South Asia. These are used by AID's Office for Foreign Disaster Assistance to verify claims for relief assistance, and by foreign governments and international organizations to minimize the effects of grain production failures around the world.

WATER RESOURCES

Climatic fluctuations also have a major impact on water resources, one of the most important inputs to industrial production. In the coming decade, this resource will become increasingly strained by agricultural and industrial consumption as well as energy (e.g., shale oil extraction). As water becomes scarce, especially in times of drought, timely assessments of climate-related water resource fluctuations will facilitate agricultural and energy planning, management, and resource allocation decisions. CEAS is working with the university community to provide these assessments (e.g., Ogallala regional studies).

HUMAN HEALTH

The need to better understand the impact of weather and climatic events on human health is an identified area for study. Currently, the impact of weather and climate on human productivity and absenteeism is being analyzed by investigators at the University of Delaware.

IV. RESPONDING TO PRIVATE AND GOVERNMENT REQUESTS

Tailored Environmental Data and Data Management

AID Assessments - CEAS support to external NOAA clients is typified by the Center's ongoing assessments for the Agency for International Development (AID). In response to an interagency agreement with AID, the Climatic Assessment Branch is providing real-time weather assessments for the Caribbean, the African Sahel, and Southeast Asia. This service greatly accelerates the processing of assistance requests from Lesser Developed Countries (LDC). Plans are to extend these assessments to South and Central America.

CEAS also conducts data management and analysis activities for external EDIS users. These include the Strategic Petroleum Reserve (SPR) and the Northeast Monitoring Program (NEMP).

Strategic Petroleum Reserve (SPR) - CEAS has served as the NOAA project manager for the Strategic Petroleum Reserve since 1977. Our activities include the design and operational monitoring and modeling of increased salinity levels resulting from brine discharge at proposed DOE disposal sites. A prototype brine discharge system for the Strategic Petroleum Reserve (SPR) became operational for the Bryan Mound, Texas site in March 1980. CEAS staff have provided expert testimony to state legislatures on the impact of increased salinity

levels at outfall sites and have calculated the impact of these levels on the shrimp and fish populations. The work is significant because it furthers the development of circulation and ecological models that track the fate and effect of pollutants on sensitive commercially important marine species. These models will be applied to studies sponsored by the National Marine Fisheries Service (NMFS), the Northeast Monitoring Program (NEMP) and the NOAA Office of Marine Pollution Assessments.

Northeast Monitoring Program (NEMP) - CEAS is supporting NEMP through analysis and synthesis of archived oceanographic data and synoptic cruise data. The analyses will be used to assess the fate and distribution of pollutants. Specific tasks for NEMP include: publication of physical oceanographic data reports that provide rapid dissemination of data to NEMP investigators; preparation of a computerized annotated bibliography of literature related to NEMP; identification of the chain of events that lead to episodes of low dissolved oxygen (DO) concentrations; organization and statistical analyses of chemical oceanographic data to provide information on chemical concentrations that characterize shelf waters; and enhancement of the coverage of NEMP cruise data through process scale studies and interpolation techniques. These results will be used by decision makers in fisheries, transportation, and energy.

Agricultural and Energy Impact Assessments

Examples of CEAS support for external EDIS users include climate and weather assessments for agriculture, energy consumption and health.

Impact Assessments - CEAS produced a series of 1980 reports on major climatic and other national events. Examples include the Heat Wave and Drought ~~Assessment and~~ an Annual Report. The Drought Assessment was used to brief House and Senate committee staffs. The first Annual U.S. Climate Impact Assessment described the effects of anomalous 1980 climatic events on construction, commerce, food and agriculture, government and taxes, recreation and services, society, and transportation and communications. CEAS products are used by urban planners, commodity brokers and other private sector managers.

AgRISTARS - In 1980, CEAS made significant progress in the development and testing of crop yield models for wheat, barley, corn and soybeans. CEAS is providing critical meteorological support to this interagency NASA/USDA/NOAA project. Twenty-seven crop yield models were reviewed for potential application and candidate models were selected for testing and evaluation.

