Act of God? or Act of Man?: A Reappraisal of the Act of God Defense in Tort Law

Denis Binder

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Defense in Tort Law

Denis Binder*

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I. Introduction

One who knows the Mississippi will promptly aver—not aloud, but
to himself—that ten thousand River Commissions, with the mines of the
world at their back, cannot tame that lawless stream, cannot curb it or

* The phrase “act of man” is not gender neutral and would normally be inappropriate usage. However, because the phrase “act of man” is the language historically used by courts and commentators, this Article also uses it.

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In recent years, we have witnessed a veritable parade of natural calamities of seemingly biblical proportions: earthquakes, floods, hurricanes, tornadoes, wildfires, and drought, having escaped only tsunamis. Lives are lost, properties destroyed or damaged, and emotions shattered when these forces of nature tragically strike. The severity of nature’s blow may come as a total shock and surprise both to the direct victims of the disaster and, subsequently, to the accused tortfeasors. Lawyers follow the path of natural disasters by unleashing a flurry of lawsuits naming seemingly every

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3. The excessive precipitation in “the upper Mississippi River basin in the spring and summer of 1993 caused the largest flood ever measured at St. Louis.” U.S. Gen. Accounting Office, Midwest Flood: Information on the Performance, Effects, and Control of Levees 2 (1995) [hereinafter Midwest]. The President declared 505 counties disaster areas, 38 lives were lost, and an estimated $16 billion in damages were incurred. Id.
5. Twenty were killed on Palm Sunday, March 27, 1994 when a tornado reduced the Goshen United Methodist Church, in Goshen, Alabama, to rubble. Peter Applehome, Across the Tornado Belt, the Rubble is Real but the Losses Are So Hard to Grasp, N.Y. Times, Mar. 29, 1994, at A20.
6. In 1991, 24 people were killed and $1.2 billion in damages were incurred in the Oakland fires. Salholz, supra note 2, at 27.
7. A long-running drought has caused severe problems in Puerto Rico in recent years. 1994 witnessed “5 months of [water] rationing for more than half of the island’s 3.6 million residents.” Mireya Navarro, Taps Go Dry as Puerto Rico Copes With Drought, N.Y. Times, Jan. 23, 1995, at A10. In January 1995, “water for 700,000 residents, mostly in the San Juan area, [was] cut off on an alternate day[ ]” basis. Id.
8. Tsunamis are commonly, but mistakenly, referred to as tidal waves. The last major tsunami to strike the United States occurred in 1946 and 1960, both hit Alaska and Hawaii. Scott McCredie, When Nightmare Waves Appear Out of Nowhere To Smash the Land, Smithsonian, Mar. 1994, at 28, 36.
potentially responsible party, except God, as a defendant. In response, defendants are quick to claim act of God as a defense to these lawsuits. A critical legal issue in the ensuing litigation is the extent to which the forces of nature may in fact be termed an uncompensable act of God, rather than a negligent act of the defendant.

For three centuries, the act of God defense has been accepted in negligence and strict liability cases. The symbolic significance of the act of God defense is such that Congress adopted it as one of the few express defenses available in CERCLA litigation. As a legal concept, act of God shows up not only as a defense, but also in discussions of duty and causation.

Yet, considering the hallowed vintage of the act of God defense, it is surprising that little critical analysis of the doctrine exists. Its existence has been taken for granted. This lack of analysis may exist because, at first glance, the act of God defense seems a simple, straight-forward concept with few nuances or intricacies.

9. For example, at least 330 lawsuits were filed by drivers after the 1989 Loma Prieta Earthquake in the San Francisco Bay area. All lawsuits but 1 were settled by the state of California for a total of $69 million. Junda Woo, Like Recent Disasters, The Quake is Expected to Spawn Many Suits, WALL ST. J., Feb. 7, 1994 at B6.

One commentator has referred to the litigation following landslides in California as the “California landslide litigation syndrome.” Rob Risley, Landslide Peril and Homeowners’ Insurance in California, 40 UCLA L. REV. 1145, 1148 (1993).

Potentially liable parties include the architects, brokers, contractors, developers, engineers, financiers, government licensing authorities and regulators, inspectors, owners, sub-contractors, tenants, as well as any parties involved in modifications of an existing structure.


11. See infra text accompanying notes 124-134, 148-149.

12. See C.G. Hall, An Unsearchable Providence, The Lawyer’s Concept of Act of God, 13 OXFORD J. LEGAL STUD. 227, 227 (1993) (noting there is “no recent analysis of the lawyer’s concept of ‘act of God’ . . . the subject is treated peripherally in most standard textbooks on Tort law); Brian J. Stammer, “Nothing We Could Do”: The Defense of Act of God in Environmental Prosecutions, 4 J. ENVTL. L. & PRAC. 93 (1993) (criticizing the practice of allowing the defendant to escape liability when the act of God defense is proven); James L. Howe III, Act of God: A Reconsideration, 18 WASH. & LEE L. REV. 336, 340-41 (1961) (arguing that, in cases of defendants’ negligence, the defendants should be liable for their share of the harm, with the remainder covered by the act of God defense).

The result of this dearth of critical analysis, though, is that questions have not been raised regarding the continued basis for its existence. Consequently, all too often, many attorneys have misused the phrase "act of God" to mean any unfortunate act of nature.

A ludicrous example of the misuse of the term comes from Springfield, Massachusetts, where in December 1994 a lawsuit was filed because of the problem of intensifying odor at the Bondi's Island regional sewage treatment plant. The city's attorneys responded by claiming the smell was an act of God: "[T]he odors . . . are a natural feature of human waste and an act of God for which defendants are not responsible."

This Article examines the act of God defense, its history, and general negligence principles. It will also analyze natural forces to show that, either through warnings or structural modifications, the consequences of these blows of nature do not, in law, constitute unforeseeable, unpredictable acts of God.

The time has come to recognize the act of God defense for what it is: an anachronistic, mirror image of existing negligence principles. The defense no longer serves an independent useful purpose and should be subsumed into the duty issue of general negligence analysis.

II. History of the Act of God Defense

Oftentimes, the origins, the original justifications, of a legal doctrine are important in assessing its continued viability. It is an axiom of the common law that if the reasons for a rule cease, so too

16. This Article is concerned with the torts aspects of the act of God defense, and not its application as a defense in contracts litigation. See, e.g., Florida Power Corp. v. City of Tallahassee, 18 So. 2d 671 (Fla. 1944) (holding that an act of God was a legal justification for nonperformance of a contract); Chandler v. Aetna Ins. Co., 188 So. 2d 506 (La. Ct. App. 1939) (holding that an insurance policy covering accidents did not include acts of God). In a contracts or insurance situation, the parties voluntarily enter into a relationship in which they are free to set the terms and conditions of their undertakings. In the torts context, an innocent third party is often involuntarily thrust into a relationship with a tortious wrongdoer.
should the rule. As it turns out, the beginning of the act of God defense is an enigma. In a sixteenth century opinion, Shelley’s Case, best known for the famous property law doctrine of the rule in Shelley’s Case, the court wrote in terms of performance becoming impossible by an act of God, which was the death of one of the parties. The court stated: “[I]t would be unreasonable that those things which are inevitable by the Act of God, which no industry can avoid, nor policy prevent, should be construed to the prejudice of any person in whom there was no laches.” No further explanation of the phrase, act of God, was provided by the court.

The phrase reappeared in the 1702 case of Coggs v. Bernard, which invoked liability for a bailment by a common carrier. Justice Powell opined:

The party’s special assumpsit and undertaking obliges him so to do the thing, that the bailor come to no damage by his neglect. And the bailee in this case shall answer accidents, as if the goods were stolen; but not such accidents and casualties as happen by the act of God, as fire, tempest, &c. So it is 1 Jones 179. Palm 548. For the bailee is not bound, upon any undertaking against the act of God. Justice Jones in that case puts the case of the 22 Ass. where the ferryman overlade the boat. That is no authority I confess in that case, for the action there is founded upon the ferryman’s act, viz. the overlading the boat. But it would not have lain, says he, without that act; because the ferryman, notwithstanding his undertaking, was not bound to answer for storms. But that act would charge him without any undertaking, because it was his own wrong to overlade the boat.

Chief Justice Holt then stated in his opinion:

First if it be to a person of the first sort, and he is to have a reward, he is bound to answer for the goods at all events. And this is the case of the common carrier, common hoyman, master of a ship, &c. which case of a

17. See, e.g., CAL. CIV. CODE § 3510 (1872) (causing any rule, for which there is no longer a need, to cease); see also, Pierce v. Yakima Valley Memorial Hosp. Ass’n., 260 P.2d 765 (Wash. 1953) (holding that charitable, non-profit hospitals should no longer be held immune from liability for their employer’s negligence).
18. Professor Baker writes: “In the Fifteenth Century a stricter theory came into vogue, that the bailee was only excused if the loss was caused by an act of God or the king’s enemies,” but cites no authority for this proposition. J.H. BAKER, AN INTRODUCTION TO ENGLISH LEGAL HISTORY 442 (3d ed. 1990).
20. Id. at 220.
22. Id. at 108.
master of a ship was first adjudged 26 Car. 2, in the case of [Morse v. Slue], Raym. 220, 1 Vent. 190, 238. The law charges this person thus intrusted to carry goods, against all events but acts of God, and of the enemies of the King.23

The Chief Justice, unfortunately, did not define, or explain, what constitutes an act of God. Instead, he discussed losses by robbery. In the cited case of Morse v. Slue,24 Judge Hale stated that the master is not chargeable in the case of pirates, storms, and the like, "but where there is any negligence in him he is."25 Morse involved a ship lying in the Thames which was boarded by robbers who took the plaintiff’s goods from the vessel.

These fragmentary excerpts from Shelley’s Case and Coggs illustrate that, from three centuries ago, the English jurists were attempting to distinguish, in a rudimentary way, acts of God from negligent acts of man.

The act of God defense received prominence in decisions construing the common-law liability of common carriers, who were treated as insurers of the goods they carried.26 Since strict liability applied to insurers, the act of God defense existed to ameliorate an otherwise potentially draconian liability.

In 1785, Lord Mansfield delivered an unanimous opinion in Forward v. Pittard,27 which involved an accidental fire for which the carrier was in no way at fault. The court clearly established a rule of strict liability for common carriers:

After stating the case - The question is, whether the common carrier is liable in this case of fire? It appears from all the cases for 100 years back, that there are events for which the carrier is liable independent of his contract. By the nature of his contract, he is liable for all due care and diligence; and for any negligence he is suable on his contract. But there is a further degree of responsibility by the custom of the realm, that is, by the common law; a carrier is in the nature of an insurer. It is laid down that he is liable for every accident, except by the act of God, or the King’s enemies. Now what is the act of God? I consider it to mean something

23. Id. at 112.
25. Id.
in opposition to the act of man: for every thing is the act of God that happens by His permission; every thing, by this knowledge. But to prevent litigation, collusion, and the necessity of going into circumstances impossible to be unravelled, the law presumes against the carrier, unless he shows it was done by the King's enemies or by such act as could not happen by the intervention of man, as storms, lightning and tempests.28

Again, in *Forward*, the English courts limited the act of God defense by excluding acts of man.29 In addition, the burden of proof was shifted from the plaintiff to the defendant to establish the existence of the act of God defense.30

Although the courts subsequently split on the liability issue for common carriers whose delay subjected its freight to damage from an act of God, there was a consensus that liability would result if the common carriers knew that the force of nature was coming.31

The act of God defense expanded from common carriers into other areas of strict liability. In the famous case of *Rylands v. Fletcher*,32 Lord Blackburn casually stated: "[Defendant] can excuse himself by showing that the escape was owing to the plaintiff's default; or perhaps that the escape was the consequence of *vis major*,

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28. *Id.* at 956-57. One of the reasons, therefore, for requiring the act of God to be solely from natural forces was to preclude collusion between the common carrier and the highwayman.

29. *Id.*

30. *Id.* at 957.


32. [1866] 1 L.R.-Ex. 265, *aff'd* [1868] 3 L.R.-H.L. 330. On its precise facts, *Rylands* appears to be an anomaly. Defendants constructed a reservoir on land underlain by abandoned mine shafts. Upon partial filling by the defendants, the shafts gave way under pressure, causing water to flow into defendants' workings, and then into plaintiff's mines. However, cases factually similar to *Rylands* have occurred in the United States.

