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## Controlling the Weather: A Study of Law and Regulatory Processes (Howard J. Taubenfeld, Editor)

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## REVIEWS

CONTROLLING THE WEATHER: A STUDY OF LAW AND REGULATORY PROCESSES. Howard J. Taubenfeld, Editor. University Press of Cambridge, Massachusetts: The Dunellen Company, Inc. 1970. Pp. xvi, 275. \$10.00.

Efforts to control the weather are as ancient as mankind: spring fertility rites recorded in pre-written history were an effort to bring weather propitious for abundant harvests; the American Indian tribes attempted to bring refreshing showers by the use of rain dances to their gods. Today, the Indian rain dances are to be found primarily as entertainment for the paleface who may contribute a shower of admission tickets. Sometimes we may wonder if some of our modern rainmakers are any more effective. Certainly the prayers still sent up to heaven by the devout during a drought are based on the same concept as the rain dances, *i.e.*, that proper vibrations between human beings and a superior being or beings will induce the superior being to give water to the parched earth — or drive away the storm or the cold and bring the desired weather.

Crude efforts at scientific control of weather have also been with us for many centuries. The early caveman who learned to build a fire at the cave entrance, thereby keeping himself and family warm, was engaging in mini-micro weather control. The fruit grower, burning his smudge pots and running his fans to keep away the frost, is certainly doing the same thing on a slightly larger scale, but still micro-weather modification.

As long as the human efforts affect only a small area and interfere with no one else, no rules or regulations by organized society seem necessary. However, as soon as the effects of human effort have an impact on a neighbor, be that neighbor an individual or a nation, some proportionate degree of control or regulation becomes necessary, since the modification beneficial to one may be disastrous to another, as when a severe hurricane changes course. If the neighbor interfered with is an individual the control required will be quite local, but where the neighbor is a sovereign state, international controls in the form of treaties may be required to avoid conflict.

*Controlling the Weather* consists of an introductory chapter of some 32 pages by Professor Taubenfeld, followed by seven specific reports by different members of a Task Force on the following subjects: Scientific Aspects of Weather Modification; Social Norms; Problems and Objectives of the Federal Effort; Federal Organization; Strategies

for State Regulation; The Role of Local Government Units; and The Atomic Energy Agency as a Model.

Professor Taubenfeld, in summarizing and commenting on the findings of the Task Force, suggests that the need for international regulation at the present stage of technology is limited. However, he does recognize that efforts such as hurricane seeding in the Caribbean may require international agreement. Inadvertent weather modification as a result of world-wide air pollution is also recognized as presenting a possible need for international agreement. The amount of scientific, pseudo-scientific, legal, economic, moral, and other literature on weather modification, air pollution and related subjects of overpopulation, food supply, and quality of living is beyond the capacity of any one person to read. Much of the better literature is cited in *Controlling the Weather*.

Ecologists are loudly, and perhaps justifiably, demanding rigid international controls on air pollution, but their cries for control face formidable barriers. The cost involved in eliminating air pollution world-wide would be prohibitive. Furthermore, underdeveloped nations want the problems of pollution, because to them it signifies technological and industrial "arrival." Every major industrial area throughout the world is now known to have a direct impact on the downwind weather as well as contributing to the world-wide effect on weather by air pollutants.

Another major problem noted by Professor Taubenfeld and his colleagues is the scarcity of knowledge concerning the broad consequences of atmospheric pollution or deliberate efforts at weather modification. In addition, scientists, despite all their knowledge, are still neophytes as far as understanding the forces of nature involved in weather, and they know even less about practical and realistic means of modifying it on other than a very small scale.

Professor Taubenfeld has considerable experience and knowledge relating to the legal problems of weather modification,<sup>1</sup> but this reviewer believes the need for international agreements is more pressing than Professor Taubenfeld suggests. Experience in the areas of outer space and ocean resources indicates, however, that nations, especially the super powers, are reluctant to agree to anything where there are substantial unknown factors. The United States, with its north-south expanse and its west to east movement of most weather systems, is much less likely to directly disturb a neighbor than would be any of

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<sup>1</sup>This is evidenced by publications such as *WEATHER MODIFICATION AND THE LAW* (1968) and *WEATHER MODIFICATION: LAW, CONTROLS, OPERATIONS* (1967).

the European countries where successful weather control would be almost certain to have an impact across national borders.

