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The Availability of Private Remedies for Acid Rain Damage

James M. Fischer*

INTRODUCTION

Concern over acid rain\(^1\) has increased markedly since it was first identified\(^2\) as a potentially injurious environmental pollutant. This concern has grown as the effects of acid rain have become better recognized and more widespread,\(^3\) prompting Congress to authorize a comprehensive study of the cause of acid rain, the danger it presents, and potential solutions to the problem.\(^4\) This Article considers whether one whose property is injured by acid rain can maintain a private action for damages.

\(^1\)For a definition of the term “acid rain” and a discussion of its causes and effects, see text accompanying notes 10-36 infra.


Problems of causation would be encountered in bringing a private damages action for such injury. There remains some dispute as to whether and in what ways acid rain causes environmental damage. Scientific evidence points with increasing certainty to a demonstrable nexus between acid rain and environmental degradation, however, and researchers are increasingly pointing to industrial plants as a source of acid rain.

The likelihood that acid rain damage can be traced to industry may lead to attempts to deal with the problem through the courts. To date, there have been very few cases seeking relief for injuries caused by acid rain. Yet potential defendants—smelters, utilities, and major fuel-burning installations—possess the proverbial deep pocket, and the issue involved—protection of the environment—often receives a sympathetic ear from the judiciary. Thus it is worthwhile to examine the legal obstacles to maintaining a private damages action for injuries caused by acid rain.

I

ENVIRONMENTAL ASPECTS OF ACID RAIN

Sulfur and nitrogen compounds released into the atmosphere may react with natural oxygen to produce sulfates and nitrates. Once formed, these compounds may precipitate independently, in a dry fall,

5. See Electric Power Research Institute, Ecological Effects of Acid Precipitation 3-7 (1979). Cf. Environmental Protection Agency, supra note 3, at 1, reprinted in Hearings on Acid Rain, supra note 3, at 207. Because all rainfall is naturally acidic, the acid rain problem is one of degree. See, Wetstone, supra note 2, at 50,001. See also notes 12-14 infra. As stated by Likens & Bormann, supra note 2, at 1177, "[t]he ecological effects of acid rain are as yet largely unknown, but potentially they are manifold and very complex."

6. See Heck, Air Pollution and the Future of Agricultural Production, in Air Pollution Damages to Vegetables 128 (American Chemical Society 1973) (concluding that we "are not far from [sulfur dioxide] pollution levels which could cause precipitous effects on agricultural production in the more humid areas of the United States"); Holt-Jensen, Acid Rain in Scandinavia, 3 Ecologist 381 (1973) (observing that studies at fish hatcheries indicate that trout do not breed in water with a low pH, as might be caused by acid rain); Wetstone, supra note 2 (collecting authorities). See also sources cited in note 3 supra.

7. See Likens & Bormann, supra note 2; Wetstone, supra note 2, at 50,001; Environmental Protection Agency, supra note 3, at 3, reprinted in Hearings on Acid Rain, supra note 3, at 207.


9. Berle has identified some of these problems:

Individuals seeking money damages from specific emission sources face serious obstacles. Damages, whether in terms of human health, loss of timber production, sterility of a lake or impact on tourist trade, are hard to quantify. The extent to which any particular plant or utility contributes to acid rain in a given downwind location is even harder to measure.

Id. at 28.

10. Wetstone, supra note 2, at 50,002.
or may combine with cloud vapors to form sulfuric and nitric acids and precipitate as rain or snow in a wet fall. This Article focuses on wet falls, which have come to be known as "acid rain."

Acid rain has been detected by measuring pH levels of rainfall. The acidity of an aqueous solution depends on its concentration of hydrogen ions and is expressed as its "pH;" the lower the pH value, the more acidic the solution. Although pure water is neutral, with a pH of seven, natural carbon dioxide in the atmosphere lowers the pH of normal rain to about 5.7. Since the 1950's, however, the acidity of rainwater has increased measurably. Studies in New Hampshire and New York have measured rain with pH values between 3.91 and 4.02. Recently, Pennsylvania reported rain in the Allegheny National Forest with a pH of 2.32 and West Virginia recorded the lowest known pH for rain, 1.5—a level more acidic than lemon juice.

There is compelling evidence that the acidity of rainfall is increased by emissions resulting from burning of coal and liquid petroleum products as fuel. Sulfur and nitrogen increase acidity, and

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11. Id.
12. The pH scale ranges from 0 to 14. A pH value of 1 is very acidic (e.g., battery acid); a pH value of 13 is very alkaline (e.g., lye). ENVIRONMENTAL PROTECTION AGENCY, supra note 3, at 3, reprinted in Hearings on Acid Rain, supra note 3, at 209. To chemists, pH is a measure of the concentration of hydrogen ions. The lower the pH value, the more hydrogen ions in solution and the stronger the acid. Id. The pH scale is logarithmic; a drop or rise of one in pH value corresponds to a tenfold increase or decrease in acidity. Id.
13. Id.
14. Id. Correspondingly, precipitation is considered to be acidic if it is below pH 5.7—the normal equilibrium value of carbon dioxide in water. Galloway, Likens & Edgerton, Acid Precipitation in the Northeastern United States: pH and Acidity, 194 SCIENCE 722 (1976).
15. The change in acidity generally recognized after 1950 is believed to be due both to increased combustion of fossil fuels and to the use of tall stacks that disperse acid chemical compounds higher into the atmosphere instead of allowing them to settle near the combustion location. Likens & Bormann, supra note 2, at 1177. See also Westone, supra note 2, at 50,001-02; H.R. REP. NO. 294, 95th Cong., 1st Sess. (1977), reprinted in [1977] U.S. CODE CONG. & AD. NEWS 1159-61. Several studies report a decrease in the total amount of acid chemical compounds in the atmosphere between the 1930's and the 1950's. See, e.g., Likens & Bormann, supra note 2, at 1177.
16. Likens & Bormann, supra note 2, at 1176.
19. See sources cited in note 7 supra. See also Likens, Wright, Galloway & Butler, Acid Rain, 241 SCI. AM. 43 (1979). The Congressional Research Service has acknowledged this cause-effect relationship. See ENVIRONMENTAL AND NATURAL RESOURCES POLICY DIVISION, CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS, REPORT ON ENVIRONMENTAL CHALLENGES OF THE PRESIDENT'S ENERGY PLAN: IMPLICATIONS FOR RESEARCH AND DEVELOPMENT, 95TH CONG., 1ST SESS. 21 (Comm. Print 1977) [hereinafter cited as Committee Print] ("The association between fossil fuel burning and sulfate concentrations and acid rain is apparent.").
20. See text accompanying note 10 supra.
both sulfur and nitrogen compounds are released into the atmosphere whenever coal and petroleum products are burned.\textsuperscript{21} While compounds that lead to the formation of acid rain are emitted by natural processes as well as by industry,\textsuperscript{22} studies indicate that the proportion of such compounds contributed by man has increased steadily in recent years.\textsuperscript{23} Sulfur emissions attributable to industry are now thought to be greater than those resulting from natural processes.\textsuperscript{24} Since the increased acidity of rain\textsuperscript{25} coincides with an increase in fossil fuel consumption,\textsuperscript{26} it is likely that the increased emissions from burning those fuels are responsible, at least in part, for the increase in acidity.

It is also becoming clear that acid rain causes several forms of environmental damage.\textsuperscript{27} Acid rain is thought to lower the pH of water bodies it enters as precipitation or runoff,\textsuperscript{28} and increased acidity in lakes is linked to the death of fish such as salmon and trout.\textsuperscript{29} Over 100 lakes in the Adirondack Mountains of New York have been so acidified in recent decades that they no longer bear any fish.\textsuperscript{30} Evidence also suggests that acid rain may damage terrestrial vegetation, thereby affecting forest and agricultural productivity.\textsuperscript{31} Foliage may be damaged,\textsuperscript{32} seed germination affected,\textsuperscript{33} and important nutrients leached from the soil by acid compounds.\textsuperscript{34}

Acid rain may also have deleterious effects on human health and property. Acid rain may mobilize heavy metals contained in soil and in water pipes, causing these toxic elements to enter the food chain and

\textsuperscript{21} Wetstone, supra note 2, at 50,001.
\textsuperscript{22} See note 5 supra. Two important causes of natural acidity are carbon dioxide in the air and minerals released by sea spray. Wetstone, supra note 2, at 50,001 n.1.
\textsuperscript{24} The latest estimate is that two-thirds of all sulfur emissions are due to industrial processes. \textit{Id}. This fact is especially significant, because sulfur emissions account for an estimated 65% of acid precipitation, with another 30% attributable to nitrogen oxides and the remaining 5% primarily to hydrochloric acid. Research and Development Related to Sulphates in the Atmosphere: Hearings Before the Subcomm. on the Environment and the Atmosphere of the House Comm. on Science and Technology, 94th Cong., 1st Sess. 10 (1975). The most significant sources of sulfur emissions are coal- and oil-fired electric powerplants, and smelters. Wetstone, supra note 2, at 50,001.
\textsuperscript{25} See note 15 supra and accompanying text.
\textsuperscript{27} See Environmental Protection Agency, supra note 3, at 1, reprinted in Hearings on Acid Rain, supra note 3, at 207; Wetstone, supra note 2, at 50,001-02.
\textsuperscript{28} Office of Technological Assessment, supra note 26, at 223.
\textsuperscript{29} \textit{Id}. Fish eggs are very susceptible to increases in acidity. Frogs and tadpoles are also killed by high acidity. \textit{Canada Today}, Feb., 1981, at 5-6.
\textsuperscript{30} Wetstone, supra note 2, at 50,002.
\textsuperscript{31} \textit{Id}.
\textsuperscript{32} Office of Technology Assessment, supra note 26, at 224.
\textsuperscript{33} \textit{Id}.
\textsuperscript{34} Wetstone, supra note 2, at 50,002.
Finally, acid rain may damage the paint on automobiles and buildings and corrode cement and marble structures such as monuments and statues.

Scientific evidence will not always conclusively support plaintiffs' claims of damages allegedly caused by acid rain. The burden of proof in a tort action does not require a conclusive demonstration that the plaintiff's injury was caused by the defendant's conduct, and the available evidence may be sufficient to link plaintiffs' injuries to acid rain under applicable standards. In addition to this causation issue, however, several other factors may determine an acid rain plaintiff's success: access to courts, amenability of defendants to suit, and allocation of burdens of proof may be significant. These and other factors are considered in the sections that follow.

II

ACID RAIN LITIGATION AND THE PROBLEMS ASSOCIATED WITH INVOKING PERSONAL JURISDICTION

A. Nature of the Problem

Because emissions that allegedly result in acid rain may be produced in one state but cause damage in another, acid rain litigation may often involve transboundary disputes. Before considering whether liability may be imposed for acid rain damage, one must determine where the action may be litigated. The plaintiff's ability to channel litigation into the most favorable jurisdiction can be of utmost tactical significance.

Several factors influence the choice of forum. First, substantive law may vary from state to state; plaintiffs will naturally seek to litigate in a state with relaxed requirements for proving causation. Second, parties may seek to litigate where local interests will reflect favorably on their positions. For example, jurors from an area that is economic-
cally dependent on industry may be less sympathetic to a plaintiff alleging an acid rain injury than jurors from a lakeside community that derives its income from tourism. Third, considerations of cost, convenience, and the accessibility of witnesses may be significant, often compelling a plaintiff to bring suit in the state of injury, which usually will be the plaintiff's state of residence. Finally, and perhaps most importantly, a plaintiff will often want to join defendants located in different states. Unless jurisdiction can be asserted in the plaintiff's state, multiple lawsuits in separate states will be necessary. Not only would piecemeal litigation be inconvenient and costly, it could also foreclose recovery under one developing theory of liability. Unless the substantive law is clearly more favorable in a defendant's state, balancing the above considerations will generally lead plaintiffs to seek relief in their home states. It thus becomes important to examine the means of asserting long arm jurisdiction over out-of-state defendants.

B. Jurisdictional Requirements

In both federal and state courts, the extent to which jurisdiction may be asserted over a nonresident is controlled by state law within the limits of the Federal Constitution. Jurisdiction thus depends on two factors. First, the long arm statute of the forum state must provide for the exercise of jurisdiction in the particular case. Second, the exercise of statutory authority must come within the limits on transboundary jurisdiction.
jurisdiction imposed by the due process clause.45

I. Long Arm Statutes

State long arm statutes are basically of two varieties. A few states have statutes providing that the state will exercise jurisdiction over nonresidents to the extent the Federal Constitution allows.46 Under these statutes, statutory analysis and due process analysis are identical. Most state statutes, however, delineate certain circumstances under which the state courts will exercise jurisdiction.47 Although these circumstances vary,48 the one most likely to prove relevant in acid rain litigation is that subjecting nonresidents to jurisdiction if their conduct outside the forum state caused foreseeable actionable consequences within the state.49

Several caveats should be kept in mind when reviewing such a statutory provision. First, states often limit this foreseeable-effects category to certain types of defendants, such as corporations.50 Jurisdiction over each defendant must of course be available under the provision of

47. R. Weintraub, COMMENTARY ON THE CONFLICT OF LAWS 149 (2d ed. 1980).
48. Long arm statutes of this variety generally follow the contours of RESTATEMENT (SECOND) OF CONFLICT OF LAW, § 27 (1971), which states:
(1) A state has power to exercise judicial jurisdiction over an individual on one or more of the following bases:
(a) presence
(b) domicile
(c) residence
(d) nationality or citizenship
(e) consent
(f) appearance in an action
(g) doing business in the state
(h) an act done in the state
(i) causing an effect in the state by an act done elsewhere
(j) ownership, use or possession of a thing in the state
(k) other relationships to the state which make the exercise of judicial jurisdiction reasonable
49. The foreseeability issue is discussed at notes 70-95 infra and accompanying text.
50. Connecticut, for example, has one long arm statute that applies exclusively to out-of-state corporations and another statute that includes within its coverage nonresident individuals and foreign partnerships. Corporations are subject to the state's long arm jurisdiction for "tortious conduct in this state" under CONN. GEN. STAT. ANN. § 33-411(c)(4) (West Supp. 1981). Nonresident individuals and foreign partnerships, by contrast, are covered by CONN. GEN. STAT. ANN. § 52-59(b)(3) (West Supp. 1981), which provides for jurisdiction, under certain conditions, over those who commit tortious acts outside the state causing injuries to person or property in Connecticut. See note 98 infra. A survey of various types of long arm statutes is contained in Sutton, Today's Long-Arm and Products Liability: A Plea
the long arm statute applicable to that defendant. Second, state long
arm statutes are often phrased in narrow terms that are broadly con-
strued.\footnote{51} Although the language of some foreseeable-effects provisions
suggests that the touchstone for jurisdiction is conduct within the
state,\footnote{52} courts have interpreted such statutes to allow the exercise of
jurisdiction where the effects of the defendant's out-of-state conduct are
realized within the state.\footnote{53} On the other hand, since a state is not obli-
gated to go as far as the Constitution allows in asserting long arm juris-
diction,\footnote{54} courts have, on occasion, read jurisdictional grants
narrowly.\footnote{55}


\footnote{51} R. Weintraub, \textit{supra} note 47, at 152.

\footnote{52} See, \textit{e.g.}, \textit{ILL. ANN. STAT.} ch. 110, § 17(1) (Smith-Hurd Supp. 1981), which provides
in pertinent part: "Any person . . . who . . . does any of the acts hereinafter enumer-
at, thereby submits such person . . . to the jurisdiction of the courts of this State . . . (b)
The commission of a tortious act within this State . . . ." \textit{See also COLO. REV. STAT.} § 13-
1-124(b) (1973).

761, 762-63 (1961) (to be tortious an act must cause injury; consequently the place of injury
satisfies the statutory "commission of a tortious act within this state" test). \textit{But see}
Longines-Wittnauer Co. v. Barnes Reinecke, Inc., 15 N.Y.2d 443, 458-64, 209 N.E.2d 68, 76-

\footnote{54} \textit{See, e.g.}, Marvel Prods., Inc. v. Fantastics, Inc., 296 F. Supp. 783, 785 (D. Conn

\footnote{55} For example, in Byram River v. Village of Port Chester, 7 ERC 1127, 1129 (D. Conn.
1974), the court interpreted the state's long arm statute, \textit{CONN. GEN. STAT. ANN.}
§ 52-59(b)(3), see note 50 \textit{supra}, to allow jurisdiction over the out-of-state defendant accused
of polluting the river marking Connecticut's boundary with New York but not over the out-
of-state defendants (state and interstate agencies) accused of merely tolerating the pollution.
The justification for this distinction may be disputed; one might question why a legislature
would ever intend that a jurisdictional statute be interpreted narrowly to deny a resident a
convenient forum to litigate claims against a nonresident. \textit{See Fischer, State Interests, Mini-
mum Contacts, and In Personam Jurisdiction Under Code of Civil Procedure Section 410.10,
from its interpretation of legislative intent, stating that

the emphasis in these statutes on the place of the alleged tortious conduct . . . and
on the alleged tortfeasors [sic] other business relationships in the state, indicate the
legislature's intention that the statutes provide jurisdiction only over potential def-
fendants whose role in causing a tort is primary and active . . . [the statute] was
not intended to reach parties whose conduct is a secondary or indirect cause of the
tort alleged. This is why the legislature required that the tortious act occur within
the state . . . or that the tortfeasor regularly do business, or anticipate the conse-
quences of his action and derive substantial revenue . . .