In *Great Lakes Dredge & Dock Co. v. City of Chicago*, on April 13, 1992, a break occurred on the roof of a freight tunnel running beneath the Chicago River. Water rapidly entered the tunnel and spread throughout the web of tunnels connecting Chicago's downtown area, causing extensive damage. 3 F.3d 225, 226 (7th Cir. 1993), *aff'd sub nom.* Jerome B. Gruhart, Inc. v. Great Lakes Dredge & Dock Co., 115 S. Ct. 1043 (1995). *See also* Williams v. Jader Fuel Co., Inc., 944 F.2d 1388 (7th Cir. 1991), *cert. denied*, 112 S. Ct. 2306 (1992) (analyzing a subsurface coal miner's right to recover for damages caused when a strip miner cut into a tunnel); Cahill v. Eastman, 18 Minn. 324 (1871) (holding that defendants were strictly liable for injuries resulting from tunnel construction).
or the act of God.” 33 As one commentator has noted, the effect of the defense, as it is used now, “is to erode the principle of strict liability under Rylands v. Fletcher in favor of a fault principle.” 34

Courts then extended the act of God defense to negligence cases. In the 1875 case of Nichols v. Marsland, 35 the court of appeals held that an act of God is a defense in cases of reservoir failures. 36 A stream had been dammed to create three ornamental ponds. An outlet, through a system of weirs, allowed water to return to the original course. A violent thunderstorm with rainfall “greater and more violent than any within the memory of the witnesses” struck on June 18-19, 1872. 37 All three dams failed during the night, washing away three county bridges downriver. 38 Evidence existed that the upper pool was defective in construction. 39 However, the jury found no negligence either in failing to predict the storm or in ensuring the safety of the embankments and weirs under ordinary, foreseeable conditions. The jury held the failure was caused by an act of vis major. 40 The trial judge overturned the jury’s finding. 41

On appeal, Lord Justice Mellish distinguished the case factually from Rylands by accepting the act of God defense:

It is the supervening vis major of the water caused by the flood, which, superadded to the water in the reservoir (which of itself would have been innocuous), causes the disaster. A defendant cannot, in our opinion, be properly said to have caused or allowed the water to escape, if the act of God . . . was the real cause of its escaping without any fault on the part of the defendant. 42

Baron Bramwell added: “No doubt [it was] not the Act of God or a vis major in the sense that it was physically impossible to resist it, but in the sense that it was practically impossible to do so.” 43

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33. Rylands, 1 L.R.-Ex. at 279-80.
34. Hall, supra note 12, at 232.
35. 10 L.R.-Ex. 255 (1875).
36. Id. at 259.
37. Id. at 256.
38. Id.
40. Nichols, 10 L.R.-Ex. at 256.
41. Id. at 257.
42. [1876] 2 Ex. D. 1, 5. Lord Mellish was the losing counsel in Rylands. [1866] 1 L.R.-Ex. 265, 287.
43. Nichols, 10 L.R.-Ex. at 258-59.
In the subsequent case of *Smith v. Fletcher*, Baron Bramwell followed the strict liability holding of *Rylands*, but brusquely dismissed the act of God defense in the following language:

It is said the flood was extraordinary, and they could not foresee it. I repeat my remark that that may take away moral blame from them, but how does it affect their legal responsibility? If for their own purposes they had diverted this flood into the hollow, when it came, then, though not knowing what would happen, it is clear they would be liable. Why are they not if it comes, because it must come, from natural causes?45

*Greenock Corp. v. Caledonian Railway Co.*46 contrasts with *Nichols*. In *Greenock Corp.*, the House of Lords followed *Rylands* in holding that

a person making an operation for collecting and damming up the water of a stream must so work as to make proprietors or occupants on a lower level as secure against injury as they would have been had nature not been interfered with. And this is so although the water accumulated suddenly, or the fall was extraordinary or even unprecedented in quantity.47

The rainfall was "heavy," "extraordinary," and "unprecedented," but still was not considered a superseding act of God.48 In *Greenock Corp.*, the defendant filled in a natural channel, substituting a culvert for it. No damage was caused by precipitation prior to defendant's alterations. However, after the alterations, damage occurred twice to property in the town.49 Therefore, an assumption could be raised pursuant to ordinary negligence principles that defendant's acts rendered the watercourse more dangerous than in its natural state.50

The defendant claimed the flood was of extraordinary violence. Lord Chancellor Finley, speaking for the court, rejected this argument, stating:

[Floods of extraordinary violence must be anticipated as likely to take place from time to time. It is the duty of any one who interferes with the course of a stream to see that the works which he substitutes for the

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44. 7 L.R.-Ex. 305 (1872).
45.  Id. at 310.
46. 1917 App. Cas. 556.
47.  Id. at 579.
48.  Id. at 580.
49.  Id. at 562-63.
50.  See, e.g., *Kennedy v. Union Elec. Co.*, 216 S.W.2d 756, 762 (Mo. 1948) (noting that prior to the building of the dam, there was never an overflow that reached the plaintiff's building).
channel provided by nature are adequate to carry off the water brought down even by extraordinary rainfall, and if damage results from the deficiency of the substitute which he has provided for the natural channel he will be liable. Such damage is not in the nature of damnum natale, but is the direct result of the obstruction of a natural watercourse by the defenders' works followed by heavy rain.\(^{51}\)

*Greenock Corp.* can also be reconciled with *Nichols* because it involved an area that experienced heavy rainfall.\(^{52}\) In his concurring opinion, Lord Dunedin maintained that one should not look to just the rainfall previously observed in Greenock because such rainfall was clearly not unprecedented in this general area of Scotland.\(^{53}\)

*Nichols* was further distinguished on two bases: the escape in *Nichols* was from a reservoir rather than a natural stream, and a jury in *Nichols* found the flood was due to an act of God. There had been “no negligence in the construction or maintenance of the reservoirs,” and “the flood was so great that it could not reasonably have been anticipated.”\(^{54}\)

Lord Wrenbury believed that liability existed because the act of the defendant failed to provide a channel sufficient to meet the contingency of the act of God: “But for the act of man there would have been no damage from the act of God.”\(^{55}\) The act of the defendant was in replacing the natural drainage channel with an inadequate artificial culvert.

\(^{51}\) *Greenock Corp.*, 1917 App. Cas. at 572.

\(^{52}\) Id. at 577 (Dunedin, L., concurring); see also Commissioner of Rys. (W. Aust.) v. Stewart, 56 C.L.R. 520, 529 (Austl. 1936) (asserting the contention that heavy, violent rainfall did not amount to act of God); Hall, *supra* note 12, at 234-35 (referring to Greenock's heavy rainfall and citing other cases involving unique or excessive rainfall problems that were acts of God).

\(^{53}\) *Greenock Corp.*, 1917 App. Cas. at 577; see also, AMF Int'l Ltd. v. Magnet Bowling Ltd., [1968] 1 WLR 1028 (finding that a heavy rainfall did not constitute an act of God since the flooding was foreseeable and could have easily been prevented); *Commissioner of Rys.*, 56 C.L.R. at 536 (asserting that reasonable care requires taking precautions for extraordinary as well as ordinary conditions) (Dixon, J.).

\(^{54}\) *Greenock Corp.*, 1917 App. Cas. at 573.

\(^{55}\) Id. at 584.
Lord Shaw, in his separate opinion, observed that he was not entirely satisfied that “damnum fatale”\textsuperscript{56} will ever be “capable of complete, exact, and unassailable definitions.”\textsuperscript{57}

Similar to Greenock Corp. is Nitro-Phosphate & Odam’s Chemical Monroe Co. v. London & St. Katherine Docks Co.,\textsuperscript{58} where an extraordinarily high tide may well have constituted an act of God, but the defendant was still negligent because it built a dock insufficiently high. The dock level was four feet above the high-water mark, which had not been reached by high tides in the prior recorded forty years. However, experience and the tradition of centuries had established four feet, two inches as the appropriate height. The defendant was negligent in not heeding the experience of centuries.\textsuperscript{59}

However, liability was limited to the damages occasioned by the defendant’s fault, and not the damages that would have occurred had it built the structure at the proper height. The burden of proof was placed on the defendant to make the allocation.\textsuperscript{60}

A recent survey of the English cases found a reluctance on the part of the courts “to formulate any clear, rule-defined, theory of what is to be accounted an act of God in law.”\textsuperscript{61} An act of God, as construed by the English courts, appears to be a combination of the occurrence and the consequence of the act.\textsuperscript{62} What is critical, though, is “the involvement of man in anticipating and averting the danger.”\textsuperscript{63} In this sense, the definition given by one court is

\textsuperscript{56} The English phrase “act of God” is the exact equivalent of the Scottish phrase “damnum fatale.” \textit{Id.} at 580.

\textsuperscript{57} \textit{Id.} This statement is comparable to Justice Stewart’s famous definition of obscenity, “But I know it when I see it.” Jacobellis v. Ohio, 378 U.S. 184, 197 (1963) (Stewart, J., concurring). It is also comparable to his antitrust statement, “[T]he Court pronounces its work consistent with the line of our decisions under § 7. . . . The sole consistency that I can find is that in litigation under § 7, the Government always wins.” United States v. Von’s Grocery Co., 384 U.S. 270, 301 (1966) (Stewart, J., dissenting).

\textsuperscript{58} 9 Ch. D. 503 (1878).

\textsuperscript{59} \textit{Id.}

\textsuperscript{60} \textit{Id.} at 527-28.

\textsuperscript{61} Hall, \textit{supra} note 12, at 238.

\textsuperscript{62} \textit{Id.} at 240.

\textsuperscript{63} \textit{Id.} at 241.
significant: "[A]n irresistible and unsearchable Providence nullifying all human effort." 64

Thus, as stated by Lord Justice James in *Nugent v. Smith*, the accident must be due to natural causes, directly and exclusively, and that it "could not have been prevented by any amount of foresight and pains and care reasonably to be expected from him." 65 As stated in a picturesque old-English case, a landowner, in constructing a reservoir, "is bound to provide against the ordinary operation of nature, but not against her miracles." 66 Acts of God, therefore, do not include "the gradual subsidence of soil caused by the wear and tear of heavy traffic," 67 or the gnawing of a hole in a ship's pipes by rats, thereby letting in sea water, causing damage to the cargo of rice. 68

It seems clear that the British jurists, like their American counterparts, have struggled from the beginning to limit acts of God to those events truly without human fault—to those events which cannot be protected against. Thus, even in the 1702 case of *Coggs*, the court discussed the ferryman who overloaded his boat. 69 It was his error, and not a storm, which resulted in the loss of the cargo. In fact, one commentator in 1937 noted that *Nichols* is the only reported English case in which a court accepted the act of God defense in a *Rylands* case. 70

III. Act of God in American Jurisprudence

The principles underlying the act of God defense in the United States are well established. The concept is not new. In essence,

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65. *1 C.P.D. 423, 444* (as stated by Mellish, L.J.). See also Greenwood Tilers, Ltd. v. Clapson, [1937] 1 All E.R. 765, 770 (K.B.D.) (holding that an owner of a flood bank could not rely on the defense of act of God when a tide broke through the bank because the tide was not the highest on record).
68. Pandorf v. Hamilton, 17 Q.B.D. 670, 675 (1886). See also Laverdoni v. Drury, 8 Ex. 166 (1852) (holding that the owner of a vessel was not excused for loss or damage of goods on the grounds that rats damaged the ship).
American courts adopted 200 years of English jurisprudence. An 1868 California case, Polack v. Pioghe,\textsuperscript{71} followed Forward v. Pittard\textsuperscript{72} in laying out principles that are equally applicable today. “The [act of God] expression excludes the idea of human agency, and if it appears that a given loss has happened in any way through the intervention of man,” it is not an act of God.\textsuperscript{73} As expressed elsewhere, an act of God is an eventuality outside of human contemplation, such as a catastrophic storm.\textsuperscript{74} If the storm is beyond human capacity to anticipate, then liability will not lie.\textsuperscript{75} One commentator posits the traditional definition of act of God as “an extraordinary event, occurring without human agency, which is both unforeseeable and impossible to prevent.”\textsuperscript{76}

The act of God defense generally entails the following requirements: the unforeseeability by reasonable human intelligence, and the absence of a human agency causing the alleged damage. Thus, if a similar event has occurred before, could be anticipated using modern techniques, or were otherwise reasonably foreseeable, even if not probable, claiming an act of God will not successfully serve as a defense. The test is not whether the eventuality is likely or probable, but whether it is foreseeable. Consequently, the defense is generally limited to truly unforeseeable events, rather than situations involving unusual, but not unprecedented, impacts.\textsuperscript{77}

\textsuperscript{71} 35 Cal. 416 (1868).
\textsuperscript{72} See supra text accompanying notes 27-30.
\textsuperscript{73} Polack, 35 Cal. at 423.
\textsuperscript{74} An act of God is “an unforeseeable force of nature.” 3 Fowler v. Harper et al., § 14.5, at 228 n.46 (2d ed. 1986).
\textsuperscript{75} See, e.g., Golden v. Amory, 109 N.E.2d 131, 133 (Mass. 1952) (holding that defendants are not liable for injuries caused by flooding that was beyond their capacity to anticipate). See also Sutliff v. Sweetwater Water Co., 186 P. 766 (Cal. 1920) (deciding that the owner of a reservoir is not liable for the breaking out of waters because of an extraordinary and unprecedented flood).
\textsuperscript{76} Stammer, supra note 12, at 94.
\textsuperscript{77} As expressed elsewhere:

Although a rainfall may be more than ordinary, yet if it be such as has occasionally occurred at irregular intervals, it is to be foreseen that it may occur again; and a party engaged in a public work, the construction of which involves the change or restraint of the flow of water in a natural channel, is guilty of negligence if it fails to make reasonable provision for the consequences that will result from such extraordinary rainfalls as experience shows are likely to recur.
a more recent case, the Alabama Supreme Court explained the standard as follows: “In its legal sense an ‘act of God’ applies only to events in nature so extraordinary that the history of climatic variations and other conditions in the particular locality affords no reasonable warning of them.” 78

The interpretation given the act of God defense is so exceedingly narrow today that the harm must happen “by the direct, immediate, and exclusive operations of the forces of nature, uncontrolled or uninfluenced by the power of men and without human intervention.” 79

If the event has occurred in the past, then it may recur in the future. For example, it will not be an act of God if higher average rainfalls occurred thirty-eight years earlier. 80 If such a storm has

Fairbury Brick Co. v. Chicago, R.I. & P. Ry. Co., 113 N.W. 535, 537 (Neb. 1907); see also Southern Pac. Co. v. Los Angeles, 55 P.2d 847 (Cal. 1936) (holding that unexpectedly heavy rain is not an act of God merely because of the volume); Webb v. Platte Valley Pub. Power & Irrigation Dist., 18 N.W.2d 563 (Neb. 1945) (holding that a flood must be so extraordinary and unprecedented as could not have been reasonably anticipated in order to be an act of God); Schweiger v. Solbeck, 230 P.2d 195, 200 (Or. 1951) (holding that act of God was not a defense when defendants’ negligence in permitting an accumulation of logging debris was a concurring cause in an alleged landslide); Butts v. City of S. Fulton, 565 S.W.2d 879, 882 (Tenn. Ct. App. 1977) (defining an act of God as

any misadventure or casualty . . . when it happens by the direct, immediate, and exclusive operation of the forces of nature, uncontrolled or uninfluenced by the power of man and without human intervention. It must be of such character that it could not have been prevented or escaped from by any amount of foresight or prudence, or by the aid of any appliances which the situation of the party might reasonably require him to use);

Anderson v. Highland Lake Co., 258 S.W. 218 (Tex. Civ. App.—Texarkana 1924, n.w.h.) (holding a lake company liable for damages to plaintiff’s property when a dam broke after a heavy rainfall); Greenock Corp. v. Caledonian Ry., 1917 A.C. 556 (holding that a landowner is bound to provide against ordinary natural events, but not acts of God).

