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It has been only in the past twenty-five years that weather modification has gained recognition as a science. At the present time the legal aspects of weather modification have not been formulated by either the courts or the legislatures of the respective states. Professor Pierce discusses the progress of weather modification and expected scientific advancements, the various legal theories that have been suggested concerning property rights to clouds and the moisture therein, and problems of liability of the weather modifier. These problems and theories are then discussed as related to the specific area of snowpack augmentation in Wyoming.

LEGAL ASPECTS OF WEATHER MODIFICATION SNOWPACK AUGMENTATION IN WYOMING

*John M. Pierce**

I. INTRODUCTION

IN February of 1962, a program of research in the area of weather modification was initiated by the Natural Resources Research Institute of the University of Wyoming under a contract with the United States Bureau of Reclamation.[1] The main objective of the program was to conduct research on atmospheric water resources leading to the development of snowpack augmentation procedures and techniques for application within the State of Wyoming. Also

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1. United States Bureau of Reclamation Contract No. 14-06-D-4278. Since the expiration of that contract in February of 1963 the United States Bureau of Reclamation and the Natural Resources Research Institute have entered into three subsequent contracts. Reports concerning these contracts have been made in Summary Report, U.S. Bureau of Reclamation Contract No. 14-06-D-4857, University of Wyoming Natural Resources Research Institute (1964); Summary Report, U.S. Bureau of Reclamation Contract No. 14-06-D-5279, University of Wyoming Natural Resources Research Institute (1966); Final Report, U.S. Bureau of Reclamation Contract No. 14-06-D-5279 (1966).

involved was the investigation of the potentialities of developing new informatic forms of instrumentation for future monitoring and evaluating of cloud seeding operations.

For purposes of fulfilling the terms of the contracts with the Bureau of Reclamation, a site suitable for experimentation was set up on Elk Mountain.[2] In the primary phase of the study the "cap-cloud" was selected as the most suitable and promising kind of cloud for investigation.[3] In February of 1963, four exploratory seedings of "cap-clouds" on Elk Mountain were attempted, one of these seedings provided positive visual indications of artificially induced snowfall. The experiments were continued and in the final report[4] of June 1966 the following conclusions were stated by Dr. John C. Bellamy, director of the Institute:

1. The cap-clouds which frequently enshroud Wyoming's higher mountain peaks are a potential source of very significant amounts of additional water supply. The quantitative measures of this potentiality described in Section 7 indicate that a single silver iodide generator can be expected to provide between perhaps 90 and 2,200 (and most probably at least 450) acre feet of water in the form of additional high mountain snowpack per day of cap-cloud occurrence. It is estimated that the order of 1000 of such generator-day units of operation should be available during most winters on the several mountain ranges in Wyoming.

2. Although cap-clouds are by no means the only potential source of additional water supplies from the atmosphere, the seeding of cap-clouds offers an exceptionally suitable way to initiate operational programs for greater utilization of our atmospheric water resources. For example, the possibilities of disbenefits elsewhere are minimized since the moisture involved in Wyoming's cap-clouds is seldom if ever directly involved in precipitation processes for hundreds or even thousands of miles downstream. Especially, the gaging of the additional amounts of

2. Elk Mountain, a solitary peak located some 50 miles northwest of the University of Wyoming at Laramie, is uniquely suitable for the experimentations contracted for.
3. Final Report, U.S. Bureau of Reclamation Contract No. 14-06-D-4278, University of Wyoming Natural Resources Research Institute (1963).
4. Final Report, U.S. Bureau of Reclamation Contract No. 14-06-D-5279, University of Wyoming Natural Resources Research Institute 3 (1966).

water supply being produced is vital to the effective management of our water resources, and the gaging of additional snowfall from otherwise nonprecipitating cap-clouds is much more direct, convenient and inexpensive than the gaging of artificial increases of amounts of precipitation from natural storms. The fixed geographic position of the cap-clouds also greatly simplifies water resource management concepts; a single silver iodide generator can simply be considered to be, in effect, a gate which is potentially capable of diverting the order of 200 cubic feet of water per second from an atmospheric stream of water whenever it is flowing through a cap-cloud.

3. The full utilization of this potential does depend, however, upon the storage of the additional water supplies obtainable in wet years for use in dry years. As indicated in Section 7.3, it now appears that seedable cap-clouds, like storm clouds, occur much less frequently in dry than in wet years.

4. The full realization of this potential also depends upon a continuing research program concomitant with an operational program of cap-cloud seeding to augment water supplies. That is, it is obviously very desirable to initiate such water-supply augmentation operations with as little delay as possible, even though such operations cannot at first be as efficiently effective as additional research and development can ultimately make them. Indeed, many of those operational problems which will ultimately be found to be most important and require additional research cannot be predicted before they have been encountered in an operational program. On the other hand, our experience to date in the Wind Rivers clearly shows that the search for solutions to most such problems can be conducted much more economically and effectively in an experimental region such as Elk Mountain than in a larger water supply region.[5]

Although Dr. Bellamy reports that quantitative measurements of the artificially induced snowfall have been made, these quantitative measurements cannot be interpreted to mean that an accurate determination can be made of the amount of runoff which becomes incremental flow in the spring from any given amount of snowpack. He refers to

5. *Id.* at 22-3.

snowpack in acre-feet equivalent.[6] At the present time engineering techniques have not been developed to allow, at least in the legal sense, for determining the amount of runoff that results from a acre-foot equivalent of snowpack.

The primary purpose of this paper is to discuss the legal problems of ownership, control and liability as related to snowpack augmentation. Since the research program being conducted by the Natural Resources Research Institute and the science of atmospheric modification are in the developmental stages, there is need to determine the present alternatives and the changes that can be made in legal institutional arrangements in order that the most economical methods now being developed can be used. While it is beyond the scope of this paper to consider the changes that should be made in legal institutions, several of the present alternatives will be briefly discussed and this discussion can be used as a basis for further interdisciplinary study.

At the outset it must be recognized that snowpack augmentation is a small segment of weather modification; because of the interrelationship that exists within the field, snowpack augmentation cannot be considered singularly. It would be neither politically nor administratively feasible to consider legal reform for snowpack augmentation alone. Any proposed legislation which results in change in the legal institutional framework must be broad enough to encompass those segments of the field of weather modification that are scientifically interrelated.

II. THE STATUS OF WEATHER MODIFICATION

In a 1964 report[7] by P. H. Wycoff the following major sub-areas of weather modification were evaluated in terms of the progress that has been made in the twenty years since the experiments of Langmuir, Schaefer and Vonnegut:

1. modification of fog, both warm and cold;
2. artificial stimulation of rain and snowfall;

6. That is to say, if all the snow that was artificially induced within the State of Wyoming resulted in surface runoff, the amount added by weather modification activities would total between 90,000 and 2,200,000 (most probably at least 450,000) acre feet of water.
7. Wycoff, *Evaluation of the State of the Art*, HUMAN DIMENSIONS OF WEATHER MODIFICATION 27 (1966).

3. hail suppression;
4. lightning suppression;
5. severe storm modification—mainly hurricanes and tornadoes;
6. climate modification—includes all activities which are intended to cause permanent changes in the weather patterns.

To understand the relationship of snowpack augmentation in weather modification, it is necessary to consider what has been developed and what is likely to be developed scientifically.

About twenty years ago weather modification gained recognition as a science with the experiments of Schaefer, Langmuir and Vonnegut.[8] Shortly after the announcement of the results of these experiments fantastic predictions such as the following were made:

> In the last nineteen months man has learned to control the weather .... It is quite possible that in the near future man may, if he wishes, sidetrack snowstorms outside large cities, clear winter fogs over airports, considerably reduce damage from hailstorms and droughts, and even modify the climate over large portions of the world. The legality of doing any of this is completely unexplored.[9]

While these dreams have not been achieved, steady progress has been made in the area of weather modification.

Fog Modification.[10] Under normal circumstances the modification of fogs is done for the purpose of improving visibility. The dissipation of cold fog for improved visibility is a proven technique; however, a satisfactory technique for dissipating warm fogs has not been achieved. Because of the economic significance in dissipating warm fogs, there is a strong probability that research will be accelerated resulting in a feasible technique for dissipation of warm fogs.

8. Langmuir and Schaefer can be credited with the initial experiments which were made in 1946 and which utilized solid carbon dioxide (dry ice). With the aid of Vonnegut it was determined that silver iodide a chemical whose crystal structures and molecular dimensions resemble those of ice would act as sublimation nuclei.
9. *Weather Under Control*, Fortune, February 1948, p. 109.
10. Wycoff, *supra* note 7, at 30.

Cloud Modification.[11] In the area of artificial stimulation of moisture either in the form of rain or snow, a substantial degree of success has been achieved with orographic clouds. Although over the last ten to twelve years there has been considerable variation, average increases in moisture of ten to fifteen percent have been achieved by modifying this type of cloud. The problems of warm cloud seeding still exist. However, it is believed that marked advancements will be made in this area in the next ten to fifteen years.

Hail Suppression.[12] For the most part hail suppression activities have utilized seeding by silver iodide. Some of these operations have been successful, generating claims of 70 percent reduction in crop damage. Although some operations have been successful, others have failed and have caused an increase in crop damage. These failures have pointed up the fact that nature's methods for producing hail are not completely understood. Because of the economic savings which might result from hail suppression, there is a need to study the dynamics of hailstorm structure. There is reasonable belief that adequate hail suppression can be scientifically attained in the next decade.

Lightning Suppression.[13] The mechanics for the production of electricity are not completely understood. Some experiments have been conducted by the United States Forest Service which indicate that a significant reduction in cloud to ground lightning strokes can be obtained through seeding of storm clouds with silver iodide. Extensive research will be initiated with the probability that the destructive nature of lightning, which has resulted in millions of dollars of damage to forest lands and other property, will be curtailed.

Severe Storm Modification.[14] Hurricanes: there is some belief that the destructive energy of hurricanes can be dissipated. At the present time the research required to achieve this dispersion is still in the model building stages. Lack of knowledge and the complexity of the problems make the prospect of achievement in the next several decades unlikely.

11. *Id.* at 31.
12. *Id.* at 32.
13. *Id.* at 34.
14. *Id.* at 36.

Tornadoes: the suppression of tornadoes is a problem more difficult than the modification of hurricanes because of the spontaneous appearance of a tornado. Since field work is impossible in the early stages of tornado suppression, research is confined to laboratory simulation and theoretical computer models. The possibility of tornado suppression is many years away.

Climate Modification.[15] Climate modification involves a change in a permanent pattern of weather activity and is distinguished from weather modification by the span of time covered by the modification activity. At the present time much unintentional climate modification is carried on by man. This has resulted from air pollution, urbanization, deforestation of large areas, and building of dams and diversion of rivers. Intentional climate modification by man is in the very elementary stages and has been confined to the electronic computer. While there has been speculation about the possibility of being able to alter the global pattern of atmospheric air masses, climate modification attempts cannot be made until the entire consequences on a world-wide basis can be assessed. The information necessary to attempt and achieve some of the more simple aspects of climate modification might be acquired within the next ten years.

In order to take advantage of these achievements and future possibilities, it is necessary that the social, economic, and legal institutional aspects of weather modification be thoroughly examined and that they grow along with the scientific. The scientific aspects of weather modification have advanced to the point where related institutional arrangements can be most advantageously developed.

