

Sacramento,⁸³ it does not follow from this that an agency has an "ancient right" to be sued in that county alone because it happens to be the defendant. If section 401 is interpreted to mean that whenever a transitory action is properly tried in Sacramento, it may be tried wherever the Attorney General maintains an office, the fiction of agency residence in Sacramento serves as a useful tool. It will, in many cases, make unnecessary any consideration of the residence of parties and fix the proper place of trial in Sacramento, San Francisco or Los Angeles. Although this may not be a perfect solution, it will lighten the suitor's burden in many cases without interfering with the orderly operation of the Attorney General's office.

Although the answers to many administrative venue questions can be found in the statutory and case materials, the necessity of a complex analysis in each factual situation to determine venue suggests the need for inclusion in the California Administrative Procedure Act of a simple, workable scheme. If the legislature desires to afford the private individual convenience, the basic statute should provide that transitory actions against all state-wide agencies and offices are properly triable in any city in which the Attorney General has an office. This would eliminate the difficulties caused by efforts to apply sections 393 and 395 of the Code of Civil Procedure to actions for which the sections are ill adapted. Administrative necessity may require that agencies defended by their own counsel receive individualized treatment. In any event their status should be clarified by express inclusion in or exclusion from the basic rule.

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THE LEGAL ASPECTS OF RAINMAKING¹

Since the first successful experiments in the laboratories of the General Electric Company in 1946,² the artificial precipitation of rain and snow has become a reality. The method developed by such experiments involves the use of dry ice and similar cooling materials

⁸³ *Supra* note 59.

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¹ The writer is indebted to Mr. John B. Leighly, Professor of Geography, University of California, for pertinent meteorological information.

² *Man-Made Snow*, *Discovery* (England) Feb., 1947, p. 33; Schaefer, *The Production of Ice Crystals in a Cloud of Super-cooled Water Droplets* (1946) 104 *Science* 457. Vincent J. Schaefer, who conducted this experiment, later precipitated snow from a natural cloud by dispersing six pounds of granulated dry ice into it from an airplane. Brownell, *How Will You Have Your Weather?* *American Magazine*, April, 1947, p. 44. In the summer of 1947, the same scientist produced a heavy shower above Roosevelt Dam. *Rainmaker*, *Newsweek*, Aug. 4, 1947, p. 64. Even more effective was a carefully conducted outdoor experiment in Australia in February, 1947. Under very favorable conditions, this operation caused a heavy rain covering at least twenty square miles and lasting throughout an afternoon. Kraus and Squires, *Experiments on the Stimulation of Clouds to Produce Rain* (England 1947) 159 *Nature* 489.

under certain favorable meteorological conditions. Such conditions are said to prevail in 80 per cent of the clouds in this country during the winter, but in a much smaller percentage during the summer.³ The size or formation of the cloud, and certain conditions outside it, may also frequently affect the success of the operation.⁴

This newly acquired ability to control to some extent the fall of rain and snow presents the possibility of serious legal problems, for its exercise involves probable benefit to some and harm to others. There is an urgent need for clarification of the resulting legal relations, especially in the private controversies which are likely to arise. Fear of undefined liability is likely to have a strong deterring effect on individuals who might otherwise engage in this new process which promises such great benefit to the community as a whole. Manufacturers of rainmaking equipment are reportedly delaying their sales, and aviation companies becoming reluctant to enter into contracts for "bombarding" clouds.⁵ Discouragement of useful experimentation has also been reported.⁶

This comment will discuss the legal relations arising, in the absence of statute, from the simple attempt of a private individual to produce rain over his land, for his own benefit.⁷ Two grievances can

³ Spencer, *The Man Who Can Make It Rain*, Saturday Evening Post, Oct. 25, 1947, p. 24. The necessary condition there discussed is that a considerable quantity of the water droplets in the cloud be super-cooled—that is, cooled below the normal freezing temperature of water.

A more recently discovered method of precipitation does not require the droplets to be super-cooled to such a low temperature as is required by the dry ice method. *The Nucleation of Ice Formation by Silver Iodide* (1947) 18 Journal of Applied Physics 593.