Energy Consumption - For several years CEAS has provided population weighted energy demand information to energy planners. These data are currently derived for each state. Normals and summaries at the state level for the current and previous year are also maintained. Other products include a natural gas demand model and a national electric comsumption model. The results of these models are used by utilities, manufacturers and federal analysts.

V. OPERATIONAL ACTIVITIES

Marine

CEAS provides program management for the Strategic Petroleum Reserve (SPR) Brine Disposal Analysis Program. The SPR program attempts to mitigate the problems associated by an energy shortfall and to minimize U.S. dependence on foreign imports of petroleum. CEAS support includes analyses, environmental monitoring, and assessments of brine discharge for SPR leaching operations.

CEAS has developed three models to support the SPR Program:

1. A transient plume model describing the diffusion and dilution of pollutants in the marine environment.

2. An ecosystem model to describe variations in abundance of resident and transient organisms related to changes in the physical environment.

3. A trajectory model to assess the environmental impact of potentially hazardous plumes.

Future work will emphasize evaluation, implementation and application of existing models, rather than research and development. Proposed modeling areas include ocean and estuarine circulation, ecosystem and economic modeling.

Elements of the SPR system will be used to support the Northeast Monitoring Program (NEMP). In NEMP, CEAS provides analyses of the environmental conditions relating to the quality of the marine environment on fisheries, transportation and energy development activities.

The Center is supporting the NOAA Office of Marine Pollution Assessment in developing data management procedures to be used at oil and hazardous material spills and is developing and applying a uniform international data exchange format (GF-3).

Agro-Climatic

CEAS supplies three major crop assessment services. The first of these provides AID planners with weekly early warning reports that designate weather induced problem areas in most of the world's Lesser Developed Countries. The second service is the training of personnel from the LDCs in the use of environmental data for crop and area-specific statistical yield models. The third service provides weekly weather related impact assessment reports for the major non-U.S. grain producers (USSR, China, Canada and Australia). These assessments increase the validity of economic forecasts for agricultural exporters and improve the cost effectiveness of government programs.

The techniques needed to support these services include: development of weather/climate and societal data bases to determine the interrelationships between weather and major societal activities such as agriculture, mining,

manufacturing, transportation, health; and further development of a low cost climate/subsistence crop monitoring system (such as the CEAS precipitation technique that derives precipitation amount estimates from a gridded analysis of both satellite and ground based weather data). This can provide a reliable early warning for weather related food shortages.

CEAS provides support to a university consortium that is developing techniques to improve water management decisions. Specific analyses for use by industrial and governmental planners in water management practices are also under development. These analyses help determine soil moisture runoff, stream flow, and urban weather impacts.

CEAS is now conducting qualitative assessments of weather impacts on construction, commerce, energy, agriculture, government, recreation, transportation and communications. In 1982, management will develop climate indices and models to quantify labor productivity changes due to weather. A sound foundation for this effort is based on the regression techniques used in CEAS U.S. energy consumption and construction models.

VI. SUMMARY

The Center's central goal is to provide operational quantitative assessments for resource managers. Current programs support all of the national priorities identified in the EDIS Plan. Currently, CEAS' products serve the National Oceanic and Atmospheric Administration, the Department of Energy, the U.S. Department of Agriculture, the Environmental Protection Agency, the Agency for International Development, the Bureau of Land Management, and the private sector.

A specific overview of each division is found in Appendix I. This includes:

- Climatic Impact Assessment Division (CIAD)
- Marine Environmental Assessment Division (MEAD)
- Data Services Division (DSD)

These discussions provide a rationale for the CEAS input to the EDIS Plan, for current operational activities, and for proposed initiatives. A description of specific projects is given in Appendix II. This includes: project name, lead contact, project description, milestones and resources.