III. CASES AND STATUTORY ENACTMENTS

A. Case Law

Neither case law nor statutory law has been developed to any large extent in the area of weather modification. As of early 1966 only nine legal actions involving aspects of weather modification had been filed in the courts. Of these actions, one was abandoned before a decision was reached on

15. *Id.* at 37.

the merits, and two cases[16] were filed recently and no decisions have been reached on them. Of the remaining six cases, one[17] was brought on constitutional grounds and in the other five either an injunction and/or damages were sought. Judgment was rendered in favor of the defendant weather modifier in four of these latter five cases. In three[18] of them the the courts ruled that there was no causal connection between the weather modification activities and the damage complained of.

In *Slutsky v. City of New York,*[19] one of the two remaining cases, the plaintiffs, who were the owners of a resort in the Catskill Mountain region of New York, sought to enjoin the City of New York from engaging in weather modification activities, the purpose of which was to increase the rainfall and runoff into a stream basin that served the City. The plaintiffs' contentions were that the increased rainfall caused some overflowing of the stream which ran through the resort's golf course and that the increased number of rainy days dis-

16. Natural Weather Ass'n. v. Blue Ridge Weather Modification Ass'n. No. 3 at the January 1965 Term of the Court of Common Pleas of Fulton County, Pennsylvania; Township of Ayr v. Fulk, No. 53 at the September 1964 Term of the Court of Common Pleas of Fulton County, Pennsylvania.

17. Summerville v. North Platte Valley Weather Control Dist., 170 Neb. 46, 101 N.W.2d 748 (1960). The Supreme Court of Nebraska held that a Weather Control Act which did not afford a person living outside but owning land within the proposed district a voice in the forming of the district violated sections of the state constitution. The Nebraska legislature repealed the statute that had been considered in the Summerville case and enacted new legislation that it felt would cure the defect as outlined by the court. See N52. R51. S9(9. §§ 2-2428 -2449 (1962).

18. Auvil Orchard Co. v. Weather Modification Inc., No. 19268, Superior Court Chelan County, Washington (1956). The weather modifiers in this case were seeding clouds for the prevention of hail. Flash floods occurred on farms adjacent to the hail-prevention target area. A temporary injunction that ordered a banning of further hail-suppression operations was granted. After hearing expert meterological testimony, the court refused to make the injunction permanent on the basis that the cloud seeding operation had not brought about the exceptional rainfall which caused the floods.

Samples v. Irving P. Krick, Inc., Civil Nos. 6212, 6223, and 6224, Fed. Dist. W.D. Okla. (1954). This was an action for damages alleged to have been suffered by the defendant due to negligence on the part of the plaintiff in seeding clouds. Coincident with defendant's cloud seeding operation a cloud burst and flood occurred which caused damage to the plaintiff's property. The case was tried to a jury which returned a verdict for the defendant.

Adams v. State of California, Doc. No. 10112, Sutter County Superior Court, California (1964). The defendant had conducted rainmaking operations in the immediate area surrounding Lake Almanor which is located in the headwaters of the Feather River. A flood occurred in the Feather River and the owners of the property damaged thereby sued to recover their losses alleging that the flood was caused in part by the operations of the defendant. The court found that Lake Almanor had not spilled and that any increase moisture successively produced by the defendant was impounded in the lake and that the flooding that occurred in the Feather River was in no way connected with the weather modification activities.

19. 97 N.Y.S.2d 238 (1950).

couraged persons from visiting the resort. The City presented evidence showing (1) that it was facing a water shortage which probably would continue for the next several yars, and (2) that it had tried several other methods to increase its water supply before resorting to weather modification. The court held that the petition for an injunction should be denied.

> This court must balance the conflicting interests between a remote possibility of inconvenience to plaintiffs' resort and its guests with the problem of maintaining and supplying the inhabitants of the City of New York and surrounding areas, . . . with an adequate supply of pure and wholesome water. The relief which plaintiffs ask is opposed to the general welfare and public good; and the dangers which plaintiffs apprehend are purely speculative. This court will not protect a possible injury at the expense of a positive public advantage.[20]

The court did state by way of dictum that the plaintiffs had no vested property rights in the clouds or the moisture therein. This case, while it does little to fill the legal vacuum concerning ownership and use of moisture from the atmosphere, does present one of the possible attitudes that may be taken by the courts concerning liability of the weather modifier.

In 1959 a case[21] involving property interest aspects of weather modification was decided by the Texas Court of Civil Appeals. The plaintiff, a group of ranchers, sought to enjoin the defendant on the basis that the activities of the defendant depleted the natural rainfall to which the plaintiff was entitled as an incident of ownership of the land surface. The defendant had been hired to suppress hail over land adjoining that of the plaintiff. The seeding activities, according to findings made in the lower court, resulted in the dissipation of clouds over plaintiff's land, such clouds normally producing natural rainfall in valuable amounts. The lower court granted a temporary injunction which prevented the defendant from engaging in weather modification activities affecting clouds that would pass over the land of the plaintiff. The injunction was modified by the court of appeals so that only those activities conducted directly over

20. *Id.* at 240.
21. Southwest Weather Research v. Rounsaville, 320 S.W.2d 211 (Tex. Civ. App. 1959).

the land of the plaintiff were prohibited. The decision was purportedly based on the natural rights doctrine which states that there is "a general right in the landowner freely to enjoy the use of his land in its natural condition, without interference by his neighbors." The court held that the right to receive natural rainfall is a natural right of a landowner and the defendant was interfering with that right when, by seeding clouds over the land of the plaintiff, it reduced the amount of natural rainfall received on the land of the plaintiff.

Although the court talked in terms of the natural rights doctrine, it seems that it employed the *ad coelum* doctrine which means that he who owns the land also owns from the center of the earth to the heavens.[22] By preventing only those activities that take place over the land of the plaintiff, the court did not prevent the defendant from interfering with the natural precipitation which might fall on the plaintiff's land. Also some of the clouds would be modified over the land of the plaintiff would in no way affect the natural precipitation that might fall on the plaintiff's land. If the court meant to protect the natural right of the landowner to receive precipitation, it partially failed because of the limits of the injunction. The terms of the injunction amounted to the employment of the *ad coelum* doctrine. This is not the law in the United States. In *Hinman v. Pacific Air Transport,*[23] the court said concerning the *ad coelum* doctrine:

> This formula . . . was invented at some remote time in the past when the use of space above land actual or conceivable was confined to narrow limits, and simply meant that the owner of the land could use the overlying space to such an extent as he was able, and that no one could even interfere with that use.
>
> This formula was never taken literally, but was a figurative phrase to express the full and complete ownership of land and the right to whatever superadjacent airspace was necessary or convenient to the enjoyment of the land.[24]

In effect, the Texas Court applied the *ad coelum* doctrine which was never meant to be taken literally or to prevent use

22. 6-A AMERICAN LAW OF PROPERTY § 28.4 (Casner ed. 1954).
23. 84 F.2d 755 (9th Cir. 1936).
24. *Id.* at 757.

of airspace above the land in circumstances where no injury resulted to the landowner.[25] By enjoining the defendant from engaging in weather modification activities over the land of the plaintiff, the court is preventing reasonable use of airspace with no injury to the landowner and at the same time is not protecting the landowner's natural right to rainfall.

The two pending cases were filed in Pennsylvania;[26] one is criminal, the other is civil, and both are based on the same set of facts. The Township of Ayr in Fulton County, Pennsylvania, passed an ordinance prohibiting the operation of any cloud seeding device within the township. The defendant set up and operated a silver iodide generator in the township for the purpose of modifying weather in the neighboring State of Maryland. The defendant was convicted of violating the ordinance and has appealed on the basis that the ordinance is arbitrary in that his activity, while originating in the township, had no effect on the persons or property therein. In the civil action the plaintiff is seeking to enjoin the defendant from engaging in weather modification activities within the jurisdiction of the court. The plaintiff lists the following bases on which the injunction should be issued:[27]

1. the released chemicals are dangerous to health;
2. the seeding interferes with the rights of landowners to receive precipitation in its undisturbed character and its natural state;
3. the seeding trespasses upon the land of the plaintiffs by invading the airspace above the land;
4. the seeding is done in a reckless manner; and
5. the operation creates a nuisance.

As can be seen from the cases that have been filed as of early 1966, there is no judicial concensus in weather modification.

25. Swetland v. Curtiss Airports Corp., 55 F.2d 201 (6th Cir. 1932).
26. Natural Weather Ass'n. v. Blue Ridge Weather Modification Ass'n., No. 3 at the January 1965 Term of the Court of Common Pleas of Fulton County, Pennsylvania; Township of Ayr v. Fulk, No. 53 at the September 1964 Term of the Court of Common Pleas of Fulton County, Pennsylvania.
27. National Science Foundation, *Weather Modification: Laws, Controls, Operations, A report to the Special Commission on Weather Modification* 54 (1966)

B. Statutory Law

While there have been few decisions involving weather modification, twenty-two[28] states have enacted statutes regulating weather modification operations within the respective states. Among the states there is a wide divergence in the provisions. A few states[29] require only that weather modification activities be registered with the proper state agency; other states[30] have provisions similar to the Wyoming statute[31] which requires licensing of the operator. Weather modification activities have been prohibited for the next few years within the State of Maryland.[32] Pennsylvania's statute[33] allows each county to decide if weather modification activities will be prohibited within the county.

IV. THEORIES OF CLOUD AND MOISTURE OWNERSHIP

Legal writers have emphasized liability of weather modification operators and ownership of clouds and the moisture therein.[34] Several different theories for determining owner-

28. Arizona, ARIZ. REV. STAT. §§ 45-2401 to -2407 (1956); California, Cal. Water Code §§ 235, 400-15 (Cum. Supp.); Colorado, COLO. REV. STAT. §§ 151-1-1 to -1-12 (1963); Connecticut, CONN. GEN. STAT. §§ 24-5 to -8 (1958); Florida, FLA. STAT. §§ 373.261 to .391 (1963); Hawaii, HAWAII REV. LAWS § 86-5 (Supp. 1965); Idaho, IDAHO CODE §§ 22-3201 to -3202 (Cum. Supp. 1965); Louisiana, LA. REV. STAT. §§ 37-2201 to -2208 (Cum. Supp. 1962); Maryland, MD. ANN. CODE, art. 66c, § 110A (Cum. Supp. 1966); Massachusetts, MASS. ANN. LAWS, ch. 6, § 72 (1962); Nebraska, NEB. REV. STAT. §§ 2-2401 to -2449 (1962); Nevada, NEV. REV. STAT. §§ 544.010 to .240 (1961); New Hampshire, N. H. REV. STAT. § 432.1 (1955); New Mexico, N. MEX. ANN. STAT. §§ 75-37-1 to -37-15 (Supp. 1965); North Dakota, N. D. CENT. CODE §§ 2-07-1 to -07-13 (Supp. 1965); Oregon, ORE. REV. STAT. §§ 558.010 to .990 (1965); Pennsylvania, PA. STAT. ANN. tit. 18, § 3871 (Supp. 1966); South Dakota, S.D. CODE §§ 4.2301 to .2308 (Supp. 1960); Utah, UTAH ANN. CODE §§ 73-15-1 to -15-2 (1953); Washington, WASH. REV. CODE §§ 43.37.010 to .37.200 (1965); Wisconsin, WIS. STAT. § 195.40 (1965); Wyoming, WYO. STAT. §§ 9-267 to -276 (1957), as amended, (Cum. Supp. 1965).
29. Connecticut, Hawaii, Idaho, New Hampshire and Utah.
30. Arizona, California, Colorado, Florida, Louisiana, Massachusetts, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Washington, Wisconsin and Wyoming.
31. WYO. STAT. §§ 9-267 to -276 (1957), as amended, (Cum. Supp. 1965).
32. MD. ANN. CODE, art. 66c, § 110A (Cum. Supp. 1965).
33. PA. STAT. ANN., tit. 18, §§ 3871 to 3874 (1965).
34. Ball, *Shaping the Law of Weather Control*, 58 YALE L.J. 213 (1949); Stark, *Weather Modification: Water—Three Cents Per Acre-Foot?*, 45 CALIF. L. REV. 698 (1957); *Legal Problems of Weather Control*, 12 BAYLOR L. REV. 113 (1960); *The Legal Aspects of Rainmaking*, 37 CALIF. L. REV. 114 (1949); *Artificial Rainmaking*, 1 STAN. L. REV. 508 (1949); *Legal Clouds for Rainmakers*, 14 ALBANY L. REV. 204 (1950); *Legal Problems Raised by Artificial Rainmaking*, 4 VAND. L. REV. 332 (1951); *Rain and the Law*, 39 GEO. L.J. 466 (1951); *Who Owns the Clouds?*, 1 STAN. L. REV. 43 (1948); *Rain Making — Torts — Property — Injunction — Landowners May Enjoin Cloudseeding Directly Above His Land*, 37 TEXAS L. REV. 799 (1959); *Property—Rights of Private Landowners to Rainfall—Injunction Against Cloud Seeding*, 4 VILL. L. REV. 603 (1959); *Are There Individual Property Rights in Clouds?*, 15 WYO. L.J. 92 (1960).

