

Legal Response to Environmental Concerns about Weather Modification

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(Manuscript received 28 August 1974, in revised form 17 January 1975)

ABSTRACT

Legal response to environmental concerns about weather engineering was minimal until the late 1960's when state laws began to tighten regulation of cloud seeding operations. The state statutes of the 1970's made possible closer governmental control over the environmental consequences of weather modification. Federal environmental protection and wilderness legislation has been applied to seeding activities. State and federal reporting rules now demand environmental information.

1. Introduction

During the first years of scientific cloud seeding there was no legal response to ecological interests. The state weather control laws passed during the 1950's were meant to squelch overreaching by rainmakers, to require seeders to state their qualifications, and to give the public notice of operations. The few lawsuits filed examined charges of artificial precipitation decrease and assertions about man-made storms and floods. Other than recognizing potential hydrometeorological consequences from atmospheric modification, neither the judiciary nor legislative bodies considered the impact of cloud seeding upon the natural ecosystem.

Increased public environmental awareness of the late 1960's was reflected in enactment by many states of regulatory provisions which more closely controlled weather modification than did the statutes passed during the prior decade. The current state and federal response is even more environmentally-oriented.

2. Past state response

a. Judicial

The first judicial mention of biological consequences of artificial nucleation is in the opinion in *Pennsylvania Natural Weather Association v. Blue Ridge Weather Modification Association*, a 1968 decision by a Pennsylvania trial court judge. In considering whether to enjoin operation of a hail suppression project, he commented upon "the dramatic effect weather or climate modification could have upon man's ecosystems." He noted that "[t]o varying extents, the components or the combinations of [seeding] chemicals are poisonous . . ." But he denied relief because the plaintiffs showed only the mere possibility of future harm, rather than probability of it.

In a companion case the same judge upheld the conviction of a seeder who had violated a township ban on seeding. He ruled that the township could act under power delegated to it by the state legislature to establish rules to protect the "health, cleanliness or comfort" of citizens of the township. Potential pollution by seeding agents posed a hazard. Here, unlike the *Natural Weather Association* case, there was no need to show harm from toxic chemicals; the ordinance was upheld because of the possibility of pollution. Legislators, even at the township level, can enact laws aimed at the possibility of environmental harm. Injunctions, however, must be based on a showing of probability of harm (Davis, 1968).

b. Legislative

It was also in Pennsylvania that one of the first laws was passed with the intent of curbing possible harm to nature by changing the weather. In discussing the bill which became the 1967 Pennsylvania law, one of its sponsors in the House of Representatives stated: "Cloud seeding involves silver iodide, and silver iodide, Mr. Speaker, is highly poisonous. AgI used in seeding falls everywhere, on trees, on vegetation, roofs, people, and in its synergistic action joins with motor exhaust to become lead iodide. Uncontrolled automatic cloud seeding then takes place, and the area for hundreds of miles suffers inversions and drastically modified weather conditions, not to mention total pollution and toxic effects upon all fauna and flora. Pine trees, for example, are especially susceptible; they store these poisons in cold weather and release them into the atmosphere in warm weather. Dry ice, CO₂, also used in seeding, is equally dangerous, disrupting the entire ecology of the planet."

Chemists, biologists, ecologists and meteorologists might take exception to such a statement. The legisla-

tors did not. The bill passed the House by more than a two to one majority and was presented to the Senate which concurred. Section 11 (c) of the original bill read: "No nucleating agent may be used which is dangerous to man or causes environmental pollution as determined by the State Department of Health." In possible recognition of the fact that small concentrations of seeding materials are not harmful, the final version which was passed struck the words "which is" and replaced them with the words "in concentrations" so the law as enacted bars use of nucleating agents "in concentrations dangerous to man." West Virginia has copied the provision.

The Pennsylvania and West Virginia laws also ban lightning suppression, provide for liability without regard to fault for any harm to farmers caused by artificial drought and for damage to land resulting from man-made downpours or storms, prohibit people from carrying out cloud seeding operations in the state "to seed in another state where such cloud seeding is prohibited." The last of these provisions was meant to help keep artificial nucleation out of Maryland which for several years banned cloud seeding. The Maryland prohibition has lapsed (Davis, 1970).