Perhaps the pattern established in the development of outer space treaties could be utilized for weather modification agreements. Each of the major outer space treaties was preceded in time by a United Nations General Assembly Resolution, which is advisory only. In most instances, the significant treaties incorporate the recommendations therein and are almost identical in large part with the language of a resolution adopted a few years previously.

The uncertain consequences of attempts to control or modify weather has led to legislation in over half the states of the United States and to a considerable amount of litigation. Professor Taubenfeld recommends absolute liability for damages resulting from weather control or modification activities. This is justified and finds numerous precedents in newly developing technologies where the risks are unascertainable and a potential plaintiff has no possible way in which to protect himself. Development of the airplane was accompanied by absolute liability which still lingers to some extent today. Space activities are held absolutely liable for any damages, pursuant to several United Nations Resolutions and article VII of the 1967 Treaty on Principles Governing Activities in Space. Nuclear power for commercial purposes is also subject to absolute liability in most applications.

Adoption of rules of absolute liability do not eliminate the questions of causation. The present state of the science or art of weather control makes it almost impossible for a plaintiff to prove that human activities in fact brought about the weather modifications which caused his damage. Also, there is frequently no agreement as to what weather is desirable. A ski resort operator wants a heavy fall of snow to bring out ski bunnies and their bucks, but the rancher with a herd of cattle nearby may suffer heavy losses if the snow storm becomes a blizzard. The agricultural industry wants rain, but the resort owners want sunshine. The only thing that can be fully agreed upon is that destructive storms are to be prevented if possible.

Thus far the federal government has not exercised extensive controls over weather modification efforts within the United States, probably because man's efforts thus far are so puny that unless the effort is made right on a state boundary there is little risk of substantial weather change outside the state. If man does acquire the ability to intentionally modify weather over a substantial area, the federal government would then find it necessary to exercise its undoubted power to regulate the activity. Whether or not the United States will be liable

for damages resulting from its efforts at weather modification will depend on laws in force at the time.

Professor Taubenfeld suggests that presently federal legislation might not permit recovery because of the discretionary nature of the activity. This result is questionable, especially in view of the fact that the federal government finances a substantial part of all weather modification research, frequently through universities and other nonprofit institutions. States and municipalities have adopted widely varying policies, but overall hangs the uncertainty of proof of causation, and where prevention of the activity is sought, a balancing of the equities is likely to give a result adverse to a plaintiff.

Based on the assumption that the science of weather modification will achieve increasing successes, *Controlling the Weather* carefully explores the kinds of institutions that might and should be established in the future. A self-imposed and troubling limitation is that only intentional weather modification is considered in detail. In view of the fact that presently the greatest human impact on weather may be inadvertent — resulting from automobile exhausts, industrial and home pollution of the atmosphere and the general overpopulation of the globe — it is suggested that the Task Force led by Professor Taubenfeld might be reconvened for the purpose of dealing with causes of inadvertent weather modification in a manner similar to the way it has studied intentional weather modification. The political, legal, religious, and economic aspects of such a study present enormous problems far outweighing in difficulty the problems associated with intentional weather modification.

The Task Force cautiously, perhaps too diffidently, suggests a federal agency to which all activities, federal, state, municipal, and private would be required to report. Licenses would be required, based on the types of activities planned. Absolute liability would prevail, but, as noted previously, subject to the problems of proof of causation and immunity of government agencies.

Thus, the introductory essay prepared by Professor Taubenfeld is a clear and understandable summation of the findings of the Task Force. The seven additional essays provide the carefully studied details on which the introductory essay is founded.

The principle shortcomings of the book are its hesitancy in making strong unequivocal recommendations when it would appear that the proper ground work had been laid, and the deliberate avoidance of the questions related to inadvertent weather modification. Although not presenting any startling conclusions or recommendations, this

collection of essays is well worth reading by anyone interested in having, perhaps not a comprehensive knowledge, but substantially more than cocktail party small talk knowledge of the problems surrounding weather modification. Everyone is interested in the weather and this is a study which tells what is being done about it.

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