ship of clouds and the moisture therein have been suggested. For the most part, these possibilities have come by way of analogy from other areas of natural resources. Without legislation, one or perhaps all of these theories may be adopted by the courts. Because of this possibility each theory will be briefly outlined:

Ad Coelum.[35] The upward extent of a landowner's property right was not discussed until the advent of the airplane. By the time of the airplane, the doctrine of *ad coelum,* which means "he who has the soil owns upward unto the heavens, and by analogy, downward to perdition,"[36] had become ingrained in the law of property. This doctrine was applied in cases where the right to space immediately above the soil was in question. With the advent of the airplane, the courts rejected the literal interpretation of the doctrine in regard for economic necessity stating "we reject that doctrine [*ad coelum.*] We think it is not the law, and that it never was the law."[37] This language, however, cannot be interpreted to mean that the landowner does not have any rights to the airspace above his land. In *Swetland v. Curtiss Airports Corp.,*[38] the court said:

> This does not mean that the owner of the surface has no right at all in the air space above his land. He has a dominant right of occupancy for purposes incident to his use and enjoyment of the surface, and there may be such a continuous and permanent use of the lower stratum which he may reasonably expect to use or occupy himself as to impose a servitude upon his use and enjoyment of the surface .... As to the upper stratum which he may not reasonably expect to occupy, he has no right, it seems to us, except to prevent the use of it by others to the extent of an unreasonable interference with his complete enjoyment of the surface. His remedy for the latter use, we think, is an action for nuisance and not trespass.[39]

The United States Supreme Court has approved the above quoted language.[40] However, the Uniform State Law of Aero-

35. *See* PROSSER, TORTS § 13, at 69 (3d ed. 1964).
36. *Id.* at 70.
37. Hinman v. Pacific Air Transport, 84 F.2d 755, 757 (9th Cir. 1936).
38. 55 F.2d 201 (6th Cir. 1932).
39. *Id.* at 203.
40. 328 U.S. 256 (1946).

nautics, which has been adopted in Wyoming,[41] recognizes unlimited ownership of upward space subject to a privilege of public flight for the purpose of travel through airspace or for any other legitimate purpose, provided it is carried out in a reasonable manner.[42]

There is some question as to whether the Wyoming Statute would be applied to weather modification so that the landowner could prevent silver iodide seeding of clouds over his land. Space ownership of this type would greatly hamper weather modification activities and would impede the discovery of new techniques which can come only from engaging in actual operations. If, on the other hand, use in a "reasonable manner" is stressed, this emphasis might stimulate weather modification activities.

Natural Rights.[43] "Natural Rights" refers to the rights of a landowner to freely enjoy the use of his land in its natural condition without interference. In *Southwest Weather Research v. Rounsaville*[44] the right to natural rainfall was held to be one of the elements of natural rights by which the landowner is protected in his enjoyment of his property. These natural rights are expressed as easements given by law to landowners so that they might be secure in their enjoyment of the land. A landowner has the right to the use of common property — in this case the moisture of the clouds. If the landowner makes beneficial use of the moisture, he could prevent another person from interfering with his natural right. If the natural rights doctrine were followed, assuming the engineering knowledge is available, it would severely limit those activities the purpose or side effect of which is to reduce precipitation. On the other hand, since engineering knowledge at the present time may not be sufficient so that the burden of proof can be met in most cases, the underlying landowner would not be adequately protected if the doctrine of natural rights were adopted now.

Ferae Naturae.[45] This doctrine has been applied to property rights in wild animals, air, water and other things which

41. WYO. STAT. §§ 10-27 to -36 (1957).
42. *Id.* at § 10-32.
43. *Rain and the Law*, 39 GEO. L.J. 466, 471 (1951).
44. 320 S.W.2d 211 (Tex. Civ. App. 1959).
45. *See* BROWN, PERSONAL PROPERTY §§ 9-10 (2d ed. 1955); *Who Owns the Clouds?*, 1 STAN. L. REV. 43, 47 (1948).

are considered to be of a vague and fugitive nature. Under this doctrine it would be necessary to reduce the clouds (*ferae naturae*) to possession, either actual or constructive. In the absence of an air ownership doctrine, there could be no constructive possession; and, as to the actual possession of clouds, one is left up in the air. However, a different situation arises when one considers reducing the moisture in the clouds to possession—this is physically possible. The use of the *ferae naturae* doctrine makes no sense when applied to moisture in actual cloud formation. If the doctrine were applied to the resulting precipitation, adequate control and economic feasibility would not be guaranteed.

Diffused Surface Water.[46] If air moisture were considered to be an upward extension of diffused surface water and the doctrine of absolute ownership were adopted, the owner of the land over which the clouds move would be able to appropriate moisture of the clouds for his own use without regard for the effect such action would have on his neighbors. This would be a sanction for all-out weather modification activities without any semblance of legal control.

Riparian Rights.[47] If legal gymnastics can overcome the definitional problems of a "watercourse,"[48] the clouds and the moisture therein could be treated as a watercourse and various aspects of the riparian rights doctrine could be applied. Assuming the theory of reasonable use is the basis of the riparian right, a person could divert the moisture from the clouds by seeding if he did not unreasonably interfere with use by other riparians. There are difficulties in applying the riparian doctrine because of the factual situation; also the extent of the property right cannot be determined since the type and amount of use by other riparians may change from one time to the next.

Prior Appropriation.[49] This doctrine has been applied

46. For a general discussion of the law relating to surface water *see* 2 KINNEY, IRRIGATION AND WATER RIGHTS § 654 (1912).
47. *See* ECONOMICS AND PUBLIC POLICY IN WATER RESOURCES DEVELOPMENT, ch. 16, pp. 272-76 (1964); MANN, ELLIS & KRAUSZ, WATER-USE IN ILLINOIS 13-39 (1964).
48. To constitute a watercourse the courts usually require that (a) the water must come from a definite source, (b) there must be a definite channel with banks, and (c) the water usually must be discharged into some other stream or body of water.
49. *See* Burke, *Western Water Law*, 10 WYO. L.J. 180 (1955), for a discussion of the prior appropriation doctrine.

to surface waters in eighteen Western states.[50] It is well ingrained in the law and a substantial body of law has been developed. The prior appropriation doctrine, in essence, states that the first person to put unappropriated water to beneficial use has acquired the better right to that quantity which can be so beneficially used. In those states[51] in which the appropriation doctrine applies only to waters of a natural stream, the clouds and the moisture thereof are not affected unless some sort of legal fiction is adopted. However, there are nine Western states[52] that subject all waters, which would probably include the moisture of the clouds of the state to appropriation.

The few alternatives that have been suggested as possibilities for obtaining ownership of the clouds or the moisture therein, as can be seen, run the gamet. It is unlikely that the extreme doctrines will be adopted in many, if any, states. The trend will be toward a doctrine which will encourage weather modification activities while at the same time adequately protect persons who may be adversely affected.

Wyoming, while it has adopted the appropriation doctrine, is not one of the nine states which has made it applicable to all the waters of the state.[53] Although this unintentional control of clouds and the moisture therein does not apply in Wyoming, it is necessary to inquire as to whether any controls or property rights have been established by either the legislature or the courts of Wyoming.

No Wyoming court cases have considered the question of weather modification and a look to the legislature must be made to see if it has acted in this area. In 1951 the State enacted legislation establishing a Weather Modification Board.[54] In the first section of the statute it is stated: "It is

50. Alaska, Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming. Mississippi has recently enacted legislation that brings all the surface water of the state under the appropriation doctrine.
51. Arizona, California, Colorado, Idaho, Nebraska, New Mexico, Oklahoma, Texas and Wyoming.
52. Alaska, Kansas, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah and Washington.
53. WYO. CONST. art. 8, § 1. "Water is state property.—The water of all natural streams, springs, lakes or other collections of still water, within the boundaries of the state, are hereby declared to be the property of the state."
54. WYO. STAT. §§ 9-267 to -276 (1957), as amended, (Cum. Supp. 1965).

hereby declared that the State of Wyoming claims its sovereign rights to the use for its residents and best interests the moisture contained in the clouds and atmosphere within its sovereign state boundaries."[55] It is probable that this language will be interpreted to mean that the State has reserved its power to control the use of the moisture. With the exception of the licensing requirement, this power has not been exercised and no rights to the moisture of the clouds have been established. Therefore, the several theories as to ownership that previously have been discussed are of definite interest since any one of them could be adopted by the State of Wyoming.

The question as to ownership in Wyoming cannot be determined at this time and therefore for our purposes it will be assumed that any person who engages in weather modification activities has the right to the moisture in the clouds or atmosphere and has received a permit from the Weather Modification Board. Following this assumption the question is: what rights does a person acquire to water that has been legally extracted from the atmosphere?