80. Kennedy v. Union Elec., 216 S.W.2d 756, 763 (Mo. 1948). See also McKinley v. Hines, 215 P. 301, 302 (Kan. 1923) (holding that an unusually severe blizzard was not an act of God since equally severe blizzards occurred in the past); Corrington v. Kalicak, 319 S.W.2d 888, 892 (Mo. Ct. App. 1959) (defining an act of God as an event in nature so extraordinary that the history of climate variations in the locality affords no reasonable warning of their coming); Radburn v. Fir Tree
happened before in the area, it could be anticipated that it might happen again; there is in effect a presumption that it can occur again.

Similarly, if rains are foreseeable based on normal climatic conditions, it is not an act of God if the resulting harm could have been prevented through the design of proper drainage channels. A modern case, citing an earlier 1916 opinion, laid out these factors in analyzing the act of God defense:

In passing upon what is or what is not an extraordinary flood or whether it should have been anticipated and provided against, the question to be decided is: [] Considering the rains of the past, the topographical and climatic conditions of the region and the nature of the drainage basins as to the perviousness of the soil, the presence or absence of trees or herbage which would tend to increase or prevent the rapid running off of the water, would or should a reasonably prudent man have foreseen the danger and provided against it?

Lumber Co., 145 P. 632, 633 (Wash. 1915) (declining to hold a defendant liable for unprecedented natural causes such as an extraordinary rainfall).

As one court stated: "Rainfall is foreseeable in most places; and heavy rainfall was characteristic of that region. There is no point at which an expectable heavy rain becomes an act of God by reason of its unusual volume." Southern Pac. Co. v. Los Angeles, 55 P.2d 847, 850 (Cal. 1936). But see Trout Brook Co. v. Willow River Power Co., 267 N.W. 302 (Wis. 1936) (holding that power company had no duty to landowners when its dam flooded plaintiffs' land following extraordinary rains).

81. See, e.g., Garret v. Beers, 155 P. 2, 4 (Kan. 1916) (holding that the fact that heavy rains had occurred "many times before" rendered defendant liable for failing to adequately safeguard against flooding); Webb v. Platte Valley Pub. Power & Irrigation Dist., 18 N.W.2d 563, 568 (Neb. 1945) (holding that although a rainfall may be extraordinary if it is such that has occasionally occurred, it should be foreseen by reasonable person); Fairbury Brick, Co. v. Chicago R.I. & Pac. Ry. Co., 113 N.W. 535, 537 (Neb. 1907) (holding that earlier rainfalls of the same magnitude, although unusual, render a defendant responsible for reasonable precautions); Cottreu v. Marshall Infirmary, 24 N.Y.S. 381, 382-383 (N.Y. Sup. Ct. 1893) (holding that a similar rainfall in 1869 demonstrated that such rainfalls that washed away defendant’s dam were not so phenomenal as to absolve defendant of liability); Gulf, C. & S. F. Ry. Co. v. Pomeroy, 3 S.W. 722, 724 (Tex. 1887) (holding that history of such flooding made flooding foreseeable and, thus, left defendant liable).


83. See United States v. J.B. Stringfellow, Jr., 661 F. Supp. 1053, 1061 (C.D. Cal. 1987) (discussing the flooding of a major toxic-waste CERCLA site following unusually heavy rains).

As explained in Curtis v. Dewey,\textsuperscript{85} the act of God defense is based on the premise that

[n]egligence cannot be predicated upon a failure to anticipate that which was so extraordinary and utterly unprecedented as to have eluded the foresight of a reasonable man. If, therefore, a person builds a dam or embankment on or beside a waterway sufficient to withstand the maximum flow of water which might be expected, and his structure is destroyed by a flow which would not have been anticipated by a reasonably prudent man, then the resulting flood would be considered such an extraordinary flow of water as to amount to an "Act of God" and that person would not be negligent and not liable for damages caused by the flood.\textsuperscript{86}

In this respect, it is critical to note that while high levels of precipitation are, as a factual matter, a force of nature, they do not constitute, as a legal matter, an unforeseeable act of God. Nature's blow may be sudden and unexpected. The storm may leave a trail of destruction, devastation, and tragedy. Both the victims and the defendants may be surprised and shocked by the awesome force unleashed by nature. Yet, the catastrophe will not necessarily constitute an unforeseeable act of God.\textsuperscript{87} Forces of nature are not synonymous with acts of God, which have a more limited interpretation in the law.

If, therefore, the injury which the flood caused could have been avoided or prevented by human prudence, foresight, and care reasonably expected from the defendant, but not exercised, liability exists.\textsuperscript{88} Taking precautions against normal conditions may not

\textsuperscript{85} 475 P.2d 808, 810 (Idaho 1970).

\textsuperscript{86} \textit{id. See also} Bratton v. Rudnick, 186 N.E. 669, 671 (Mass. 1933) (defining an act of God as an event, such as a rainfall twice the amount previously recorded, which is so extraordinary and unprecedented as to defeat reasonable foresight); Frink, 186 N.W.2d at 439 (holding that a rainfall more than twice the maximum expected to occur once every 100 years would absolve a defendant of liability).

\textsuperscript{87} \textit{See, e.g.}, Freter v. Embassy Moving & Storage Co., 145 A.2d 442 (Md. Ct. App. 1958) (holding that even a hurricane, depending on the particular circumstances, might not absolve a defendant warehouse owner of liability for stored goods).

\textsuperscript{88} Perkins v. Vermont Hydro-Electric Corp., 177 A. 631, 636 (Vt. 1934). \textit{See also} McFeeters v. Renollet, 500 P.2d 47, 52 (Kan. 1972) (explaining that an act of God defense is only allowed if the intervening cause was not foreseeable or preventable); Butts v. City of S. Fulton, 565 S.W.2d 879, 882 (Tenn. Ct. App. 1977) (describing how construction work had caused property damage by preventing natural run off of flowing rainwater during a heavy rainstorm); Dougherty v. California-Pacific Utils. Co., 546 P.2d 880, 882 (Utah 1976) (explaining that an act of God classification depends on whether the storm was so severe that a reasonable and
suffice if abnormal conditions, such as wet cycles, are reasonably foreseeable. The test is not a subjective standard of what a defendant thought; rather, it is an objective standard of what a reasonable person under similar circumstances knew, or reasonably should have known. Normal weather conditions cannot, therefore, constitute an act of God even if the defendant has misjudged the situation. Thus, ice on the Hudson River in New York Harbor during January is not an unforeseeable act of God. Similarly, failure to protect against lightning striking oil storage tanks which were not vapor proof, and which had open holes on top, is negligence and not defensible as an act of God. The point is that violent acts of nature might not constitute an act of God even if unexpected by the defendant.

A minority view held by some courts advances a more liberal interpretation of act of God. The question for these courts is not whether the event occurred before, but whether it could reasonably be expected to recur in the future.

A significant limitation on the defense is that if the act of God coalesces with an act of the defendant, the defense fails. Thus, if the injury is caused in part by an act of God and in part by the

prudent person would not have foreseen or guarded against it).

89. Lang v. Wommenberg, 455 N.W.2d 832, 836 (N.D. 1990).
93. Southern Ry. Co. v. Cohen Weenen & Co., 157 S.E. 563, 564 (Va. 1931); Trout Brook Co. v. Willow River Power Co., 267 N.W. 302, 305 (Wis. 1936). See also Jacoby v. Town of City of Gillette, 174 P.2d 505, 510 (Wyo. 1946) (holding that an act of God defense existed with respect to a canal’s overflowing since it had not overflowed in the 35 years since it was constructed); Faulkner v. Ottawa, 41 S.C.R. 190 (1908) (holding that City of Ottawa has no duty to construct drainpipe capable of carrying an unforeseeably excessive amount of rainwater); R. V. Byron Creek Collieries Ltd., 8 C.E.L.R. 31 (B.C. Co. Ct. 1979) (holding that the rain that caused the damage was of an unforeseeable amount and defendant, thus, had no duty); Garfield v. City of Toronto, 220 A.R. 128 (Ont. Ct. App. 1895) (holding that the fact that the level of rain had occurred before was not enough to negate act of God defense).
n egligent act of defendant, the defendant remains liable.94 If the resulting injury might have been avoided or prevented by human prudence, foresight, and reasonable care, liability can ensue. For the defense to prevail, the act of God, therefore, must be the sole proximate cause of damage to the plaintiff with no negligence on the part of the tortfeasor.95 An act of God, therefore, proceeds from natural forces alone, to the exclusion of human agency.96 In other

94. Beaton v. Connecticut Light & Power Co., 3 A.2d 315, 318 (Conn. 1938); Lang v. Wonnenberg, 455 N.W.2d 832, 836 (N.D. 1990); Dougherty v. California-Pacific Util. Co., 546 P.2d 880, 882 (Utah 1976). See, e.g., Arkansas Valley Elec. Coop. v. Davis, 800 S.W.2d 420, 423 (Ark. 1990) ("Under this instruction, if HUD's injuries were produced by the combined effect of the act of God and the negligence of Arkansas Valley, then Arkansas Valley is liable for the damages."); Dye v. Burdick, 553 S.W.2d 833, 839 (Ark. 1977) (holding that act of God must be sole proximate cause of the damage with no negligence on the part of the injured party contributing to the cause); Diamond Springs Lime Co. v. American River Constructors, 94 Cal. Rptr. 200 (Cal. Dist. Ct. App.—3d Dist. 1971) (discussing liability of defendant when negligence is a substantial factor in causing the injury, despite the presence of independent causal forces); Frederick v. Hale, 112 P. 70 (Mont. 1910) (holding that when damages by a flood resulted from the negligence of the owner of a dam and an unprecedented flood constituting an act of God, the owner of the damaged property could recover from the owner of the dam); Rix v. Town of Alamogordo, 77 P.2d 765, 768-69 (N.M. 1938) (stating that when several causes combine to produce injuries, a party is not relieved from liability because the party is responsible for only one of them); Supervisor and Comm'r's of Pickens County, S.C. v. Jennings, 107 S.E. 312 (N.C. 1921) (discussing that if the damages to property by a flood resulted from both negligence and an unprecedented flood constituting an act of God, the owner of the damaged property could recover damages); Charvoz v. Bonneville Irrigation Dist., 235 P.2d 780 (Utah 1951) (explaining that it is well settled that a party is accountable if negligence concurs with an act of God); Perkins v. Vermont Hydro-Electric Corp., 177 A. 631, 636 (Vt. 1934) ("[If] the negligence of the one sought to be charged mingled with the operation of the natural causes, the injury is not, in a legal sense, the act of God.").


96. See, e.g., Johanson v. Burley Irrigation Dist., 304 P.2d 912, 916 (Idaho 1956) ("The distinguishing characteristic of an 'act of God' is that it proceeds from the force of nature alone, to the entire exclusion of human agency."); Slater v. South Carolina Ry. Co., 6 S.E. 936, 937 (S.C. 1888) ("The onus is upon the carrier to show not only that the act of God was the cause, but that it was the entire cause; because it is only when the act of God is the entire cause that the carrier can be shielded.").

The act of God defense is given an exceedingly narrow interpretation today such that the harm must happen "by the direct, immediate, and exclusive operation of the forces of nature, uncontrolled or uninfluenced by the power of man and without
words, "It must be of such character that it could not have been
prevented or escaped from by any amount of foresight or prudence,
or by the aid of any appliances which the situation of the party might
reasonably require him to use."

Inadequate design, construction, inspection, and maintenance are acts of people, and
should be adjudicated as such.

Two examples illustrate this principle. The first example is the
Johnstown, Pennsylvania flood of May 31, 1889; it entailed the
largest number of people, 2209, in the United States to die as the
result of the failure of a human-made structure.

human intervention." Butts v. City of S. Fulton, 565 S.W.2d 879, 882 (Tenn. Ct.

97. Butts, 565 S.W.2d at 882.

98. See, e.g., S.K. Whitty & Co., Inc. v. Lawrence L. Lambert & Assoc., 576
1929).

99. See, e.g., Shell v. Town of Evarts, 178 S.W.2d 32, 35 (Ky. 1944) (finding
that the injury to the plaintiffs’ property “was the natural and to be expected result
of the defendants’ negligent construction).

100. See, e.g., Ingram v. Howard-Needles-Tammen and Bergendorf, 672 P.2d
1083, 1087 (Kan. 1983) (finding that inadequate inspection and maintenance constitute
a breach of the duty owed foreseeable victims, citing RESTATEMENT (SECOND) OF
TORTS § 324A (1965)). See also Phillips v. United States, 801 F. Supp. 337, 348 (D.
Idaho 1992) (finding that defendant owed a duty “to inspect reconstruction work to
ensure that the work did not result in an unsafe condition of the road.”), aff’d, 15
F.3d 1088; Johnson v. Burley Irrigation Dist., 304 P.2d 912, 915 (Idaho 1956)
(finding that the existence of gophers should have been discovered through an
inspection); Bowman v. Columbia Tel. Co., 179 A.2d 197, 199 (Pa. 1962) (holding
that in determining whether the act of God defense is applicable, the defendant’s
knowledge of inspections must be evaluated).