7 ERC at 1128-29. One might question the court's distillation of the "primary and active"
requirement out of § 52-59b. None of the statutory criteria mentioned by the court are logi-
cally tied to this concept of directness; rather the criteria are closely related to the concept of
foreseeability. One of the criteria—anticipation of the consequences of one's conduct—
clearly is predicated upon foreseeability. The other two appear designed to exclude isolated
events from the statute's coverage, by focusing on whether a potential defendant derives
income or revenues from transboundary transactions.
Under the long arm statutes of most states, however, satisfaction of statutory requirements should not pose a problem. The statutes are either liberally written or have been liberally construed to allow jurisdiction over nonresidents.\textsuperscript{56}

2. Due Process

The basic due process principle limiting the exercise of transboundary jurisdiction was stated in \textit{International Shoe Co. v. Washington:}\textsuperscript{57}

[D]ue process requires only that in order to subject a defendant to a judgment in personam, if he be not present within the territory of the forum, he have certain minimum contacts with it such that the maintenance of the suit does not offend "traditional notions of fair play and substantial justice."\textsuperscript{58}

The meaning of this statement has proved enigmatic.\textsuperscript{59} The Court did not attempt in \textit{International Shoe} to describe the relationship between undefined "minimum contacts" and "fair play and substantial justice" or to state the relative importance of each.\textsuperscript{60} In three recent cases,\textsuperscript{61} however, the Supreme Court has attempted to clarify the due process constraints on the exercise of transboundary jurisdiction. The Court's reformulation takes three approaches. First, forum contacts were accorded primacy in determining whether transboundary jurisdiction comports with due process.\textsuperscript{62} Second, transboundary jurisdiction based on foreseeable consequences was restricted.\textsuperscript{63} Third, renewed emphasis was placed on the theretofore largely ignored purposeful availment.

\textsuperscript{56} See notes 46 & 53 supra. Cases such as Byram River v. Village of Port Chester, 7 ERC 1127 (D. Conn. 1974), see note 55 supra, go against the grain and may reflect unstated judicial concern with other issues such as interstate relations or subject matter jurisdiction. In \textit{Byram River}, for example, two of the defendants had raised eleventh amendment objections to the exercise of federal jurisdiction. \textit{Byram River v. Village of Port Chester, 7 ERC} at 1128. Furthermore, the court may have been motivated partly by a concern that the defendants were protected by sovereign immunity. The case arose prior to \textit{Nevada v. Hall}, 440 U.S. 410 (1979), in which the Supreme Court held that California was not obligated to recognize Nevada's sovereign immunity in connection with torts committed by Nevada in California. The court in \textit{Byram River} avoided these difficult issues by its dismissal and its transfer, as to the remaining defendant, to the Southern District of New York. \textit{Byram River v. Village of Port Chester, 7 ERC} at 1131.

\textsuperscript{57} 326 U.S. 310 (1945).

\textsuperscript{58} \textit{Id.} at 316 (1945).


\textsuperscript{60} \textit{See} Fischer, \textit{supra} note 55, at 389.


\textsuperscript{62} \textit{See} Kulko v. California Superior Court, 436 U.S. at 92; \textit{Shaffer v. Heitner}, 433 U.S. at 209.

\textsuperscript{63} \textit{See} World-Wide Volkswagen Corp. v. Woodson, 444 U.S. at 295-97; Kulko v. California Superior Court, 436 U.S. at 97-98.
Most jurisdictional problems arise where suit is brought in the plaintiff's state of residence against defendants located outside the state. Since a foreseeable effects statute will likely serve as the basis for jurisdiction in this situation, the problem is whether the foreseeable effects test, as applied in an acid rain lawsuit, satisfies the Supreme Court's new due process rulings. The version of the foreseeable effects test applied by the Court in *Kulko v. California Superior Court* includes an express exception to jurisdiction where "the nature of the effects and of the individual's relationship to the state make the exercise of jurisdiction unreasonable." *Kulko* thus raises two questions concerning its application in acid rain litigation: first, is the relationship between the acid rain producing defendant and the forum state of sufficient type and scope to make the exercise of jurisdiction reasonable, and second, does the type of injury alleged by the plaintiff in such a suit constitute a jurisdictional effect sufficient to satisfy due process?

The Supreme Court has described "the relationship among the defendant, the forum, and the litigation" as "the central concern of the inquiry into personal jurisdiction." The relationship between a defendant corporation and the forum must be such that it is "reasonable to require the corporation to defend the particular suit which is brought there." The test has often been phrased in terms of foreseeability. As stated by the Supreme Court, "[t]he forum State does not exceed its powers under the Due Process Clause if it asserts personal jurisdiction

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64. World-Wide Volkswagen Corp. v. Woodson, 444 U.S. at 297-98.
65. Should a plaintiff choose to bring suit in the defendant's state of residence, long arm jurisdiction is, of course, not necessary. The assertion of personal jurisdiction over a resident defendant does not raise due process concerns. It is unlikely that a plaintiff would have any basis for asserting jurisdiction in a third state in which neither plaintiff nor defendant resided. Even if the defendant conducted business in that state, such activity would probably not be sufficiently related to the cause of action to satisfy minimum due process requirements. See text accompanying notes 70-72 infra.
66. Since defendants' activities occur outside the state of injury, the only probable basis for asserting jurisdiction over them as nonresidents arises by reason of the in-state effects of their out-of-state conduct.
67. In *Kulko v. California Superior Court*, 436 U.S. 84, 96 (1978), the Court applied the foreseeable effects test set forth in the American Law Institute's Restatement of Conflict of Laws which recognizes the power of states "to exercise judicial jurisdiction over an individual who causes effects in the state by an act done elsewhere with respect to any cause of action arising from those effects." *Restatement (Second) of Conflict of Laws* § 37 (1971).
68. *Id*.
69. These questions are merely another way of stating the minimum-contacts test, established in *International Shoe*, which is quoted at text accompanying note 58 *supra*. For the purposes of this analysis, however, it will be useful to consider as separate, though closely related, the issues of the defendant's relationship to the forum state and of the nature of the plaintiff's injury.
over a corporation that delivers its products into the stream of commerce with the expectation that they will be purchased by consumers in the forum State.\textsuperscript{72}

This standard, developed in the context of products liability, could arguably be satisfied by a demonstration that the inherent mobility of an allegedly defective product made it foreseeable that the product would reach the forum state and there create a risk of injury. But the Supreme Court, in \textit{World-Wide Volkswagen Corp. v. Woodson},\textsuperscript{73} required greater evidence. In \textit{World-Wide Volkswagen}, plaintiff attempted to hold a New York retailer and regional distributor of automobiles answerable in Oklahoma for an accident that occurred in Oklahoma.\textsuperscript{74} The car involved in the accident had been handled and sold by the defendants in New York.\textsuperscript{75} The plaintiffs argued that the inherent mobility of automobiles made it foreseeable that a claim involving the automobile could arise in Oklahoma, and that it was therefore reasonable to require defendants to defend the suit there.\textsuperscript{76} The Court rejected that argument as a basis for jurisdiction, explaining that the foreseeability that is critical to due process analysis is not the mere likelihood that a product will find its way into the forum State. Rather, it is that the defendant's conduct and connection with the forum State are such that he should reasonably anticipate being haled into court there. . . . The Due Process Clause, by ensuring the "orderly administration of the laws," . . . gives a degree of predictability to the legal system that allows potential defendants to structure their primary conduct with some minimum assurance as to where that conduct will and will not render them liable to suit.\textsuperscript{77}

This decision is relevant to acid rain litigation. Plaintiffs involved in such litigation might argue for a foreseeability test that allowed for jurisdiction based on the inherent mobility of air masses; once a pollutant was injected into the atmosphere, it would be held foreseeable that harmful effects could occur anywhere downwind. It seems clear that this approach is foreclosed by \textit{World-Wide Volkswagen}.

In explaining the foreseeability requirement, the Court in \textit{World-Wide Volkswagen} quoted the purposeful availment test established in the 1958 case of \textit{Hanson v. Denckla}.\textsuperscript{78} That test requires that the exercise of jurisdiction over a nonresident be preceded by "some act by which the defendant purposefully avails itself of the privilege of conducting activities within the forum State, thus invoking the benefits and

\textsuperscript{72} World-Wide Volkswagen Corp. v. Woodson, 444 U.S. 286, 297-98 (1980).
\textsuperscript{73} Id.
\textsuperscript{74} Id. at 288.
\textsuperscript{75} Id.
\textsuperscript{76} Id. at 295.
\textsuperscript{77} Id. at 297. [citations omitted].
\textsuperscript{78} Id. at 297, quoting Hanson v. Denckla, 357 U.S. 235 (1958).
protections of its laws."  

The purposeful availment test is designed to give "predictability to the legal system." By requiring that the defendant have taken purposeful action in or with respect to the forum state, the standard assures that defendants will be brought into court only in those states where they could reasonably anticipate that their actions might give rise to a cause of action.

The purposeful availment test is unfortunately framed in terms most readily adaptable to interstate commercial transactions and products liability. It may prove difficult to demonstrate that an acid rain defendant whose facilities emit pollutants into the atmosphere is purposefully availing itself of the benefits and protections of the laws of the states where the pollutants are precipitated. The operator of the facilities may not have conducted business in the forum state, or in-state business that it has conducted may be insufficiently related to the acid rain injury to demonstrate purposeful availment.

It is unclear, however, whether satisfaction of the purposeful availment test would be required in the context of an acid rain lawsuit. The Supreme Court has not always treated the test as an absolute requirement of due process, and there is a fundamental difference be-

80. World-Wide Volkswagen Corp. v. Woodson, 444 U.S. at 297.
81. Id.
82. See text accompanying note 70 supra. The Court's emphasis in recent jurisdictional decisions on the relationship between the defendant, the forum, and the litigation, see notes 70-71 supra and accompanying text, may preclude approaches such as that used in Buckeye Boiler Co. v. Superior Court, 71 Cal. 2d 893, 458 P.2d 57, 80 Cal. Rptr. 113 (1969), where economic activity unrelated to the matter before the court was relied upon to satisfy the purposeful availment test.
83. See Phillips v. Anchor Hocking Glass Corp., 100 Ariz. 251, 256, 413 P.2d 732, 735 (1966). At least one court, however, has held the purposeful availment test applicable to all cases. See Colorado River Water Conservation Dist. v. Andrus, 476 F. Supp. 966 (D. Colo. 1979) (denying jurisdiction where the out-of-state release of fish into interstate streams had caused in-state destruction of endangered fish).
84. Since its formal inception in Hanson v. Denckla in 1958, the test has been applied twice by the Court, in Kulko v. California Superior Court, 436 U.S. 84, 94 (1978), and in World-Wide Volkswagen Corp. v. Woodson, 444 U.S. 286, 297-98 (1980). The Court's discussion of the test in the most recent of these cases, World-Wide Volkswagen, appears to leave open the question of whether due process might be satisfied without meeting the purposeful availment test. In applying the test to the facts of the case, the Court stated that there was "no such or similar basis for Oklahoma jurisdiction." Id. at 298 (emphasis added). Recently, in City of Milwaukee v. Illinois, 49 U.S.L.W. 4445 (1981) (Milwaukee II), a case involving pollution of interstate waterways, the Supreme Court approved an exercise of personal jurisdiction over out-of-state polluters. Id. at 4447 n.5. The case is especially significant in that the court below had eschewed any reliance on the purposeful availment test, relying instead on a pure reasonableness criterion. Illinois v. City of Milwaukee, 599 F.2d 151, 156 (7th Cir. 1979). The Supreme Court did not expressly approve this rationale in upholding jurisdiction, stating merely that "given the existence of a federal common law claim at the commencement of the suit... personal jurisdiction was properly exercised." 49 U.S.L.W. at 4447 n.5. Nonetheless, the Court's approval of the exercise of jurisdiction in Milwaukee II should aid plaintiffs in their attempts to assert jurisdiction over out-of-state
tween the cases in which the Supreme Court has applied the purposeful availment test and the situation present in an acid rain lawsuit. In each of the former cases, the Court denied jurisdiction because, in its words, "the unilateral activity of those who claim some relationship with a nonresident defendant cannot satisfy the requirement of contact with the forum state."\textsuperscript{86} Kulko v. California Superior Court,\textsuperscript{87} for example, involved a marital dispute. The plaintiff had moved to California after the couple's separation, and she sought to assert jurisdiction there over her husband who had remained in New York.\textsuperscript{88} The Court denied the plaintiff jurisdiction in California, reasoning that "[i]t is [the defendant] who has remained in the State of the marital domicile, whereas it is [the plaintiff] who has moved across the continent."\textsuperscript{89} In the case of acid rain, by contrast, it is the defendant that reaches across state lines with its emissions; the occurrence of the injury in the forum state does not depend on any boundary-crossing activity by the plaintiff. Since it is the defendant rather than the plaintiff who has engaged in unilateral activity leading to the contact with the forum, the primary justification for the purposeful availment test is absent in the context of acid rain.

Even if courts were to apply the purposeful availment test in acid rain litigation, there are several ways the test might be satisfied. First, the test does not require willful action; it is sufficient that the nonresident have actual or constructive knowledge of the in-forum effects of its conduct.\textsuperscript{90} Once the causal link between out-of-state conduct and in-state effects was established, the nonresident could reasonably anticipate that continued activities would give rise to a cause of action in the forum state. Since it is precisely this foreseeability of being sued in the forum state that serves as the rationale for the purposeful availment test, an acid rain plaintiff could argue that the test is satisfied where the defendant continues to emit pollutants with knowledge of their effects. In such a case, there would be little reason to shield the nonresident from the state's jurisdiction.\textsuperscript{92}

\textsuperscript{86} Hanson v. Denckla, 357 U.S. at 253.
\textsuperscript{87} 436 U.S. 84 (1978).
\textsuperscript{88} Id. at 87-88.
\textsuperscript{89} Id. at 97.
\textsuperscript{90} See text accompanying note 77 supra.
\textsuperscript{91} See text accompanying notes 78-80 supra.
\textsuperscript{92} Cf. W. PROSSER, LAW OF TORTS 576 (4th ed. 1971) (noting that "[a defendant's] persistence, over the plaintiff's protest, in continuing conduct which may have been merely
Another theory that might satisfy the purposeful availment test rests on the growing recognition by courts, legislative bodies, and commentators that air and water are limited, allocable commodities. Under this point of view, those who use the air or water as a receptacle for certain substances have as surely availed themselves of the benefits and protections of the law of the place where the air and water are located or transported as does someone who manufactures goods to be sold in another state. Both the manufacturer and the operator of a polluting facility are deriving benefit from conduct that may impose costs on those in the forum state. Drawing this analogue between the use of previously free resources and normal commercial transactions requires the shedding of long held attitudes concerning the environment. In formulating substantive law, however, these attitudes are being replaced by a view that treats air and water as precious, yet bankable, commodities. It is logical to extend this new view to the law of procedure.

Where the defendant's product is marketed in the state of injury, there is a more direct route to fulfillment of the purposeful availment test. Suppose, for example, that a potential defendant operates a coal-fired power plant in state A that is alleged to have contributed to plaintiff's acid rain injury in state B. If defendant markets electricity, whether from this plant or another, in state B, a court in state B may assert jurisdiction over defendant regardless of where the injury arises or whether the defendant's activities in state B were directly related to the injury.

The question remains whether the exercise of long arm jurisdiction is reasonable given the nature of acid rain injuries. In evaluating the reasonableness of exercising long arm jurisdiction, courts and legislatures have at times focused on the nature of the harm suffered, distinguishing between physical injury to persons and property or economic loss. In *Kulko v. California Superior Court*, the Supreme Court held California's exercise of personal jurisdiction unconstitutional partly because there was "no claim that appellant has visited physical injury on either property or persons within the state of California." Similarly, some state long arm statutes limit jurisdiction to cases of physical negligent or abnormal in its inception, is sufficient to establish its character as an intentional wrong.

95. Since the product produced (electricity) is directly connected with the risk of harm created (emission of acid rain precursors), there should be no difficulty in establishing the necessary nexus between the defendant, the forum, and the litigation. See text accompanying notes 70-71 supra.
96. 436 U.S. 84 (1978).
97. Id. at 96-97. Note that the absence of physical injury was only one of several con-
injury.\textsuperscript{98} Although acid rain may cause physical injury both to humans\textsuperscript{99} and the environment,\textsuperscript{100} acid rain plaintiffs may have difficulty proving that they have incurred personal injury or injury to their property\textsuperscript{101} and may lack standing to sue for damage to the environment.\textsuperscript{102} As a result, most plaintiffs in acid rain suits will probably assert claims for economic injury. For example, where a lake has been acidified and its fish destroyed, a plaintiff will seek to recover the business losses suffered due to a decline in tourism\textsuperscript{103} or fishing revenues, rather than claiming direct compensation for the environmental harm.

Distinguishing, for purposes of determining whether jurisdiction exists, between physical and economic claims rarely promotes a more just outcome. The primary consideration in evaluating the propriety of long arm jurisdiction is the relationship between the defendant, the liti-

\footnotesize{\textsuperscript{98} See, e.g., N.Y. CIV. PRAC. § 302(a)(3)(ii) (McKinney’s 1972). This statute and other state long arm statutes of its kind provide for jurisdiction over nonresident defendants who commit “a tortious act without the state causing injury to person or property within the state” (emphasis added). Id. The Second Circuit has stated, as the terms of the statute imply, that the statute was directed primarily at physical rather than commercial injuries. American Eutectic Welding Alloys Sales Co. v. Dytron Alloys Corp., 439 F.2d 428, 432 (2d Cir. 1971). See also CONN. GEN. STAT. ANN. § 52-59b (West 1960 & Supp. 1981).

\textsuperscript{99} See text accompanying note 35 \textit{supra}. See also \textit{Hearings on Acid Rain, supra} note 3, at 213.