V. ALTERNATIVE APPROACHES IN TREATMENT OF THE INCREASE IN RUNOFF

A. Introduction

There are three mountain ranges[56] in Wyoming which have peaks of sufficient altitude for cap-clouds formations to occur in adequate quantity so that economical snowpack augmentation operations can be conducted. The spring runoff from these mountain ranges is a main source of water for several inter-state rivers that have their headwaters in or flow through Wyoming. The allocation of the waters of these interstate rivers is governed either by court decree[57] or interstate river compacts.[58] With certain exceptions that

55. WYO. STAT. § 9-267 (1957).
56. The Snowy Range in the Medicine Bow Mountains, the Big Horn Mountain range and the Wind River Mountain range. Within each of these ranges there are mountain peaks of the requisite height (approximately 10,000 feet) for cap-cloud formations.
57. Colorado River Compact, WYO. STAT. § 41-505 (1957); Upper Colo. River Basin Compact, WYO. STAT. § 41-507 (1957); Yellowstone River Compact, WYO. STAT. § 41-511 (1957); Snake River Compact, WYO. STAT. § 41-509 (1957).
58. Nebraska v. Wyoming, 325 U.S. 589 (1945).

are stated in the controlling documents, all waters which contribute to the flow of these rivers are included within the prescripts of the documents and thus the allocation of the increase in runoff which results from snowpack augmentation will be divided among the various states[59] as determined unless it comes within one of the exceptions. The adverse possibility that the increase in runoff will be allocated among several states raises problems as to the economic feasibility of engaging in snowpack augmentation since an operator may not be able to use all or for that matter any of the water he has created. For private enterprise this is a roadblock which will most likely prevail for some time because the engineering know-how does not exist for identifying in legal terms runoff resulting from the increase in snowpack. While it is true that state law determines allocation of water within state boundaries, any exception in following priorities within the state system also will probably meet the exceptions set forth in the compacts and the decree; the major exception being imported water.[60]

Since physical proof is not currently available for identifying the increase in runoff as imported water, it is essen-

59. For example, under the Colorado River and the Upper Colorado River Basin Compacts Wyoming's share is 14 percent of 7,450,000 acre feet that was allocated to the upper basin states; under the Yellowstone River Compact Wyoming's share ranges from 40 per cent to 80 per cent depending on the tributary involved; under the Snake River Compact Wyoming's share is 4 per cent exclusive of established rights. Also existing and future domestic and stock-water uses of water are excluded from the allocation.

60. Upper Colorado River Basin Compact, art. XVII states: "The use of any water now or hereafter imported into the natural drainage basin of the Upper Colorado River System shall not be charged to any state under the apportionment of consumptive use made by the compact."

The Yellowstone River Compact, art. X states:

No water shall be diverted from the Yellowstone River Basin without the unanimous consent of all the signatory states. In the event water from another river basin shall be imported into the Yellowstone River Basin or transferred from one tributary basin to another by the United States of America, Montana, North Dakota, or Wyoming, or any of them jointly, the state having the right to the use of such water shall be given proper credit therefor in determining its share of the water apportioned in accordance with article V herein.

In Nebraska v. Wyoming, 325 U.S. 589, 656-57 (1945), the Court stated:

Importation of Water. The decree which we enter apportions only the natural flow of the North Platte River. The United States suggests that the decree explicitly state that it does not cover any additional supply of water which may be imported into this basin from the watershed of an entirely separate stream and which presently does not flow into the basin. To remove any possible doubt on that score the decree will contain a provision that it does not and will not affect the use of such additional supplies of water or the return flow from it. All questions concerning the apportionment of such water will await the event.

Article IXX(c) of the decree specifically states that imported water is excepted from the prescripts of the decree.

tial to look at the present situation. Assuming that snowpack augmentation operations are conducted, there will be more spring runoff than would occur in the absence of such operations. However, because of the lack of scientific evidence, the increase in runoff cannot be legally identified and thus the operator would not be able to claim directly the increase for his own benefit. The increase in runoff will inure to the general public both within the State of Wyoming and the other states which share the waters of the interstate rivers. In other words, there will be (1) more water to be divided among the states, and (2) more water to be divided among those persons with valid appropriations within each of the states.[61]

As mentioned previously, another situation which does not exist but which may develop is where the increase in runoff can be legally identified. In order to consider this second possibility, it is necessary to assume that engineering knowledge will advance to the point where it is possible to identify the amount of increase in runoff which results from any given snowpack augmentation program. It will then be possible to classify the increase as imported water and thereby exclude it from the prescripts of the compacts and decree. State water law also places imported water in a separate category, such category receiving special consideration. The amount of streamflow determined to be imported water will not be taken into consideration when allocating waters of interstate streams among the states, and within the state the importer will have the first and exclusive right to all the imported water.

The treatment given the increase in runoff determines the direct benefit which the operator will derive and thus determines the person or entities that will be able to economically enter the field of snowpack augmentation. Private individuals or entities that must show a profit in order to stay in business will not enter the field if they cannot derive a direct benefit from their activity.[62] If the increase in run-

61. Those persons who will benefit mostly in the state of Wyoming are appropriators with late priorities on heavily appropriated streams. Under the appropriation doctrine those with late priorities are the first to lose their access to water. If there is an increase in runoff, the time in which the late priorities can be serviced will be extended.

62. The exception to this statement would be power companies which would be able to use increased flow without it being identified.

off cannot be identified and thus cannot be controlled or used exclusively by the operator, the private sector will be precluded. If, on the other hand, the increase is treated as imported water, the private sector would be able to enter the field assuming that there would be sufficient return from the importation of the water to cover the costs involved. There would appear to be no economic or engineering reason prohibiting a public entity from entering the field under both the situations described above.

Regardless of the entity involved, there still will be the questions of liability of the weather modifier and of the extent of ownership that can be acquired in the increased runoff. The question of liability will be present whether the operator is of a public or private nature—extent of liability and the defenses available for the public operator will be different from those of the private operator. The extent of ownership rights, on the other hand, will in no way depend on the parties—both public and private operators will be governed by state water laws[63] and will receive the same treatment.

B. Increase in Runoff Unidentified

First will be considered the situation in which the increase in runoff is not subject to legal identification and is treated as is any other runoff; there is simply an increase in runoff due to the snowpack augmentation program. The first question to be answered is how much of the increase in stream flow may be used in the State of Wyoming. In order to answer this question one must look at the documents controlling the allocation of water of the interstate river and the tributaries involved. As an example, the effect the Colorado River Compact and the Upper Colorado River Compact will have on the allocation of any runoff that would result from a snowpack augmentation program in Wyoming will be considered. The allocation of the water of the Green River, which is a major tributary of the Colorado River, is controlled by the Colorado River Compact of 1922[64] and the Upper Colorado River Basin Compact of 1948.[65] These com-

63. WYO. STAT. §§ 41-1 to -512 (1957).
64. *Supra* note 57.
65. *Supra* note 57.

pacts resulted from controversies which have arisen because of the scarcity of water in certain areas of the Colorado River Basin.

Colorado River Compact. This compact divides the basin into two parts—the upper basin and the lower basin. The point dividing the two parts of the basin is Lee Ferry, Arizona. The upper basin includes "those parts of the states of Arizona, Colorado, New Mexico, Utah and Wyoming within and from which waters naturally drain into the Colorado River System above Lee Ferry . . . .;[66] the lower basin includes "those parts of the states of Arizona, California, Nevada, New Mexico and Utah within and from which waters naturally drain into the Colorado River System below Lee Ferry . . . ."[67] The compact specifies that the upper basin states shall have "the exclusive beneficial consumptive use of 7,500,000 acre feet of water per annum . . . ."[68] There is some limitation on the extent of this right in that if there is a deficiency in the amount of water at the Mexico-United States border the upper basin states will be required to supply one-half of such deficiency.[69] Also, the upper basin states shall not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years.[70] There is a further provision in the compact which allows lower basin states to increase their consumptive use by an additional 1,000,000 acre feet annually.[71] The compact then goes on to provide that any surplus water above the amount apportioned in the compact may be divided among the respective states after October 1, 1963 "if and when either basin shall have reached its total beneficial consumptive use."[72] It is important to note that the compact allocates water on the basis of beneficial consumptive use; this means that a total of 7,500,000 acre feet of water may be used within the upper basin states.

Upper Colorado River Basin Compact. This compact which is among the states of Arizona, Colorado, New Mexico,

66. Colorado River Compact, art. II, par. (f).
67. *Id.* at (g).
68. *Id.*, art. III, par. (a).
69. *Id.* at (c).
70. *Id.* at (d).
71. *Id.* at (b).
72. *Id.* at (f).

Utah, and Wyoming divides the water allotted to the upper basin among the respective states—50,000 acre feet annually to Arizona,[73] and specific percentages of the remainder to the other states—Wyoming's allocation of the remainder being 14 percent.[74] Wyoming's share, like the share of the other states, is stated in terms of beneficial consumptive use.

Consider the effect these compacts have on the allocation of runoff that results from a snowpack augmentation program. First, the requirement of 75,000,000 acre-feet for the ten-consecutive-year period must be met. If there is not sufficient runoff under natural conditions to meet this requirement, the artifically induced runoff would go to meet the requirement and none of the induced runoff could be used in the upper basin states. The above situation is not very likely to occur. A situation that is more likely to occur is one where the total runoff is not sufficient to meet the commitment to Mexico, plus the 7,500,000 acre feet for the lower basin and the 7,500,000 acre feet for allocation among the upper basin states. In this situation the artificially induced runoff would accrue to the benefit of the upper basin states of which Wyoming would get its 14 percent share.

This arrangement may not be as unfeasible as it appears. Since presently there are areas in the state that are not using all the water available while other areas are experiencing a water scarcity, there is the possibility that a snowpack augmentation operation could be used in place of transbasin diversions or in place of transporting stream flow many miles to the place of use. While snowpack augmentation will not increase the amount of water available for use, it may result in a better distribution of stream flow at less cost than would a redistribution of existing stream flow through man-made diversions and transportation of water.

Assuming that it is economically and politically feasible to operate a snowpack augmentation program under the above conditions, the next important matter to consider is by whom would the program be run. Private enterprise probably would not engage in such a program since there is no way of directly recovering the costs of the operation, thus the op-

73. Upper Colorado River Basin Compact, art. III, par. (a) (2).
74. *Ibid.*

eration of a snowpack augmentation program would have to be financed and operated by some public or quasi-public entity. Under existing laws there are both federal and state agencies that could engage in this type of activity.

C. Increase in Runoff as Imported Water

Definitions. The situation in which the increase in runoff is identified and treated as imported water will be considered. First it will be helpful to clarify the meaning of several terms that will be used in this section. The term "person" or "importer" will include all levels of government, special districts, public utilities, private corporations and individuals. "Imported water" will be used as it was defined by the Court in *Nebraska v. Wyoming*: waters which come from the watershed of an entirely separate stream and which presently do not enter said basin.[75] Identical in meaning to imported water is "foreign water" and these two terms will be used interchangeably.[76] Since the increase in runoff from artifical snowpack augmentation logically might be considered "developed water," this term also will be defined. Developed water has been defined differently,[77] but for our purpose, the term will refer to water which would not have augmented the stream flow under natural conditions. "Waste water" which must be distinguished from developed water is water that escapes from the works or appliances of appropriators without being used; or, such water as escapes from an appropriator's land after he has made all the beneficial uses thereof that are possible and which cannot be returned to the natural stream from which it was originally taken.[78]

The increase in runoff which results from weather modification activities probably can be classified as developed water or as imported water by almost any of the definitions used by various authorities to date. Cases dealing with both developed and imported water will be considered because of the similar treatment given these waters by the courts.

75. 325 U.S. 589, 671 (1945).
76. HUTCHINS, SELECTED PROBLEMS IN THE LAW OF WATER RIGHTS IN THE WEST 375 (1942).
77. *Id.* at 362; 1 KINNEY, IRRIGATION AND WATER RIGHTS § 320 (2d ed. 1912).
78. 1 KINNEY, *id.* at § 322.

The rules applied to both types of water are similar and there appears no reason to differentiate between them.