101. See, e.g., Curtis v. Dewey, 475 P.2d 808 (Idaho 1970); Webb v. Platte
Valley Pub. Power & Irrigation Dist., 18 N.W.2d 563 (Neb. 1945); Little v. Price,
397 P.2d 15 (N.M. 1964); Bowling v. City of Oxford, 148 S.E.2d 624 (N.C. 1966);
Carlson v. A & P Corrugated Box Corp., 72 A.2d 290 (Pa. 1940); Glover v.
Hardeman County, 713 S.W.2d 73 (Tenn. Ct. App. 1985). See also Kimble v.
Mackintosh Hamphill Co., 59 A.2d 68, 71 (Pa. 1948) (stating that all acts preventable
by the exercise of ordinary maintenance are not subject to the act of God defense).

For example, there is only so much protection which can reasonably be afforded
to utility poles against the risks of hurricanes in the coastal United States. On the
other hand, we do not expect utility poles to be knocked over by a mild gust of wind
or foreseeable snowfall.

102. See generally Donald J. Jackson, When 20 Million Tons of Water Flooded
Johnstown, SMITHSONIAN, May 1989, at 50; Clare Ansberry, Johnstown Offers A Lot
to Devotees of Floods This Year, WALL ST. J., May 31, 1989, at A1.
The South Fork Dam was constructed fourteen miles upstream from Johnstown on the South Fork tributary of the Little Conemaugh River.\(^3\) It was built in 1852, collapsed in 1863, and laid abandoned until purchased by the South Fork Fishing and Hunting Club. Repairs on the dam to create a fishing lake were done without an engineer’s supervision. The capacity of the emergency spillway was reduced, and the top of the dam sagged in the middle. After heavy rains, the dam burst, pouring twenty million tons of water down a narrow river valley, whose river channel had in turn been artificially squeezed in by developments on filled-in land. The runoff was further increased by timber cutting on the hillsides. The valley had been subject to periodic flooding. Seven floods had occurred in the eight years prior to the collapse.\(^4\) Warnings of structural inadequacy were disregarded by the Club. Thus, the 1889 flood was a disaster waiting to happen.

In one case, a railroad had misshipped a passenger’s trunk, and the trunk ended up destroyed in the Johnstown tragedy.\(^5\) The railroad claimed the loss was an unforeseeable act of God. The court agreed that the tragic flood was an act of God, but since it was the railroad’s negligence which placed the trunk in the path of the floodwaters, the railroad was held liable in the only case imposing liability out of the flood.\(^6\) Although a coroner’s jury found the

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103. Jackson, supra note 102, at 52.
104. In addition to the earlier floods, subsequent floods occurred in 1891, 1894, 1902, 1907, 1936 (killing 25 people), and 1977 (killing 80 people).
106. Id. This case follows the general view. See, e.g., Bibb Broom Corn Co. v. Atchison, T. & S. F. Ry. Co., 102 N.W. 709, 711 (Minn. 1905) (holding that the defendant breached the duty of a common carrier by not promptly forwarding goods to their destination). But see Toledo & O. Cent. Ry. Co. v. S.J. Kibler & Bros. Co., 119 N.E. 733 (Ohio 1918) (holding that antecedent delay of transportation, without other act of negligence, will not render the bailee responsible for damage caused by flood).

In contrast to today’s litigation that would ensue after such a tragedy, this case was the only liability arising out of the dam’s failure. The dam, which was in poor structural shape, was owned by an association whose members included Andrew Carnegie, Andrew Mellon, and other Pittsburgh industrialists.

In a different case, arising out of the Johnstown Flood, where no negligence existed on the part of a railroad, the loss of two trunks was held to be an act of God. Long v. Pennsylvania R.R. Co., 23 A. 459 (1892).
owners "culpable in not making [the dam] as secure as it should have been," several juries held that the flood was an act of God and exculpated the Club. 107

The second example, a classic Colorado case, further illustrates the limitations of the act of God defense. 108 Design plans for the dam called for a spillway capacity of 33,000 cubic feet per second (cfs). 109 The actual spillway, as constructed, had a 4500 cfs capacity. 110 The probable maximum flood was 200,000 cfs, although the previously known high flow of water was 27,500 cfs. 111 The peak of the flood that occurred was 158,000 cfs with an estimated 75,000-100,000 cfs passing over the top of the dam. 112 Defendants claimed act of God as a defense. The court rejected that defense, holding the defendants negligent in designing an inadequate spillway. 113 There was no act of God since the flow of water was reasonably foreseeable. 114 The foreseeability of the risk, that is the probable maximum flood, was the key to liability.

Negligence, of course, may arise in the design, siting, construction, maintenance, or operation of a facility. Structural survival cannot be guaranteed in earthquakes, fires, storms, hurricanes, tornadoes, or similar acts of nature. However, design and construction techniques exist which may minimize the impact of the act. 115 If such means exist, then it may be negligence not to employ them.

107. Jackson, supra note 102, at 60.
See also Hayashi v. Alameda County Flood Control & Water Conservation Dist., 334 P.2d 1048 (Cal. Ct. App. 1959) (stating that once the defendant constructs a levee, it has a duty to maintain it in a reasonable manner); Curtis v. Dewey, 475 P.2d 808 (Idaho 1970) (holding that when defendants had boarded up the spillway of their dam, neglected to maintain the toe of the dam properly, and waited until back waters were almost overspilling the top of the dam before opening the headgates, the jury could properly find that the defendants had negligently operated the dam); Oklahoma Ry. Co. v. Boyd, 282 P. 157, 163 (Okla. 1929) (stating that a party is not liable for damage resulting from an act of God, but is liable if the party's negligence, "commingled with an act of God," causes the damage).
110. Id.
111. Id.
112. Id.
113. Id. at 343.
114. Barr, 497 P.2d at 344.
115. See infra text accompanying notes 188-207.
To reiterate, while unforeseeable levels of precipitation may, as a factual matter, constitute a force of nature that may be labeled as an act of God, the inadequate design, construction, inspection, and maintenance are acts of people, and will be adjudicated as such. In truth, technological failures, such as dam breaches and bridge collapses, normally constitute acts of people.

For example, presume that in the case of major structural failures, subsequent investigations reveal the cause of the failure. Inevitably, at least one of the causes will involve human error. Arguably, the major weakness in any engineering plan is the human.

Even when an act of God occurs, negligence may still exist when the defendant fails to take reasonable steps to avert or minimize the resulting losses. For example, when floodwaters are rising, but still confined within the dam and levee system, a railroad might have time to remove freight cars threatened by a

116. In addition to the information discovered through formal investigations, a practical reality in this age of almost immediate media coverage is that after a major technological failure, such as the space shuttle Challenger explosion, "I told you so" memos will often surface. These memos are evidence of warnings received by the organization prior to the accident. They point out weaknesses or predict failures of the system. The practical effect of these memos is to undercut any claim of lack of knowledge of the risks. For example, it was reported after the New York World Trade Center bombing that a task force report eight years earlier warned of the possibility of a terrorist attack, and recommended the parking garage be closed to the public, as one of several recommendations to insure security of the building. Few of the recommendations were carried out. Mary B.W. Tabor, Panel Warned in 1985 of Vulnerability of Center's Parking to Bombing, N.Y. TIMES, Mar. 1, 1993, at B5. Such memos constitute a "smoking gun" in the hands of attorneys seeking compensation for the victims.

breach or overtopping of the retention facilities.\textsuperscript{118} Elsewhere the act of God defense failed when snow fell off a roof and injured a pedestrian because four days existed in which the eighteen-inch snowpack could have been removed.\textsuperscript{119}

Disaster and emergency relief planners and utility companies have long designed contingency plans for such foreseeable acts of nature as blizzards, earthquakes, floods, hurricanes, and tornadoes. Such planning is often legally required.\textsuperscript{120} For example, Congressional response to the Exxon Valdez Oil Spill included a requirement for vessel and facility response plans to establish a "worst case discharge" analysis, which should address training, equipment testing, unannounced drills, and planned responses.\textsuperscript{121} These plans often include implementation of an emergency warning system, whose activation in an emergency may reduce injuries and damages that might otherwise result from the impact of the natural force.

Once the plaintiff makes out a prima-facie case of negligence, the burden of proof shifts to the defendant to establish the act of God

\begin{enumerate}
\item[118.] See, e.g., Ismert-Hincke Milling Co., v. Union Pac. R.R. Co., 238 F.2d 14 (10th Cir. 1956) (holding that defendant could be found liable if it failed to act as a prudent person would under such circumstances, but the facts demonstrated that the damage had been caused only by an act of God). See also W.A. Taylor & Co. v. Griswold & Bateman Warehouse Co., 754 F. Supp. 1260 (N.D. Ill. 1990) (holding that a genuine issue of material fact existed as to whether the warehouse owner breached its duty to the owner of goods stored in the warehouse which flooded due to unforeseeable rainfall); Chesapeake & O. Ry. Co. v. Blilter, 415 S.W.2d 894 (Ky. Ct. App. 1967) (holding defendant railroad negligent and, thus, liable for death of plaintiff's son because it failed to make close inspection of the railroad tracks as required).
\item[119.] Slaters v. Worthington's Cash Stores, [1941] 1 L.J.K.B. 488, 492.
\end{enumerate}
defense.\textsuperscript{122} The existence of the defense is a question of fact for the jury.\textsuperscript{123}

Failure of the act of God defense does not automatically result in liability. While the doctrine may serve as a defense, its absence does not establish a duty of care. The defendant would still have to be found liable in light of the normal negligence standard of reasonable care. If the risk is unforeseeable, there is no duty of care, and thus no negligence. One important question is whether, in light of the foreseeability of the risk, the defendant could have done anything to avert or minimize the impact.

To summarize, the act of God defense in American jurisprudence generally fails if the event reasonably should have been anticipated in light of past knowledge, or if antecedent negligence on the part of the defendant exacerbates the situation. While the past is prologue with respect to actually occurring events, foreseeability is based not only upon the historical past, but also upon that which modern technology and science allows us to project into the future.

IV. Act of God as a Causation Issue

The act of God defense often has arisen in cases of joint causation, when two causes, one of human origin and the other of natural origin, combined to cause injury to a third party. The legal issue resulting is the allocation of liability between the negligent act of the defendant and the natural cause, which was labeled an act of God. Many courts refuse to allocate liability, analogizing the


scenario to the normal rules of joint and several liability\textsuperscript{124} which apply if both causes of a harm are the act of tortfeasors.\textsuperscript{125}

Similarly, the traditional \textit{sine qua non} ("but for"), substantial factor, or legal causation tests apply. If the act of God is so overwhelming that its own force produces the injury independent of the defendant’s negligence, then the defendant will not be liable.\textsuperscript{126} If the damages suffered are incurred solely due to natural causes without any known fault, there is no liability because of the act of God. There are two ways of viewing this situation. The act of God either supersedes the defendant’s negligence, or the defendant’s negligent act is not a cause in fact of the injury. In either case, the defendant’s act did not cause the damage since the injury would have occurred anyway.\textsuperscript{127}

If, though, the defendant could have reasonably expected that the resulting injuries might have been avoided or prevented by human prudence, foresight, or care, liability may ensue.\textsuperscript{128} If,

\begin{itemize}
\item \textsuperscript{124} \textit{See}, \textit{e.g.}, Michie v. Great Lakes Steel Div., Nat’l Steel Corp., 495 F.2d 213, 217-18 (6th Cir.) (explaining general rule of joint and several liability against multiple tortfeasors), \textit{cert. denied}, 419 U.S. 997 (1974); A.M. Holter Hardware Co. v. Western Mortgage & Warranty Title Co., 149 P. 489, 491 (Mont. 1915) (holding that defendants remain liable if their actions contribute to the injury, regardless of a contributory act of God cause of injury). \textit{But see} Brown v. Chicago B. & Q. R.R. Co., 195 F. 1007, 1012-13 (D. Neb. 1912) (rejecting that a claim for negligence can be made when damages cannot be apportioned to each specific cause).
\item \textsuperscript{125} \textit{See}, \textit{e.g.}, Inland Power & Light Co. v. Grieger, 91 F.2d 811, 816-17 (9th Cir. 1937) (stating that when an act of God is concurrent with defendant’s negligence, defendant is liable as if it had caused the harm); Fairbrother v. Wiley’s Inc., 331 P.2d 330, 336-37 (Kan. 1958) (declaring that defendant is not excused from liability when the act of God would not have wrought the injury but for the human negligence which contributed there); Supervisors and Comm’rs of Pickens County, S.C. v. Jennings, 107 S.E. 312, 315 (N.C. 1921) (describing the well-settled rule that defendant is responsible even though the defendant’s negligence is concurrent with an act of God). \textit{See also} Harris v. Norfolk S. R.R. Co., 91 S.E. 710, 711 (N.C. 1917) (observing that when the negligence of a common carrier concurs with an act of God, the common carrier is liable as if it alone had produced the harm).
\item \textsuperscript{126} Krupa v. Farmington River Power Co., 157 A.2d 914, 917 (Conn. 1959); Bratton v. Rudnick, 186 N.E. 669, 672 (Mass. 1933); Frank v. County of Mercer, 186 N.W.2d 439, 446 (N.D. 1971); City of Piqua v. Morris, 120 N.E. 300, 302 (Ohio 1918); Oklahoma City v. Tarkington, 63 P.2d 689, 691 (Okla. 1936); Perkins v. Vermont Hydro-Elec. Corp., 177 A. 631, 636 (Vt. 1934).
\item \textsuperscript{127} \textit{See}, \textit{e.g.}, Krupa, 157 A.2d at 917; Bratton, 186 N.E. at 672; City of Piqua, 120 N.E. at 302.
\item \textsuperscript{128} Perkins, 177 A. at 636.
\end{itemize}
therefore, one builds in geologically fragile areas, or with improper building methods, or follows up with inadequate inspection and maintenance, then the resulting blow of nature does not supersede liability.