A new theory, propounded by Dr. Langmuir late in 1947, indicates the possibility that rain may be made from clouds of any temperature, having certain characteristics, by simply dropping water into them. Such clouds are common throughout the year on the Pacific Coast. *Langmuir Announces New Rain Propagation Theory* (1947) 25 Chemical and Engineering News 3568.

⁴ The snowfall mentioned in note 2 probably never reached the ground, because the air conditions were such that it evaporated on the way down. The articles cited in the same note indicate that in general an unusually large cumulus-type cloud is necessary in order to precipitate a useful amount of rain.

⁵ N. Y. Times, Jan. 18, 1948, § 4, p. 8, col. 2.

⁶ *Whose Rain?* Time, Dec. 22, 1947, p. 44.

⁷ Disputes are likely to arise also on an interstate or international scale. In the winter of 1947-48, the Chamber of Commerce of Reno, Nevada attempted to cause snow to fall on ski slopes near Reno. The state of Utah protested, fearing impairment of Utah's water supply for 1948. N. Y. Times, *supra* note 5.

The possibility of regional climatic control in the future poses further widespread problems. For example, Dr. Langmuir has suggested that it may become possible to make the regions just east of the Cascades and the Sierra Nevada less arid by systematic precipitation of the clouds that float past those mountains. Spencer, *supra* note 3. Compare *Weather Under Control*, Fortune, Feb. 1948, p. 106, 128, 131. Possible methods of dispelling hurricanes or attracting thunder storms may raise further difficulties. Kaempfert, *Making Weather to Order*, N. Y. Times Magazine, July 20, 1947, p. 9. 29.

The problems of international relations and interstate conflict thus raised are beyond the scope of this comment.

arise from such an attempt: (1) depriving others of the benefit of such rain; (2) damage to the property of others by the fall of such rain. It will be convenient to discuss each of these separately, as *diversion of air-borne moisture* and *precipitation of harmful rain*, respectively.

Since there are as yet no customs or reported legal precedents in this field, it is necessary to try to predict legal results by examining doctrines applied in analogous situations in the light of the practical needs of this situation. The chief difficulty of this approach lies in the fact that there is no perfect analogy, due to the peculiar circumstances of rainmaking. Perhaps the most important of these circumstances are the changeability of clouds and the impossibility of controlling either the amount of rain precipitated or the area covered. It is a familiar fact that cumulus clouds, which are best suited to rainmaking, constantly increase and diminish, appear and disappear. Similarly, their water content and other characteristics which affect the production of rain are constantly changing. Even if a particular cloud were to remain substantially the same for a considerable time, its course would seldom be predictable with much accuracy because air currents are so variable.⁸

From these circumstances it may seem impossible to prove impairment of rainfall due to rainmaking operations, and perhaps such proof would be impossible in suits for damages for taking particular clouds. But the problem of proof would be less difficult in suits to enjoin rainmaking, since it is apparent that any taking of rain by a party usually to windward will necessarily lessen the chances of a party usually to leeward of getting rain by natural or artificial means. Although the potential harm so proved may or may not be sufficient to warrant a judicial remedy, the fact that it can be proved makes pertinent the following discussion.

Liability for Diversion of Air-Borne Moisture

It would be nonsense to talk of private ownership of a particular cloud, even were it a better defined and less ephemeral thing than it is. The element of control⁹ is lacking up to the very moment of precipitation, and when one has passed up the brief opportunity to make rain out of a cloud while it is over his land, he can never receive any enjoyment from it. If such enjoyment is essential to private ownership, it appears that clouds cannot be private property; if property at all, therefore, they must be, like uncontrolled water or wild animals and

⁸ An enlightening discussion of natural precipitation from cumulus-type clouds is found in TAYLOR, *AERONAUTICAL METEOROLOGY* 271-74 (rev. ed. 1941).

⁹ "... of fire or light, of air and of water. A man can have no absolute permanent property in these ... since these are of a vague and fugitive nature, and therefore can admit only of a precarious and qualified ownership, which lasts so long as they are in actual use and occupation, but no longer." 2 BL. COMM. *395.

fish, the property of the state.¹⁰ These analogies to water and animals, then, should be considered.