Burden of Proof. To acquire the rights of an importer a person engaging in weather modification activities must be able to establish: (1) that the precipitation is artifically induced, (2) the amount of artificially induced snowpack; and (3) the amount of increase in runoff that results from the artificially induced snowfall. In *City of Los Angeles v. City of Glendale,*[79] which dealt with imported water, the court said: " 'It is not necessary that he [the appropriator] confine it [the imported water] upon his land or convey it in an artificial conduit. *It is a requisite, of course, that he be able to identify it . . . .*"[80] When the court uses the term "identify," it does not mean that the importer must show each individual particle that belongs to him but rather that he must be able to show how much water he contributed to the flow of the stream. Thus, in the area of weather modification, the law imposes a rather difficult task upon the engineer for not only must he supply the physical evidence that the increased snowpack was due entirely to his expense and labor, but he must provide also the evidence that will show how much runoff results from the increase in snowpack and when and where the runoff reaches the stream and becomes incremental stream flow.

In *Smith v. Duff,*[81] a case dealing with developed water, the court referred to both the right of the developer and to the burden of proof he faces:

> If by their own exertions they have developed a supply of water theretofore not a part of the waters [of the stream] and not before available to the users of the stream, they have the first right to take and use the increase . . . . "It is only the actual increase resulting from the addition of water to a natural stream which would not otherwise pass down either its surface of subterranean channel to the benefit of other prior appropriators which the law recognizes as an increase of that character which can

79. 132 P.2d 574 (Cal. 1942), *modified,* 23 Cal.2d 68, 142 P.2d 289 (1943).

80. 132 P.2d 574, 583.

81. 39 Mont. 382, 102 P. 984 (1909); *see also* Mountain Lake Mining Co. v. Midway Irr. Co., 47 Utah 346, 149 P. 929 (1915).

> be diverted as against those entitled to its natural flow . . . ."
>
> Whoso asserts that he is entitled to the exclusive use of water by reason of its development by him must assure the court by satisfactory proof that he is not intercepting the supply to which his neighbor is rightly entitled. Thus the burden was on the respondent [developer] to prove that they developed the . . . water awarded them by the court . . . this proof necessarily would have given assurance that in taking the alleged new supply they did not diminish the quantity of the principal stream.[82]

Rights of the Importer. Once the importer has shown that he has added water to the stream flow and has shown the quantity of water involved, the question arises as to what right has he acquired in the use of the water. The general rule as to an importer's right to water brought into the watershed was stated concisely in a 1939 California case:

> One who by the expenditure of money and labor diverts appropriable water from a stream, and thus makes it available for fruitful purposes, is entitled to its exclusive control so long as he is able and willing to apply it to beneficial uses, and such right extends to what is commonly known as wastage from surface run-off and deep percolation, necessarily incident to practical irrigation. Considerations of both public policy and natural justice strongly support such a rule.[83]

This rule was first applied to developed water[84] and was carried over and applied to the rights of the importer by the California courts. This ruling has been accepted generally in the appropriation states. As can be seen, it makes no difference whether the water is treated as imported or developed water — there still exists the burden on one claiming title to the water to prove (1) he imported the water, and (2) he is taking from the stream only the amount that he contributed.

This exclusive right of control extends to the point that a prior or subsequent appropriator cannot acquire the right

82. 102 P. at 986-87.
83. Stevens v. Oakdale Irr. Dist., 13 Cal.2d 343, 90 P.2d 58, 62 (1939).
84. United States v. Haga, 276 Fed. 41 (D. Idaho 1921); Leadville Mine Development v. Anderson, 91 Colo. 536, 17 P.2d 303 (1932); Rock Creek Ditch & Flume Co. v. Miller, 93 Mont. 248, 17 P.2d 1074 (1933); 89 A.L.R. 210 (1934).

to the continued importation of the water nor any of the benefits connected therewith.[85] In *Stevens v. Oakdale Irrigation District,*[86] the plaintiff, who had been using return flow from water that had been imported by the defendant for several years, was denied an injunction when the importer after fifteen years proceeded to recapture return flow. It would appear that the court based its opinion on two grounds; first, the plaintiff had not acquired a right to have a continuation of the imported water; and second, on the question of abandonment the court said that

> Waters brought in from a different watershed and reduced to possession are private property during the period of possession. When possession of the actual water, or corpus, has been relinquished, or lost by discharge without intent to recapture, property in it ceases. This is not the abondonment of a water right but merely an abandonment of specific portions of water, *i. e.,* the very particles which are discharged or have escaped from control.[87]

These are two rather important concepts: first, there is no obligation to continue weather modification activities if for some reason the feasibility of such activities changed; and second, if it were necessary in some years to spill water that has been stored, this would not be an abandonment of the water right but would only be an abandonment of the specific particles of water.

A point raised in the above quote is that of possession. Since the extent of the property right and the right of control depend on possession, it is necessary to determine what constitutes possession. As can be seen, the runoff in question will have to be transported from the place of development to the place of use and probably stored for a period of time before it is used.[88] From the point of the economics of

85. E. C. Horst Co. v. New Blue Point Mining Co., 177 Cal. 631, 171 P. 417 (1918); Brighton Ditch Co. v. City of Engelwood, 124 Colo. 366, 237 P.2d 116 (1951); Hagerman Irr. Co. v. East Grand Plains Drainage Dist., 29 N.M. 649, 187 P. 555 (1920); Wiel, *Mingling of Waters,* 29 HARV. L. REV. 137 (1916).

86. *Supra* note 83.

87. *Id.* at 61-2.

88. From the scientific information that has been acquired so far it appears that in dry years the amount of snowpack and runoff that results therefrom will be less than will result in wet years and thus to make the most efficient use of the water it will be necessary to store water during the wet years for use in the dry years.

the situation it becomes a question of whether it is possible to use the channels of the natural stream and still maintain such possession that will protect the importer's property interests in the water. In Wyoming the owner, manager, or lessee of a reservoir has the right to use the bed of the stream or other watercourse for the purpose of transporting impounded or stored water from the place the water is stored to the place of use.[89] The statute seems to imply also that the owner of the reservoir does not lose his property rights or control of water by commingling the stored water with the natural flow of the stream. There are several cases from other states which state this rule explicitly. In *City of Los Angeles v. City of Glendale,*[90] the court, quoting from *United States v. Haga,*[91] stated:

> Nor is it essential to his control that the oppropriator maintain continuous actual possession of such water. So long as he does not abandon it or forfeit it by failure to use, he may assert his rights. It is not necessary that he confine it upon his own land or convey it in an artificial conduit. It is requisite, of course, that he be able to identify it; but, subject to that limitation, he may conduct it through natural channels and may even commingle it or suffer it to commingle with other waters. In short, the rights of an appropriator in these respects are not affected by the fact that the water has once been used.[92]

Although this case dealt with imported water, the same rule has been applied to situations dealing with developed water.[93] Whether the Wyoming court would interpret the statutory language in this manner may depend on the fact situation of the first case presented to it. As early as 1909 the Supreme Court of Washington justified this rule, stating: "that the immense cost and waste involved in conveying water to its place of use justified the owner in taking advantage of the natural beds and channels of streams when it could be done without injury to the rights of others."[94]

89. WYO. STAT. § 41-29 (1957). Section 7, "Importer's Right to Use The Natural Channel" covers the question of using the natural channel in more detail.
90. 132 P.2d 574 (Cal. 1942), *modified,* 23 Cal.2d 68, 142 P.2d 289 (1943).
91. 276 Fed. 41, 43 (D. Idaho, 1921).
92. 132 P.2d, at 583.
93. Twin Falls Canal Co. v. Damman, 277 Fed. 331 (D. Idaho 1920); Spaulding v. Stone, 46 Mont. 483, 129 P. 327 (1913); Jones v. Warm Springs Irr. Dist., 162 Ore. 186, 91 P.2d 542 (1939).
94. Miller v. Wheeler, 54 Wash. 429, 103 P. 641, 643 (1909).

Importer's Right to Return Flow. The second matter of concern to the importer is that of his rights to use of return flow. In appropriation states the first person to put water to beneficial use has the prior right to that amount of water necessary to carry out the beneficial use to which the water was originally put.[95] An appropriation is defined in terms of the right to divert a certain volume of water and the appropriator does not acquire ownership rights to the entire amount of water diverted.[96] Normally, the appropriator does not have the right to capture and reuse or sell the return flow.[97] Exceptions to this rule have developed[98] one of which is the right of the appropriator to capture and reuse water while it is still on his land, if such reuse does not extend or enlarge the original appropriation.[99] The cases sustaining this rule have factually been based on federal reclamation projects and for this reason they do not seem to be factually or politically good cases to rely on. For example, in *Ide v. United States*[100] the Court held that return flow from an irrigation project could be captured and reused on the project land. However, this reuse did not result in an enlargement of the appropriation but rather made it possible to reclaim and cultivate more of the land that was originally included in the project. It was stated:

> A second use in accomplishing the object is as much within the scope of the appropriation as a first use is. The state law and the National Reclama-

95. Lake De Smet Res. Co. v. Kaufman, 292 P.2d 482 (Wyo. 1965); Wyoming Hereford Ranch v. Hammond Packing Co., 33 Wyo. 14, 236 P. 764 (1925); *see also* TRELEASE, BLOOMENTHAL & GERAUD, CASES AND MATERIALS ON NATURAL RESOURCES 2 (1965).

96. While the original diversion is normally stated in terms of the right to divert so many cubic feet per second, when one tries to sell this water right and transfer it the water right then is defined in terms of consumptive use within the limits of the former actual usage. Farmers Highline Canal & Reservoir Co. v. City of Golden, 129 Colo. 575, 272 P.2d 629 (1954).

97. Enlarged Southside Irr. Ditch Co. v. John's Flood Ditch Co., 116 Colo. 580, 183 P.2d 552 (1947); Pulaski Irr. Ditch Co. v. City of Trinidad, 70 Colo. 565, 203 P. 681 (1922); Trowel Land & Irr. Co. v. Bijou Irr. Dist., 65 Colo. 203, 176 P. 292 (1918); Galiger v. McNutty, 80 Mont. 339, 260 P. 401 (1927); Wyoming Hereford Ranch v. Hammond Packing Co., 33 Wyo. 14, 236 P. 764 (1925).

98. Ide v. United States, 263 U.S. 497 (1924); United States v. Haga, 276 Fed. 41 (D. Idaho 1921); Stevens v. Oakdale Irr. Dist., 13 Cal. 2d 343, 90 P.2d 58 (1939); Leadville Mine Dev. Co. v. Anderson, 91 Colo. 536, 17 P.2d 303 (1932); Westside Ditch Co. v. Bennett, 106 Mont. 422, 78 P.2d 78 (1938); Spaulding v. Stone, 46 Mont. 483, 129 P. 327 (1912); Jones v. Warmsprings Irr. Dist., 162 Ore. 186, 91 P.2d 542 (1939); Benning v. Miller, 55 Wyo. 451, 102 P.2d 54 (1940).

99. *See* United States v. Haga, *supra* note 98; Ramshorn Ditch Co. v. United States, 269 Fed. 80 (1920); United States v. Telby, 124 F.2d 850 (1942).

100. 263 U.S. 497 (1924).

> tion Act both contemplate that the water shall be so conserved that it may be subjected to the largest practicable use.[101]

The other cases dealing with federal reclamation projects are similar in nature and supply no additional clue as to the law that would be applied to the reuse of imported water. There is language in the case of *United States v. Haga*[102] that is significant:

> One who by the expenditure of money and labor, diverts appropriable water from a stream, and thus makes it available for fruitful purposes, is entitled to its exclusive control so long as he is able and willing to apply it to beneficial uses, and such right extends to what is commonly known as wastage from surface run-off and deep percolation, necessarily incident to practical irrigation. Consideration of both public policy and natural justice strongly support such a rule. Nor it is essential to his control that the appropriator maintain continuous actual possession of such water. So long as he does not abandon it or forfeit it by failure to use, he may assert his rights. It is not necessary that he confine it upon his own land or convey it in an artificial conduit. It is requisite, of course, that he be able to identify it; but subject to that limitation, he may conduct it through natural channels and may even commingle it or suffer it to commingle with other waters. In short, the rights of an appropriator in these respects are not affected by the fact that the water has once been used.[103]

The United States Supreme Court in *Nebraska v. Wyoming*[104] interpreted this language to mean that a person could recapture water even though it had entered the natural stream if the intent existed to recapture at the time the original diversion was made and the water had not been abandoned.