Thus, if the force of nature would have produced the damage solely on its own, there is no liability. However, if the defendant's negligence coincides with the natural cause to increase the damage, there is liability. For example, if a flood, caused by an act of God, would not on its own have damaged the plaintiff's property, then the defendant will be liable for all resulting damage to the plaintiff caused by its dam failure. There is no need to apportion damages or liability in this situation since the defendant's negligence is in fact the proximate cause of the plaintiff's damages. The burden of proof is on the defendant to show that the unprecedented flood would have produced the same result, notwithstanding the release of any additional waters.

When divisibility of damage is possible, some courts allow for an apportionment of damages between the losses occasioned by human acts and those caused by the forces of nature. If allocation is not possible, then the defendant should be liable for the totality of the plaintiff's damages.

129. Carlson v. A & P Corrugated Box Corp., 72 A.2d 290, 293 (Pa. 1950). See also Kennedy v. Union Elec. Co., 216 S.W.2d 756, 764 (Mo. 1948) (asserting that the act of God defense fails if "the result in part is ascribable to the participation of man").

130. See, e.g., McAdams v. Chicago, R. I. & P. Ry. Co., 205 N.W. 310, 311 (Iowa 1925) (holding that a negligent defendant should not be liable for damages that would have resulted from flood regardless of defendant's actions); Rix v. Town of Alamogordo, 77 P.2d 765, 770 (N.M. 1938) (supporting the trial court's attempt to apportion damages between those injuries resulting from unusual rainfall and those resulting from a combination of extraordinary rainfall and defendant's negligent acts); Radburn v. Fir Tree Lumber Co., 145 P. 632, 633 (Wash. 1915) (advising that defendant should be liable only for damages to crops resulting from defendant's negligent act, but should not be liable for damages resulting from rainfall). See also Johnson & Johnson v. Dundas, 4 D.L.R. 624, 638 (Ont. 1945) (finding that defendant who diverted surface water into a creek, thus increasing the volume of the creek, was liable only for damages caused by the overflow beyond the normal periodic flooding).

131. See Kennedy v. Union Elec. Co., 216 S.W.2d 756, 762-63 (Mo. 1948) (reaffirming that when a defendant's negligence concurs with an act of God, the act of God defense does not apply and the defendant is responsible and liable for the whole).
The act of God defense can also be analogized to the rules regarding intervening causes because a blow of nature is an intervening cause with respect to defendant's pre-existing negligence. The question arises, though, whether the intervening cause is a superseding cause. Some courts view the act of the defendant as a non-superseding intervening cause. However, the act of God must be an unforeseeable intervening cause whose consequences could not be prevented.

A common maxim of causation law is that liability, arising out of the defendant's negligence, exists for both foreseeable results of foreseeable causes and for foreseeable results of unforeseeable causes. Therefore, these intervening causes are not viewed as superseding. By way of example, if a defendant negligently spills flammable oil in a body of water, it is foreseeable that something could ignite the oil, even if the precise means of ignition—be it a bolt of lightning, a lit cigarette, or welding sparks—are unforeseeable. If the result is within the risk, and if the risk is foreseeable, then it usually does not matter how the risk materializes.

Similarly, if the intervening cause is foreseeable, it is not a superseding cause. Thus, we are back to the premise that most forces of nature, such as earthquakes, hurricanes, and blizzards, are

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132. See, e.g., Diamond Cattle Co. v. Clark, 74 P.2d 857, 869 (Wy. 1937) (finding that the defendant is not liable for intervening causes).

133. See, e.g., Lee v. Mobil Oil Corp., 452 P.2d 857, 860 (Kan. 1969) (finding defendant's release of dangerous substances, if intentional and contemporaneous with the flood, a direct cause of damages); Butts v. City of S. Fulton, 565 S.W.2d 879, 882 (Tenn. Ct. App. 1977) (confirming holding that defendant's construction work was intervening cause of damage to plaintiff's property due to heavy rains).


135. See, e.g., Johnson v. Kosmos Portland Cement Co., 64 F.2d 193, 197 (6th Cir.) (holding that lightning was not a sufficient intervening cause to remove liability for original wrong), cert. denied, 290 U.S. 641 (1933).


137. See, e.g., Overseas Tankship (U.K.) Ltd. v. Mort's Dock & Eng'g Co. Ltd. (The Wagon Mound), 1961 App. Cas. 388, 389 (holding that appellants were not liable for damages resulting when oil spilled into harbor met with sparks and spread fire along the water because the situation was not reasonably foreseeable).

138. Tex-Jersey Oil, 292 S.W.2d at 809.
foreseeable today.\textsuperscript{139} As succinctly expressed in Prosser and Keeton on the Law of Torts: "Thus, it has been held that a defendant will be required to anticipate the usual weather of the vicinity, including all ordinary forces of nature."\textsuperscript{140} These forces of nature include wind,\textsuperscript{141} rain,\textsuperscript{142} snow,\textsuperscript{143} frost,\textsuperscript{144} fog,\textsuperscript{145} and

\begin{footnotesize}
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\item See, e.g., McKinley v. Hines, 215 P. 301, 303 (Kan. 1923) (holding that a blizzard did not supersede the original act as proximate cause of the injury); Diamond Cattle Co. v. Clark, 74 P.2d 857, 869 (Wyo. 1937) (finding defendant's cancellation of plaintiff's lease a cause of plaintiff's loss of cattle, despite the fact that an unusual storm ensued).
\item W. PAGE KEETON, ET AL., PROSSER AND KEETON ON THE LAW OF TORTS \S\ 44, at 304 (5th ed. 1984).
\item See, e.g., Jacobson v. Suderman & Young, Inc., 17 F.2d 253, 254 (5th Cir. 1927) (noting that wind may be an expected occurrence depending on knowledge of local weather conditions for certain times of the year); Cachick v. United States, 161 F. Supp. 15, 19 (S.D. Ill. 1958) (holding that where strong winds should be expected the act of God defense does not excuse negligent construction); Fairbrother v. Wiley's, Inc., 331 P.2d 330, 337 (Kan. 1958) (ruling that if defendant should have anticipated strong and gusty winds liability will attach regardless of the natural phenomenon).
\item See, e.g., Holter Hardware Co. v. Western Mortgage & Warranty Title Co., 149 P. 489 (Mont. 1915); Milton D. Taylor Constr. Co. v. Ohio Dep't of Transp., 572 N.E.2d 712, 715 (Ohio Ct. App. 1988) (holding that when rainfall is reasonably expected one cannot claim such as unforeseeable and beyond the control of the party).
\item See, e.g., Klein v. United States, 339 F.2d 512, 515 (2d Cir. 1964) (holding defendant liable for natural accumulation of ice due to the fact that the underlying walkway was uneven and left unrepaired); Bowman v. Columbia Tel. Co., 179 A.2d 197, 198-99 (Pa. 1962) (ruling that when snowfall is expected it is a question of fact for the jury to determine whether defendant was negligent in not taking known, natural conditions into account).
\item See, e.g., Benedict Pineapple Co. v. Atlantic Coast Line R.R. Co., 46 So. 732, 738 (Fla. 1908) (holding that when certain precautions have been taken by plaintiff to avoid anticipated cold and frost, defendant is not released from liability for destroying such protections by asserting the frost was an act of God); Fox v. Boston & M.R. Co., 19 N.E. 222, 223 (Mass. 1889) (ruling that even when plaintiff had specified a delivery date to avoid possible frost, a change in temperature is to be expected and, thus, cannot be an act of God).
\item See, e.g., White v. Dickerson, 105 S.E.2d 51, 57 (N.C. 1958) (noting that when "fog is anticipated by everybody" it cannot be used in the act of God defense).
\end{enumerate}
\end{footnotesize}
lightning.\textsuperscript{146} Illustrating this principle that a defendant must anticipate the weather, one court recognized that lightning striking a utility line was an act of God, but failure to ground the line was "not an act free from human agency."\textsuperscript{147}

With the risks being foreseeable, many of these opinions refer to the defendant's failure to exercise the duty of reasonable care.\textsuperscript{148} Several of these cases also reject the act of God defense because of the foreseeability of the natural risk.\textsuperscript{149}

V. Negligence

An overview of the parameters of negligence analysis reveals its overlap with the act of God defense. Negligence is defined as the failure to exercise the standard of care of a reasonable person under the circumstances. This standard, in turn, is based upon the

\textsuperscript{146} See, e.g., Richards v. Kansas Elec. Power Co., 268 P. 847, 848 (Kan. 1928) (finding that lightning did not supersede defendant's failure to install sufficient ground wires as proximate cause of plaintiff's injury); Clark's Adm'r. v. Kentucky Utils. Co., 158 S.W.2d 134, 136 (Ky. 1941) (ruling that even if lightning is an act of God, no grounding of the wires is still a proximate cause of the injury); Jackson v. Wisconsin Tel. Co., 60 N.W. 430, 431 (Wis. 1894) (ruling that defendant could not use the act of God defense to escape liability for damages resulting from a lightning strike and subsequent fire when defendant negligently constructed telephone wiring and, thus, made it more probable that lightning would strike the building).


\textsuperscript{148} See, e.g., Klein v. United States, 339 F.2d 512, 516 (2d Cir. 1964) (finding landlord negligent for allowing ice to form in walkway causing plaintiff to slip); Cachick v. United States, 161 F. Supp. 15, 18-19 (S.D. Ill. 1958) (finding Government negligent for failing to secure stands at airshow so that they could withstand foreseeable forces of nature); Fairbrother v. Wiley's, Inc., 331 P.2d 330, 336-37 (Kan. 1958) (finding department store owner negligent for failing to secure windows in store from frequent wind gusts); Clark's Adm'r v. Kentucky Utils. Co., 158 S.W.2d 134, 137 (Ky. 1941) (finding utility company negligent for electrocution, from lightning, of a child when grounding wire would have prevented accident); A.M. Holter Hardware Co. v. Western Mortgage & Warranty Title Co., 149 P. 489 (Mont. 1915); White v. Dickerson, 105 S.E.2d 51, 58 (N.C. 1958) (finding contractor negligent for failing to foresee effect of fog to users of bridge).

\textsuperscript{149} Cachick v. United States, 161 F. Supp. 15, 19 (S.D. Ill. 1958); Fairbrother v. Wiley's, Inc., 331 P.2d 330, 336-37 (Kan. 1958); A.M. Holter Hardware Co. v. Western Mortgage & Warranty Title Co., 149 P. 489, 491 (Mont. 1915); Vipond v. Townsend, 60 N.W. 430, 432 (Wis. 1894).
reasonable foreseeability of the particular risk. The legal standard of reasonable care, as laid out by Judge Learned Hand, becomes a calculus of three components: the risk of an accident occurring, the magnitude of harm should the risk materialize, and the availability of alternatives which would prevent the accident. \textsuperscript{150} Therefore, once a risk is foreseeable, the question becomes how a reasonable person should act, taking into account the potential magnitude of harm and the alternatives available.

The standard of care is a sliding, flexible concept. As the potential gravity of harm increases, so too does the applicable duty of care. \textsuperscript{151} Thus, the duty of reasonable care is proportional to the risk of injury. As stated by Prosser and Keeton:

\begin{quote}
[I]f the risk is an appreciable one, and the possible consequences are serious, the question is not one of mathematical probability alone. The odds may be a thousand to one that no train will arrive at the very moment that an automobile is crossing a railway track, but the risk of death is nevertheless sufficiently serious to require the driver to look for the train and the train to signal its approach . . . . As the gravity of the possible harm increases, the apparent likelihood of its occurrence need be correspondingly less to generate a duty of precaution.\textsuperscript{152}
\end{quote}

Thus, while only slight care might be required for a small stock-watering pond in an unpopulated, rural area, it would be grossly

\textsuperscript{150} United States v. Carroll Towing Co., 159 F.2d 169, 173 (2d Cir. 1947).

\textsuperscript{151} Albison v. Robbins & White, Inc., 116 A.2d 608, 612 (Me. 1955); Willie v. Minnesota Power & Light Co., 250 N.W. 809, 810-11 (Minn. 1933). \textit{See also} Dover v. Georgia Power Co., 168 S.E. 117, 118 (Ga. Ct. App. 1933) (holding that due care is "in proportion to the extent of the injury which will be likely to result to third persons"); Herro v. Board of County Rd. Comm'rs, 118 N.W.2d 271, 274 (Mich. 1962) (imposing a duty on a municipality undertaking a public works project to use care "proportioned to the danger of injury"); City Water Power Co. v. City of Fergus Falls, 128 N.W. 817, 818 (Minn. 1910) (observing that the owner is bound to exercise a degree of care in the construction and maintenance of a dam in proportion to the injuries likely to result to others if it proves insufficient); Mackay v. Breeze, 269 P. 1026, 1027 (Utah 1928) ("The degree of care required to prevent the escape of water is commensurate with the damage or injury that will probably result if the water does escape.").

\textsuperscript{152} KEETON, ET AL., \textit{supra} note 140, § 31, at 171.
improper to use minimal care in designing, constructing, or maintaining a large dam overlooking a major population center.\footnote{153}

In addition, the applicable standard of care is also flexible over time, based upon the understanding of the risks, and the availability of precautions that may minimize or lessen these risks' impact. Thus, if technology improves to minimize the risk, the duty to use this technology correspondingly rises.\footnote{154} The risk may also increase because of external circumstances, such as changes in development downstream from a dam. For example, if a trailer park is situated downstream from a stock-watering pond, the pond owner's duty of care should rise accordingly.