3. Current state response

a. Constitutional

Near the close of the decade of the 1960's well over half of the states were involved in some stage of official action pointing toward revision of their constitutions. Many of the constitutional conventions, study commissions and legislatures contemplating constitutional revision viewed environmental quality as one of the fundamentals which merited constitutional treatment. Among the approaches taken is that of the environmental article of the New York Constitution which begins with a statement of public policy. It declares that the "policy of the state shall be to conserve and protect its natural resources and scenic beauty." Almost all of the recent state constitutions direct the state legislature to pass environmental legislation. Michigan's constitution, for example, says that the lawmakers "shall provide for the protection of the air, water and other natural resources of the state from pollution, impairment and destruction." In Virginia, as in some other states, the general assembly "may" undertake the protection of the commonwealth's atmosphere, lands and waters from pollution, impairment and destruction. Illinois' new constitution declares that individuals have a constitutional right to a "healthful environment." Other states do likewise, and a proposal has been introduced into Congress which asks for an amendment to the federal constitution which would state: "Every person has the inalienable right to a decent environment."

Most of these new provisions will not affect weather modification practices until appropriate legislation is

passed. However, in a few instances the new constitutions expressly give citizens a right to go to court to enforce the environmental guarantee. In Illinois "[e]ach person may enforce this right against any party, governmental or private, through appropriate legal proceedings subject to reasonable limitation and regulation . . . by law." (Howard, 1972)

b. Legislative

The 1967 Texas Weather Modification Act, which is the prototype of the more recent legislation, states that: "[N]o person shall engage in activities for weather modification and control except under and in accordance with a license and a permit issued by the Board authorizing such activities." An increasing number of states have enacted similar provisions which make it clear that carrying out weather alteration activities is illegal unless both a professional weather modifier's license and an operational permit have been issued. This key provision protects the public from inept or unscrupulous cloud seeders and assures that the most advanced scientific methods are employed for optimization of benefits from weather control operations. This dual requirement is designed to assure that both the personnel and the project are sound. If they are, the dangers of environmental harm are minimized.

In 1973 the Montana weather modification regulatory agency was given authority to look beyond individual permit applications and enter into agreements for research relating to the identification and evaluation of environmental, ecological, economic and sociological impacts of weather engineering. Also in 1973 the Utah Division of Water Resources was given authority to contract for research concerning "other factors that may be affected by cloud-seeding activities." It is only through research that the real environmental problems associated with weather modification can be identified and properly attended to.

Colorado's 1972 law demands that permit applicants supply a statement showing the expected effect of the proposed operation upon the environment. A year later Colorado by means of an administrative regulation called for a detailed listing of potential risks from a project. If the application discloses that they are too serious, it can be denied. In any event there is opportunity for an administrative pre-assessment of ecological issues (Davis, 1974). Licensing agencies in other states have imposed a similar requirement on a less formal basis.

The Illinois Weather Modification Control Act flatly states that weather modification affects the environment and requires permit applicants to set up emergency shut-down procedures to be put into effect should ecological or other disasters threaten. Following the June 1972 flash flood in Rapid City, S. D., the charge was made that an experimental program involving salt seeding of clouds had contributed to the

disaster. Investigators concluded that the seeding had not done so, but recommended that automatic stand-down procedures be incorporated into all weather modification operations (St.-Amand *et al.*, 1973). Seeding should be halted immediately upon any indication of either natural or artificial adverse weather conditions. Illinois gives force of law to that recommendation (Ackermann *et al.*, 1974).

4. Environmental regulation

a. Environmental protection acts

The National Environmental Policy Act of 1969 requires federal agencies to file environmental impact statements with the Council on Environmental Quality whenever they propose any "major Federal actions significantly affecting the quality of the human environment." These documents consist of a "detailed statement by the responsible official on—(i) The environmental impact of the proposed action, (ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented, (iii) Alternatives to the proposed action, (iv) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." This essentially is a full-disclosure requirement which gives the public the right to information on the impact of actions before the fact. The Act is intended to cause federal agencies to take into account environmental considerations from the inception of projects and to use environmental information as one of the bases upon which project decisions are made.

The federal courts have built up a large body of case decisions relating to the Environmental Policy Act. This has resulted from the fact that they have taken jurisdiction of complaints from groups which have asserted that various impact statements were not prepared according to the procedures required by the Act and regulations enforcing it or were not adequate. In other instances environmentalists have sued federal agencies to force them to file statements covering actions considered by the agency officials not covered by the law (Anderson, 1973).