The preceding language and discussion refer only to recapture and a second use of water and in no way include the question of selling the right to the return flow. The court in the Wyoming case of *Wyoming Hereford Ranch v. Ham-*

101. *Id.* at 505.
102. 276 Fed. 41 (D. Idaho 1921).
103. *Id.* at 43-44.
104. 325 U.S. 589, 637 (1945).

mond Packing Co.[105] held that when appropriated water has been used to the full extent intended by the appropriation, the unconsumed water once again becomes property of the state and the appropriator cannot sell this return flow. The court in this case made an exception and allowed the City of Cheyenne to divert its sewage water to a third person under contract. This, however, is a special case because of the nature of the product involved.[106] Thus, with one exception, a person in Wyoming cannot sell waste water as a means of disposing of it. The return flow becomes public water and is subject to appropriation or becomes part of the waters that are needed to fill the requirements of junior appropriators.[107] This Wyoming case did not involve imported or developed water and should not be considered as controlling in the situation presented.

There are few cases dealing with the rights of the importer. However, those few cases seem to be in agreement that the developer or importer of water has the right to appropriate and use the water to the full extent of the increase.[108] While it is in his possession he may recapture and either reuse the water or sell it.[109] California has developed the most extensive legal precedent in the area of imported water. In *City of Los Angeles v. City of Glendale,*[110] the court held that an importer may use the natural channels to carry his water, may spread and recapture it, sell it for irrigation and recapture the return flow for the importer's own use just so long as he does not abandon or forfeit the right to such water. This is true even though the water is not confined to his own

105. 33 Wyo. 14, 236 P. 764 (1925).
106. The city of Cheyenne had entered into a contract with Hammond Packing Co. for the disposal of the City's sewage. The court held that the city could sell the sewage waste if it was conducted through an artificial channel but it could not transport the waste by way of the natural channel. Once the sewage waste becomes part of the stream it once more was subject to appropriation.
107. *Supra* note 105.
108. City of Los Angeles v. City of Glendale, 23 Cal. 2d 68, 142 P.2d 289 (1943); Stevens v. Oakdale Irr. Dist., 13 Cal. 2d 343, 90 P.2d 58 (1939); Leadville Mine Development Co. v. Anderson, 91 Colo. 536, 17 P.2d 303 (1932); Rock Creek Ditch & Flume Co. v. Miller, 93 Mont. 248, 17 P.2d 1074 (1933); Smith v. Duff, 39 Mont. 382, 102 P. 984 (1909); Hagerman Irr. Co. v. East Grand Plains Drainage Dist., 29 N.M. 649, 187 P. 555 (1920); Mountain Lake Mining Co. v. Midway Irr. Co., 47 Utah 346, 149 P. 929 (1915).
109. City of Los Angeles v. City of Glendale, *supra* note 108; Stevinson Water Dist. v. Roduner, 36 Cal. 2d 264, 223 P.2d 209 (1950); Coryell v. Robinson, 118 Colo. 225, 194 P.2d 342 (1948); Ironstone Ditch Co. v. Ashinfelter, 57 Colo. 31, 140 P. 177 (1914).
110. 132 P.2d 574 (Cal. 1942), *modified,* 23 Cal.2d 68, 142 P.2d 289 (1943).

land and he does not have actual continuous physical possession of it. The California courts have also held that water imported from another drainage basin is subject to recapture by the importer although he may have allowed the return flow to escape for a period in excess of twenty-two years and other persons have appropriated the return flow.[111] The basis for their decision seems to be that since no one on the stream to which the water was imported has the right to require the continuation of the importation of the water, he cannot acquire any rights (against the importer) to the water.

In the *City of Los Angeles* case, Los Angeles had imported water from the Owens River Valley. The imported water was handled in two ways: (1) part of it was spread on the gravel surface of the San Fernando Valley floor so that it could be stored in the subsurface thereof and reclaimed when it reached the lower end of the Valley, and (2) the other part was sold to the farmers of the San Fernando Valley for irrigation use. Twenty-seven percent of the water sold to the farmers settled into the subsurface and migrated to the lower end of the Valley where it joined the other water as anticipated. In a suit brought by Los Angeles to determine the rights to all the imported water, the court stated: (1) Los Angeles had the prior right to the water brought into the San Fernando Valley from an external source; (2) it did not abandon this right when it spread the waters for the purpose of economical transportation and storage; (3) the natural channels may be used for the transportation of imported water and the importer need not construct artificial conduits; and, (4) the use by others of the imported water did not cut off the importer's right to the return flow. There is a limitation in that if the water is previously used, the intention to reuse th return flow must have existed before the water was allowed to escape the control of the importer and return to the natural channel. Also, the quantity taken out of the natural channel for reuse is limited to that put in the channel, less such amount as might be lost by evaporation and other like causes.[112] While the case does not cover all the possible situations that might arise as to the importer's

111. Stevens v. Oakdale Irr. Dist., 13 Cal. 2d 343, 90 P.2d 58 (1939).
112. City of Los Angeles v. City of Glendale, *supra* note 108; Jones v. Warmsprings Irr. Dist., 162 Ore. 186, 91 P.2d 542 (1939); 2 KINNEY, *supra* note 77, at § 832.

right in water, it is by far the most extensive treatment and has not been disapproved by a court of any other state.

There are two Wyoming cases that should be mentioned which may have some bearing on the question of the extent of the importer's right. In *Hunt v. City of Laramie,*[113] the court stated "that percolating waters developed artificially by excavation and other artificial means, as was done in this case, belong to the owner of the land upon which they are developed . . . ." It appears that the waters to which the court was referring were developed waters and not seepage or percolating waters. In its petition on appeal the City of Laramie alleged that the waters of Pope Spring, which were sought to be appropriated under the application of Hunt, were not the waters of any natural stream, spring, lake, or other collection of water, but were waters wholly discovered and developed artificially by excavation and other artificial means by one Pope, who was the owner of the lands upon which the spring in question was and is situated, and that the waters of said spring were the absolute property of said Pope. This the court adopted. This case really involved a dispute as to the right to the waters on the surface after they had been artificially developed by digging at a shallow depth. The court, in saying that these waters were not subject to appropriation, may have been applying the rule of developed waters. As between the developer and a second party, the developer has the prior right. Since these were the only parties to the action, the court may have felt there was no need to state the rule that has been applied to developed waters and instead just held that these particular waters were not subject to appropriation but belonged to the owner of the land on which they were found.[114]

In the second case, *Wyoming Hereford Ranch v. Hammond Packing Co.,*[115] one of the minor issues dealt with the validity of a contract between the City of Cheyenne and the defendant Wyoming Hereford Ranch in which the Ranch was given a perpetual right "to use the waters and all of the same emptied from the city sewer." There were two separate se-

113. 26 Wyo. 160, 181 P. 137 (1919).
114. *See Constitutionality of the Wyoming Underground Water Statute,* 3 WYO. L.J. 140 (1949) in which the author uses the same reasoning in arriving at the conclusion that the court was applying the general rule of developed water.
115. 33 Wyo. 14, 236 P. 764 (1925).

wer lines involved in this case. One was the "sanitary trunk line" discharging into the channel of Crow Creek at a point where the creek flows across the lands of the defendant; the other, the "sanitary sewer east of Lake Minnehaha" discharging into a ditch on the lands of the defendant. In regard to these waters and the right of the city to sell them to the defendant after the city itself had used the water, the court said:

> Whether the city owns such waters or has merely a right to their use is immaterial in this case, for all the authorities agree that when the appropriated waters have been used to the full extent intended by the appropriation, the quantity unconsumed and returned to the stream is then a part of the waters of the state . . . . The full, beneficial use of the waters that have become a part of the sewage may, because of the necessity of disposing of the sewage, require that such water, a part of the sewage, be consumed, or so diverted that it does not again become a part of the waters of the stream. But the sewage deposited in Crow Creek is not consumed and is not so diverted. It becomes mingled with the waters of the stream, and, as is conceded, the water content of the sewer increases the volume of water in the stream suitable for irrigation. The city's right to the beneficial use of the water has been fully enjoyed, and the water has been returned to the stream where it is susceptible of further beneficial use by other appropriators . . . . It follows that the defendant has no right to divert any of the waters of Crow Creek by virtue of its contract with the City . . . .[116]

If the court would follow this case in a situation involving imported water, a city once it had used the water for the purpose for which it was imported would not be able to sell the return flow and recoup part of its costs. However, it must be noted that the water involved in this case was not imported water but was part of the natural flow. Whether the court would apply the same rule in both situations is a question that must be answered by the court.

116. *Id.* at 773.

VI. THE RIGHT TO STORE INCREASE IN RUNOFF IN EXISTING FACILITIES

A. Federal Statutes

As was stated earlier, the greatest production of runoff will occur in wet years. This, coupled with the fact that runoff resulting from weather modification activities will occur for the most part in the spring and early summer, will necessitate that storage facilities be available so that the runoff can be stored for use later in the year or in subsequent dry years. Most of the research that has been done concerning the expansion of storage facilities in the Upper Missouri Basin indicates that additional storage facilities will be so expensive that the resulting cost to the irrigator would be prohibitive.[117] Thus it is necessary to look to existing storage facilities to fill the demand.

The legal concepts and principles in the area of storage and reservoir rights have been much slighted. The federal statutes have nothing directly on the subject and there is little state statutory or case law. The whole tenor of the federal law, while not direct, seems to be that if existing facilities are capable of handling additional supplies of water, the more water that can be obtained and utilized the better.[118] Title 43, section 390b of the *United States Code* sets forth the general policy of the federal government in regard to dams and reservoirs built by either the Corps of Engineers or the Bureau of Reclamation:

> (a) It is declared to be the policy of the Congress to recognize the primary responsibilities of the States and local interests in developing water supplies for domestic, municipal, industrial and other purposes and that the Federal Government should participate and cooperate with States and local interests in developing such water supplies in connection with the construction, maintenance, and operation of Federal navigation, flood control, irrigation, or multiple purpose projects.