\textsuperscript{100} See text accompanying notes 27-36 \textit{supra}.

\textsuperscript{101} See text accompanying note 37 \textit{supra}.

\textsuperscript{102} In order to establish standing litigants must show (1) that they have sustained injury and (2) that a causal link exists between that injury and the conduct complained of. Duke Power Co. v. Carolina Environmental Study Group, Inc., 438 U.S. 59, 72 (1978). Damage to the environment can satisfy the first part of the test, but the litigant must further demonstrate that the injury is personal and not merely a generalized grievance that wrongful conduct has occurred. See Sierra Club v. Morton, 405 U.S. 727, 734-40 (1972); Metcalf v. National Petroleum Council, 553 F.2d 176, 187 (D.C. Cir. 1977). This aspect of the standing requirement is similar to the public nuisance-private nuisance distinction. See notes 340-346 \textit{infra} and accompanying text. With respect to the second requirement, the Court has evidenced a willingness to allow quite amorphous allegations of causation to suffice. See, e.g., United States v. Students Challenging Regulatory Agency Procedure (SCRAP), 412 U.S. 669 (1973). In \textit{SCRAP} the alleged injury arose out of a refusal by the ICC to suspend the effectiveness of a temporary surcharge on rail freight rates. \textit{Id.} at 675-76. Plaintiffs claimed that the action would increase the cost of recycled goods, induce use of natural resources, and thereby adversely affect the environment. \textit{Id.} at 676. The Court stated that the injury was pleaded with sufficient specificity and that any claim that the line of causation was attenuated was best left for consideration on a motion for summary judgment. \textit{Id.} at 688-90. But cf. Duke Power Co. v. Carolina Environmental Study Group, 438 U.S. 59, 75 n.20 (1978) (suggesting that the test for standing is whether there is a substantial likelihood that the relief requested will redress the injury claimed).

\textsuperscript{103} This type of claim has been the most common one in weather modification litigation, which has striking similarities to acid rain litigation. See Davis, \textit{Weather Modification, Stream Flow Augmentation, and the Law}, 24 ROCKY MTN. MIN. L. INST. 833, 851-56 (1978).}
gation, and the forum, and the relationship between a nonresident polluter of a lake and the forum is the same whether the claimed consequence is physical or economic. It seems unlikely that a court would rely on the property damage-economic loss distinction and deny jurisdiction only because of the economic nature of the claim. Indeed, in cases where economic injury alone has been found an insufficient jurisdictional "effect" to sustain long arm jurisdiction, the relation between the nonresident and the forum was more tenuous than in the acid rain context.

The narrow situations in which economic effects alone will not suffice for jurisdictional purposes are illustrated by the Second Circuit case of American Eutectic Welding Alloys Sales Co. v. Dytron Alloys Corp. The plaintiff, a New York-based company, alleged that the defendant, a Michigan-based competitor, had engaged in unfair methods of competition to steal plaintiff's customers in Kentucky and Pennsylvania. None of defendant's actions were committed in New York. The court found that, for the purposes of New York's long arm statute, jurisdictional injury required something more than the incidental effect on a resident's profits occasioned by out-of-state conduct. The court expressly declined to address the issue of whether it was foreseeable that defendant's out-of-state conduct would give rise to consequences in the forum state. It is noteworthy that the court focused on the plaintiff's domicile as the sole forum connection with the out-of-state conduct and the situs of the resultant injury and that the damage-causing activity and injury to plaintiff were found to have occurred outside the forum in a state where the plaintiff had initiated substantial contacts. Indeed, where a direct link between out-of-state conduct and in-state injury has been demonstrated without recourse to mere domicile, courts have proceeded to assert jurisdiction without asking whether the injury was physical or economic.
Whether a court will exercise jurisdiction in cases of economic injury should turn only on whether the damage-causing event and injury occurred in the forum state. One significant factor that distinguishes cases where the damage-causing events occur in the forum from those in which injury occurs outside the forum is the likelihood that the nonresident could have foreseen in-forum effects. The property damage-economic loss dichotomy is an imprecise way of expressing in legal terms the intuitive conclusion that, due to the potential pervasiveness of economic loss and its capability for great mobility, greater caution is warranted before a defendant is called on to answer for economic consequences outside of its own state.

In acid rain litigation the damage-causing event and injury occur in the plaintiff's state of residence or business. Focusing on this consideration, rather than on whether plaintiff's injury is physical or economic, would allow a court in plaintiff's state to find that jurisdiction over the nonresident defendant is justified. Acid rain litigation would be different from cases like American Eutectic, where plaintiffs seek to obtain jurisdiction solely on the basis of their domicile. With acid rain, although selection of the forum might be based on plaintiff's domicile, jurisdiction would be based on concrete occurrences within the forum that are direct consequences of defendant's out-of-state conduct.

C. Venue Requirements

Venue rules in acid rain litigation will depend on the legal theory on which a suit is based. A plaintiff attempting to bring suit under the Clean Air Act, for example, will find venue limited by that Act to the judicial district where the polluting facility is located. In other cases brought in federal court, venue will be governed by the general court venue statute. Under this statute, a plaintiff basing jurisdiction only on diversity of citizenship may lay venue "in the judicial district where
all plaintiffs or all defendants reside, or in which the claim arose.”

Diversity suits can thus be brought wherever jurisdiction may be asserted. Where federal jurisdiction is invoked to assert a federal common law claim, however, and thus is not based solely on diversity, the federal venue statute limits the suit to the district where all defendants reside or where the claim arose. Because of the likelihood that acid rain sources may be scattered over a broad geographic area and because of the causation problems associated with acid rain litigation, it is unlikely that all defendants in any one action will be found in one state. Venue therefore will typically be limited to the state where the claim arose. Most courts, however, have liberally interpreted the phrase “where the claim arose,” allowing plaintiffs to lay venue where a significant portion of the claim arose. Since most courts consider the occurrence of injury a significant portion of the claim, plaintiffs relying on this provision of the federal venue statute should be able to bring suit in the district where the injury has occurred—usually their own jurisdiction.

Another potential stumbling block for plaintiffs basing their claims on federal common law or on state-created causes of action is the local action rule. The local action rule mandates that actions affecting real property, such as trespass *q.c.f.* and nuisance, be brought in the judicial district where the real property is situated. Although the local action rule has been criticized as antiquated, it remains in force in a major-

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(a) A civil action wherein jurisdiction is founded only on diversity of citizenship may, except as otherwise provided by law, be brought only in the judicial district where all plaintiffs or all defendants reside, or in which the claim arose.

(b) A civil action wherein jurisdiction is not founded solely on diversity of citizenship may be brought only in the judicial district where all defendants reside, or in which the claim arose, except as otherwise provided by law.

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119. *Id* § 1391(a).
120. *Id* § 1391(b).
121. See notes 143-74 *infra* and accompanying text.
124. See generally *F. JAMES & G. HAZARD, CIVIL PROCEDURE* 606-07 (1977) for a discussion of state venue rules.
ity of American jurisdictions, including the federal courts. Where plaintiffs seek to recover for losses resulting from acid rain damage to soil fertility or to ecological stability of lakes, courts will probably see such lawsuits as involving injury to real property and apply the local action rule. Plaintiffs could attempt to focus attention on considerations other than property damage, such as lost profits due to a decline in tourism or destruction of wildlife habitat. Although the claimed damages would then be for economic injury, however, the source of the injury would still be damage to land, and the distinction would be tenuous.

The local action rule presents a possible bar to assertion of jurisdiction in acid rain lawsuits in two situations. Where a plaintiff wishes to bring suit for damages in the defendants’ home state, typically because the substantive law of that jurisdiction is more favorable than in the plaintiff’s state, the local action rule may prevent the exercise of jurisdiction by a court in the defendants’ state because the property injury complained of will have occurred in another state. Plaintiffs in such cases will therefore be forced to bring suit in their own jurisdiction.

A more serious problem confronts plaintiffs in cases where defendants cannot be brought under the jurisdiction of the plaintiff’s state because that state’s long arm statute does not permit it or because the

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129. Because of the difficulty of proving other sorts of damages, such claims of lost profits are the most likely type of claim to be asserted in acid rain litigation. See text accompanying notes 99-103 supra.


131. Commentators have pointed out that the local action bar makes sense, if at all, only as applied to actions affecting use or ownership of land located in another jurisdiction. Only in those cases does state sovereignty pose a potential obstacle, and it is in those cases too that the court of a different state is likely to be an inconvenient forum for litigation. See F. JAMES & G. HAZARD, supra note 125, at 656-57. RESTATEMENT (SECOND) OF CONFLICT OF LAWS § 87 (1971) makes such a distinction, allowing jurisdiction where the dispute involves injury to land located in another state, but not where the dispute is to determine title to such land.

It has also been suggested that the local action rule be abolished completely. See D. LOUISELL & G. HAZARD, supra note 44, at 340. Note, however, that if the action is commenced in federal court, the Erie Doctrine, established in Erie Railroad Co. v. Thompkins, 304 U.S. 64 (1938), may require that federal courts apply the local action rule if it is the law of the state in which they sit. Compare Still v. Rossville Crushed Stone Co., 370 F.2d 324, 325 (6th Cir. 1966) (local action rule is substantive for purposes of Erie) with Miller & Lux, Inc. v. Nickel, 149 F. Supp. 463, 467 (N.D. Cal. 1957) (state position on local action rule should be considered but is not determinative). See generally Note, Local Actions in the Federal Courts, 70 HARV. L. REV. 708 (1957).
exercise of long arm jurisdiction is found to be unconstitutional in the particular case. If courts in the defendant's state apply the local action rule, the plaintiff will be left without a forum. Although this problem has long been recognized,\(^{132}\) it has rarely been dealt with by the courts. One of the few modern decisions on point\(^{133}\) recognized the injustice of giving plaintiff a right without a remedy,\(^{134}\) and refused to apply the local action rule where its effect would be to leave the plaintiff without a forum.\(^{135}\)

Where a plaintiff joins a variety of claims with differing venue requirements, all such requirements must be satisfied as to each claim in order to establish venue for the entire claim.\(^{136}\) Because venue provisions are for the protection and convenience of the defendant, however, they generally may be waived by the defendant.\(^{137}\) One possible exception to the waiver rule is the local action rule,\(^{138}\) which some courts regard as a question of subject matter jurisdiction.\(^{139}\) Another possible exception is the special venue provisions under federal pollution control statutes such as the Clean Air Act.\(^{140}\) These provisions may pose a problem for acid rain plaintiffs by restricting litigation to the jurisdiction where the polluting facility is located.\(^{141}\) Whether such federal

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\(^{133}\) Reasor-Hill Corp. v. Harrison, 220 Ark. 521, 249 S.W.2d 994 (1952).


\(^{135}\) Reasor-Hill Corp. v. Harrison, 220 Ark. 521, 525-26, 249 S.W.2d 994, 996 (1952). The court in Reasor-Hill noted that the Arkansas Bill of Rights guaranteed every person "a certain remedy in the laws for all injuries he may receive in his person, property, or character." Id. The court reasoned that applying the local action rule would violate the state constitutional guarantee:

"Under the majority rule we should have to tell Barton that he would have been much better off had the petitioner stolen his cotton outright instead of merely damaging it. And the only reason we could give for this unfortunate situation would be that English juries in the thirteenth century were expected to have personal knowledge of the disputes presented to them. We prefer to afford this litigant his day in court."

Id. at 526, 249 S.W.2d at 996.

\(^{136}\) See Bowles v. Edwards Mfg. Co., 57 F. Supp. 887, 890 (S.D.N.Y. 1944). Where venue is not proper as to all the claims, the action will be dismissed or transferred, or the offending claims will be severed to preserve proper venue. One method of avoiding venue problems associated with multiple claims is through the expanding concept of pendant or ancillary jurisdiction. If the court finds the additional claim to be ancillary, venue may be predicated on the principal or main claim alone. See Note, Ancillary Process and Venue in the Federal Courts, 73 HARV. L. REV. 1164, 1166 (1960).

\(^{137}\) See HART & WECHSLER, supra note 126, at 1110. Waiver may be implied by defendants' failure to object to venue, as well as by other means. See id. at 1111.

\(^{138}\) See text accompanying notes 126-135 supra.

\(^{139}\) See, e.g., Ellenwood v. Marietta Chair Co., 158 U.S. 105, 108 (1895). The local action rule at other times has been characterized as a venue provision and has thus been deemed waivable. See, e.g., Wheatley v. Phillips, 228 F. Supp. 439, 442 (W.D.N.C. 1964).

\(^{140}\) See text accompanying note 117 supra.

\(^{141}\) In the majority of cases, plaintiffs will find it preferable to bring suit in their home state. See text accompanying notes 40-43 supra.
venue provisions govern forum selection for adjudicating all claims should turn on whether Congress intended the venue provisions to be waivable. Waivability indicates that Congress did not regard the venue provisions as themselves constituting substantive policies that outweigh convenience concerns and the standard rules regarding venue in complex litigation. Where venue provisions are expressly made not waivable, Congress's intent is clearly to give forum selection independent significance beyond the concerns of the parties.\textsuperscript{142}

III 
ESTABLISHING THE RIGHT TO JUDICIAL RELIEF

A. Identifying Parties Responsible for Acid Rain Damage

Perhaps the most difficult hurdle in establishing a private action for acid rain damage is linking acid rain to a specific source or sources. As noted in Part I of this Article, acid rain is the product of complex meteorological conditions that transform air pollutants into waterborne pollutants of a different chemical composition.\textsuperscript{143} In addition, the pollutants that contribute to the creation of acid rain are transported over long distances and combined with pollutants from other sources—a process controlled entirely by variable wind currents.\textsuperscript{144} Hence, establishing the causal link between individual sources of pollution and the resultant injury will test the ingenuity of both lawyer and scientist.

There are two approaches one might take in establishing the liability of a defendant polluter for acid rain damage. The first approach treats the question as simply a problem of proof that can be satisfied by the use of current methods of evidentiary analysis with advances in technology and modeling techniques. A second approach would sidestep evidentiary analysis by developing alternatives to traditional principles for the allocation of burdens of proof or by eliminating the

\textsuperscript{142} An example of such independent significance is found in the prevailing rule treating the local action rule as "jurisdictional," and hence nonwaivable, under the theory that the subject matter jurisdiction of a court may not be conferred by the parties. See note 139 supra and accompanying text.

\textsuperscript{143} See notes 10-14 supra and accompanying text. \textit{See also} Environmental Protection Agency, supra note 3, at 2, \textit{reprinted in} Hearings on Acid Rain, supra note 3, at 208.

\textsuperscript{144} \textit{See} Hearings on Acid Rain, supra note 3, at 141-42 (prepared statement of Dr. Ellis B. Cowling):

| Atmospheric processes can lead to extensive mixing which leads to both chemical and physical interactions and transformations of atmospheric particles, aerosols, and gases. Furthermore, these substances and their reaction products are dispersed by meteorological processes and finally enter the biosphere in fields of deposition that extend hundreds or even thousands of kilometers from the original sources of emission. The fallout of radioactive materials all over the northern hemisphere since the early 1950s as the result of atomic bomb tests provides a dramatic and continuing reminder of the long-distance transport and deposition of pollutants. |
requirement that plaintiff establish a direct casual relationship between individual sources of pollution and creation of acid rain.

1. Source Identification

The uncertainties surrounding the creation of acid rain present a substantial impediment to imposition of civil liability. Creation of acid rain is thought to result not from discrete, large-scale operations but from the aggregation of emissions from a number of sources. Also, while an overall increase in the atmospheric loading of acid chemical compounds has been detected over the past seventy years, individual occurrences of acid rain differ greatly. A particular area may experience rainfall that is increasingly more acidic than normal for a period of time and then return to a period of relatively stable acidity. The reasons for these variations are presently unknown.

Despite these difficulties, it is probably possible to demonstrate that individual sources contribute to loading of the atmosphere with acidic chemical compounds. That harm is caused by precipitation of these compounds onto land or water is also probably demonstrable. If an evidentiary link could be established between individual sources and injuries occurring distant from these sources, this connection might provide a causal relationship that would satisfy the substantial factor test. The question thus becomes, in part, whether currently available technology is adequate to identify sources that cause acid rain in a given location.

The following diagrams illustrate the problem of source identification. Figure 1 indicates the average acidity of rainfall in different parts

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145. The Environmental Protection Agency reports:

In 1977, sulfur oxides accounted for 14 percent (27.4 million metric tons) of the total air pollution in the United States, while nitrogen oxides accounted for 12 percent (23 million metric tons). Although other pollutants also act as precursors to acid rain, it is believed that these two oxides are the major contributors to the problem.

Sulfur oxides (SO₂) are primarily emitted from stationary sources such as utility and industrial boilers burning coal as a fuel. However, nitrogen oxides (NOₓ) are emitted from both stationary and transportation-related sources such as cars and trucks. Approximately 56 percent of the NOₓ discharged into the atmosphere in 1977 resulted from the combustion of fossil fuels by stationary sources, while 40 percent originated from transportation-related sources.

ENVIRONMENTAL PROTECTION AGENCY, supra note 3, at 2, reprinted in Hearings on Acid Rain, supra note 3, at 208.

146. Hearings on Acid Rain, supra note 3, at 169-71 (prepared statement of Dr. Ellis B. Cowling).

147. Id. at 113-16 (prepared statement of Svante Oden).

148. Nevertheless, it is increasingly argued that acid rain is man-made. Id. at 116; id. at 128-29 (prepared statement of Dr. Eville Gorham).

149. See note 7 supra and accompanying text.

150. See note 6 supra and accompanying text.

151. The substantial factor test is discussed at note 179 infra.
of the country. Figure 2 shows the distribution of coal combustion facilities within the United States.