The analogy to water flowing in a well-defined stream is defective in that a cloud does not follow an accurately predictable course. Even percolating water, although more similar to clouds in this respect, furnishes a poor analogy, because it provides a continuously available supply of water which is reduced in a measurable degree (*i.e.*, the water table is lowered) by removal of a certain amount. In contrast, the irregularity of the weather, the quirks of air currents and the continual materializing and dematerializing of clouds render very difficult the determination of the effect of rainmaking in a particular case. Also, every person over whose land a cloud floats is, by these analogies, in the position of the riparian owner (as to surface or underground water courses) or of the overlying landowner (as to percolating waters), so that all land is, at one time or another, "riparian" to clouds. Thus, there can be no such distinction as is made between riparian and non-riparian owners or uses.

Percolating underground waters, then, present the closer analogy on the facts. The law of percolating waters is very similar to that of surface water rights. One author recently stated the three alternative doctrines governing percolating water rights as follows: "(1) absolute ownership by the owner of the overlying land; (2) ownership by a landowner subject to reasonable use and correlative rights of owners of all land overlying the common ground-water supply;¹¹ and (3) ownership by the public, subject to appropriation for beneficial use."¹²

Three similar doctrines are found in the law governing riparian rights in surface waters: the primitive law, the reasonable use doctrine and the appropriation doctrine. A fourth, the natural flow doctrine,¹³ has no counterpart in the law of percolating waters.

The primitive law of riparian rights, which places no restrictions on taking by any riparian owner, may be adequate in the field of rainmaking at this time. Present rainmaking methods require considerable trouble, skill and good fortune to make one good shower; under these

¹⁰ Conceivably, a contrary result could be reached by applying the ancient theory that the landowner owns indefinitely above the land, "*usque ad coelum*." Co. Lrrr. *4a. This theory is reasserted in the STATE AERONAUTICS COMMISSION ACT of California, CAL. STATS. 1947, p. 2929, § 2(c). However, in view of the established exception, noted therein, as to airplane flights, and especially because the theory has never been held to give the landowner title to such things as water flowing over the land (Co. Lrrr. *4a; 2 BL. COMM. *395), it seems difficult to believe that the courts will reach this result.

¹¹ This is the prevailing doctrine in California. *Katz v. Walkinshaw* (1903) 141 Cal. 116, 74 Pac. 766.

¹² Hutchins, *Protection in Means of Diversion of Ground-Water Supplies* (1940) 29 CALIF. L. REV. 1, 2.

¹³ The discussion of these doctrines is based largely on the very adequate treatment of the subject in 4 RESTATEMENT, TORTS 341-47 (1939).

conditions it is reasonable to suppose that such law would work no real injustice, because the possibility of any material deprivation of rain, at least by individuals, seems slight.

Assuming, however, that material harm can result, modern water law doctrines may be more appropriate. Two main theories exist, with varying force in the different states. One, the natural flow theory, entitles each riparian owner to unimpaired natural flow of the water in the stream, subject to its unrestricted use by upper riparian owners for "natural" (*i.e.*, necessary domestic) uses, including washing and watering cattle kept for the owner's personal use, but excluding irrigation.¹⁴ The reasonable use theory allows, in addition, use of the water for any reasonable purpose on other land, to the extent that it does not unreasonably impair the reasonable use by the lower riparian owner.¹⁵ It seems very unlikely that the artificial production of rain would be undertaken solely for "natural" uses, in the sense of natural riparian uses; thus, to apply a natural flow theory would be practically to prohibit rainmaking, a result unnecessary where rainfall is plentiful, unwise where it is scarce. Therefore, if riparian doctrines are to be employed in rainmaking cases, the primitive unrestricted doctrine or the reasonable use theory probably will be applied. As a matter of social policy, the decision whether to apply the restrictions of the latter doctrine to rainmaking should depend upon whether the diversion of air-borne moisture, to the extent presently possible, can result in material harm. An important factor is the relative scarcity of water in the state where the court sits. In the damp eastern states unrestricted diversion is more likely to be allowed than in California.

If some restriction is necessary, the purpose for which the operation is carried out should be taken into consideration.¹⁶ Thus, the right of a farmer to take rain for crops should be held superior to that of an owner of an amusement park to raise the water level of his boating pond. The controlling principle should be the promotion of that use of rain which will produce the greatest general benefit to the community.