To avoid unwanted and possibly protracted litigation, federal agencies involved in weather modification should have their contractors and grantees submit environmental assessments along with their proposals. In such a manner the applicant can build into the project formulation process at the earliest possible point consideration of the environmental impacts of the proposed action. The agency then should conduct an environmental review to identify and evaluate the expected and potential impacts of the action and the alternatives to it. It is of particular importance to ascertain whether the project is a "major Federal" action which "signifi-

cantly affects the quality of the human environment." If it is not, a negative declaration should be prepared and the information made public. If it is, then a draft impact statement should be prepared which will cover the items called for in the Act. The data upon which a statement is based may be obtained from existing environmental literature, in-house studies, studies specially contracted for, environmental assessments, and environmental reviews. The statements then are circulated to interested state and federal agencies and to interested groups and persons. Public hearings should be held whenever the project is a matter of public controversy. Information obtained from hearings and from circulation of the draft should be incorporated in the final statement. It is filed with the Council on Environmental Quality.

Almost a third of the states have now enacted impact statement requirements (Hagman, 1974; Yost, 1973). Most of these jurisdictions also have weather control laws, and in many of them there are currently active cloud seeding projects. State impact statement provisions in general are based on the federal act. Some, however, require private as well as governmental projects to comply if they have a "significant" effect on the environment. A number of the state laws ask for more information than does the federal act. In Montana, for example, the state did not accept the statement that had been filed with the federal government for the Hungry Horse project. More was required to comply with its law.

b. Wilderness acts

The Wilderness Act of 1964 was designed to set in motion creation of a National Wilderness System in which lands to be designated by legislation are to be preserved and protected in their natural condition. These so-called "wilderness areas" are to "be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness." According to the Act, "[a] wilderness, in contrast with those areas where man and his own works dominate the landscape, is . . . an area where the earth and its community of life are untrammelled by man . . . retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural condition, and which . . . generally appears to have been affected primarily by forces of nature, with the imprint of man's work substantially unnoticeable, . . . of sufficient size to make practicable its preservation and use in an unimpaired condition."

Many high water yield areas lie in federal lands which either have been or may be designated as wilderness areas. The National Park Service and the National Forest Service have taken a purist approach to their task of administration of wilderness areas under their

jurisdiction (Foote, 1973; Haight, 1974). They assert that artificial modification of weather would result in unnatural conditions incompatible with the intent of Congress, and they also have restricted installation and monitoring of hydrometeorological data collection equipment in wilderness areas. The Bureau of Reclamation takes the position that the effects of cloud seeding "are not manifested as an observable artificiality in wilderness character and that the Wilderness Act was not intended to, and does not, prohibit weather modification." (Division of Atmospheric Water Resources Management, 1974). A bill introduced in the House of Representatives in 1974 would allow cloud seeding and installation and use of measuring devices in wilderness areas upon permission of the departments administering them, provided the activities would be so conducted as to minimize impact on the wilderness character. Permission could be denied or terminated in case of such adverse impact.

Just as they followed the federal lead in enacting impact statement requirements, states are now starting to pass their own wilderness provisions covering state lands.

c. Technology assessment act

Federal money has played a central role in financing study, experimentation and development of many American technological breakthroughs, including weather engineering. Congress, however, has become concerned that public money has at times been poured into projects which were ill-fated. In order to assist federal lawmakers, few of whom have any scientific or technological background, in making realistic pre-assessments about technological projects for which they are asked to appropriate money, Congress set up its Office of Technology Assessment. When called upon by congressional committees, the Office undertakes a technology assessment for them to give them more background upon which they can make informed judgments. It is hoped that in the future Congress will not appropriate funds for unsound projects.

Weather modification was considered as a "natural" for exploration by the technology assessment device in the basic report which led to passage of the act (Tribe, 1969). The Stanford Research Institute has conducted a technology assessment of the impacts of snow enhancement in the Upper Colorado River Basin (Weisbecker, 1972). This study shows what can be done in making pre-determinations about the overall consequences of weather modification.

d. Environmental treaties

At the 1972 United Nations Conference on the Human Environment in Stockholm, Sweden, the nations of the world adopted a declaration of international environmental principles, one of which proclaimed that

nations "have, in accordance with the Charter of the United Nations and the principles of international law . . . the responsibility to insure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction." It has been asserted that the United States, which was a party to the Declaration, violated it by the use of precipitation enhancement techniques in Indochina during the Vietnam War. Because the Declaration conditions the obligation by reference to the UN Charter and international law, it has been argued that American weather warfare did not violate the Declaration. Neither the Charter nor other international law principles, according to that argument, ban the use of weather modification as a weapons system (Davis, 1972).

In the summer of 1973 the Senate passed a resolution urging the President to negotiate treaties which would bar signatory nations from using environmental warfare techniques, including cloud seeding. Nothing has come of the resolution.