Figure 1

![Map showing distribution of coal combustion facilities in the United States]


The high concentration of coal combustion facilities in the South and Midwest portions of the country, particularly the Ohio River Valley, is thought by many to be directly responsible for the high incidence of acid rainfall in Pennsylvania, New York, and the Northeastern United States.154 Although it seems intuitively obvious that each up-

153. PENNSYLVANIA DEP'T OF ENVIRONMENTAL RESOURCES, Position Paper on the Interstate Transport of Air Pollution, reprinted in Hearings on Acid Rain, supra note 3, at 61, 66. See also Committee Print, supra note 19, at 23-25.
154. PENNSYLVANIA DEP'T OF ENVIRONMENTAL RESOURCES, supra note 153, at 68, 85. EPA estimates that Ohio alone generated approximately 2.6 million tons of SO₂ emissions in
wind, geographically proximate power plant is to some extent responsible for creation of acid rain occurring in downwind locations, courts may require specific evidentiary proof of a cause and effect relationship between individual sources and injury. While great strides in sensing technology and modeling have been achieved in recent years,\textsuperscript{155} it remains questionable whether an accepted technology exists at the present time for establishing individual cause and effect relationships between air pollutant emissions and creation of acid rain.

Sensing technology and modeling have proved relatively effective where the number of variable factors is small. In \textit{State v. Inland Steel Co.},\textsuperscript{156} for example, the plaintiff successfully used remote sensing technology to establish a cause and effect relationship between the defendant's effluent discharges into Lake Michigan from an Indiana plant and the presence of pollutants near the Illinois shores of the lake. In order to prove that a significant volume of the defendant steel company's discharges had reached Illinois waters, the State of Illinois submitted remote sensing evidence of three types. Infrared photographs taken from airplanes showed effluents moving north toward the state line on a day when the wind was blowing in that direction.\textsuperscript{157} Water samples taken by boats simultaneously showed that the constituents of the photographed pollution plume matched discharges from the defendant's plant.\textsuperscript{158} Finally, a Skylab photograph taken on a different day, when the wind was blowing toward the south away from Illinois, demonstrated that an effluent plume from the plant could extend a distance longer than the distance from the plant to the Illinois border.\textsuperscript{159} These three pieces of evidence, although circumstantial, were held sufficient when taken together to establish the defendant's liability.\textsuperscript{160}

When the variables are more numerous—the number of pollution discharge points increases and there are numerous intervening stages leading to the creation of the undesirable end product—establishing cause and effect relationships becomes more difficult. For example, studies by the Environmental Protection Agency (EPA) have determined that individual smokestacks leave their mark on areas many

\textsuperscript{156} No. 72 CH 259 (Ill. Cir. Ct., Cook County, Jan. 27, 1976) (\textit{Mem.}). For a discussion of this case, see Latin, Tannehill & White, \textit{supra} note 155, at 1349-50.
\textsuperscript{157} \textit{Id.}, Record at 1884-98.
\textsuperscript{158} \textit{Id.} at 1870.
\textsuperscript{159} \textit{Id.} at 965-69.
\textsuperscript{160} \textit{Id.}, Memorandum Ruling at 12.
miles away, and the agency has devised models capable of predicting the impact of a stack on a hill twenty miles distant. Former EPA Administrator Douglas Costle has stated, however, that he is not optimistic about the prospect of developing models that are legally and scientifically adequate to trace the impacts of individual stacks on areas several hundred miles away. This difficulty is due to the large numbers of geographical and meteorological variables that would have to be included in such a model.

The problems confronting plaintiffs who attempt to use remote sensing data in acid rain litigation are comparable to those that have been faced by plaintiffs seeking to establish liability for weather modification. Weather modification involves artificially induced precipitation. Particles of a foreign substance, usually silver iodide, are released into clouds. These particles provide nuclei on which ice crystals form, resulting in increased cloud formation and precipitation. Like acid rain formation, cloud seeding involves many uncertainties and continually varying factors, and the result of a cloud seeding operation is thus not entirely predictable.

Largely because of the uncertainties and large number of variables involved in weather modification, no plaintiff has thus far been successful in collecting damages for injuries allegedly caused by cloud seeding, and only one case has resulted in even a temporary injunction. A Michigan case illustrates the difficulties in proving causation. In Reinbold v. Sumner Farmers, Inc., the plaintiff’s crops had been damaged by a heavy storm. In order to establish liability, he was required to show both that the materials from the upwind seeding were present in the area where they could have affected the weather and that they significantly worsened the storm. The litigation became a dispute between the plaintiff’s expert witness on plume tracing and the defendants’ weather modification experts. The jury found that the plaintiff had not met his burden of proof and denied recovery.

162. *Id.* at 325.
163. *Id.*
166. *Id.* at 852-53.
169. *Id.* The Reinbold case is discussed in greater detail in Davis & St.-Amand, *Proof of Legal Causation in Weather Modification Litigation: Reinbold v. Sumner Farmers, Inc., and Irving P. Krick, Inc.*, 7 J. OF WEATHER MODIFICATION 127 (1975). Professor Davis has pointed out elsewhere that “experts in weather modification have torn a leaf from the book of other professionals: when one of their own is in trouble they rally around. The caliber of
Seeding clouds with silver iodide presents problems similar to releasing acidic chemical compounds into the air. Proving cause and effect relationships may be even more difficult in acid rain cases, since the variables are considerably greater and the degree of resolution achievable may thus be reduced. These problems may be overwhelming in a legal system accustomed to discrete proof in individualized cases. While there are some indications that long distance remote sensing of individual emissions contributing to acid rain may in time prove sufficiently precise to satisfy legal standards of proof, at present only aggregates are measurable. For example, pollution episodes can be plotted as they cross frontiers and political boundaries. Because plaintiffs in acid rain lawsuits will have difficulty sustaining the traditional burden of proof on the issue of causation, it is worthwhile to examine alternative legal theories that may effectively transfer this burden of proof to the defendants.

2. Alternatives to Plaintiff's Shouldering the Burden of Persuasion on Causation

Imposition of liability in tort actions generally depends on a plaintiffs' showing that the injuries complained of were caused by acts of defendants or instrumentalities under defendants' control. Historically, the law has required proof of individual responsibility by a pre-testimony for plaintiffs tends to be significantly less impressive than that for defendants.”

Davis, supra note 103, at 853.

170. See text accompanying notes 164-65 supra.

171. Unlike acid rain, weather modification does not involve distant transport of substances in the atmosphere. Moreover, weather modification is closely monitored and has a definite data base, having been the subject of numerous studies and articles and a few cases. By comparison, little data has been compiled on acid rain.

172. It should be noted that scientists have not yet succeeded in modeling a quantitative relationship between emissions and acid deposition, and researchers seeking to do so face numerous unanswered questions as to what simulation techniques are valid. ELECTRIC POWER RESEARCH INSTITUTE, PROCEEDINGS: ADVISORY WORKSHOP TO IDENTIFY RESEARCH NEEDS ON THE FORMATION OF ACID PRECIPITATION 2-76 (1979).

173. EPA's Regional Field Studies Office has used “conventional satellite data, computer simulation, and image enhancement to detect and show the formation and spread of large scale pollution episodes.” The process is described by Dr. Walter A. Lyons in Hearings on Acid Rain, supra note 3, at 83-99.

174. Only in recent years have studies given attention to the long range transport and transformation of pollution after it emanates from a particular point source. Id. at 85. In one instance, an individual plume from a Missouri coal-burning power plant was tracked at night to a point three hundred miles away in southern Minnesota. Id. The plume could not conclusively be tied to any effects, however, since it had combined with numerous other sources of pollution during its journey. Id. at 85-86.

ponderance of the evidence before liability is imposed.\textsuperscript{176} In the typical situation giving rise to acid rain damage, there will be many major and minor contributors to acid rain formation within an identifiable geographic area, but at present there is no way to match specific sources with the end product of acid rain.\textsuperscript{177} This fact poses a significant obstacle for plaintiffs seeking damages for injuries caused by acid rain, since under traditional causation doctrine, in order to recover plaintiffs must identify defendant as either a "but for" cause of\textsuperscript{178} or "substantial factor" leading to\textsuperscript{179} the alleged harm.\textsuperscript{180}

It is possible that the chemical emissions discharged by some joined defendants may not have been carried in the precise direction of a plaintiff's property or will have been carried so high into the atmosphere that they will not have formed rain at the location of plaintiff's property. Moreover, acid rain might have formed even in the absence of a particular defendant's discharges, which then could not be considered a but for cause of the plaintiff's harm.\textsuperscript{181} A plaintiff in acid rain litigation would thus have serious difficulty proving causation under the traditional theory. Similarly, each individual source of pollution may contribute only a small portion of the emissions leading to the creation of acid rain.\textsuperscript{182} The sheer number of potential contributors, the regional nature of the problem, and the shifting variables present because of changing atmospheric conditions may preclude proof even under the more lenient substantial-factor test for causation. There are

\textsuperscript{176} W. Prosser, supra note 92, at 241 (4th ed. 1971).
\textsuperscript{177} See note 174 supra and accompanying text.

\textsuperscript{178} The but for test, developed early in tort law, may be stated as follows: "the defendant's conduct is not a cause of the event, if the event would have occurred without it." W. Prosser, supra note 92, at 239. The test, strictly applied, would pose an insurmountable obstacle to plaintiffs in acid rain suits; no single source of emissions contributing to acid rain formation can be said to have determined whether the harm would occur. Plaintiffs would thus be well advised to rely instead on the substantial factor test, see note 179 infra, or the doctrine of contribution to aggregate condition, see notes 219-28 infra and accompanying text.

\textsuperscript{179} The modern trend is to apply the substantial-factor test to prevent the absolution of defendants who play an important role in causing plaintiffs' injuries. Restatement (Second) of Torts § 431 (1965); 57 Am. Jur. 2d. Negligence § 147 (1971). Cf. Warth v. Seldin, 422 U.S. 490, 504 (1975) ("Petitioners must allege . . . that, absent the respondents' . . . practices, there is a substantial probability that they would not have been harmed"). Under this test, the defendant's conduct is a cause of the event if it was a material element and a substantial factor in bringing it about. W. Prosser, supra note 92, at 240. Thus, if defendant throws a lighted match into a forest fire, he is an insignificant factor. Yet, if he sets a fire, which merges with a fire from some other source, and the combined fires burn plaintiff's property, then defendant's conduct is a substantial factor although it would not have been a but-for cause. Id. at 239.

\textsuperscript{180} W. Prosser, supra note 92, at 238-40.

\textsuperscript{181} Emissions produced by such a defendant could still be a substantial factor. See note 179 supra.

\textsuperscript{182} For a discussion of this problem, see text accompanying note 217 infra.
emerging exceptions, however, to the general rule requiring the plain-
tiff to prove causation.

The first exception was announced in *Summers v. Tice*. Where
the conduct of two or more persons is tortious, and the plaintiff has
proved that harm was caused by one of them but there is uncertainty as
to which one caused it, each defendant is held jointly and severally
liable unless it can prove that it did not cause the harm. In *Sum-
mers*, plaintiff was injured when two hunters shot in his direction.
Since both hunters had similar firearms, it could not be determined
which one had caused the injury. The California Supreme Court de-
cided to shift the burden of proof and require each defendant to estab-
lish that he had not caused the injury. The stated reason underlying
the rule was the court’s perception that it would work injustice to per-
mit proven wrongdoers, who among them inflicted injury upon an en-
tirely innocent plaintiff, to escape liability merely because the nature of
their conduct and the resulting harm had made it difficult or impossible
to prove which of them caused the harm.

An acid rain plaintiff might have difficulty invoking the principle
of *Summers v. Tice*. In *Summers* it was established that one of the
defendants had actually caused plaintiff’s injury. In cases involving
acid rain, by contrast, there remains the possibility that none of the
defendants’ emissions will have affected plaintiffs’ property; discharges
may never have reached the damaged area or may have bypassed it
and continued on, and the bulk of the damage may have been caused
by others besides the joined defendants. In such a situation reliance on
*Summers* may prove unavailing. Invocation of *Summers* may also
require joinder of all the defendants engaged in the wrongful con-
duct. Where the conduct of the defendants is not clearly wrongful,
for example, where they have been operating in compliance with appli-

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183. 33 Cal. 2d 80, 199 P.2d 1 (1948). In *Summers*, the California Supreme Court relied
plaintiff was injured while he was unconscious during surgery. He sought damages against
several doctors and a nurse who attended him while he was unconscious. The California
Supreme Court held that it would be unreasonable to require him to identify the particular
defendant who had performed the alleged negligent act since the defendants had clearly
exercised control over the instrumentalities that caused the harm. *Id.* at 492, 154 P.2d at
690. Therefore, under the doctrine of res ipsa loquitur, an inference of negligence arose that
defendants were required to meet by explaining their conduct. *Id.* at 494, 154 P.2d at 691.


186. See, e.g., *Sindell v. Abbot Laboratories*, 26 Cal. 3d 588, 611, 607 P.2d 924, 936-37,
163 Cal. Rptr. 132, 144-45 (1980), *cert. denied*, 101 S. Ct. 286, where the court recognized
that *Summers* “is inappropriate to shift the burden of proof of causation to defendants be-
cause . . . there is a possibility that none of the five defendants in this case produced the
offending substance and that the responsible manufacturers, not named in the action, will
escape liability.” See notes 208-11 infra and accompanying text.

187. See text accompanying notes 184-85 supra.
cable emission standards, the *Summers* rationale would not be applicable.\textsuperscript{188}

A second exception suggested by some judicial decisions had arisen under the "industry-wide" or "enterprise" theory of liability. This theory applies where more than one manufacturer of a product is before the court and each has engaged in the same tortious manufacturing practice. In such cases, the burden of persuasion with respect to causation may be shifted to the defendants as in *Summers v. Tice*, if plaintiff can show by clear and convincing evidence that one of the defendants before the court must have manufactured the injury-causing product.\textsuperscript{189} A version of this theory was applied in *Hall v. E.I. Du Pont De Nemours & Co.*\textsuperscript{190}

In *Hall*, plaintiffs were thirteen children injured in twelve separate incidents by exploding blasting caps.\textsuperscript{191} Defendants were six blasting cap manufacturers, composing almost the entire blasting cap industry in the United States, and their trade association.\textsuperscript{192} There were a number of Canadian blasting cap manufacturers that could have supplied the caps.\textsuperscript{193} The complaint alleged that industry practice created an unreasonable risk of harm by its omission of warnings on individual blasting caps and by its failure to take other safety measures.\textsuperscript{194}

In discussing industry-wide liability, the *Hall* court stated that the theory was most appropriately applied to a centralized industry where producers tend to rely on the same information.\textsuperscript{195} In such cases, something akin to concerted action may be found: the industry-wide standard can be considered the cause of plaintiff's injury, and each defendant's use of the standard perpetuates and enhances its effect.\textsuperscript{196} The court further noted that it may be unreasonable to apply enterprise liability to an industry composed of countless small producers.\textsuperscript{197} In such cases it is less certain that individual producers are aware of the risks caused by the industry-wide practice, and it is doubtful that they can influence other producers to reduce those risks. In order to prove liability under the enterprise theory, a plaintiff must show both con-

\begin{footnotesize}
\textsuperscript{188} See note 185 supra and accompanying text.
\textsuperscript{191} Id. at 359.
\textsuperscript{192} Id. at 358-59.
\textsuperscript{193} Id. at 379.
\textsuperscript{194} Id. at 359.
\textsuperscript{195} Id. at 378. The court noted that the manufacturers had delegated some safety investigation responsibility to a trade association. *Id.* at 359. It therefore concluded that there was industry-wide cooperation in the risk and cost decisions regarding blasting cap safety practices.
\textsuperscript{196} See Comment, supra note 189, at 997 (1978).
\textsuperscript{197} Hall v. E.I. Du Pont De Nemours & Co., 345 F. Supp. at 378.
\end{footnotesize}
structive knowledge of the risk and a joint capacity of the producers to affect the risk.198

The enterprise liability theory has not been widely applied. In *Sindell v. Abbott Laboratories*, 199 the California Supreme Court expressly declined to apply the theory when plaintiffs brought an action against manufacturers of the drug diethy stilbesterol (DES).200 The court reasoned that drug manufacturers are decentralized and numerous and do not determine their drug formulas jointly or through a common agent.201 The court also stressed that it would be unfair to impose liability on a manufacturer who may not have caused an injury, merely because the manufacturer followed a standard formula suggested or compelled by the Food and Drug Administration.202

A plaintiff in an acid rain lawsuit would probably not be able to take advantage of the industry-wide liability theory, even if that theory was more widely recognized. The most likely group of acid rain defendants-powerplants, major fuel burning installations, and smelters—is not centralized and consists of numerous facilities of different types. It may thus prove impossible to show concerted action by acid rain defendants, either actual or constructive, and this appears to be a necessary element of liability under the enterprise liability theory.203

In *Sindell*, the California Supreme Court recognized a third exception to the general requirement that plaintiff prove causation. Under this theory, known as “market share” liability, plaintiff need not prove causation if (1) all defendants produced the injurious product from an identical design or formula; (2) plaintiff, through no fault of its own, cannot identify the particular manufacturers of the product that caused its injuries; and (3) the manufacturers joined as defendants produced a substantial share204 of the product that harmed plaintiff.205 In such a

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198. *Id.* at 375-76.
200. *Id.* at 609, 607 P.2d at 935, 163 Cal. Rptr. at 143.
201. *Id.*
202. *Id.* 609-10, 607 P.2d at 935, 163 Cal. Rptr. at 143.
204. The court explained the “substantial share” requirement as follows:
   If plaintiff joins in the action the manufacturers of a substantial share of the DES which her mother might have taken, the injustice of shifting the burden of proof to defendants to demonstrate that they could not have made the substance which injured plaintiff is significantly diminished. While 75 to 90 percent of the market [has been] suggested . . . . we hold only that a substantial percentage is required.
*Sindell v. Abbott Laboratories*, 26 Cal. 3d at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145.
205. *Id.* at 611-12, 607 P.2d at 937, 163 Cal. Rptr. at 145. One writer has criticized *Sindell* on the ground that the decision places the manufacturer in the role of insurer of its products. Kroll, *Intra Industry Joint Liability: The Era of Absolute Products Liability*, IN-SUR. L.J. 186, 195 (1980). Compared to enterprise liability, on the other hand, *Sindell’s* market share theory may favor manufacturers by substituting proportionate liability, based
case, "[e]ach defendant will be held liable for the proportion of the judgment represented by its share of that market unless it demonstrates that it could not have made the product which caused plaintiff's injuries." 206 The Sindell theory does not abrogate plaintiffs' burden of showing that the injury was caused by the allegedly defective product rather than some other cause, however. 207

In Sindell, 208 the plaintiff claimed that she was exposed to DES before her birth and that her injuries 209 occurred because of the defendants' advertised assurances that DES was safe. Due to the lapse of time, however, she could not identify which of the five joined defendants, if any, had manufactured the DES ingested by her mother. The court accepted plaintiff's argument that she was not at fault for her inability to make the identification 210 and held that as long as the joined defendants supplied a substantial share of the DES sold, it was fair to hold them liable even without individualized proof of causation. 211

Sindell, in effect, eliminated the requirement of establishing causation in fact in products liability cases where individual cause and effect relationships cannot be established because of common ingredients, design, and use of a product. A plaintiff's prima facie case is established by showing that it was injured as a result of a defective product of a type manufactured by the defendants. 212 The market-share version of enterprise liability recognized in Sindell goes beyond the industry-wide

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206. Sindell v. Abbott Laboratories, 26 Cal. 3d at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145.