A further water law doctrine, apparently ill-suited to rainmaking, is that of appropriation. This doctrine is applied in place of the doctrine of riparian rights in some western states and exists in California along with, but subordinate to, the doctrine of riparian rights.¹⁷ The

¹⁴ 4 RESTATEMENT, TORTS 342; 1 WIEL, WATER RIGHTS 795, 801 (3rd ed. 1911).

¹⁵ 4 RESTATEMENT, TORTS 344; 1 WIEL, *op. cit. supra* note 14, at 807.

¹⁶ In the law of streams, a further standard is imposed: use on riparian land is given superior rights over use on other land. *Cowell v. Armstrong* (1930) 210 Cal. 218, 290 Pac. 1036. 1 WIEL, *op. cit. supra* note 14, at 792-830. All land, however, is "riparian" to the general flow of the clouds.

¹⁷ *Lux v. Haggin* (1886) 69 Cal. 255, 10 Pac. 674 (establishing the superiority of riparian rights); CAL. WATER CODE, div. 2, pt. 2.

appropriator of water rights acquires the privilege of diverting water from a stream continuously at a certain rate of flow, and the right that this diversion shall not be interfered with by later users. It appears utterly impracticable to apply this doctrine to the diversion of water from clouds.¹⁸

It seems possible, without straining the facts too far, to think of a cloud, not as part of the stream of air flowing over the land, but as an *object* which floats by. If so, a clear analogy to wild ducks and other birds flying overhead becomes apparent. Course and speed are similarly variable and uncontrollable; in both cases the only practical method of gaining control so as to acquire ownership of the object is by causing it to fall to the ground during the brief time that it is overhead. The analogy is equally applicable to wild animals that pass over one's land on foot, or fish that swim over it in a river or lake. The differences between these examples and clouds, however, must be kept in mind. Two important differences are the much greater value of the precipitated cloud, and the fact that clouds do not continue to travel indefinitely in a usable form, but are constantly disappearing, to be replaced by others. Of these, the former would indicate the need of greater regulation of rainmaking than of fishing and hunting, but this effect is perhaps counter-balanced by the self-replacing nature of shower clouds.

Arguments from these analogies could be made on both sides of a rainmaking case. The law, apart from statutes, imposes almost no restriction on the taking of fish and game;¹⁹ some animals are left unprotected by the regulatory statutes, presumably because of their relatively low value and great quantity.²⁰ In a state where rainfall is very plentiful an analogy to such animals would support unrestricted rainmaking. Where rain is scarce and variations in rainfall are of great economic importance, the same social policy which provides statutory

¹⁸ The following problems appear insuperable: (1) the difficulty of measuring the amount of artificially precipitated rain falling on the land of a rain appropriator, either to measure the original privilege or its current exercise; (2) the necessity of prohibiting all rainmaking in a wide area around the appropriator's land, if his "right" to a certain amount of rain is to be protected; (3) the impossibility of proving which of several other rainmakers in the area prevented the appropriator from getting his share of the rain.

However, it is reported that a Nevada rancher in 1947 "filed a formal claim to all the water in all the clouds passing over" his ranch. *Whose Rain?* Time, Dec. 22, 1947, p. 44.

¹⁹ Such ownership as exists in wild game and fish is in the state. *Lacoste v. Dept. of Conservation* (1924) 263 U. S. 545 (wild game); *Gratz v. McKee* (C. C. A. 8th 1919) 258 Fed. 335 (fish). Apart from statutory restrictions such as licensing, the cases indicate no restriction on the taking of fish or game, aside from cases of complete obstruction of the passage of fish in a stream or of its pollution so as to prevent fish from living in it. *Weld v. Hornby* (1806) 7 East 195, 103 Eng. Rep. 75 (obstruction); *People v. Truckee Lumber Co.* (1897) 116 Cal. 397, 48 Pac. 374 (pollution).

²⁰ In California, crows, squirrels, and beavers are among the unprotected animals. CAL. FISH AND GAME CODE §§ 420, 1175, 1176, 1230, 1232, 1310.

protection for the more rare and valuable animals would support restriction and regulation. Such arguments would serve to reinforce the analogies drawn from water law, which also indicated a balance in favor of a reasonable use doctrine in arid states and no restrictions in states where rainfall is plentiful.