Appendix I

Divisional Statements

CIAD

It is the responsibility of the Climatic Impact Assessment Division (CIAD) to develop and produce quantitative assessments of the effects of climate on public health, safety, and key industrial sectors of the U.S. economy. These assessments are provided in a usable format to NOAA policy makers, federal agencies, and the general public. To accomplish this mission, the CIAD:

1. Summarizes climate impact assessments produced by other government agencies and the private sector;

2. Evaluates existing assessment techniques and models;

3. Develops new assessment methodologies;

4. Designs and maintains impact assessment data bases;

5. Publishes periodic reports that quantify the economic impact of climate; and

6. Coordinates impact assessments with responsible agencies for mitigation planning.

The Division includes: the Models Branch in Columbia, Missouri; the Climatic Assessment Branch in Washington, D.C.; the staff located at the Johnson Space Flight Center (JSFC); and the Division staff in Washington, D.C. These personnel are involved in all phases of the mission. Cooperation and close coordination are essential for the completion of CIAD products.

The Models Branch is primarily involved with crop yield and energy consumption modeling. This includes testing and evaluating existing models, developing new models, and expanding model application to new regions of the world. These models are quantitative and provide a historical perspective. The agriculture models include economic as well as climatic factors and allow the analyst to separate and measure the relative effects of precipitation, evapotranspiration and technology improvements. Future activities will concentrate on model development in transportation, health, and construction.

The Climatic Assessment Branch (CAB) is responsible for disseminating periodic climate impact assessments. It is the task of the CAB to constantly develop new sources and types of information and to attempt to strengthen the quantitative techniques used in the reports.

The emphasis of the (JSFC) staff is data management, and coordination with USDA and NASA for the AgRISTARS program. This staff is also responsible for integrating digital imagery procedures into climate assessment methodologies for other users.

MEAD

The Marine Environmental Assessment Division (MEAD) develops the techniques to translate separate marine environmental data bases and studies into consistent information for policy purposes. This involves data synthesis techniques such as ASD, cluster analysis, ocean circulation, and ecological modeling. The scope of the service is interdisciplinary and includes:

1. Assessment of the quality of the marine environment, and estimation of impacts from natural and man-induced events;

2. Synthesis of marine environmental data and development of comprehensive environmental descriptions for resource managers;

3. Development of applied climatologies for contingency planning;

4. Management of marine assessment programs;

5. Modeling of the marine environment for impact assessment; and

6. Applied research dealing with interpretation of environmental data.

Available expertise includes physical oceanography, chemical oceanography and marine ecology, air-sea interaction, meteorology, and marine climatology.

The Division serves EDIS, NOAA, and other federal government agencies directly. Private institutions and the general public are served indirectly through the dissemination of published reports. Although the MEAD primarily supports EDIS and the mission of the National Oceanic and Atmospheric Administration, technical service to other federal departments and bureaus is provided under Interagency Agreements.

DSD

The Data Services Division (DSD) provides computer systems, data base management systems, computer graphics, and communication/terminal support to all CEAS divisions and projects, as well as managing specific data validation, quality control and developmental/research projects.

The Division serves EDIS and NOAA directly by participating in joint EDIS projects and in contracting with other NOAA elements for projects on a reimbursable basis. The Division does not provide long-term archive services. Final data sets are sent to EDIS' permanent archive centers for service to the general public and other governmental agencies.

Specific projects and services include:

1. Tape Library service to generate, manage, and track the Center's tapes in all computer systems;

2. Data Center services to receive, store, collate, and ship data sets;

3. PDP-11/50 minicomputer system with interactive graphics for project support. The system has various telecommunications interfaces to outside systems and supports 800/1600 BPI tape drives and user-dedicated disk packs;

4. U-9300 RJE terminal to access NOAA or EDIS UNIVAC systems;

5. Various terminal systems operating at 300 and/or 1200 baud to access required computer systems;

6. Name/address file to support mailing of publications;

7. Development of inventory and data base management systems to support projects;

8. Development and production of data validation and quality control methods to support various sets of meteorological and oceanographic data;

9. Research and development involving meteorological and climatological data to relate climate variability and short-term change to productivity and economics;

10. Research and development to combine satellite derived data with ground based reports to estimate areal precipitation;

11. Research and development to understand various oceanographic processes, and to depict the mean state and variability of selected parameters at specific sites; and

12. Development and application of computer-graphical systems to support projects.

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