207. See Comment, supra note 189, at 995. Sindell went to the California Supreme Court on demurrer after the trial court had dismissed the complaint on grounds that plaintiff could not identify which defendant had manufactured the product. Sindell v. Abbott Laboratories, 26 Cal. 3d at 595-96, 607 P.2d at 926, 163 Cal. Rptr. at 139. Thus the court assumed for purposes of the appeal that the injuries would be linked to DES by evidence produced at trial.

208. Sindell was a claim against several manufacturers of DES. DES was taken by many women between 1947 to 1971 to prevent miscarriage. In 1971 the Food and Drug Administration ordered defendants to cease marketing DES because of mounting evidence that the daughters of women who took DES during pregnancy suffered from an increased risk of adenocarcinoma (cancer of the vagina) and adenosis (precancerous vaginal and cervical growths). Sindell v. Abbott Laboratories, 26 Cal. 3d at 593-94, 607 P.2d at 925, 163 Cal. Rptr. at 133.

209. Plaintiff developed a malignant bladder, which was surgically removed. She also suffered from adenosis and had to be constantly monitored by doctors. Id. at 594-95, 607 P.2d at 926, 163 Cal. Rptr. at 134.

210. Id. at 611, 607 P.2d at 936, 163 Cal. Rptr. at 144.

211. Id. at 612-13, 607 P.2d at 937-38, 163 Cal. Rptr. at 145-46.

212. To negate the presumption of cause in fact raised by such a showing, a defendant must either show that the product did not cause plaintiff's injury or that the defendant could not have manufactured the particular product used by the plaintiff. Id. at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145.
liability theory of *Hall* by eliminating the concerted action requirement. Furthermore, *Sindell* extends the reach of *Summers v. Tice* by shifting the burden of proof of causation even where it is not conclusively established that at least one of the defendants was responsible for the injury. The California court substituted a probability thesis that allows shifting of the burden of proof where the joined defendants as a group have a substantial share of the market for the particular product.213

The principle of *Sindell* can be extended to acid rain litigation. Plaintiffs in acid rain suits could attempt to establish the required elements of the market-share theory by proving that (1) all defendants (e.g., power plants and major fuel burning installations) are conducting activities resulting in virtually identical discharges; (2) it is not the plaintiffs’ fault that they cannot track and monitor the emissions from individual plants during their release, transformation in the upper atmosphere, and eventual deposition onto specific land sites as acid rain; and (3) that the dischargers joined as defendants produced a substantial share of the acidic chemical compounds causing plaintiffs’ injuries.214 Under the market-share theory, plaintiffs would still have to show that their injuries were caused by emissions from fuel-burning sources such as those operated by the defendants. They would not have to show that any particular defendant’s plant was responsible for their injuries, however.

*Sindell* held that where a dangerous product cannot be traced to a specific producer, it is proper to distribute the cost of resulting injuries among all possible producers, rather than imposing the full cost on an innocent plaintiff.215 A producer of a dangerous product thus assumes the risk of injuries resulting from the use of the product and does not escape liability just because the producer’s identity can rarely be determined in an individual case. Similarly, the operator of a power plant or smelter may be held to assume the risk of injury created through its profit-making activities. As with manufacturers of dangerous products, the question of which defendant among the group caused the particular injury complained of may lose significance where the courts seek to transfer the social costs imposed by the injury from those who sustained the injury to those who directly benefit from the activities that, in the aggregate, create the risk of injury.

The major practical difficulty with the market-share liability the-

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213. The court noted that the plaintiff asserted that six or seven potential defendant manufacturers produced 90% of the DES marketed and thus that at trial, there would be "only a 10 percent likelihood that the offending producer would escape liability." *Id.*

214. See text accompanying note 205 *supra*.

ory lies in determining proportionate shares of responsibility. Under *Sindell*, each defendant is liable only for that fraction of the harm equal to its share of the market. Extent of participation in the controlled-drug market is relatively easy to determine compared with assessing proportionate responsibility for creation of acid rain. Courts could attempt to apportion liability by determining each joined source’s contribution to the total amount of acidic chemical compounds discharged by man-made sources within the region. To arrive at even a reasonable approximation of an individual source’s contribution, however, may be beyond the capabilities of modern science. In order to calculate individual contributions we must know the point of origin and volume of emissions of all sources, both man-made and naturally occurring. Even if a party could arrive at an estimate for man-made source contributions, there is at present no accurate data on natural contributions to the acid rain problem.216 Regarding determination of the source region, courts would again be faced with scientific uncertainty; while acid rain is a regional problem, shifting wind patterns make it impossible to define any consistent boundaries.

Faced with the impossibility of accurately determining proportionate liability, there are still a few ways in which a court might proceed under the market-share liability theory. First, a court could make do with a roughly approximated apportionment based on the best expert opinion available. Courts may be reluctant to adopt such an unreliable approach, however. Second, a court could apportion liability entirely among the joined defendants without attempting to calculate the contributions of nonjoined polluters, instead allowing the joined defendants to implead other contributors. This approach has the disadvantage of requiring defendants to pay for more than the risk created by their actions if not all contributors can be joined. Finally, the court might replace proportionate responsibility with joint and several liability and consign market share computations to collateral actions among defendants for indemnity or contribution. Again, however, such an approach may impose liability on defendants for more than their share of the acid rain injury and would negate the difference between enterprise liability based on industry-wide standards, as developed in *Hall*, and the market-share liability developed in *Sindell*. None of these three approaches truly addresses the problem of determining the source region.

Even where a plaintiff can identify, and is able to join as defendants, all those who have contributed to the acid rain damage, another causation-related difficulty may arise. The emissions of any single de-
fendant may alone be insufficient to constitute a but-for or substantial-factor cause of plaintiff's harm. Thus, for example, an SO$_2$ source accused of contributing to the creation of acid rain over a plaintiff's property could argue that the acid rain was caused by the combined emissions of many sources, both natural and man-made, and that the emissions of the individual defendant were a negligible factor in producing the harm. The defendant's emissions, it would argue, are therefore neither a but-for cause nor a substantial-factor in the creation of the acid rain. There is a doctrine, which this Article will refer to as the "contribution-to-aggregate-condition" test of causation, that may help overcome this problem faced by plaintiffs attempting to establish causation in acid rain litigation.

The contribution-to-aggregate-condition test was developed in a series of cases dealing with pollution of watercourses. The cases held each polluter of a watercourse liable even though, standing alone, the contribution of each was insufficient to constitute a nuisance. As noted by Professor Prosser:

There are occasional cases in which the conduct of each of two or more defendants, taken alone, would cause no unreasonable interference, but all together amount to a nuisance. One may pollute a stream to some extent without any harm, but if several do the same thing the plaintiff's use of the stream may be destroyed. It has been held consistently in these cases that each defendant is liable. The explanation given is that . . . the conduct of each, however reasonable it would be in itself, becomes unreasonable in view of what the others are doing.

Use of this doctrine in acid rain suits may be inhibited by three factors. First, where the flooding of land, pollution of a watercourse, or creation of smoke has given rise to liability because of the aggregate effect of defendants' conduct, that conduct has generally occurred within a clearly defined area of activity and resulting in-

217. See text accompanying notes 181-82 supra.
218. See note 219 infra and accompanying text.
219. W. PROSSER, supra note 92, at 608. For example, in Warren v. Parkhurst, 45 Misc. 466, 92 N.Y.S. 725 (1904), aff'd 186 N.Y. 45, 93 N.Y.S. 1009 (1905), plaintiff claimed $1000 in damages to his property along a creek due to the discharges of 26 upstream mills. The court admitted that riparian owners have the right of reasonable use and that individually the discharges were insignificant. The court nevertheless concluded that each defendant was a cause of plaintiff's injury, reasoning that

Id. at 467, 92 N.Y.S. at 726. See also Northup v. Eakes, 72 Okla. 66, 178 P. 266 (1919).
220. W. PROSSER, supra note 92, at 322.
221. Id.
222. Harley v. Merrill Brick Co., 83 Iowa 73, 48 N.W. 1000 (1891).
Watercourses have definite boundaries; thus, the effect of each defendant’s conduct can be measured and its contribution to the aggregate harm determined. Patterns of prevailing winds, by which acid chemical compounds are transported, are materially less definite, and the ability to identify individual contributions may be reduced. Under such circumstances, a court may feel less confident in applying the contribution-to-aggregate-condition theory of causation.

Second, at least one case has held that even under the contribution-to-aggregate-condition test, individual contributions must still be “significant.” Under this view, proof of causation is aided by the contribution-to-aggregate-condition test but is still subject to the requirement that defendant’s conduct be a “substantial factor.” The meaning of “significant” or “substantial” is of course highly subjective and will vary depending on the context. A relatively small amount of pollution in a stream, for example, may be held significant whereas the same amount of discharge in a lake or ocean would not be. Foreseeability of the harm and knowledge of others’ contributions to it may also be taken into account.

Finally, the fact that the acid rain problem is being caused by such a widespread and widely accepted activity as burning fossil fuels to produce power may make courts reluctant to impose liability on individual defendants. Traditionally, the judiciary has been hesitant to establish private legal remedies for generic societal problems; under separation of powers principles, such problems are viewed as calling for legislative rather than judicial solutions. Acid rain may be viewed as resulting from the general industrialization of our society rather than from the actions of a defined group of power plants and the like. The determination of whether the costs imposed by industrial emissions are outweighed by the benefit of cheaper energy is of manifest political significance and perhaps beyond the competence of courts to make. The enormity of potential liability for acid rain damage may increase courts’ reluctance to recognize legal liability.

223. See, e.g., case described in note 219 supra.
225. See W. Prosser, supra note 92, at 323 n.96.
226. See the passage from Warren v. Parkhurst quoted at note 219 supra.
227. Examples of the hesitancy of courts to accept cases involving problems that are not readily capable of discrete solution are commonplace. See, e.g., Diamond v. General Motors Corp., 20 Cal. App. 3d 374, 97 Cal. Rptr. 639 (1971). In upholding the dismissal of a suit to enjoin further air pollution in Los Angeles County, the court in that case held that “such an undertaking was beyond [the trial court’s] effective capability.” Id. at 383, 97 Cal. Rptr. at 646.
228. See Hearings on Acid Rain, supra note 3, at 213-18.
3. Party Joinder

The traditional rule in American jurisprudence is that joint tortfeasors are jointly and severally liable for any harm resulting from their acts or omissions. Procedural rules typically allow parties to join some or all of the joint tortfeasors. One of several joint tortfeasors may be required to compensate the plaintiff in full for the injury, and a defendant tortfeasor wishing to avoid this outcome is relegated to remedies of contribution and indemnity, if available.

Whether or not this traditional rule of party joinder will be applied in acid rain litigation depends to a significant extent on the causation standard adopted by the court. Where traditional methods of evidentiary analysis are relied upon, the traditional rule should apply and the plaintiff should be able to join as many or as few defendants as is deemed tactically advantageous. Where joint and several liability thus applies, the joined defendants will each be wholly liable for the injury if proven. The absent tortfeasor is not significantly affected by


230. See, e.g., Fed. R. Civ. P. 13g, 13h, 14, 18 & 20.


232. See Davis, Comparative Negligence, Comparative Contribution, and Equal Protection in the Trial and Settlement of Multiple Defendant Product Cases, 10 Ind. L. Rev. 831 (1977).

233. See text accompanying notes 151-74 supra.


235. See, e.g., Wassel v. Eglowsky, 399 F. Supp. 1330, 1370 (D. Md. 1975), aff'd per curiam, 542 F.2d 1235 (4th Cir. 1976). At common law those who acted in concert, to create an indivisible injury by private or public nuisance were jointly and severally liable. See W. Prosser, supra note 92, at 291. See also Snively v. City of Goldendale, 10 Wash. 2d 466, 117 P.2d 221, 223 (1941). On the other hand, the common law initially took the position that where individuals did not act in concert, no joint and several liability for private nuisance would be recognized. See Chipman v. Palmer, 77 N.Y. 51, 53 (1879). The reason for this limitation was the perceived inability under common law for one joint tortfeasor to obtain contribution from others. Merryweather v. Nixan, 101 Eng. Rep. 1337 (1799). Hence, where damages could not be apportioned or where defendants did not act in concert, it was thought unjust to require one who contributed only partly to the injury to bear the full cost of plaintiff's damages. Wm. Tackanberry Co. v. Sioux City Service Co., 154 Iowa 358, 364, 132 N.W. 945, 949 (1911); Chipman v. Palmer, 77 N.Y. at 53-54. Not only is it unlikely that a modern court would require the innocent plaintiff rather than the culpable defendant to bear the cost of damages, see note 215 supra, but the widely recognized rejection of the bar against contribution from joint tortfeasors undermines the basis of the early common law approach. The rule today is to recognize joint and several liability where multi-party conduct leads to the creation of a nuisance. See, e.g., Landers v. East Tex. Salt Water Disposal Co., 151 Tex. 251, 256, 248 S.W.2d 731, 733-34 (1952). Several federal decisions interpreting and applying state law have reached the same conclusion. See, e.g., Michie v. Great Lakes Steel Div., Nat'l Steel Corp., 495 F.2d 213, 215 (6th Cir. 1974) (applying Michigan law); Wm. G. Roe & Co. v. Armour & Co., 414 F.2d 862, 870 (5th Cir. 1969) (applying Florida law); Phillips Petroleum Co. v. Hardee, 189 F.2d 205, 212 (5th Cir. 1951) (applying Louisi-
the litigation in such a case.\textsuperscript{236} Nonjoinder of any of the tortfeasors should not raise any problems in the maintenance of a suit.

Similarly, if the court adopted an enterprise theory of liability based on industry-wide standards,\textsuperscript{237} the traditional rule of permissive party joinder should apply because that theory assumes that each purveyor of goods or services is better able to internalize and distribute the social costs of its conduct than those harmed.\textsuperscript{238} Each entity creating or contributing to the problem is supposedly able to assess and quantify the total cost of doing business, including the maintenance of collateral suits for contribution or indemnity. Imposing the whole liability on those defendants the plaintiff elects to proceed against is consistent with the enterprise theory and should not be precluded by rules governing joinder of necessary parties.

Where the plaintiff seeks to bypass the causation issue by using the market-share theory articulated in \textit{Sindell},\textsuperscript{239} however, party joinder may become mandatory. In \textit{Sindell}, the court stated that a plaintiff using the market-share theory for causation would be required to join a "substantial" portion of those persons who compose the relevant market.\textsuperscript{240} The principal reason given by the \textit{Sindell} court for requiring joinder was to ensure that "the offending producer would [not] escape liability."\textsuperscript{241} The justification for the substantial-share requirement is not as strong in a suit for damage caused by acid rain. Unlike the drug-related injury in \textit{Sindell}, acid rain injuries are caused by the combined actions of several parties. Moreover, there is a strong likelihood, based on what is known about acid rain, that every joined defendant will have contributed to some degree to the injury. Thus, because liability is unlikely to be imposed on parties not responsible for plaintiffs' injuries, there is less injustice in not joining a substantial share of the market than there would be in a \textit{Sindell}-type case.\textsuperscript{242}

\textsuperscript{236} Only those in privity with a party to a judgment can be bound by that judgment; two tortfeasors are not as such in privity with each other. \textit{See Restatement of Judgments} § 94 (1942).

\textsuperscript{237} \textit{See text accompanying notes} 189-203 \textit{supra}.

\textsuperscript{238} Although the enterprise or strict-liability theory of loss allocation is often criticized, it has nevertheless served as the basis for expanding tort liability in the last half century. \textit{See W. Prosser, supra} note 92, at 257. \textit{See also Green, The Paisgraf Case, 30 Colum. L. Rev. 789 (1930); Green, Foreseeability in Negligence Law, 62 Colum. L. Rev. 1401 (1962).} \textit{See note} 215 \textit{supra}.