5. Environmental reporting

a. State reporting provisions

Over half of the state weather control laws require cloud seeders to make periodic reports about their weather modification activities. The laws vary rather widely in the quantum of information requested. Some of the states, however, now have either by legislation or administrative regulation so broadened their information requirements that many environmental facts must be reported (Davis, 1968).

b. Federal reporting provisions

The current federal reporting law which was passed late in 1971 authorizes the Commerce Department to promulgate reporting regulations for weather modification activities. The administrative authority was sub-delegated to the National Oceanic and Atmospheric Administration which made comprehensive rules and published them in the Federal Register in the fall of 1972. Soon thereafter NOAA officials, acting under a Presidential directive to expand the regulations so they would require more environmental material, drafted some proposed alterations in the regulations. They drew such a heated response from the weather modification industry that NOAA beat a retreat and drew up environmental rules of a more limited scope. These regulations, which went into effect 15 February 1974, ask for information about project safeguards. Have impact statements been filed? If so, they should be furnished to NOAA. Have provisions been made to acquire the latest forecasts, advisories and warnings? If so, they should be specified. Have any safety procedures and environmental guidelines been included in the operational plans? If so, descriptions of them should be furnished.

The required environmental information is evaluated by NOAA. If a report indicates that a project may significantly depart from the practices or procedures generally employed in similar circumstances to avoid danger to persons, property or the environment, or shows that it may adversely affect the success of federal research projects, NOAA will so notify the operator and responsible state officials and will make recommendations where appropriate (Charak and DiGiulian, 1974). Such regulation by adverse publicity can be very effective (Gellhorn, 1973).

6. Summary

Environmental law has dramatically increased in scope and variety during the years that scientific weather modification has been practiced. National, state and local lawmakers have responded to public concerns about environmental quality. Although weather modification has not been singled out as a target of unfavorable treatment by environmentally-aware lawmakers, cloud seeding activities have been affected by legal norms which have been intended to protect the environment. Technologies developed earlier in this century have not been so affected during their developmental stages, but they too have now been subjected to environmental law. The prognosis is that there will be increasing legal response to anxieties about the application of technology, including applied cloud seeding.

REFERENCES

- Ackermann, W., S. Changnon and R. J. Davis, 1974: The new weather modification law for Illinois. *Bull. Amer. Meteor. Soc.*, **55**, 745-750.
- Anderson, F. R., 1973: *NEPA In the Courts: A Legal Analysis of the National Environmental Policy Act*. Resources for the Future, Inc., 324 pp.
- Charak, M. T., and M. T. DiGiulian, 1974: Weather modification activity reports: November 1, 1972, to December 31, 1973. NOAA, Office of Environmental Monitoring and Prediction, pp. D-1 and D-2.
- Davis, R. J., 1968: The legal implications of atmospheric water resources development and management. Final Report for Office of Atmospheric Water Resources, Contract No. 14-06-D-6224, Secs. 7.4, 11.7.
- , 1970: State regulation of weather modification. *Ariz. Law Rev.*, **12**, 35-69.
- , 1972: Weather warfare: Law and policy. *Ariz. Law Rev.*, **14**, 659-88.
- , 1974: Trends in weather modification legislation. *J. Wea. Modification*, **6**, 17-27.
- Division of Atmospheric Water Resources Management, 1974: Position paper on weather modification over wilderness areas and other conservation areas U. S. Dept. of the Interior, 29 pp.
- Foote, P. J., 1973: Wilderness—A question of purity. *Environ. Law*, **3**, 255.
- Gellhorn, E., 1973: Adverse publicity by administrative agencies. *Harvard Law Rev.*, **86**, 1380.
- Hagman, D. G., 1974: NEPA's progeny inhabit the states—Were the genes defective? *Urban Law Annual*, **7**, 3-17.
- Haight, K., 1974: The wilderness act: Ten years after. *Environ. Affairs*, **3**, 275.
- Howard, E. E. D., 1972: State constitutions and the environment. *Virginia Law Rev.*, **58**, 193.
- St.-Amand, P., R. D. Elliott and R. J. Davis, 1973: Report on Rapid City flood of June 9, 1972. *J. Wea. Modification*, **5**, 318-346.
- Tribe, L., 1969: Technology: processes of assessment and choice. Report of Panel on Technology Assessment, National Academy of Sciences.
- Weisbecker, L. W., 1972: Technology assessment of winter orographic snowpack augmentation in the upper Colorado River basin. Final Report, Stanford Research Institute, National Science Foundation Contract NSF-C641, 2 vols.
- Yost, N. C., 1973: NEPA's progeny: state environmental policy acts. *Environ. Law Reporter*, **3**, 50090-50098.