Liability for Precipitation of Harmful Rain

Here there is greater difficulty for the rainmaker. It seems clear that he who intentionally or negligently causes surface or subsurface water to come upon another's property is liable for resulting foreseeable harm to that property,²¹ and no good reason appears for distinguishing water taken from a cloud. Since rainmaking operations often result in showers covering many square miles, and since it is apparent that a change of wind can carry the shower some distance from its originally intended position, it would seem that a reasonable man carrying out rainmaking operations should anticipate that he may cause rain to fall anywhere within a very wide region.²²

As a defense, it may be possible in rare cases to prove from the appearance of the cloud that it would have produced naturally a shower similar to that which followed the defendant's operations.²³ Otherwise, the only defense would seem to be a possible public policy in favor of the encouragement of rainmaking in certain situations. A good analogy could be drawn to the development of the law of liability for flying an airplane over another's land. There, the ancient theory of ownership of space up to the sky was rejected so far as to allow reasonable flights over anyone's land, in the interest of promoting the socially useful art of aviation.²⁴ It is true that the qualification here proposed would exempt a more substantial injury than intrusion on air space high overhead, since the trespass here is on the surface of the land, from which the owner derives most of the enjoyment of his property rights. But rainmaking can be of great and sometimes vital usefulness to the community, especially when the need for rain is general. At such times, crops of great value might be needlessly lost if the threat of tort liability were not removed.²⁵

There is no apparent legal obstacle to a reasonably effective safe-

²¹ *Chicago v. Troy Laundry Machinery Co.* (C. C. A. 7th 1908) 162 Fed. 678; *Montgomery v. Locke* (1887) 72 Cal. 75, 13 Pac. 401; *Dauberman v. Grant* (1926) 198 Cal. 586, 246 Pac. 319.

²² 2 RESTATEMENT, TORTS § 289 and comments.

²³ TAYLOR, *op. cit. supra* note 8, at 248.

²⁴ PROSSER, TORTS 84-88 (1941), and cases there cited.

²⁵ There may be special circumstances under which social utility would be an especially strong defense. An instance would be the precipitation of rain from a developing thunder cloud, to prevent damage to crops from hail. The effectiveness of such measures has been indicated by Dr. Langmuir. *Artificial Weather Made* (1947) 52 SCIENCE NEWS LETTER 277.

guard against all the possible liabilities discussed herein by proper contracts with parties likely to be injured by rainmaking operations. Further protection can be gained from liability insurance, as recently used by San Diego County.²⁶

Possibility of Legislation

Latest available information indicates that rainmaking has not yet progressed beyond the limited and unreliable process described in the first paragraph of this comment.²⁷ Few cases are likely to arise in the immediate future, and for these the analogies discussed may be considered adequate to protect the interests of the injured parties. Enactment of statutes, therefore, designed either to encourage rainmaking or to protect the interests of persons harmed by it, seems unlikely at present. If more effective methods should be devised, however, so that rainmaking acquires great economic importance, regulatory statutes will undoubtedly be enacted. Such statutes should have two main purposes: (1) protection of those who may be harmed by requiring adequate notice of proposed operations, with opportunity to object at a hearing before a body empowered to forbid the operation or to approve it conditionally; (2) elimination of uncertainty as to potential liability for rainmaking by taking away the remedy in damages from those who have had notice and the opportunity to be heard, unless they have successfully litigated their objections. Jurisdiction to issue permits or restraining orders might be given to the courts or to an administrative tribunal.²⁸

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²⁶ *Rain by Contract*, Business Week, Aug. 28, 1948, p. 36 (describing projected rainmaking operations for San Diego County by a meteorologist).

²⁷ Results of outdoor experiments commenced in March, 1948, by the Air Force and the Weather Bureau, apparently with a view to the possibilities of causing extensive rainfall over enemy territory and of dissipating fog over airfields. *Forecast: Dry Spell*, N. Y. Times, Nov. 28, 1948, § 4, p. 2, col. 3; *Weather or Not*, Time, Dec. 6, 1948, p. 50.

²⁸ For further material on the legal aspects of rainmaking, see *Who Owns the Clouds?* (1948) 1 STANFORD L. REV. 43.

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