In terms of foreseeability, the question is not whether a similar event has occurred before, but whether the risk that this particular mishap may occur is foreseeable. Thus, a flood, earthquake, hurricane, or other natural force need not have previously struck a particular location for negligence to exist. Liability may still exist if reasonable design, construction, operation, inspection, or mainte-

\footnote{153. This proposition was well stated 150 years ago in Mayor of New York v. Bailey, 2 Denio 433, 440-41 (N.Y. 1845). See also Eikland v. Casey, 266 F. 821, 823 (9th Cir. 1920) (finding defendant negligent for altering a stream and increasing the chances of it overflowing), \textit{cert. denied}, 254 U.S. 652 (1920); Erickson v. Bennion, 503 P.2d 139, 140-41 (Utah 1972) ("[T]he degree of care increases in proportion to the hazards to be anticipated.").}

\footnote{154. \textit{Compare} Davison v. Snohomish County, 270 P. 422 (Wash. 1928) (holding that a municipality is under no duty to erect barriers sufficient to prevent a vehicle from crashing through) with Bartlett v. Northern Pac. Ry., Co., 447 P.2d 735 (Wash. 1969) (explaining that the costs and practicality of guard rails have changed since \textit{Davison} was decided). \textit{See also} Gentile v. Public Serv. Coordinated Transp., 78 A.2d 915 (N.J. Super. Ct. App. Div. 1951). The \textit{Gentile} court stated:

[W]e must realize that the hypothetical person of reasonable vigilance, caution, and prudence is our contemporary and not our forefather. What the reasonably prudent individual would do or refrain from doing in our modern environment of hazards cannot rationally be measured today by the probable behavior of our ancestors in the conditions of the age in which they lived.

\textit{Id.} at 918.
nance procedures should have anticipated and prevented a structural failure.\footnote{155}

VI. Architects and Engineers

When assessing liability for structural failure, it is often necessary to look at the design plans and studies. What was known, and what reasonably should have been known, by the design professionals responsible for the structure is needed in determining liability when a structure fails. It is also critical to ascertain the legal duty imposed upon design professionals because that duty may well determine if the resulting damages are compensable. In essence, therefore, all these factors assist in assessing the potential liability of the responsible architects and engineers.

Architects and engineers are generally held to a standard of reasonable care rather than strict liability. As expressed in a leading 1896 Maine case, *Coombs v. Beede.*\footnote{156}

The undertaking of an architect implies that he possesses the skill and ability . . . sufficient to enable him to perform the required services at least ordinarily and reasonably well . . . . But the undertaking does not imply or warrant a satisfactory result . . . . An error of judgment is not necessarily evidence of a want of skill or care, for mistakes and miscalculations are incident to all the business of life.\footnote{157}
A century later, the standard that architects and engineers are not absolute insurers of their work is still generally accepted.\footnote{158} It is important to emphasize therefore that the standard is not that of strict liability, but one of reasonable care. Consequently, the prevailing views of the profession will set a floor.\footnote{159} This caveat is significant because after major natural catastrophes such as an earthquake, the scientific community often reassesses existing building standards and technology. For example, recent earthquakes in California may have called into question some of the technical assumptions underlying current seismic knowledge.\footnote{160} However,

\footnote{158. See, e.g., LaRossa v. Scientific Design Co., 402 F.2d 937, 942-43 (3d Cir. 1968) (finding no strict liability in New Jersey for designing or engineering a plant); Abdul Warith v. Arthur G. McKee & Co., 488 F. Supp. 306, 310 (E.D. Pa. 1980) (holding that strict liability may apply to a supplier of labor and engineering expertise); Swett v. Gribaldo, Jones & Assoc., 115 Cal. Rptr. 99, 101 (Cal. Ct. App. 1974) (finding no strict liability for soil engineers in a 200 unit development); Stuart v. Crestview Mut. Water Co., 110 Cal. Rptr. 543, 549-50 (Cal. Ct. App. 1973) (finding engineers not strictly liable in tort); Chapel v. Clark, 76 N.W. 62, 62 (Mich. 1898) (finding that the judge was correct in refusing to instruct the jury to hold defendant architect strictly liable for any construction or design mistakes); City of Eveleth v. Ruble, 225 N.W.2d 521, 524-25 (Minn. 1974) (holding that expert opinion is needed to determine whether engineers had a duty); Chubb Group of Ins. Cos. v. C.F. Murphy & Assoc., 656 S.W.2d 766, 774 (Mo. Ct. App. 1983) (holding that an architect is not a “guarantor or an insurer”); Van Ornum v. Otter Trail Power Co., 210 N.W.2d 188, 201 (N.D. 1973) (holding that the judge’s refusal to instruct a jury to hold defendant architect liable for defective design was correct). See also RESTATEMENT (SECOND) OF TORTS § 299A (1965) (requiring a professional or tradesman to exercise skill and knowledge normally possessed by good standing members of that profession or trade); Peck & Hoch, supra note 157, at 418-21 (proposing a standard of care for engineers which is less than strict liability).}

\footnote{159. See The T.J. Hooper, 60 F.2d 737, 740 (2d Cir.) (finding liability where some in the industry thought a safety device necessary, but defendant did not use such a device), cert. denied, 287 U.S. 662 (1932); Clark’s Adm’t r v. Kentucky Utils. Co., 158 S.W.2d 134, 137 (Ky. 1941) (describing the duty of highest degree of care and skill known to be used when supplying electricity); Helling v. Carey, 519 P.2d 981, 983 (Wash. 1974) (holding physicians liable, although they complied with the professional standard of not giving pressure tests to patients under 40).}

\footnote{160. For example, a section of the San Francisco-Oakland Bay Bridge collapsed during the 1989 Loma Prieta Earthquake. The bridge had been reinforced in the mid-1970s to protect it against earthquake damage. Engineers for the State of California did not believe the section that collapsed was in fact vulnerable. U.S. GEN. ACCOUNTING OFFICE, LOMA PRIETA EARTHQUAKE: COLLAPSE OF THE BAY BRIDGE AND THE CYPRUS VIADUCT 2, 5 (June 1990). In addition, the engineers believed that a major earthquake could damage the columns supporting double-deck freeways, but}
failure to devise a correct solution does not excuse failure either to act at all, or to learn from the mistakes of the past.

Engineering standards are based upon experience. Structural engineering is a dynamic discipline, constantly evolving and changing. Advances in technology and knowledge are continually incorporated into designs. Standards which seemingly suffice at one point in time may quickly become inadequate. In addition, engineering principles, to a large extent, advance upon the mistakes and tragedies of earlier design failures. As one engineer stated: "[T]he history of structural engineering, indeed the history of engineering in general, may be told in its failures as well as in its triumphs."\textsuperscript{161}

Engineers recognize, therefore, that engineering is not an exact science; totally risk-free engineering is unachievable.\textsuperscript{162} Engineering solutions are not guarantees of success. In rejecting strict liability as a basis for liability, one court stated:

If every facet of structural design consisted of little more than the mechanical application of immutable physical principles, we could accept the rule of strict liability. . . . But even in the present state of relative technological enlightenment, the keenest engineering minds can err in their most searching assessment of the natural factors which determine whether structural components will adequately serve their intended purpose. Until the random element is eliminated in the application of architectural sciences, we think it fairer that the purchaser of the architect's services bear the risk of such unforeseeable difficulties.\textsuperscript{163}

\textsuperscript{161} Henry Petroski, To Engineer Is Human: The Role of Failure in Successful Design 9 (1982).


\textsuperscript{163} City of Mounds View v. Walijarvi, 263 N.W. 2d 420, 424 (Minn. 1978).
The professional implicitly promises to exercise the standard of reasonable care required of members of the profession.164 As applied by the courts, “structural engineers who have designed at the minimum professional level of competence but not necessarily at the state of the art” have been protected from liability.165

Often, the decisionmakers, from the initial architects and engineers to the owners, operators, and regulators, must exercise discretion. In analyzing negligence, it is important to recognize that design decisions involve trade-offs between cost, safety, and utility. Safety factors may increase the cost of a structure rendering it uneconomical.166 Structural changes cost money. Thus, structural

164. See Aetna Ins. Co. v. Hellmuth, Obata & Kassabaum, Inc., 392 F.2d 472, 477 (8th Cir. 1968) (noting that reasonable care of a professional architect includes knowledge and experience ordinarily required of architects and skills necessary to cope with engineering and construction problems); Housing Auth. of Carrollton v. Ayers, 88 S.E.2d 368, 373 (Ga. 1955) (holding:

The law imposes upon persons performing architectural, engineering, and other professional and skilled services the obligation to exercise a reasonable degree of care, skill, and ability, which generally is taken and considered to be such a degree of care and skill as, under similar conditions and like surrounding circumstances, is ordinarily employed by their respective professions.);

Board of Educ. of Community Consol. Sch. Dist. No. 54 v. Del Bianco and Assoc., Inc., 372 N.E.2d 953, 958 (Ill. Ct. App. 1978) (holding that an architectural firm had an implied duty to specify use of reasonably good materials and to perform work in a reasonably skillful manner); Milton J. Womack, Inc. v. House of Representatives, 509 So. 2d 62, 67 (La. Ct. App. 1987) (holding architectural firm liable for negligently prepared plans), writ denied, 513 So. 2d 1208 (La. 1987); Klien v. Catalano, 437 N.E.2d 514, 525 (Mass. 1982) (holding architectural firm to standard of reasonable care required of members of its profession); Cowles v. City of Minneapolis, 151 N.W. 184, 185 (Minn. 1915) (holding that an engineer has a duty to exercise reasonable care in assuming that contractors performed their work properly in all respects). See also Clark v. City of Seward, 659 P.2d 1227, 1230 (Alaska 1983) (holding that an engineer has the duty to exercise the care and skill ordinarily used by reputable members of the profession); RESTATEMENT (SECOND) OF TORTS § 299A (1977) (requiring a professional or tradesperson to exercise skill and knowledge normally possessed by good standing members of that profession or trade).

165. Peck & Hoch, supra note 157, at 407.

166. For example, the General Services Administration estimated it would cost $1.1 million to retrofit a brick post-office building in Eureka, California. This cost is “about twice the property’s estimated market value.” U.S. GEN. ACCOUNTING OFFICE, FEDERAL BUILDINGS: MANY ARE THREATENED BY EARTHQUAKES, BUT LIMITED ACTION HAS BEEN TAKEN 56 (May 1992) [hereinafter GAO].
changes involve trade-offs between utility, safety, and economics. For example, the problem is how secure from storm damage does society wish to make mobile homes, which cannot be made tornado or hurricane proof but which can be built to be more hurricane resistant.\textsuperscript{167}

Design trade-offs may be legally acceptable because the essence of negligence analysis is whether a defendant exercised reasonable care under the circumstances. For example, in \textit{Wright v. United States},\textsuperscript{168} a highway bridge was designed to withstand a twenty-five year flood, which the state highway department believed was all they could justify expending, taking into account the expected traffic on the road. The bridge's approach road washed away in a storm that could be expected to occur only once every forty-two to fifty-five years. Unable to traverse the washed-out road, a car went out of control killing the two occupants. No liability was found against the federal government which built the bridge; this determination was based upon the fact that the State of Utah designed the bridge and also assumed maintenance of it upon completion.\textsuperscript{169}

The issue of design trade-offs often varies between existing structures and new construction. The reasons are ones of practicality and economics. The feasibility and costs of retrofitting an existing structure may render such changes exceedingly difficult if not impossible, whereas it is usually easier to design these features into a plan from the outset.

The requisite standard of care may also be established by statutes, regulations,\textsuperscript{170} ordinances,\textsuperscript{171} building codes,\textsuperscript{172} con-

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\item[167.] Eight out of roughly thirteen hundred mobile homes in Homestead, Florida survived Hurricane Andrew. As a result of this devastation, the federal government considered substantially tightening mobile home wind-safety standards. An official of the United States Department of Housing and Urban Development recognized that the issue requires "the classic balancing act . . . . We could make these homes completely safe and solid—so much so they'd be out of reach for lower-income consumers." Laurie McGinley, \textit{Storm Rages Over Mobile Home Safety}. \textsc{Wall St. J.}, Aug. 23, 1993, at B1.
\item[169.] \textit{Id.} at 154-57.
\item[170.] Henry v. Britt, 220 So. 2d 917, 920 (Fla. Dist. Ct. App. 1969) (stating that the violation of a regulation, enacted pursuant to statute, would be prima-facie evidence of negligence).
\end{itemize}
\end{footnotesize}
tracts, custom, or professional codes. These sources of conduct set forth a minimum standard of care to which the professional must adhere.

VII. Critique of the Act of God Defense

It seems clear that the act of God defense rests on the twin pillars of lack of predictability and lack of control. If either pillar is missing, the defense fails. Both pillars were solidly based for centuries on the lack of scientific knowledge. The act of God defense had its origins in an age when we not only lacked the ability to predict the forces of nature, but also the ability to guard against, control, or otherwise minimize their impacts. In the words of

171. See, e.g., Maritime Constr. Co. v. Benda, 262 So. 2d 20, 22 (Fla. Dist. Ct. App. 1972) (denying architect’s compensation when architect failed to prove that plans would meet the city zoning ordinance, a condition in the agreement between the landowner and architect); Tex-Jersey Oil Corp. v. Beck, 292 S.W.2d 803, 807 (Tex. Civ. App.—Texarkana 1956, writ granted) (stating that violation of a valid ordinance of a municipality is negligence per se), modified, 305 S.W.2d 162 (Tex. 1957); Bebb v. Jordan, 189 P. 553, 555 (1920) (stating that city has power to enact regulative ordinance as to height and character of buildings in order to promote public health, safety, or welfare).

172. See, e.g., FLA. STAT. ANN. § 553.84 (West 1988) (providing a civil cause of action for violation of statute or state minimum building codes); Burran v. Dambold, 422 F.2d 133, 135-36 (10th Cir. 1970) (stating that, under New Mexico law, a violation of a statute, including a building code, is negligence per se); St. Joseph Hosp. v. Corbetta Constr. Co., 316 N.E.2d 51, 62-64 (Ill. App. Ct. 1974) (stating that the use of paneling that did not comply with city building code is basis for declaratory judgment against installer of paneling); Virginia Elec. & Power v. Savoy Constr. Co., 294 S.E.2d 811, 817 (Va. 1982) (noting that the purpose of a building code is to ensure safety of the project and its ultimate construction, and to provide comprehensive protection of the public health and safety).