\textsuperscript{240} \textit{Id.} at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145. The court did not elaborate on what portion of the market constitutes a "substantial" share. \textit{See note} 204 \textit{supra}.

\textsuperscript{241} \textit{Id}.

\textsuperscript{242} It may nonetheless be to plaintiffs' advantage to join as many defendants as possi-
If the substantial-share requirement is applied in an acid rain lawsuit notwithstanding the differences between this type of action and the product liability suit involved in *Sindell*, plaintiffs may be unable to succeed under the market-share theory unless they join all major contributors to acid rain, *i.e.*, all those emitting sulfur and nitrogen oxides into the atmosphere in the region where the injury occurred.\(^{243}\) Since a large proportion of the NO\(_2\) in the atmosphere is emitted by automobiles,\(^{244}\) joining NO\(_2\) emitters is an unlikely proposition. Plaintiffs would thus be well advised to argue for relaxation of the substantial-share requirement on the basis of the differences between production of acid rain and drug manufacturing. In any case, sulfur oxide emissions are responsible for about two-thirds of the acidity in acid rain,\(^{245}\) and, if most SO\(_2\) emitters are joined, there may be enough to constitute a substantial share even under the *Sindell* standard.

A strict application of the *Sindell* substantial-share requirement to acid rain litigation also raises significant party joinder problems. Even if a substantial share of the acid rain market could be found among power plant operators, the number of power plant and major fuel-burning installations that contribute to the acid rain problem is significantly greater than the number of market share defendants considered by the court in *Sindell*. Ohio, which many believe is a significant contributor to acid rain over Western Pennsylvania and the Adirondack region of New York,\(^{246}\) has 32 coal fired powerplants, which together emitted over 2.7 million tons of SO\(_2\) in 1977.\(^{247}\) Since total contributions from Ohio must be considered together with additional SO\(_2\) contributions made by sources in states located upwind of Ohio,\(^{248}\) the number of defendants that would have to be joined to constitute a sub-

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\(^{243}\) See *Ecological Effects of Acid Precipitation*, supra note 5, § 4.1, for a listing of acidic or potentially acidic substances, their significance, and their deposition processes.

\(^{244}\) Nitrogen oxides (NO\(_X\)) are produced in large quantities by both automobiles and coal burning facilities; it has been estimated that “[i]n 1972 stationary sources and mobile sources each contributed about half the nearly 25 million tons of NO\(_X\) emitted to the atmosphere.” Committee Print, supra note 19, at 28. “Of the stationary sources, coal burning was the single largest contributor with coal-fired electric generating plants producing 16% of total NO\(_X\) emissions in the United States.” *Id.* Automobiles have been responsible for an increasing proportion of NO\(_X\) emissions since federal law mandated use of exhaust systems designed to control hydrocarbon emissions. *Id.* These exhaust systems, which rely on high temperatures in catalytic converters to burn hydrocarbons that would otherwise be emitted, produce NO\(_X\) as a byproduct of that combustion process. *Id.*

\(^{245}\) *National Parks & Conservation Magazine*, October 1978, at 17.

\(^{246}\) *Hearings on Acid Rain*, supra note 3, at 59-60; *Electric Power Research Institute*, supra note 5, at 6.

\(^{247}\) *Hearings on Acid Rain*, supra note 3, at 72.

\(^{248}\) *Id.*
stantial share of the acid rain contributors might be very large indeed. As well as presenting jurisdictional and venue problems, this need to join a large number defendants might make the difficulty and expense of maintaining a suit overwhelming.

Using defendant class action procedures might resolve the problem of required party joinder. Where "questions of law or fact common to the class" exist as to a group of potential defendants, the Federal Rules of Civil Procedure allow a plaintiff to designate a defendant class and sue one or more defendants as class representatives, giving notice of the action to the other members of the class. The class action device may not be used to subvert the protections underlying required party joinder, namely concern over potential impairment by the judgment of the interests of absent parties and infliction of multiple liability on parties who are before the court. These concerns, however, are not present in the joinder requirement under the market share approach—as noted, the substantial-share requirement is designed instead to increase the likelihood that plaintiff's injury was caused by one of the defendants before the court. Thus, allowing the class action device to substitute for individual party presence would not appear to prejudice the interests of members of the defendant class.

For a defendant class action to be maintained in federal court under Rule 23, four requirements must be satisfied. The class must be so numerous that joinder is impracticable; there must be questions of

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249. For example, if suit were brought in the state where some but not all of the defendants were located, a court in that state might not have jurisdiction over defendants from a neighboring state or from the plaintiff's home state.

250. FED. R. CIV. P. 23(a)(2). See generally C. WRIGHT & A. MILLER, FEDERAL PRACTICE AND PROCEDURE: CIVIL § 1770 (1972). Suits by plaintiffs to establish rights against a class were common in equity. See, e.g., Brown v. Vermuden, 22 Eng. Rep. 796 (Ch. 1676). Although class actions are generally used by classes of plaintiffs rather than against classes of defendants, Rule 23 of the Federal Rules of Civil Procedure expressly authorizes class actions of the latter type: "One or more members of a class may sue or be sued as representative parties on behalf of all only if . . . the claims or defenses of the representative parties are typical of the claims or defenses of the class." FED R. CIV. P. 23(a) (emphasis added). See Parsons & Starr, Environmental Litigation and Defendant Class Actions: The Unrealized Viability of Rule 23, 4 ECOLOGY L.Q. 881 (1975) for an informative discussion of defendant class actions and their application to environmental litigation.

251. Thus, where the putative class representative is not a member of the class, see Johnson v. Duffy, 588 F.2d 740, 745 (9th Cir. 1978), where the representatives' interests are in conflict or antagonistic to those of the class, see J. MOORE & J. KENNEDY, 3B MOORE'S FEDERAL PRACTICE ¶ 23.07[2]-[3] (2d ed. 1980), or where the claims or defenses asserted by the representative are not typical of the class, see Garonzik v. Shearson Hayden Stone, Inc., 574 F.2d 1220 (5th Cir. 1978), cert. denied, 439 U.S. 1072 (1979), the class device will not suffice, and the absent parties must be joined. Counterbalancing these factors is the frequently repeated maxim that the Rule 23 class action provision is to be liberally applied. See J. MOORE & J. KENNEDY, supra ¶ 23.02[4].


law or fact common to the class; the defenses of the representative parties must be typical of those of the class as a whole; and the representative parties must be capable of fairly and adequately representing the interests of the class. The number of class members required before joinder is considered impracticable varies widely and depends on the particular circumstances of the case. The second and third requirements should not be difficult to satisfy in acid rain lawsuits as long as a proper representative is chosen, since the factual claims and legal arguments asserted against all defendants will be identical. Nonetheless, plaintiffs should be wary of one potential obstacle: some of the issues raised in the suit may require individualized proof, and potential defendants opposing a class action will argue that this fact makes a class action inappropriate. One answer to this problem would be to recognize subclasses within the class.

Arguments that class treatment is inappropriate because of conflicts between class members over responsibility for creation of acid rain should not pose a substantial problem. Under the market-share approach of Sindell, it would be open to potential class members to argue that they were not part of the relevant market and hence not properly a part of the class. Once it is shown that an individual has participated in the relevant market, however,—i.e., by contributing acid rain precursors to the regional air mass—then the question is no longer one of establishing liability but is rather one of assessing proportionate share. The latter issue concerns apportionment of responsibility among the defendants and should not influence the initial decision regarding liability to the plaintiff. Moreover, since a defendant cannot realistically refute liability if it is part of the market, the defendant is

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254. FED. R. CIV. P. 23(a).
255. Joinder has been held practicable with as many as 300 litigants and impracticable with as few as 13. See Parsons & Starr, supra note 250, at 907-08.
256. Examples of such issues might include whether a given defendant was within the area producing the emissions that reached plaintiff's property or what was the magnitude of a defendant's emissions.
257. See Parsons & Starr, supra note 250, at 908-10.
258. Membership in the class is a condition precedent to imposing liability through the class action device. See J. MOORE & J. KENNEDY, supra note 251, at ¶ 23.04[1]. This condition is implicit in the requirement that there be a class. See also FED. R. CIV. P. 23(c)(3) (class action judgment binds only those who are members of the class).
259. Questions of contribution and indemnity among defendants do not affect the rights of the plaintiff. See American Motorcycle Ass'n v. Superior Court, 20 Cal. 3d 578, 578 P.2d 899, 146 Cal. Rptr. 182 (1978). Moreover, where assertion of contribution or indemnity adversely affects the interests of the plaintiff, preference is given to the plaintiff's interests. See, e.g., State Mut. Life Assur. Co. of Am. v. Peat, Marwick, Mitchell & Co., 49 F.R.D. 202, 213 (S.D.N.Y. 1969) (third party complaint for contribution for indemnity strikes where obviously unmeritorious and designed to prejudice plaintiff's case). Sindell does not discuss who has the burden of establishing the size of individual defendants' market shares.
similarly situated whether represented in a class suit or appearing individually.

B. Remedies

I. Federal Remedies

a. Clean Air and Clean Water Acts

The Clean Air Act and Clean Water Act permit private citizen suits to enforce their pollution limitation provisions. Although both statutes allow successful private litigants to recover costs and attorneys' fees, neither expressly authorizes recovery of damages for injuries caused by emission of pollutants in excess of statutory limits. The express remedies available under these Acts would thus be of no help to plaintiffs seeking to recover damages for injuries caused by acid rain.

Plaintiffs suing for acid rain damage might argue, however, that an implied remedy exists for injuries caused by violations of the Clean Air Act's emissions standards. Although courts have not directly addressed this issue, it seems unlikely that such an implied remedy will be recognized. A federal district court recently intimated that remedies would not be implied from the Act and courts considering this ques-

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260. Section 304 of the Clean Air Act, 42 U.S.C. § 7604 (Supp. III 1979), and Section 505 of the Clean Water Act, 33 U.S.C. § 1365 (1976) authorize, respectively, "any person" or a person "having an interest which is or may be adversely affected" to bring an action in federal district court to enforce air pollution emission limitations or water pollution effluent standards. See W. Rodgers, Handbook on Environmental Law § 1.13 (1977); R. Stewart & J. Krier, supra note 93, at 547-48.


262. EPA has considered the acid rain problem only with reference to the Clean Air Act. See Hearings on Acid Rain, supra note 3, at 202 (Statement of former EPA Administrator Douglas M. Costle). It is unlikely that it would attempt to deal with the acid rain problem under the Clean Water Act. Id.

263. The lack of case law addressing this question is explained by Professors Stewart and Krier:

It was hoped that the citizen suit provisions, together with regular disclosure by sources of emissions data, would assure vigorous private enforcement of pollution control requirements in all cases where the states or EPA failed to take actions. Despite the prospect of attorney fee awards, however, the citizen suit provisions have thus far proved relatively unsuccessful in stimulating private enforcement actions. National environmental groups with experienced legal staffs generally eschew suits against individual sources, preferring to devote their scarce litigation resources to federal policies of nation-wide application. Local environmental groups that would have an incentive to bring enforcement actions against individual sources often lack the organization, seed money, and legal know-how to maintain citizen suits.

R. Stewart & J. Krier, supra note 93, at 547.

tion under the Clean Water Act have uniformly rejected an implied damages remedy.\textsuperscript{265} This approach is consistent with the Supreme Court's general reluctance to find implied remedies in federal statutes\textsuperscript{266} and its emphasis on legislative intent rather than policy as the test for determining whether implied remedies are available.\textsuperscript{267}

Even if a private damage action were implied under the Clean Air Act, the remedy might provide little help to plaintiffs in acid rain suits. First, suits under section 304\textsuperscript{268} must be brought in the district in which the emitting facility is located.\textsuperscript{269} This venue requirement would pose problems for plaintiffs seeking to join emitting facilities located in different districts.\textsuperscript{270} The requirement may also force plaintiffs to litigate away from the place of injury.\textsuperscript{271} Further, in these cases, unlike common law nuisance actions,\textsuperscript{272} compliance with statutory and regulatory standards would be a complete defense; since the remedy is implied from the statutory purpose, it would be available only where the statute is violated.\textsuperscript{273}

suits brought under the Act and did not consider whether a private action for damages may be implied, the court's approach suggests strongly that it would have been unwilling to recognize such an action.

Another district court assumed, without deciding, that there is a private right of action for damages under the Clean Air Act. Delaware Citizens for Clean Air, Inc. v. Stauffer Chem. Co., 367 F. Supp. 1040, 1047 (D. Del. 1973), aff'd, 510 F.2d 969 (3d Cir. 1975). This assumption was made only arguendo, however, in the course of deciding another question adversely to plaintiffs. Thus, Delaware Citizens for Clean Air cannot be read to stand for the proposition that a private damages action should be implied from the Clean Air Act.


266. See Touche Ross & Co. v. Redington, 442 U.S. 560, 575-76 (1979), holding there is no implied right of action under § 17 of the Securities Exchange Act of 1934. The Court indicated that it earlier had upheld an implied remedy under § 10(b) of the Act largely because lower federal courts had recognized such a remedy for 45 years. \textit{Id.} at 577-78 n.19. The Court intimated that had there been no long-standing reliance on the remedy implied under § 10(b), it would not have sanctioned such a remedy. \textit{Id.} This opinion would not support an attempt to establish implied damages remedies under the Clean Air Act. See also Middlesex County Sewerage Auth. v. National Sea Clammers Ass'n, 49 U.S.L.W. 4783, 4787-88 (1981) (finding no private remedies implied from Federal Water Pollution Control Act or Marine Protection, Research, and Sanctuaries Act). See note 310 infra.


268. See note 260 \textit{supra}.


270. See note 136 \textit{supra} and accompanying text.

271. See note 40 \textit{supra} and accompanying text.

272. See text accompanying notes 354-61 infra.

273. It might be argued that as a matter of policy, compliance should not be a defense. Since the acid rain problem results from cumulative loading of the atmosphere with acidic chemical compounds, exempting facilities from responsibility because they are individually in compliance with emission standards would hinder effective treatment of the problem. Those whose activities exceed statutory limits may contribute to the acid rain problem only
b. Federal common law

Plaintiffs seeking to recover for acid rain injuries may also find a remedy under the federal common law of nuisance. The scope of the federal common law is uncertain, however. Federal courts have only recently recognized this remedy, and their decisions have been less than clear. In any event, it is established that a federal common law exists and that claims brought under it "arise under" federal law for jurisdictional purposes. In general, federal common law has developed where there is a need for a nationally uniform rule, as in suits between states, or where a strong federal interest is involved.

The federal common law of nuisance was developed in a series of cases that began around 1900. These cases typically involved disputes between states over transboundary pollution. For such disputes, fed-

marginally more than those in compliance; imposing liability only on the former would undercut efforts to remedy the situation.

EPA has promulgated ambient air quality standards for individual acid rain precursor elements, see note 369 infra, but has not attempted to regulate these pollutants in their role as acid rain precursors, see note 370 infra and accompanying text. Thus it may be difficult to determine whether the Act is being violated and thus whether the defense of compliance is available.

274. See notes 283-324 infra and accompanying text.


278. See note 280 infra and accompanying text.

279. A federal interest has been found where there is a direct effect on the national treasury, see Clearfield Trust Co. v. United States, 318 U.S. 363, 367 (1943), and where the government is a party or its rights are involved, see United States v. 93,970 Acres of Land, 360 U.S. 328, 332-33 (1959). See generally M. REDISH, FEDERAL JURISDICTION: TENSIONS IN THE ALLOCATION OF JUDICIAL POWER 79-94, 105-07 (1980). In determining whether such a federal interest is present, courts have considered whether the federal interest is substantial, see Bank of Am. Nat'l Trust & Savings Ass'n v. Parnell, 352 U.S. 29, 33-34 (1956) (private parties dealing with federal commercial paper are governed by state law absent some federal interest or regulatory policy that requires displacement of state law), and whether a uniform rule of national application would more effectively deal with the problem. See Clearfield Trust Co. v. United States, 318 U.S. 363, 367 (1943). See also Friendly, In Praise of Erie—and the New Federal Common Law, 39 N.Y.U. L. REV. 383, 410 (1964). The presence of detailed federal regulation in the general subject area has also led to the finding of national interest. See O'Brien v. Western Union Tel. Co., 113 F.2d 539, 541 (1st Cir. 1940). See generally HART & WECHSLER, supra note 126, at 800-04.

eral jurisdiction was clearly authorized by article III of the Constitution, and federal courts were willing to invoke this jurisdiction because state remedies were inadequate for reasons of interstate comity.

The Supreme Court first explicitly recognized a federal common law of nuisance in 1972 in *Illinois v. City of Milwaukee (Milwaukee I)*. Although the scope and continued vitality of the *Milwaukee I* decision are unclear, the federal common law it recognized may provide a legal remedy to victims of acid rain.

In *Milwaukee I*, the State of Illinois sued four Wisconsin municipalities that were polluting Lake Michigan, an interstate body of water. Illinois sought to invoke the Supreme Court's original jurisdiction over cases in which a state is a party. The Court declined to exercise its original jurisdiction, holding that the problem of interstate pollution justified invocation of the federal common law of nuisance and thus presented an issue over which the district court could assert federal question jurisdiction. The Court remanded to the district court for consideration of whether the federal common law afforded a remedy to the state.

Plaintiffs seeking to invoke the federal law of nuisance in acid rain litigation will face a major obstacle. Because prior cases recognizing

\[\text{vate defendant. E.g., Georgia v. Tennessee Copper Co., 206 U.S. 230 (1907) (action to enjoin private company in another state from releasing noxious gases). See also 10 ENVIR. L. REP. 10,101 (1980).}

281. *U.S. CONST.* art. III, § 2, cl. 1 reads in part: "The judicial power shall extend... to Controversies between two or more States; between a State and citizens of another State."