Additional storage may be included in a project that is controlled by either the Corps of Engineers or the Bureau of Reclamation for both municipal or industrial use, provided, "That before construction or modification of any project

117. Gertel & Wollman, *Price and Assessment Guides to Western Water Allocation*, 42 J. FARM ECON. 1332 (1960).

118. 43 U.S.C. §§ 390, 390a, 390b(a)-(d), 390c, 390d, 390e, 523 and 524 (1964).

including water supply provisions for present demand is initiated, State or local interests shall agree to pay for the cost of such provisions in accordance with provisions of this section."[119] The provisions of the section refer to the period of payment and the time when the payment shall start. It is further stated that the provisions of the section shall apply to

> all dams and reservoirs heretofore or hereafter constructed by the United States Government . . . wherein either a part of the construction costs thereof shall have been contributed or may be contributed by States or local interests or local interests have acquired or may acquire rights to utilize certain storage space thereof by making payments during the period of such use as specified in the agreement with the Government . . . .[120]

There are two sections of the *Code*[121] that concern only reclamation projects and water used for irrigation. In essence, there two sections provide for the use of excess storage or carrying capacity of reclamation facilities by "systems operating under section 641 (grant of desert land to states) of this title, and individuals, corporations, associations, and irrigation districts organized for or engaged in furnishing or in distributing water for irrigation.[122]

On the basis of these few sections of title 43, it can be said that fedeal law does not prohibit but rather encourages for most purposes the use of excess capacity of any reservoir that is owned by the federal government. If an arrangement could be worked out with the federal government so that those entities engaging in weather modification would only have to pay for the excess part of the reservoir which they actually used by means of rental, it would probably be feasible to enter into such an agreement. This, however, does create the situation that in years when there was no excess capacity the first water to be spilled would be that of the individual or organization that is using or was using the excess capacity. For the most part the federal government is

119. 43 U.S.C. § 390b(b) (1964).
120. 43 U.S.C. § 390d (1964).
121. 43 U.S.C. §§ 523, 524 (1964). Section 524 provides that the government is to cooperate with water organization in the construction and use of reservoirs and facilities.
122. *Id.* at § 523.

concerned with storage facilities because in theory it is merely a storer, carrier, or distributor of such water and is not the owner of the property right to the use of such water.[123] Therefore, it is not concerned with the use of natural channels by others for transportation.

B. State Statutes and Cases

There is not much state law, either statutory or case law, that applies to the question of multiple use of reservoirs. The construction of reservoirs and the use of water within reservoirs are covered by statute in Wyoming.[124] Permits for reservoirs in Wyoming are couched in terms of obtaining a permit to construct a reservoir to "store or impound, for beneficial uses, any of the unappropriated waters of the state of Wyoming . . . ."[125] Further, this is considered a "primary" permit and the actual user of the water obtains a "secondary" permit.[126] If surplus water is available, this, under the proper statutory procedure, must be furnished to those showing a need for such water.[127] In other words Wyoming statutes add flexibility to the concept of storage of water and recognize that this is merely a step in the direction toward a beneficial use of such water subject, of course, to regulation by the State Engineer. It is also possible for the owner of the reservoir to sell a portion of the capacity of the reservoir.[128] However, any such sale of a portion of the capacity of the reservoir carries with it an interest in the reservoir and works appurtenant thereto of such proportion as the portion sold bears to the total capacity of the reservoir. This would seem to indicate that if the total appropriation of the owner is measured by the capacity of the reservoir the owner would be abandoning part of his appropriation by selling part of the reservoir capacity. However, there appears to be no reason why it would not be possible to lease the unfilled portion of the reservoir on the basis that if the owner does not use the full capacity the lessee could store his

123. So the United States Supreme Court has held in Nebraska v. Wyoming, 325 U.S. 589, 612 (1945); Ickes v. Fox, 300 U.S. 82 (1937).
124. WYO. STAT. §§ 41-26 to -46, 41-201 to -216 (1957); Manual of Regulations and Instructions, State Engineer's Office, State of Wyoming (1958).
125. WYO. STAT. § 41-26 (1957).
126. WYO. STAT. § 41-27 (1957).
127. WYO. STAT. § 41-39 (1957).
128. WYO. STAT. § 41-34 (1957).

water therein. In other words the first water to be spilled in case the water from both water rights was more than sufficient to fill the reservoir would be that of the lessee.

There have been no cases decided in Wyoming directly or indirectly concerning multiple use of reservoirs. However, there have been cases decided in other states which may have a direct bearing on the matter. In 1908 the Supreme Court of Colorado held that an appropriation for storage in a reservoir is measured by the capacity of the reservoir; that is, what it will hold as a result of a single filling, not the amount that could be run into it in successive fillings.[129] This statement would more than likely be considered to be the law as to the reservoir appropriation in Wyoming: this rule, however, would not prevent the leasing of a portion of the excess storage capacity of a reservoir.

In the case of *Orchard City Irrigation District v. Whitten,*[130] the court considered the question of acquiring a second appropriation from a different source for the same reservoir. The first appropriation for the reservoir did not supply enough water to use the full capacity of the reservoir because the appropriation was rather a late one relative to the other appropriations from the source in question. A second storage appropriation was acquired — the purpose of which was to use the full capacity of the reservoir and, further, to refill the reservoir during the same water year. The court ruled that if the two storage decrees gave the appropriator the right to fill the reservoir more than once in any one year it must be stated in the decrees or result from a legal construction thereof. After an examination of the decrees, the court held that the second decree was auxiliary which provided only that if extra water above that of the earlier decree was needed to fill the reservoir to capacity then the second decreed right became effective. The appropriator was bound by the one filling rule and could not use the second decree to refill the reservoir during the same water year. In another Colorado case[131] that dealt with both storage and direct flow

129. Windsor Reservoir & Canal Co. v. Lake Supply Ditch Co., 44 Colo. 214, 98 P. 729 (1908); *see also* TRELEASE, BLOOMENTHAL & GERAUD, CASES AND MATERIALS ON NATURAL RESOURCES 149 (1965).

130. 146 Colo. 127, 361 P.2d 130 (1961).

131. City and County of Denver v. Northern Colorado Water Conservancy Dist., 130 Colo. 375, 276 P.2d 992 (1954).

rights the Supreme Court of Colorado stated that "One cannot add water to a full cup, and may not have a second decree for water from the same source to be held at the same time in the same reservoir to which a decree already has been awarded to its full capacity."[132] The facts involved mainly the direct flow rights of the transmountain tunnel diversion that Denver was making from the Blue River. Under the original plan Denver was going to use a tunnel capable of carrying 1600 c. f. s. for the purpose of the transmountain diversion. In a revised plan the City would use a tunnel with 788 c. f. s. capability and use Dillion dam as temporary storage for the difference between the 1600 c. f. s. and the 788 c. f. s. If this alternative plan could be used, it would save the taxpayers of Denver approximately $10,000,000. The court held that if the alternative plan were used the decreed appropriation for direct flow would be governed by the capacity of the diversion tunnel — first, because the size of the diversion work determines the extent of the appropriator's right; second, because water diverted from a stream under an appropriation for direct use cannot temporarily be impounded for use later in the season; and third, one cannot have a second decree for water from the same source to be held at the same time in the same reservoir to which a decree already has been awarded to its full capacity.

It is improbable that the Wyoming court would see fit to strangle an attempt to import water into the various water basins of Wyoming at the expense of no one when the result of the success of such an attempt would result in increased economic activity and betterment of the area to the detriment of no one. Also, it is possible to distinguish the situation that occurred in Colorado from that which would be applicable under the weather modification activities. If the language the Colorado court used is taken literally, the facts under the weather modification activities would not fit within the terms of the rule laid down by that court. First, the second decree would not be held by the same person; second, the source of supply is not that of the first; and third, there is no combining direct flow and storage rights together. Last but not least, the political situation in Wyoming is much dif-

132. *Id.* at 998.

ferent than exists between the eastern and western slopes in Colorado.

It would be a great setback to the agricultural industry and general economic growth of the state of Wyoming in general if the court followed the rule set out by the Colorado court.

VII. IMPORTER'S RIGHT TO USE THE NATURAL CHANNEL

The other question that must be considered at this point it whether the natural channel of a watercourse may be used to transport the increase in runoff after it has been stored for a period of time. A well known author has stated that "an appropriator has the right to make use of all of the natural advantages of the country . . . [and may use] the channel of another stream for a portion of his ditch in conducting the water to the place of use.[133] The author goes on to say "water from any different source of supply may be turned into the channel of any stream, conducted therein for a distance, and again taken out by the appropriator thereof."[134] There are, however, three limitations to using the natural channel of a stream to conduct water: (1) there must be an intent to recapture such water at the time it is turned into the natural channel;[135] (2) no more water may be removed from the natural water course than was turned into it, allowing for evaporation and seepage;[136] and (3) no more water can be turned into the natural water course than it can safely carry.[137] As was stated earlier, the burden of proof is upon the importer to show the amount of water which he may claim from the natural channel.

Section 41-29 of the *Wyoming Statutes* seems to infer that the right to use the natural channel is assured in that the section provides that if a reservoir owner desires to use a stream or other watercourse for the purpose of carrying stored water from a reservoir to a consumer, he must notify the water commissioner of the district in which such stored water is to be used. Further, by statute, an owner of a right

133. 2 KINNEY, IRRIGATION AND WATER RIGHTS § 832, at 1458 (2d ed. 1912).
134. *Id.* at 1459.
135. *Ibid.*
136. *Id.* at 1459; § 1206, at 2188.
137. *Id.* at 1460.

to use foreign water in Wyoming "may transport the same in the natural channel of any interstate stream . . . ."[138]

Although there are no cases in Wyoming dealing with this question of using natural channels to transport water, there seems to be no reason for the court not adopting the rules that have been set forth above. From the above mentioned statutes it is safe to say that the public policy of the state as inferred by the legislature is that natural channels of water-courses may be used to transport water if such transportation can be carried on without injury to others.

VIII. LIABILITY OF THE WEATHER MODIFIER

Legal liability will arise either (1) from the depletion of natural precipitation, or (2) from damage due to excessive precipitation. A legal action brought in a court of law could result in a judgment for either an injunction or damages or both. First, for there to be interference with another person's property right in the clouds or the moisture thereof the jurisdiction involved must adopt some theory of cloud or moisture ownership. Eliminating the analogous theories of water law that could be adopted, there are three available theories upon which ownership of clouds or the moisture thereof could be predicated. The doctrine of *ad coelum* is one of the theories. This doctrine has been discussed previously and can be discounted as a realistic theory which would be adopted by the courts.[139] This leaves for discussion some form of existing statutory law or the natural rights theory. Many states have adopted the Uniform State Law for Aeronautics wherein it is stated "The ownership of the space above the lands and waters of this state is declared to be vested in the several owners of the surface beneath subject to the right of

138. WYO. STAT. § 41-13 (1957); Foreign water is defined as water of an interstate stream which enters the State of Wyoming from another state while flowing in a natural stream channel and which water has been or may be determined by final decree of the Supreme Court of the United States not to be available for diversion and application to beneficial use within the State of Wyoming, or other waters originating outside of the State of Wyoming, and which neither the State of Wyoming nor any Wyoming appropriator could divert and use as against another state or appropriator therein, the rights to which through purchase, exchange or negotiation are acquired by anyone for beneficial use in the State of Wyoming, and which are conveyed, imported or permitted to flow into the State of Wyoming through the channel of any natural stream, or otherwise . . . .
WYO. STAT. § 41-11 (1957).

139. *Supra* note 23.

flight described in section 7 (§ 10-33)."[140] This however does not mean that because an underlying landowner does own the airspace that it necessarily follows that he owns the clouds and the moisture passing through his airspace. For example, does a landowner own wild animals just because they may happen to be on his land? No, ownership of wild animals is governed by the law of capture and until the animal is subjected to control it is the property of the public.[141] The fugitive nature of the clouds make them analogous to animals and the same reasoning should be applied. Ownership or rights of use are not based on mere proximity and mere ownership of the underlying ground should not be the basis of ownership or rights of use in clouds. In terms of the statute and the purpose involved, there is no logical reason for an interpretation that would vest the underlying landowner with such ownership rights.