175. One court defined act of God in an automobile insurance coverage dispute as “something in which man plays no part, does not understand and in most instances is afraid to attempt to fathom.” Chandler v. Aetna Ins. Co., 188 So. 506, 508 (La. Ct. App. 1939).
the ancient mime writer Publilius, "it is vain to look for a defense against lightning."176

At a time when little was known about the seemingly perverse forces of nature, the act of God defense served an understandable purpose. We were, in essence, at the mercy of the fates. Predicting earthquakes, hurricanes, volcanoes, and similar natural forces was essentially non-existent. Past knowledge, historical records, and personal experience were the major means of gauging prospective risks until this century. If the event had not occurred within human memory, it was an act of God since it was outside human comprehension. Even if foreseeable, only minimal means were available to control the impacts of these natural forces.

Today, foreseeability is based not only upon the past, but also upon that which modern technology and science allow us to project into the future.177 Science has advanced to the point where we can understand many forces of nature, such as precipitation and flooding.178 Historically, we know which areas have been subjected to specific forces of nature. Scientifically, we can predict the areas which may be subjected to such forces. Throughout the country, we

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176. JOHN BARTLETT, BARTLETT'S FAMILIAR QUOTATIONS 127a (14th ed. 1968). Of course, a lightning rod solves many problems today.

177. For example, recent studies, based on the analysis of tree trunks, indicate the geographic area now called California suffered through droughts much more intense than any experienced in recent centuries. In fact, the Twentieth Century has been a relatively wet period, notwithstanding the dry conditions of recent years. If a similar mega drought hit California again, the results would be catastrophic. William K. Stevens, Severe Ancient Droughts: A Warning to California, N.Y. TIMES, July 19, 1994, at C1.

178. As one judge stated in 1963:

Is it not time to relieve Nature of even the formal blame for many acts which now seem to be within the scope of man's prowess? Perhaps the term "act of God" should be replaced by a concept which reflects the possibility of human causality as well as that of the Divine.

have identified the major geographical faultlines,\textsuperscript{179} mapped floodplain zones,\textsuperscript{180} and recognized the vulnerability of coastal zones and barrier islands.\textsuperscript{181} In addition, the United States Geological Survey and several state agencies have undertaken landslide mapping.\textsuperscript{182}

Some risks are evident on the surface. In many landslide areas, the geologic instability is sufficiently visible. The California Supreme Court noted one such example in the famous 1981 case of \textit{Sprecher v. Adamson}.\textsuperscript{183} The landslide conditions in \textit{Sprecher} were evident since the area was first developed in the early 1900s.\textsuperscript{184} Yet, people developed the area anyway.

\textsuperscript{179} Congress adopted the Earthquake Hazard Reduction Act of 1977, in which it was recognized that all 50 states are vulnerable to earthquakes. Thirty-nine states are considered at risk for moderate to major earthquakes. Although earthquakes in California get most of the publicity, earthquakes have occurred in all 50 states. Major fault lines include the San Andreas in California, the Cascadia in Washington, the Wasatch in Utah, and the New Madrid in the Mississippi Valley. In fact, three of the largest earthquakes in United States history occurred during the winter of 1811-1812 on the New Madrid Fault. GAO, \textit{supra} note 166, at 15.


\textsuperscript{183} 636 P.2d 1121 (Cal. 1981).

\textsuperscript{184} \textit{Id.} at 1122. \textit{See also} Easton v. Strassburger, 199 Cal. Rptr. 383 (Cal. Ct. App. 1984) (discussing soil problems and landslides in Diablo, California); Connor v. Great W. Sav. & Loan Ass'n, 73 Cal. Rptr. 369 (1968) (discussing foundational problems due to expanding and contracting adobe soil in Ventura County, California); Oakes v. The McCarthy Co., 73 Cal. Rptr. 127 (Cal. Ct. App. 1968) (discussing improper grading and filling of real estate lots in Los Angeles County). One commentator starts his article: "Malibu: where the slide meets the tide." Risley, \textit{supra} note 9, at 1145.
It should be readily apparent that some site locations defy the laws of nature. For example, cliffs, along the coastline, which are of soil and not rock, are destined to go into the ocean through erosion, subsidence, mudslides, or washouts. People who build on, or otherwise develop these cliffs, should not reasonably expect the improvements to have a degree of permanency. Landslides, and land subsidence, are often caused by human actions.

The threat of natural disasters caused by geologic instability is well documented in states like California. In 1973, the California Division of Mines and Geology issued a report detailing the geologic hazards in the state. For the years between 1970 and 2000, the Division estimated losses from earthquakes at $21 billion, from landslides at $9.9 billion, from flooding at $6.5 billion, and from other causes at $17.6 billion. The Report also noted that losses could be substantially reduced through the application of state-of-the-art technology, as well as by vigorous enforcement of building codes. This information is available to planning commissions, zoning boards, builders, developers, and purchasers.

Foreseeability, by itself, does not resolve all issues. There is much we still do not understand about these forces of nature. Major storms and earthquakes are random, unique events of varying intensity, velocity, magnitude, point of impact, and direction, which may or may not strike a specific geographic area at an unknown time.


186. DEPARTMENT OF CONSERVATION, CAL. DIV. OF MINES AND GEOLOGY, URBAN GEOLOGY: MASTER PLAN FOR CALIFORNIA, BULLETIN NO. 198 (1973) [hereinafter URBAN GEOLOGY].

187. Id. at 5.

188. Id. at 3.
in the future. Therefore, we often are unable to predict either the occurrence of events such as an earthquake, the exact path of a storm, or even control the physical course of forces of nature. Some areas may escape unscathed from severe natural forces for millennia. Where a tornado touches down, or where an earthquake strikes, may be a quirk of fate. It is conceivable that "The Big One" may not strike San Francisco or Los Angeles. However, even if not all the earthquake faultlines under Los Angeles are

189. An earthquake's severity depends not only upon its intensity, but also such factors as soil and rock conditions, density of population, types of buildings, and distance from the epicenter of the quake.

Soil properties have a great effect in determining the potential impact of an earthquake. For example, solid, stable bedrock tends to suppress earthquake motion, while soft, sandy soil can intensify or amplify the earthquake motion. In a worse case, clay or sandy soil can undergo liquefaction, in which these soils temporarily act as a liquid rather than a solid. Buildings on liquefiable soils are subject to partial or total collapse of their foundations during an earthquake. GAO, supra note 166, at 48. Much of the structural damage of the Loma Prieta Earthquake was in areas with underlying soft soil. Id. at 49.

190. We try with varying degrees of success to control floods through dams, reservoirs, levees, channels, and other means. These attempts may not only be unsuccessful, but in some situations, they may exacerbate the natural problem. Levees can squeeze in a river, thereby increasing the depth of the water, concentrating its energy, and accelerating the current. If the swollen waters break free, such as through a breach in a levee, they will do much greater damage to the inundated area. Keith Schneider, Legacy of '93 Flood: Sand, Sand, and More Sand, N.Y. TIMES, June 9, 1994, at A1, B12.

We are now beginning to recognize that a trade-off occurs. Residents in the Mississippi River Basin have little to fear from normal levels of precipitation. The levee system also keeps the river from constantly changing its channel, as was graphically described by Mark Twain. However, we witnessed in 1993 that extreme or high sustained levels of precipitation over an extended period of time can place inexorable pressure on the levee system. If a levee fails, the resulting flooding in that area will be higher than would have naturally occurred. MIDWEST, supra note 3, at 37-38.

191. "The Big One" is defined as an earthquake of a magnitude of eight or more occurring along the San Andreas Fault. By way of comparison, the Northridge Earthquake that struck Los Angeles in 1994 was a magnitude 6.8 quake. How Many More After Northridge?, 263 SCI. 460 (1994).
presently known or charted, structural and civil engineers should use design criteria to minimize the risk of collapse from earthquakes since the general risk of earthquakes in the Los Angeles basin is well established. Similarly, a major hurricane may, or may not, bear down directly on New Orleans.

Some hazards are sufficiently well known that legislation is enacted to minimize the risks. For example, California reacted to the severe 1933 Long Beach Earthquake by enacting the Field Act, which placed the design of schools under the supervision of the State

192. Geologists now recognize that dozens of fault lines underlie the Los Angeles Basin. These faults are referred to as blind faults because, unlike major fault lines such as the San Andreas, they are not visible from the surface. Sharon Begley et al., A Whole Lot of Shaking Going On, NEWSWEEK, Jan. 31, 1994, at 34; Frederick Rose, Beneath Los Angeles, More Earthquakes are Lurking, WALL ST. J., Mar. 22, 1994, at B1. One report stated that almost 100 active faults have been identified in the Los Angeles area. James F. Dolan et al., Prospects for Larger or More Frequent Earthquakes in the Los Angeles Metropolitan Region, 267 SCI. 199 (1995).

193. For example, both the 1989 Loma Prieta Earthquake in northern California and the 1994 Northridge Earthquake in Los Angeles were initiated on previously unidentified faults, but both "occurred in structurally complex and seismically active areas." Thomas L. Holzer, Predicting Earthquake Effects-Learning from Northridge and Loma Prieta, 265 SCI. 1182, 1183 (1994). Earlier earthquakes in both areas had alerted scientists to the potential risks in the area. Id.

194. New Orleans is considered especially vulnerable to hurricanes. The city rests six feet below sea level, and is surrounded by water on three sides. It is protected from flooding by an extensive series of levees. In addition, the Army Corps of Engineers has devised a by-pass system through the Atchafalaya, to divert floodwaters from the Mississippi River to the Gulf, and the Bonnet Carre spillway into Lake Pontchartrain, thereby substantially reducing the threat of swollen Mississippi River water flooding New Orleans. Consequently, the severe 1993 flooding of the Missouri and Upper Mississippi River Basins left New Orleans unscathed. However, the levees and diversion systems will not protect New Orleans against a major hurricane tracking up the Mississippi River from the Gulf of Mexico. In one expert’s worst case scenario, "New Orleans could become a lake 20 feet deep." The storm surge would enter Lake Ponchartrain, top the 16-foot levees, and pour into the city. The levees would then serve as dams retaining the storm water in New Orleans, most of which lies at or below sea level. Frances F. Marcus, Storm Adds Reality to New Orleans Drill, N.Y. TIMES, May 14, 1995, at 18.

New Orleans has been struck at least nine times by hurricanes. New Orleans experienced hurricanes in 1817, 1837, 1887, 1900, 1915, 1939, 1947, 1965 (the infamous Hurricane Betsy) and 1969 (the equally infamous Hurricane Camille). Other hurricanes struck coastal areas of Louisiana and may have come close to New Orleans. A history of hurricanes striking Louisiana is found at Mark Schleifstein et al., Eying a Hurricane, NEW ORLEANS TIMES-PICAYUNE, May 30, 1993, at J1.
Division of Architecture,\textsuperscript{195} and the Riley Act, which placed design requirements on buildings used for human occupancy, but exempted dwellings designed for two families or less.\textsuperscript{196}

Similarly, after a 1991 wildfire that seared the hills of Oakland, California, the California legislature enacted a statute requiring a thirty-foot brush clearance around buildings in fire-prone areas.\textsuperscript{197}

Thus, while we cannot control the courses of earthquakes, hurricanes, and other phenomena, we know enough both to sufficiently appreciate the risks posed by these foreseeable forces of nature and to take steps that will minimize their impact on populated areas. These steps often include design and construction methods, maintenance, inspection, operation, and warning techniques that are presently known, technologically feasible, and economically viable.\textsuperscript{198} Sometimes structures survive because of fortuity. Oftentimes though, what may seem to be a capricious act of nature, is in fact based upon differences in design, construction, or maintenance techniques.

The risks are sufficiently foreseeable that design professionals should take them into account. This Article is not intended to serve as a design manual for engineers. However, examples will be used to illustrate why the act of God defense is factually inappropriate in situations such as earthquakes and storms.

Earthquake technology has sufficiently advanced so that two commentators stated: “Because cost-effective technology is available to reduce substantial injuries associated with an earthquake, the judicial system should not protect isolated design professionals who ignore or fail to stay abreast of the tribulations.”\textsuperscript{199}

\textsuperscript{197} Cal. Gov’t Code § 51182 (West 1992).
\textsuperscript{199} Flatt & Kliner, supra note 174, at 22-23. Their premise is that "effective seismic design can be relatively inexpensive." Id. at 21.
Building standards may substantially ameliorate the effects of an earthquake. For example, the 1989 Loma Prieta Earthquake caused 63 deaths, 3757 injuries, and an estimated $6 billion in property damage, but its effects were minimized because of efforts to make buildings earthquake resistant. By way of comparison, a similar sized earthquake in 1988 in Armenia destroyed or damaged 87 percent of the buildings in the city of Spitak and killed at least 25,000 people.

There are two traditional methods of building structures to resist earthquakes. The first is to build with strength. Examples of the strength method include reinforced concrete, steel frames, deep foundations, and light roofs. The other method is to build structures, such as Japanese wood and paper houses, which hold together during earthquakes because the shaking does not affect them. Wood frame buildings survive earthquakes much better than those of masonry. In addition, innovative techniques are being utilized with some structures.

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200. In spite of the devastation caused by the Northridge Earthquake of January 17, 1994, to the greater Los Angeles freeway system, one expert believes that enough is known “about the behavior of structures in earthquakes that we can design them so that they survive intact.” Calvin Sims, Quake Damage Shakes Faith in Overpass Designs, N.Y. TIMES, Jan. 24, 1994, at A1, A10.

201. GAO, supra note 166, at 2.

202. Id. at 14.

203. Buildings made of stiff, brittle materials, such as brick or concrete, are vulnerable in earthquakes because they cannot sway with the vibration of the quake. Id. at 45. However, there are trade-offs in safety. Often by focusing on one risk, another is increased. Thus, wood frame structures provide more resiliency to earthquakes than unreinforced masonry, but are more susceptible to the fires often caused by earthquakes.