282. The Court of Appeals for the Fourth Circuit has explained the evolution of the federal common law of nuisance as follows:

This "new federal common law"... came into being as a necessary expedient in the resolution of interstate controversies. The law of the state whose citizens were subject to injuries by the interstate pollution ought not to govern the conduct of citizens and municipalities in another state, while to apply the law of the offending state would be a utilization of the laws of a state whose selfish interest was in the protection of the offenders, herself, her political subdivisions or her citizens.

Committee for the Consideration of Jones Falls Sewage System v. Train, 539 F.2d 1006, 1008 (4th Cir. 1976). The necessity of a federal forum was particularly acute because, until the very recent decision in *Nevada v. Hall*, 440 U.S. 410 (1979), nonconsenting states could not be subjected to suit in the courts of sister states. *Id.* at 420-21.


284. *Id.* at 93.

285. Original jurisdiction over "all Cases... in which a State shall be a Party" is conferred by *U.S. CONST.* art. III, § 2, cl. 2.


the remedy have involved suits brought by states or political subdivisions, it is unclear whether the federal common law of nuisance extends to suits between private litigants. Since the common law of nuisance evolved largely because it was thought that state courts might not fairly resolve disputes between states, much can be said for denying its application in private actions.

Furthermore, the Supreme Court's language in Milwaukee I indicates that the Court thought the federal law should not be available to a private plaintiff. For instance, the Court cited with approval Georgia v. Tennessee Copper Co., an early Supreme Court case suggesting that the federal common law was limited to interstate disputes. In dicta, however, the Court intimated that the law might not be so limited, but might also be available in all cases presenting federal interests or federalism concerns.

The Court's ambiguity on this question has been reflected in lower court decisions after Milwaukee I. In Committee for the Consideration of Jones Falls Sewage System v. Train, a private individual brought suit under federal common law, seeking to enjoin discharges from a city sewer system. The court dismissed the action, holding that only states could institute actions invoking the federal common law of nuisance remedy. The Court of Appeals for the Fourth Circuit affirmed, but on a narrower ground: since the plaintiff had not alleged that the pollution involved was an interstate problem, "there is present neither the reason nor the necessity for the invocation of a body of federal common law." In dicta, the court disapproved of the district

289. See note 280 supra and text accompanying notes 294-310 infra. In one case a private individual was allowed to bring suit under the federal common law. See National Sea Clammers Ass'n v. City of New York, 616 F.2d 1222 (3d Cir. 1980), rev'd on other grounds sub nom. Middlesex County Sewerage Auth. v. National Sea Clammers Ass'n, 49 U.S.L.W. 4783 (1981), discussed at notes 308-10 infra and accompanying text.

290. See note 282 supra.


292. See note 280 supra.

293. The Court observed:

[I]t is not only the character of the parties that requires us to apply federal law . . . . As Mr. Justice Harlan indicated for the Court . . . where there is an overriding federal interest in the need for a uniform rule of decision or where the controversy touches basic interests of federalism, we have fashioned federal common law. . . . Certainly these same demands for applying federal law are present in the pollution of a body of water such as Lake Michigan bounded, as it is, by four States. [citations omitted]


295. Id. at 1149.

296. Id. at 1153-55.

297. Committee for the Consideration of Jones Fall Sewage System v. Train, 539 F.2d 1006 (4th Cir. 1976).

298. Id. at 1009.
court’s reasoning, and implied that the federal law might be invoked “if the interests of the state are sufficiently implicated.”\textsuperscript{299}

The federal district court’s ruling in \textit{Township of Long Beach v. City of New York}\textsuperscript{300} was similarly confusing. In that case, the plaintiff municipality sought to enjoin, under the federal common law, the defendant’s dumping of sludge into the Hudson River and Atlantic Ocean. The court allowed the suit, holding that political subdivisions of the state could assert the federal law recognized in \textit{Milwaukee I}\textsuperscript{301} yet stating in dictum that \textit{Milwaukee I} “should not be extended to encompass an action by a private person.”\textsuperscript{302} The court’s reasons for allowing suits by political subdivisions—“the equitable nature of the federal common law of nuisance, the clearly interstate nature of the dispute, and the significant repercussions [of the activity in question] on the entire state”\textsuperscript{303}—could apply equally to some private litigants. Limiting the federal law to cases presenting such factors, however, would mean that even if some private actions were allowed, federal common law remedies would be unavailable to many plaintiffs injured by acid rain.

In \textit{City of Evansville, Indiana v. Kentucky Liquid Recycling},\textsuperscript{304} the Court of Appeals for the Seventh Circuit also held that a political subdivision may assert the federal common law of nuisance. Although the court did not expressly state that a private individual could also invoke the remedy, the opinion suggests a willingness to go that far. The court stressed the dictum in \textit{Milwaukee I} that the federal common law might be invoked by a party other than a state in cases presenting federal interests or federalism concerns.\textsuperscript{305} The court’s holding that political subdivisions may invoke the federal law was based not only on the character of the party bringing suit, but also on the party’s assertion of a state interest.\textsuperscript{306} This fact suggests that a private litigant may be able to assert the federal law where the litigant will represent state

\textsuperscript{299} \textit{Id.} at 1009 n.8.
\textsuperscript{301} \textit{Id.} at 1214.
\textsuperscript{302} \textit{Id.} at 1213.
\textsuperscript{303} \textit{Id.} at 1214.
\textsuperscript{304} 604 F.2d 1008 (7th Cir. 1979), \textit{cert. denied}, 444 U.S. 1025 (1980).
\textsuperscript{305} \textit{Id.} at 1017-18.
\textsuperscript{306} The court noted:

Whatever the result should be when the plaintiff is a private party or when no interstate effects are alleged, there can be little doubt that the reasons the Supreme Court found compelling for declaring a federal common law of interstate water pollution are applicable here. The plaintiffs are municipal or public corporations, subdivisions of the state, that were required to spend public funds because of pollution of an interstate waterway by acts done in another state. The interests of the state in this interstate pollution dispute are implicated in the same way such interests were implicated in \textit{Illinois v. Milwaukee}. [citations omitted]

\textit{Id.} at 1018.
interests.\textsuperscript{307} One court has apparently held that private litigants may invoke the federal common law of nuisance where the individuals represent the interests of a state. In \textit{National Sea Clammers Association v. City of New York},\textsuperscript{308} an association of private fishermen sought damages and equitable relief for injuries sustained as a result of New York’s practice of barging sludge out to sea for disposal.\textsuperscript{309} The court found that because the private litigants were representing state interests in maintaining a clean environment, they could assert the federal common law remedy.\textsuperscript{310}

A second obstacle confronting private plaintiffs asserting the federal nuisance remedy in acid rain litigation is the possibility that federal legislation enacted since \textit{Milwaukee I} has supplanted the federal common law of nuisance. The Court in \textit{Milwaukee I} noted the possibility that “new federal laws and new federal regulations may, in time, preempt the field of federal common law of nuisance.”\textsuperscript{311} Since 1972, the date of the \textit{Milwaukee I} decision, Congress has enacted several statutes regulating environmental quality that might be interpreted as preempting the federal common law.\textsuperscript{312}

In a recent decision, \textit{City of Milwaukee v. Illinois (Milwaukee II)},\textsuperscript{313} the Supreme Court exercised the option it had left open in \textit{Milwaukee I} to reexamine, in light of newly enacted legislation, the con-
continued vitality of a federal common law remedy for interstate water pollution. The Court reversed a decision by the Seventh Circuit which had held that the Federal Water Pollution Control Act Amendments of 1972\(^{314}\) and 1977\(^{315}\) did not preempt the federal common law remedy recognized in *Milwaukee I*.\(^ {316}\) The Supreme Court observed that "in cases such as the present 'we start with the assumption' that it is for Congress, not the federal courts, to articulate the appropriate standards to be applied as a matter of federal law."\(^ {317}\) Noting that the specific problems raised by the plaintiffs had been "thoroughly addressed through the administrative scheme established by Congress, as contemplated by Congress,"\(^ {318}\) the Court held the federal common law remedy had therefore been preempted. The Court said that the lower court decisions did not fill gaps in a regulatory scheme, but rather created a "different regulatory scheme."\(^ {319}\) This decision apparently leaves open the possibility that a federal common law remedy would be still appropriate where necessary to fill in gaps left by legislation if it did not second-guess an existing regulatory framework established by Congress.

In *United States v. Atlantic Richfield Co.*,\(^ {320}\) the district court relied on the court of appeals' decision in *Milwaukee II* in holding that the federal common law had not been preempted by passage of the Clean Air Act,\(^ {321}\) and that the Federal Government could thus assert the fed-

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\(^{316}\) *Illinois v. City of Milwaukee*, 599 F.2d 151, 157 (7th Cir. 1979), *rev'd* 49 U.S.L.W. 4445 (1981). The court of appeals had based its decision on the savings clause contained in section 511(a) of the Federal Water Pollution Control Act, which the court read broadly as evincing congressional intent to leave the federal law of nuisance intact. Section 511(a) of the 1972 amendments provides that nothing in the Act should be construed as "limiting the authority or functions of any officer or agency of the United States under any other law or regulation not inconsistent with the Act . . . ." 33 U.S.C. § 1371 (1972). The court noted that this language "is arguably broad enough to include the federal courts and . . . suggests, if it does not require, the conclusion that Congress did not intend to preempt the federal common law of nuisance." *Illinois v. City of Milwaukee*, 599 F.2d at 162.

While the Supreme Court did not consider the effect of section 511(a), it did reject the similar argument that the savings clause contained in the Act's citizen suit provision precludes a finding of preemption. The Court interpreted the savings clause to mean only "that nothing in § 503, the citizen suit provision, should be read as limiting any other remedies." 49 U.S.L.W. at 4452. The Court concluded that "most assuredly it cannot be read to mean that the Act as a whole does not supplant formerly available federal common law actions." *Id.*


\(^{318}\) *Id.*

\(^{319}\) *Id.* at 4451 n.18.

\(^{320}\) 418 F. Supp. 1215 (D. Mont. 1979). *See also* California Tahoe Regional Planning Agency v. Jennings, 594 F.2d 181, 193 (9th Cir. 1979).

eral common law. The district court stressed the Act's savings clause and noted that the provisions of the Act alleged to have supplanted the federal common law were very similar to those considered in the *Milwaukee I* decision. The *Atlantic Richfield* decision, of course, was undermined significantly by the Supreme Court's reversal of the Seventh Circuit's opinion in *Milwaukee II*.

The acid rain problem is significantly different from the problem before the Court in the *Illinois v. City of Milwaukee* litigation. The Clean Air and Clean Water Acts do not directly address the acid rain problem, whereas the statutes at issue in *Milwaukee II* did address interstate water pollution. Unlike the regulations considered in *Milwaukee II*, the regulatory control of acid rain achieved by existing legislation is clearly inadequate. This inadequacy may constitute an "interstice" sufficient to justify judicial intervention. On the other hand, courts will not easily be persuaded to recognize a federal common law remedy for interstate pollution in the aftermath of *Milwaukee II*. The *Milwaukee II* opinion emphasized the propriety of committing problems of technological complexity to Congress rather than to the courts, and the acid rain problem is certainly complex. This factor may deter courts from recognizing a federal common law remedy for acid rain damage.

A potentially important development may stem from Congress' review in 1981 of the 1977 amendments to the Clean Air Act. A major goal of environmentalists will be to seek amendments bringing acid rain within the purview of the Act. Reenactment of the Clean Air Act's savings clauses after the decision in *Milwaukee II* and after consideration of the acid rain problem by Congress may enable courts to find implicit authorization by Congress of the federal common law remedy.

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322. 478 F. Supp. at 1218-19. The court did not rely on the possibility that the common law rights of the United States as sovereign might exceed those of the states or of individuals. This suggests that the decision should not be limited to cases in which the United States is a party.

323. *Id.* at 1219-20.

324. *Id.*

325. See notes 1-6 & 27-36 supra and accompanying text.

326. *But cf.* *Illinois v. City of Milwaukee*, 49 U.S.L.W. at 4451 n.18 ("At most respondents argue not that the Act is inadequate, as was the legislation considered in [Milwaukee I], but that these particular permits issued under it are. This does not suffice to create an 'interstice' to be filled by federal common law.") (emphasis in original).

327. *Id.* at 4451.


2. State Common Law Remedies

Three state common law remedies could be asserted in cases alleging interstate pollution: trespass, strict liability, and nuisance.331 This Article will focus on common law nuisance, the remedy most likely to be asserted.332 This focus is appropriate because nuisance is the only common law remedy predicated on environmental concerns.333

A nuisance is a substantial and unreasonable interference with the use and enjoyment of an interest in land.334 If the interference is suffered generally by a community, the nuisance is a "public nuisance"335 for which a private damages remedy lies only on proof of special injury to a particular plaintiff.336 A "private nuisance," on the other hand, involves injury to a single property owner or to a relatively small group.337 A plaintiff need not prove special injury to recover for a private nuisance.338 Although courts have imposed liability for public and private nuisances on theories of intent, negligence, or strict liability, the theory that a court uses in a particular case makes little practical difference.339 In the case of either a public or private nuisance, however, a

331. Two recent papers discuss at length the possible theories of relief that may be asserted in litigation involving transboundary pollution. See Hirsch & Abramovitz, Clearing the Air: Some Legal Aspects of Interstate Air Pollution Problems, 19 Duq. L. Rev. 53, 82-97 (1979); Pfennigstorf, Environment, Damages, and Compensation, 1979 Am. Bar. Foundation Research J. 349. See also Post, Federal Common Law Suits to Abate Interstate Air Pollution, 4 Harv. Envt'l L. Rev. 117 (1980).

332. Trespass is unlikely to be invoked by plaintiffs in acid rain suits because, as noted by Pfennigstorf, this remedy has been applied for recovery of environmental damage mainly in cases "where waste or debris was unlawfully deposited on the plaintiff's land." Pfennigstorf, supra note 331, at 378.

Similarly, the strict liability doctrine, initially articulated in Rylands v. Fletcher, L.R. 3 H.L. 330 (1868), has received little use beyond its extension to defective products. W. Prosser, supra note 92, at 508-09. Strict liability will not be imposed where the risk was not known to the defendant, or where the consequence, created by the risk, was abnormal. Id. at 518. A review of the cases indicates that aside from products liability cases, imposition of strict liability has generally been limited to circumstances where defendants had created substantial risks to their neighbors, as for example by erecting dams, see, e.g., Rylands v. Fletcher, L.R. 3 H.L. 330, by engaging in blasting operations, see W. Prosser, supra note 92, at 513-14, or by keeping wild animals, id. at 518. Where the risk is commonplace, as in the case of acid rain, the argument for imposing strict liability is less compelling. Also, in acid rain cases the defendant does not alone create a special risk; the defendant's conduct may merely aggravate an existing atmospheric condition. Further, strict liability has been imposed only where it was certain that the defendant's conduct caused the plaintiff's injury. The causation problem in acid rain cases would seem thus to preclude application of strict liability in this context.

333. The nuisance remedy was not specifically devised to remedy environmental injury, however. See Pfennigstorf, supra note 331, at 368-69.

334. W. Prosser, supra note 92, at 571-83; W. Rodgers, supra note 260, at 107.

335. W. Prosser, supra note 92, at 583-86.

336. Id. at 586-91.

337. Id. at 591-602.

338. See id. at 591-602.

339. Id. at 573-77. Prosser notes:
private plaintiff must prove that the defendant's activity caused the injury to plaintiff's property interest. As observed above, acid rain plaintiffs may have difficulty demonstrating such causation.

Where an acid rain plaintiff proves that a defendant's action caused injury to plaintiff's land, much depends on whether defendant's activity is deemed a "public" or a "private" nuisance. In a sense, characterizing acid rain is a question of perspective that depends on whether courts focus on the general right to an unpolluted atmosphere and environment or on the individual's right to own property free from another's pollution. Acid rain is a public nuisance in that it affects the environment to a degree beyond that involved in individual disputes, but is also a private nuisance in that it causes particular injuries to privately owned land. In short, an acid rain plaintiff could probably allege either a public or a private nuisance.

There are relatively few situations in which it makes very much difference which basis of liability is to be relied on. For this reason, and because the action on the case for nuisance was adequate to cover any of the three, the courts seldom have made the distinction, and have been content to say merely that a nuisance exists. Another reason for this has been the fact that the great majority of nuisance suits have been in equity, and concerned primarily with the prevention of future damage. Under such circumstances the original nature of the defendant's conduct frequently loses its importance, since his persistence, over the plaintiff's protest, in continuing conduct which may have been merely negligent or abnormal in its inception, is sufficient to establish its character as an intentional wrong. In the usual case, therefore, the problem is not discussed, but intent is the apparent basis of liability.

Id. at 576.

340. See notes 143-74 supra and accompanying text.

341. It is possible that some courts would insist on characterizing the injury as either private or public, and thus permit prosecution of plaintiff's action on only one of these theories. For instance, where acid rain befouls a water basin or causes injury to land covering thousands of square miles, a court might be unwilling to characterize the nuisance as private. On the other hand, characterizing such a problem as a public nuisance, with the result that only certain classes of plaintiffs suffering a "different injury" can recover, seems an illogical favoring of certain plaintiffs over others. Thus, insistence on characterizing acid rain as a public nuisance likely would represent a court's reluctance to assume responsibility for resolution of such an extensive problem. This reluctance in a related context is exemplified by Diamond v. General Motors Corp., 20 Cal. App. 3d 374, 97 Cal. Rptr. 639 (1971) (rejecting attempt to maintain class action on behalf of residents of Los Angeles County against several hundred named industrial corporations for air pollution allegedly caused by defendants).