The natural rights theory would probably be the soundest theory upon which to grant to a plaintiff ownership rights to the clouds or the rights of use in the clouds. In essence, the theory states that there is a general right in the landowner to freely enjoy the use of his land in its natural condition without interference from his neighbors.[142] This theory is basically a common law doctrine and in those states where the common law has been rejected or modified, in relation to riparian rights, a question arises as to whether this theory would be accepted.[143] In Wyoming, which is one of the nine western states[144] that has rejected in total the riparian doctrine, this leads to the argument that the natural rights doctrine has never been the law in the State of Wyoming and should not be considered in deciding the law of ownership of the clouds or the rights of use therein. In those states following the Colorado doctrine of prior appropriation there are strong arguments for the proposition that these states would not recognize the natural right to rainfall. The strong-

140. WYO. STAT. § 10-32 (1957).
141. BROWN, PERSONAL PROPERTY § 8, at 15-17 (2d ed. 1955).
142. *Rain and the Law*, 39 GEO. L.J. 466, 471 (1951).
143. *Who Owns the Clouds?*, 1 STAN. L. REV. 43, 51 (1948). The most commonly listed principal natural rights are (1) riparian rights of water; (2) the right to natural drainage of the land; (3) the right to both lateral and subjacent support of land; and (4) the right to the natural diffusion of air free from pollutants.
144. Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

est argument for not adopting the theory would center around the shortage of water situation and the fact that it is necessary to put all rainfall or potential rainfall to beneficial use — this would not be guaranteed under the natural rights theory.

A plaintiff who seeks damages on the ground of interference with his ownership or rights of use in the clouds by a person engaging in weather modification is faced by a difficult task. First, it must be shown that there is a casual connection between the weather modification activity and the occurrence complained of;[145] and second, the plaintiff must show that the occurrence in some manner interfered with the use of his land thereby causing the plaintiff to suffer injury.[146]

As to the first issue, there are becoming more persons that can qualify as experts in the weather modification field and give opinions as to whether certain activities would or would not cause the occurrence complained of given certain other facts. Also, more data are becoming available each year that have a direct bearing on the issue. Given the current rate of experimentation, it should not be too many years before it will be a relatively simple task to show the necessary casual connection in micro-weather modification activities. The second issue will be much more difficult in that if the state does recognize some property right in the form of ownership or rights of use in the clouds how does one prove that there has been interference. Does making it rain one place deprive twenty acres of land five miles away of the rain it would naturally receive? How does one prove that a particular cloud would have caused rain to fall on his particular piece of land except for the weather modification activities? This may be the most difficult task that a plaintiff would face.

The most likely area for legal action in the weather modification field is where the artificial nucleation has caused damage through excessive precipitation. This type of action will also place a formidable task before the plaintiff and his lawyer in that proof of causation must be presented and some reasonable calculation of damages shown. These must be shown regardless of the theory upon which liability

145. PROSSER, TORTS 146 (3d ed. 1964).
146. *Ibid.*

is predicated, be it negligence or absolute liability. The proof of causation, while it is difficult will probably be solved scientifically more readily than the damage issue. With modern equipment (radar) some experiments have provided "visual" sighting of precipitation resulting from seeding. Thus, with each experiment, data and expert knowledge are increasing so that it will be possible for reliable expert testimony to be given as to whether seeding did cause additional precipitation under the given physical facts that were present.

Given the proof of causation, the next issue is that of the calculation of damages. Unless it can be shown that a certain percentage of the actual runoff resulted from the weather modification activity, any question of damages is pure speculation. Since no two storms or seasons are exactly alike, no one can say with any assurance the percentage of natural precipitation or runoff and the percentage that was artificially induced.

In addition to flooding, there also may arise the situation in Wyoming in which there is a snowfall that would not have resulted except for the artificial nucleation. Assuming that causation and the calculation of damages can be shown, there remains the question of upon what theory will the defendant be held liable, if at all. Liability could be based on one of the following: trespass, strict liability or negligence.

Trespass.[147] Trespass is probably the most obvious remedy where there has been an invasion of a possessory interest in land. This would relate to the situation in which moisture, whether it is in the form of some type of precipitation or as flooding water, enters onto the land of the plaintiff. In some states the defendant is still liable for an invasion of property even though such invasion was neither intended nor negligent.[148] This is a survival of the common law action of *trepass quare clausum fregit.*[149] The modern trend has been, however, that an unintended entry or intrusion upon the property in the possession of another does not constitute actionable trespass; now the great majority of jurisdictions accept the rule stated in the Restatement of Torts that the

147. *See* PROSSER TORTS ch. 3 (3d ed. 1964).
148. *Id.* at 64. New York may be the only state that still follows this rule.
149. *Artificial Rainmaking,* 1 STAN. L. REV. 508, 532 (1949).

invasion must be intentional, negligent, or the result of an ultra-hazardous activity for the defendant to be liable for trespass.[150]

If the plaintiff cannot show intention on the part of the defendant to cause precipitation on his land, then the plaintiff must show that the defendant acted in a negligent manner or was conducting an ultra-hazardous activity. Once a trespass has been established, all damages caused by the trespass, including damages to personalty, may be recovered by the plaintiff.[151]

Negligence.[152] It is necessary to distinguish between an action in trespass based on negligent entry upon land and an action for negligence. In trespass it is a question of whether there is an unreasonable risk of invading the land, and the wrongdoer is held liable for all damages proximately caused to the property by the unlawful entry although such damage is not the result of any negligent or wrongful act beyond the mere trespass itself.[153] The same extent of liability has been extended to the person of the owner and the members of his household.[154] Negligence, on the other hand, is a matter of risk in which there is a weighing of the magnitude of the risk of harm against the utility of the defendant's conduct; in other words, negligence is conduct which is below the standard set for the protection of others against an unreasonable risk of harm.[155] The basic rules of negligence will be applied to weather modification as they are to any other field of human activity. Because the knowledge and skill in the weather modification field is in its infancy, the degree of skill that the "reasonable weather modifier" must exhibit cannot be determined. In Wyoming, however, a person cannot engage in weather modification activities unless he is qualified and registered professional engineer with a showing of qualifications in the atmospheric sciences.[156] Thus it would appear that a registered engineer as a professional man would not only be required to exercise reasonable care but also that this reasonable care must be exercised in the light of a standard of

150. RESTATEMENT (SECOND) OF TORTS §§ 158, 163, 165 (1965).
151. PROSSER, TORTS 67 (3d ed. 1964).
152. *Id.* chs. 5, 6, 8.
153. *Supra* note 151.
154. *Ibid.*
155. *Id.* at 146-48.
156. WYO. STAT. § 9-271 (Cum. Supp. 1965).

his special knowledge and ability. The operator will be held liable if harm results from the fact that he does not have the skill and knowledge commonly possessed by members of his profession in good standing. Not only will the weather modifier be holding himself out as a professional engineer but he will also be claiming to be a specialist in atmospheric sciences. When a person represents himself as a specialist, the standard of care to which he is held is accordingly modified.[157]

Another area that will present some problems as to the ultimate effects of weather modification will be proximate cause. This generally is a question of whether the conduct of the defendant is so significant and important a cause in relation to the injury suffered that the defendant should be held legally responsible.[158] This is essentially a matter of legal policy and thus becomes a question of to what degree will the law extend the responsibility of the weather modifier. Many times the issue is stated in terms of the duty owed by the defendant to the plaintiff.[159]

One thing that should be noted is that the scope of recovery may be broader under an action for trespass based on negligence than under an action for negligence not based on trespass.[160] Where the plaintiff has the alternative, he will probably find it to his advantage to bring the action in trespass.

Strict Liability.[161] To apply this doctrine to weather modification the court must answer in the affirmative the question as to whether the modifier should be saddled with the burden of an insurer. The doctrine, when accepted, has been applied to those things and activities which by their nature are abnormally dangerous. The Restatement of Torts sets out two elements to be considered in determining if an activity is abnormally dangerous: (1) the activity involves a risk of serious harm which cannot be eliminated by the utmost care; and (2) the activity is not a matter of common

157. *Supra* note 151, at 164.
158. *Id.* at 282.
159. *Ibid.*
160. In trespass if the entry is negligent then all damages suffered may be included without regard to scope of risk or proximate cause. In an action based solely on negligence there must have been an unreasonable risk of causing harm.
161. *See* PROSSER, TORTS ch. 14 (3d ed. 1964).

usage.[162] The applicability of the first element cannot be determined at this time; there is no doubt that the second element is applicable. At the present time given current knowledge the courts may find that most aspects of weather modification do come within the prescripts of the first element.

The doctrine of strict liability as it is applied to abnormal things and activities started its modern development by way of the leading case of *Rylands v. Fletcher*.[163] The rule of this case was stated by Prosser as follows: "The defendant will be liable when he damages another by a thing or activity unduly dangerous and inappropriate to the place where it is maintained, in light of the character of that place and its surroundings."[164] In listing the states that have rejected or accepted the doctrine, Posser has placed Wyoming in the status of probably rejecting the doctrine of strict liability as espoused by *Rylands v. Fletcher*. While the Wyoming court in the case[165] cited refers several times to *Rylands v. Fletcher* and appears to be rejecting the doctrine, the facts of the case do not appear to bring the case within the rule.[166] Whether the Wyoming court would feel bound by this prior case when presented with a situation dealing with weather modification is a question only it can answer.

CONCLUSION

The legal aspects of weather modification are at present undefined. Few cases have been decided and there is no legal concensus in either the control and ownership of clouds and the moisture therein or of the liability of the weather modifier. While it is true that twenty-two states have enacted legislation regulating weather modification activities, most statutes amount to no more than token regulation, if that. There has been some rumbling in Congress concerning the need for

162. RESTATEMENT (SECOND) OF TORTS § 520 (1964).

163. 3 H. & C. 774, 159 Eng. Rep. 737 (1865), *rev.* L. R. 1 Ex. 265 (1866), *aff.*, L.R. 3 H.L. 330 (1868).

164. PROSSER, TORTS 522 (3d ed. 1964).

165. Jacoby v. Town of Gillette, 62 Wyo. 487, 174 P.2d 505 (1947).

166. The Town of Gillette maintained a ditch to carry off drainage water through the town. During an unprecedented thaw that occurred in 1943 the ditch over-flowed causing damage to the plaintiff's property. Maintaining the ditch within the corporate boundaries does not appear to be an activity unduly dangerous in light of the character of the place and its surroundings.

federal regulation of weather modification.[167] If the States continue to make no more than the token regulation presently existing, pressure is going to mount for the federal government to intervene and take over all facets of weather modification regulation. In the next ten years or so there should be a significant scientific advancement in many areas of weather modification and time is going to run out in which the states will be able to act.

Most theories that have been advanced for determining ownership of the clouds and the moisture therein have been drawn from rules and theories which are used in other areas of natural resources. Little new thinking and ideas have developed and so far little attempt has been made to adjust legal thinking and ideas to the advancements that are being made in scientific areas. Unless new ideas are put forward and adopted by the legislatures and courts, the legal profession will have failed to meet its obligation to society: the old standard rules and theories will be applied to weather modification and the chance for the law to show that it can grow and change to meet the challenge of our changing society will have passed. Now is the time for legal institutions to be developed so that development can take place independent of pressures resulting from adversary proceedings and recognition can be given to the social and economic effects that may result.

167. *See* OPPENHEIMER, *The Legal Situation*, 2 FINAL REPORT OF THE ADVISORY COMMITTEE ON WEATHER CONTROL 209 (1957). There have been a few bills introduced since this report which concern the control of weather modification.