Of course, judicial sensitivity to the problem of unmanageable damages is not a recent phenomenon, as evidenced by H.R. Moch Co. v. Rensselaer Water Co., 247 N.Y. 160, 159 N.E. 896 (1928) (no liability of water company to private citizen when service fails at critical moment and house is destroyed by fire as a result) and Ryan v. New York Cent. R.R. Co., 35 N.Y. 210, 91 Am. Dec. 49 (1866) (limiting liability for spread of fire, which spread from building to building and thus destroyed a large area, to only the first building so burned). In cases involving the imposition of liability that would significantly affect a substantial segment of society, the ultimate resolution depends less on rules of law than it does on the courts' judgment as to where, as a matter of policy, the burden of loss ought to be placed. See note 215 supra and accompanying text. See also W. Prosser, supra note 92, at 257-58, 625-26. See generally Schaefer, Precedent and Policy, 34 U. Chi. L. Rev. 3 (1966).
In a suit alleging a public nuisance, the plaintiff's ability to maintain the action may depend initially on whether damages or injunctive relief are sought. The modern trend recognizes that an action in equity to abate nuisances may be maintained as long as the litigant has standing to sue as a representative of the general public, a member of a class in a class action, or a citizen in a citizen's action. On the other hand, where the litigant seeks a damages recovery, the "different injury" test must be satisfied—that is, the litigant must demonstrate that the injury sustained is different from that suffered by the general public.

It would be difficult for plaintiffs in acid rain suits to demonstrate the different injury required for prosecution of an action under the public nuisance theory. In related contexts, although the decisions are not uniform, courts generally have not been eager to find such a particular injury. In some instances, however, plaintiffs would probably be able to prove such an injury—for example, if they were put to extraordinary expense to purify water or land contaminated by acid rain, or if acid rain affected their land in a peculiar manner. Similarly, substantial pecuniary loss may afford standing to sue for a public nuisance, despite the general rule that plaintiffs' injury must be different in kind, and not just in degree, from that suffered by the general public.

Plaintiffs who can prove that they have suffered such a different injury, or that a private nuisance action is proper, must still prove, in

342. See Comment, The Environmental Lawsuit: Traditional Doctrines and Evolving Theories to Control Pollution, 16 WAYNE L. REV. 1085 (1970). At common law, however, a private citizen could sue to abate a public nuisance only if special damages or a threat of special damage were shown. See W. PROSSER, supra note 92, at 586-87, 604-05.

343. W. PROSSER, supra note 92, at 587 n. 68.

344. Id. at 587.

345. Exemplary of the courts' reluctance in this area is Venuto v. Owens-Corning Fiberglas Corp., 22 Cal. App. 3d 116, 99 Cal. Rptr. 350 (1971). In Venuto three individuals sought abatement of defendant's emissions, which they alleged had caused them to suffer allergic and respiratory disorders. Id. at 121, 99 Cal. Rptr. at 353. The court affirmed a dismissal of the plaintiffs' complaint, finding that the plaintiffs had only alleged a general claim that public health and safety were affected. The fact that the plaintiffs may have been more susceptible to the health problems caused by the emissions was seen as insufficient to warrant a finding of special injury. Id. at 125, 99 Cal. Rptr. at 356. The court stressed that the effect of the emissions on the plaintiffs must be materially different from that on others similarly situated. Id. at 125, 99 Cal. Rptr. at 356.

346. Cf. Burgess v. M/V Tamano, 370 F. Supp. 247 (D. Me. 1973), aff'd, 559 F.2d 1200 (1st Cir. 1977) (cause of action for injury caused by large-scale oil spill can be asserted by those owning shoreline property but not by other property owners); Union Oil Corp. v. Oppen, 501 F.2d 558 (9th Cir. 1974) (inference that commercial interests injured by large-scale pollution episodes could show special injury). Burgess and Oppen are critically discussed in Pfennigstorf, supra note 331, at 393-95.


348. W. PROSSER, supra note 92, at 587.
addition to causation, that the interference was both substantial\textsuperscript{349} and unreasonable.\textsuperscript{350} Establishing that interference with a plaintiff’s property rights is substantial, especially if the plaintiff has proceeded under a public nuisance theory and has succeeded in proving a special injury, would probably pose little problem. Professor Prosser noted that “[w]here the invasion affects the physical condition of the plaintiff’s land, the substantial character of the interference is seldom in doubt.”\textsuperscript{351} Thus the more troublesome question is whether a plaintiff will be able to prove that the defendant’s activity was conducted unreasonably.

The determination of whether the defendant’s use is unreasonable weighs “the gravity of the harm to the plaintiff” against “the utility of the defendant’s conduct.”\textsuperscript{352} There is little question that the conduct of defendants in acid rain cases will have some utility; power produced through fuel combustion is a necessity. Yet in at least some cases acid rain may cause extensive damage to the property interests of others. The cases suggest that a use will be found unreasonable if it imposes such serious harm, even though the utility of the defendant’s conduct is also considerable.\textsuperscript{353}

A plaintiff who succeeds in proving that defendant’s conduct was unreasonable may still be faced with the defense of statutory authorization.\textsuperscript{354} This defense argues that if a facility’s operations are authorized by statute—as when the facility operates in conformity with state or local permit\textsuperscript{355} or with zoning regulations\textsuperscript{356}—the operations will not be found to constitute a nuisance. Cases so holding are very rare, however, and in most cases the defense would not be recognized for three reasons. First, the defense generally requires that the defendant not have engaged in unnecessary or injurious methods of operation.\textsuperscript{357} Thus a showing that the defendant’s operations were conducted negligently or with less than state-of-the-art technology should defeat the defense.\textsuperscript{358} Second, courts might be unwilling to find that the state had insulated a defendant from liability, because such insulation could constitute a taking for which compensation would be required.\textsuperscript{359} A final

\begin{itemize}
  \item \textsuperscript{349} \textit{Id.} at 577.
  \item \textsuperscript{350} \textit{Id.} at 580.
  \item \textsuperscript{351} \textit{Id.} at 578.
  \item \textsuperscript{352} \textit{Id.} at 596.
  \item \textsuperscript{353} \textit{Id.} at 598.
  \item \textsuperscript{354} \textit{Id.} at 606-07.
  \item \textsuperscript{355} \textit{See} 58 AM. JUR. 2D \textit{Nuisances} \S 234 (1971); Pfennigstorf, \textit{supra} note 331, at 381.
  \item \textsuperscript{356} W. PROSSER, \textit{supra} note 92, at 599-600, 606-07.
  \item \textsuperscript{357} \textit{See}, e.g., CAL. CIV. PROC. CODE \S 731a (West 1980).
  \item \textsuperscript{358} Christopher v. Jones, 231 Cal. App. 2d 408, 41 Cal. Rptr. 828 (1964); Pfennigstorf, \textit{supra} note 331, at 379-80.
\end{itemize}
point—although one not addressed by the cases—is that the defense of statutory authorization could not equitably be made available in trans-boundary disputes. Although one decision has allowed the defense where the harm occurred across a jurisdictional boundary, that decision is of uncertain scope and questionable authority.\(^\text{360}\) Allowing a defense of statutory authorization, in cases involving a harm inflicted by a resident of one state on a resident of another state, would run counter to basic concerns of comity; it would permit states to foist the consequences of local industrial activity on neighboring jurisdictions.\(^\text{361}\) Because acid rain is generally a transboundary problem, courts cognizant of such concerns would likely be unwilling to allow the defense in acid rain litigation. This argument would not apply, however, if the defendant could establish compliance with a nationwide standard. This raises the related issue of preemption of state law by nationwide standards.

3. Preemption of State Remedies

Another obstacle plaintiffs would confront in asserting a cause of action under state common law of nuisance in acid rain suits is the possibility that the state law remedy will be held to have been preempted by Congress. Under the preemption doctrine,\(^\text{362}\) Congress may supersede attempts by states to exercise legal authority in a particular field.

The Supreme Court has stated that federal preemption of state law will be found only upon “clear evidence” that Congress sought to ex-

Rodgers states that “[a] strong case can be made that the protection afforded by inverse condemnation, where applicable, and the law of nuisance should be coextensive although the prevailing dogma is that the taking theory is narrower, protecting against only aggravated nuisances.” \(\text{Id.}\)

360. New England Legal Foundation v. Costle, 475 F. Supp. 425 (D. Conn. 1979) (federal common law nuisance claim negated by compliance with Clean Air Act). An appeal of the court’s decision in Costle is currently pending before the Second Circuit. New England Legal Foundation v. Costle, No. 76-6202 (2d Cir. May 20, 1980) (decision and jurisdiction reserved as to the Long Island Lighting Company pending review by the Supreme Court of Milwaukee II). It should also be noted that compliance with federal environmental standards does not serve as an absolute defense to a state nuisance remedy. See notes 368-70 infra and accompanying text. Of course, compliance with environmental regulations will likely influence a court in determining whether a nuisance exists.

361. \(\text{See W. PROSSER, supra note 92, at 599. In the case of zoning laws, caselaw has recognized that a city may not zone land without regard to the effect of its zoning plan on neighboring localities. See, e.g., Scott v. City of Indian Wells, 6 Cal. 3d 541, 492 P.2d 137, 99 Cal. Rptr. 745 (1972) (requiring notice to property owners in adjacent municipalities). A similar principle of state comity should apply with regard to the defense of statutory authorization.}\)

362. Articles on the preemption doctrine are legion. A discussion of the general contours of the doctrine can be found in L. TRIBE, AMERICAN CONSTITUTIONAL LAW 376-404 (1978).
clude regulation by the states.\textsuperscript{363} Preemption may arise by implication, however, and thus an express statement is not required for a finding of "clear evidence" of Congress's intention to preempt.\textsuperscript{364} Preemption generally is found in either of two situations: where state action "conflicts with the actual operation of a federal program,"\textsuperscript{365} in which case the state action is invalid to the extent of the conflict,\textsuperscript{366} or where state action "intrudes upon a field that Congress has validly reserved to the federal sphere."\textsuperscript{367}

Although the preemption doctrine is an amorphous concept, it is nonetheless a potent legal doctrine; if preemption is found, states are wholly without authority in a given field. The doctrine may affect acid rain litigation in two ways: state remedies may be held preempted by federal statutory law or by federal common law of nuisance.

Federal statutes have not expressly preempted state common law remedies for acid rain damage. No federal statute directly regulates acid rain, and the two statutes operating in related areas both contain savings clauses that preclude a finding of express preemption.\textsuperscript{368} Although EPA, using its authority under these statutes, has promulgated regulations that apply to emission of acid rain precursors,\textsuperscript{369} the agency has not sought to control the acid rain problem with the directness that would support a finding of express preemption.\textsuperscript{370}

It is less clear whether federal statutes have implicitly preempted state acid rain remedies. Congress has not been silent regarding acid

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\item \textsuperscript{363} Ray v. Atlantic Richfield Co., 435 U.S. 151, 152 (1978) (quoting Rice v. Santa Fe Elevator Corp., 331 U.S. 218, 230 (1947)). Express preemption occurs when Congress has stated either in a statute or its legislative history that federal regulation was intended to be exclusive. See City of Burbank v. Lockheed Air Terminal, Inc., 411 U.S. 624, 644-45 (1973).
\item \textsuperscript{364} Rice v. Santa Fe Elevator Corp., 331 U.S. 218, 230 (1947).
\item \textsuperscript{366} McDermott v. Wisconsin, 228 U.S. 115, 132 (1913); Savage v. Jones, 225 U.S. 501, 533 (1912).
\item \textsuperscript{367} L. Tribe, \textit{supra} note 362, at 377.
\item \textsuperscript{368} Clean Air Act, 42 U.S.C. \textsection 7604(e) (Supp. III 1979); Clean Water Act, 33 U.S.C. \textsection 1365(e) (1976). As the term implies, a savings clause expressly preserves common-law and state-created remedies not inconsistent with or detrimental to the express federal remedies. These savings clauses have been expansively interpreted. See, \textit{e.g.}, California Tahoe Regional Planning Agency v. Jennings, 594 F.2d 181, 193 (9th Cir. 1979). At least one court, however, has found preemption notwithstanding such a savings clause. New England Legal Foundation v. Costle, 475 F. Supp. 425, 442 n.22 (D. Conn. 1979), \textit{appeal docketed}, New England Legal Foundation v. Costle, No. 76-6202 (2d Cir. May 20, 1980). See note 360 \textit{supra}.
\item \textsuperscript{369} Ambient air quality standards for sulphur dioxide and nitrogen dioxide, the two predominant acid chemical compounds contributing to acid rain, are already in effect. 40 C.F.R. \textsection\textsection 40.4-50.5 (1980) (sulphur dioxide); id. \textsection 50.11 (1980) (nitrogen dioxide).
\item \textsuperscript{370} There is some question whether EPA possesses authority to attempt such direct regulation; in fact, EPA has recently maintained that in some instances it lacks this authority. \textit{See Hearings on Acid Rain,} supra note 3, at 234 (statement of Douglas Costle).\end{itemize}
rain; it has authorized a study of the problem and considered acid rain in implementing coal-conversion plans. Further, because the acid rain problem is of national proportion, its resolution should be attempted at the national level. Nevertheless, in the absence of specific legislation from which an inference of preemption could be drawn, a finding that Congress has implicitly preempted state action is unlikely, and the vague expression of federal concern with acid rain to date is insufficient to warrant a finding of implied preemption.

It is also possible that recognition of a federal common law of nuisance by the courts has implicitly preempted state common law remedies. Although preemption is a question of congressional intent, the Supreme Court has recognized that implied preemption may result from administrative rulemaking and the act of courts in recognizing the federal common law may fit this mold. Further, the federal common law of nuisance has developed where courts found that Congress had indirectly authorized a federal law remedy by enacting regulation in the subject area, and this finding might also support the conclusion that Congress has impliedly preempted state law remedies.

While the federal common law may be grounded in general policies advanced by Congress, as a practical matter it exists independent of those policies, and thus a finding of implied preemption seems unwarranted. Further, the federal common law of nuisance has been ab-

373. Commonwealth Edison Co. v. Montana, 49 U.S.L.W. 4957, 4964 (1981) (refusing to find that a general expression of national policy encouraging the use of coal preempted Montana’s Coal Severance Tax). It should be noted that the Federal Government may soon take direct steps toward regulation of the acid rain problem. Hearings on Acid Rain, supra note 3, at 278-321, 340-67. If such action is taken, a finding of implied preemption will become much more likely. Courts might find in such circumstances that state remedies had been preempted, since such a finding would permit them to defer, at least temporarily, the difficulties of fashioning relief in acid rain cases. A finding of preemption could also be attractive because it would prevent piecemeal resolution of the problem under the differing remedies available among the different states.
374. As observed above, the Clean Air Act and Clean Water Acts regulate in areas related to the acid rain problem, and it might be argued that these statutes support a finding of implied preemption. In particular, § 125 of the Clean Air Act, 42 U.S.C. § 7425 (Supp. III 1979), which authorizes the use of low-grade coal when use of a higher grade would cause significant economic disruption in a geographic area, seems to reflect a congressional judgment as to how competing environmental and economic concerns may be reconciled. The Act’s savings clause, see note 368 supra, should preclude a finding of implied preemption, however.
375. See L. Tribe, supra note 362, at 386. See also notes 363-64 supra and accompanying text.
377. See note 279 supra.
stracted largely from statutes containing savings clauses, and it would be anomalous to hold that while the statutes themselves did not preempt state remedies, the federal common law derived from those statutes does preempt state law.

CONCLUSION

Plaintiffs seeking damages for injuries caused by acid rain face a number of potential obstacles. To bring together in one forum defendants residing in different states, plaintiffs must establish long arm jurisdiction over them. This raises questions of constitutionality under the due process clause. Statutory and common law venue requirements pose a second hurdle for acid rain plaintiffs.

This Article has considered how the jurisdictional and venue questions may be resolved to permit acid rain plaintiffs to bring suit in the state of their choice. Assuming that these initial obstacles can be surmounted, acid rain plaintiffs must next establish the liability of individual defendants for their injuries. Although acid rain can probably be linked generally to industrial sources, evidence is likely to prove insufficient to match acid rain with particular sources. Acid rain plaintiffs may nevertheless be able to establish liability, however, if the burden of proof on causation is shifted to the defendants, once injury to plaintiffs is shown. Recent cases in some states suggest rationales for burden shifting that may apply in acid rain cases.

A cause of action for acid rain could be stated under existing law—specifically, under either state or federal common law of nuisance remedies. That these remedies could be made available without advancing new legal doctrine does not mean, however, that the judiciary would be willing to sanction such a cause of action. Lawsuits brought for acid rain damage would be complex and time-consuming, and would entail significant costs for the courts. Further, acid rain poses a potentially enormous threat to the environment, and thus presents issues of great importance to society. Many judges may conclude that problems of such magnitude would better be addressed by legislative than judicial action.

These concerns, however, are not unique to acid rain, and there is reason to believe that courts may be willing to undertake resolution of such problems. Questions of the proper role of courts in society, and vis-a-vis the legislative branch, have attended many advances in legal doctrine. Courts have sometimes been willing to expand legal principles so as to remedy perceived wrongs when they believed, rightly or wrongly, that such changes would benefit society. In this spirit, some

378. See note 368 supra and accompanying text.
379. See Post, supra note 331, at 129.
courts may conclude that the policies of environmental protection and of remedying personal wrongs justify intervention on behalf of victims of acid rain damage.