204. For example, the historic San Francisco Federal Courthouse and Post Office, damaged in the 1989 Loma Pietra Earthquake, is being retrofitted with 256 sliding shock absorbers between the building and its foundation. The goal is to have the structure “roll with the blow” rather than bend and crash. Similar designs have worked well in other earthquakes. Richard Saltus, In a Quake, This Place Will Roll, Not Rock, BOSTON GLOBE, Apr. 18, 1994, at 23. Another technique, “active mass damping,” involves mounting a larger mass on the top of a structure, attaching the weight to computer-controlled hydraulic actuators to counteract the building’s motion during an earthquake. Corey S. Powell, Shaking Quakes, SCI. AM., Apr. 1994 at 112, 112.
Just as steps may be taken to reduce the risks posed by earthquakes, effective means, such as wetlands preservation205 and floodplain zoning, exist to minimize the risks of flooding.206 In essence, uncontrolled suburban development covered wetlands with impervious concrete, asphalt, and rooftops. For example, in 1972 rainfall of one-half inch “cause[d] worry at the higher levels and flooding” in the valleys of San Diego, whereas previously it took three inches of rain to pose such a threat.207

Similarly, flood losses from dam breaks caused by excessive precipitation can be minimized. Information for the probable

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Brigadier General Gerald E. Galloway, of the Army Corps of Engineers, stated: “Every time we have a flood we are reminded how we have ignored the lessons of the past.” Timothy Egan, *California Storm Brings Rethinking of Development*, N.Y. TIMES, Jan. 15, 1995, at § 1, 20. Officials in the Sacramento, California area continue to approve housing developments in areas that soak up rainwaters. *Id.*

Coastal wetlands serve a similar function in preventing tidal floods and blunting the force of tides and waves. These lands, which are able to store 300,000 gallons of water per acre, are even more effective as storage basins than their inland counterparts. PETER L. JOHNSON, *WETLANDS PRESERVATION* 1 (1969). In addition, the complex infrastructure of peat, bog, and heavy grasses absorbs many of nature’s blows. The damage done to the marsh is readily repaired by nature. In light of these facts, replacing natural wetlands with artificial, physical structures is an invitation to disaster when the blows of nature strike again.

206. Over extensive periods of time, nature has carved out floodplains as a channel or basin to contain excess runoff. In 1959, Professor Dunham wrote an influential article advancing the case for strong government regulation of the development of flood-prone areas. Alison Dunham, *Flood Control Via the Police Power*, 107 U. PA. L. REV. 1098 (1959).

maximum precipitation (PMP) is available.\textsuperscript{208} The PMP is an extreme condition which will probably not occur in any given area. Yet, it is not a theoretical abstraction since extreme precipitations have occurred.\textsuperscript{209} Using the PMP, and hydrologic charts, the probable maximum flood (PMF) can be calculated.\textsuperscript{210} The Corps of Engineers recommends an emergency spillway capacity sufficient to pass the PMF for major, high-risk dams.\textsuperscript{211} The Corps' standard will effectively eliminate the risk of most major dams overtopping due to extreme precipitation. It will not be an act of God if, as in \textit{Barr v. Fish, Game & Parks Commission},\textsuperscript{212} the spillway does not meet the Corps' PMF requirements. The PMF standard does not

\textsuperscript{208} The PMP is: "Theoretically, the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location at a certain time of the year." \textit{COMMITTEE ON SAFETY CRITERIA FOR DAMS, NATURAL RESEARCH COUNCIL SAFETY OF DAMS: FLOOD AND EARTHQUAKE CRITERIA} 304 (1985) [hereinafter DAM SAFETY].


\textsuperscript{210} The PMF is the "flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region." DAM SAFETY, \textit{supra} note 208, at 304.

The PMF has become a standard design criterion for flood protection at major dams. \textit{Id.} at 12. Its use has prevented dam failures throughout the world. \textit{Id.} at 17. However, because the methods for calculating the PMF have not yet been standardized, its calculation is based upon a combination of facts, theory, and professional judgment. \textit{Id.} at 12.

\textsuperscript{211} The U.S. Army Corps of Engineers issued guidelines for the safety inspection of dams pursuant to the National Dam Inspection Act. Pub. L. No. 92-367. The Corps' guidelines assess spillway capacity in relation to the risk, which is measured by the size of the dam and potential downstream life or property losses. Dams on the high hazard list need a spillway capacity of one-half the PMF. \textit{OFFICE OF THE CHIEF OF ENG'R, U.S. Army Corps Eng'rs, FINAL REPORT TO CONGRESS, NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, THE NATIONAL DAM INSPECTION ACT OF 1972, SEC. 5, PUB. L. NO. 92-367 B9} (1982).

More recently, a task team of the American Society of Civil Engineers (ASCE) recommended that for dams where the consequences of failure are unacceptable, the PMF should be used as the safety design flood. \textit{ASCE TASK COMM. ON SPILLWAY DESIGN FLOOD SELECTION, EVALUATION PROCEDURES FOR HYDRAULIC SAFETY OF DAMS} 17 (1988).

\textsuperscript{212} 497 P.2d 340 (Colo. Ct. App. 1972); \textit{see supra} text accompanying notes 108-14.
reduce the risk of dam failure from other causes, such as structural weakness or design inadequacies, but these causes do not normally constitute acts of God.\textsuperscript{213}

Let us assume that large dams designed for the PMF pass-on floodwaters as intended.\textsuperscript{214} Let us also assume, in the case of a small dam washed out in a major storm, that the dam failure fails the but-for causation test. If so, then there is no role for the act of God defense.

\textsuperscript{213} For example, the sunny-day dam break is a prime candidate for the application of the doctrine of \textit{res ipso loquitur}. See, \textit{e.g.}, City Water Power Co. v. City of Fergus Falls, 128 N.W. 817, 818-19 (Minn. 1910) (discussing dam owner's liability under \textit{res ipso loquitur} when the dam broke and flooded neighboring land); East Liverpool City Ice Co. v. Mattern, 127 N.E. 408, 409 (Ohio 1920) (applying \textit{res ipso loquitur} doctrine of negligence to find dam owner liable for damage caused by dam breaking when water levels were normal).

\textsuperscript{214} The general rule that has developed in this country is that the operator of a dam may permit floodwaters to pass over or through the dam in an amount equal to the inflow, but will be liable if any excess amount is discharged. The premise behind this rule is that a downstream plaintiff would have been damaged in any event by the flood, so the victim should not be allowed to recover damages simply because of the fortuitous fact that a dam was built with insufficient capacity to capture the flood. Yet, simply passing on a storm's inflow can cause devastating downstream damage in the case of a major storm or flood. However, it is assumed that the defendant's acts did not in fact cause plaintiff's injuries since the damage would have occurred irrespective of the dam's existence. In essence, the "but-for causation" test fails. See, \textit{e.g.}, Bradford v. Stanley, 355 So. 2d 328, 330 (Ala. 1978) (holding that landowners cannot recover for damage to property due to an overflow caused by excessive rainfall if the injury would have occurred without the dam); Ireland v. Henrylyn Irrigation Dist., 160 P.2d 364, 365 (Colo. 1945) (holding that defendant's operation of a reservoir did not increase the effect of the flood); Baldwin Processing Co. v. Georgia Power Co., 143 S.E.2d 761, 767 (Ga. App. 1965) (holding that the owner of a hydroelectric dam has no duty to operate it as a flood-control mechanism); Rockford Paper Mills, Inc. v. City of Rockford, 18 N.W.2d 379, 382 (Mich. 1945) (holding that landowner must show some negligent conduct on the part of the dam owner caused the injury in order to recover); City of Piqua v. Morris, 120 N.E. 300, 302 (Ohio 1918) (holding that an owner of a dam is not responsible for the injuries caused by extraordinary floods, which could not have been prevented through ordinary care); Crawford v. Cobbs & Mitchell Co., 253 P. 3, 4 (Or. 1927) (holding that the owner and operator of a dam has the right to permit floodwaters to pass through or over the dam); Trout Brook Co. v. Willow River Power Co., 267 N.W. 302, 305 (Wis. 1936) (holding that a dam owner is not required to guard against floods of such extraordinary proportions as could not have been anticipated by a person of ordinary prudence and experience).
Measures have been taken through building and zoning codes to minimize the risk of water-caused landslides. For example, California imposes grading requirements on hillside developments to reduce the landslide and subsidence problem.\textsuperscript{215}

The ordinances adopted by Los Angeles for minimizing the risk of landslides have proven effective. The first was enacted in 1952 and has been progressively strengthened. The loss rate for 10,000 hillside lots developed prior to 1952 was 1040 during the heavy rain year of 1969. Of 27,000 sites developed between 1952 and 1962, 350 were damaged. Of the 11,000 sites developed after 1963, only 17 were damaged in 1969.\textsuperscript{216}

Similarly, compliance with building codes, and methods of construction, can improve the chances of a structure surviving a hurricane.\textsuperscript{217} Unprecedented high winds might not constitute an act of God when the winds blow away a roof, which lands on a victim, when the roof and its supports are rotten, the nails and bolts rusted, and the problems all could have been discovered through inspection.\textsuperscript{218} One study of Hurricane Andrew's devastation attributed much of the damage to "inappropriate design, weak building materials, poor construction techniques, inadequate inspection and similar failings."\textsuperscript{219}

\textsuperscript{215} CAL. HEALTH & SAFETY CODE §§ 17953-17955, 17957-17958 (West 1984).
\textsuperscript{216} URBAN GEOLOGY, supra note 188, at 28-29. \textit{See also} Olshansky, supra note 182, at 964-65 (identifying Los Angeles grading ordinances as a model for other cities at risk of landslides).
\textsuperscript{217} Much of the damage along the coastal zone from hurricanes comes from the wave surge, which strikes solid structures with great force. Buildings can be designed so that the first level is essentially open, allowing the waters to flow through. The habitated quarters are above the open first floor. James S. Russell, \textit{Building a House to Withstand a Hurricane}, N.Y. TIMES, Aug. 19, 1993, at C1, C6.
\textsuperscript{218} Kimble v. Mackintosh Hemphill Co., 59 A.2d 68, 71-72 (Pa. 1948).
\textsuperscript{219} Steven T. Maher, \textit{Emergency Decisionmaking During the State of Florida's Response to Hurricane Andrew}, 17 NOVA L. REV. 1009, 1011 (1993) (citations omitted). Investigations in the aftermath of Hurricane Andrew in 1992 discovered several reasons for the severity of the hurricane's impact. The unusual ferocity of the storm was one of several factors to blame for the damage. Other major reasons include inadequacies in south Florida building codes, changes in the kinds of buildings constructed, and "widespread construction, design and material deficiencies that apparently left thousands of buildings... below code standards." Peter Applebome, \textit{Amid the Fallen Buildings, a Host of Questions About How They Were Built}, N.Y. TIMES, Sept. 6, 1992, at A36. A wide range of construction errors in roofs included "hurricane straps not properly attached to roof trusses, roof tiles attached with dabs..."
A major fear has been a large oil spill during a hurricane. Hurricane Andrew caused great damage on shore. Offshore production platforms and pipelines incurred production interruptions and needed repairs. Yet, less than six barrels of oil were spilled because of the hurricane.\footnote{220}

Design and construction improvements were responsible for minimizing Hurricane Andrew’s impact. Platforms were raised to at least fifty feet above water level, up from forty-three feet in earlier designs. In addition, instead of the four legs previously supporting the platforms, there are now up to twelve legs, which have thicker steel footings and are driven deeper into the Gulf’s floor.\footnote{221}

The threat posed by wildfires to human habitation in areas such as the Los Angeles hills can similarly be reduced through changes in construction methods. The wildfires that plague southern California canyons often spread by embers blowing onto roofs, commonly made of readily combustible materials. However, if the roof is made of clay tile, or of other inflammable materials, the falling or flying embers may not ignite the house.\footnote{222}

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\footnote{220}{Michael Quint, \textit{A Year After Hurricane Andrew, Insurers Maneuver to Lower Risk}, \textit{N.Y. Times}, Dec. 28, 1993, at A1, D5 (quoting Rick Vignild, director of the Southern Building Code Congress). \textit{See also} Arkansas Valley Elec. Corp. v. Davis, 800 S.W.2d 420, 423 (Ark. 1990) (finding that an F-1 tornado did not serve as an exculpatory act of God because of defendant’s negligence in maintaining utility poles and power lines).}

\footnote{221}{The government estimated 249 of the 3800 offshore platforms in gulf water were damaged by Hurricane Andrew. Thomas C. Hayes, \textit{How the Offshore Rigs Rode Out Gulf’s Storms}, \textit{N.Y. Times}, Oct. 21, 1992, at D1.}

\footnote{222}{Architects and builders have developed fire-resisting techniques for buildings in fire-prone areas. These approaches include installing fire-resistant siding—such as brick, stucco, or concrete walls—clay or concrete-tiled roofs, and double-glazed windows, as well as cutting back dried vegetation from around the house, and creating a green belt of fire-resistant grasses, ice plants, salvias or similar forms of vegetation. Michael Webb, \textit{New Home Option: Surviving Flames}, \textit{N.Y. Times}, Nov. 11, 1993, at C2. Clearing a space (removing foliage, dead twigs, and debris) around the building can also create a limited firebreak, thereby reducing the risk of a fire spreading to the structure.}
Some forces of nature cannot be prevented by any design or construction techniques. Tornadoes are the prime example of such a blow of nature. Yet, warning systems have been installed in much of the Tornado Alley to minimize the threat posed to people. Sufficient warnings may enable people to seek shelter, thereby minimizing loss of life.

There are no guarantees of success in warding off the natural blows, but steps like these show that the actor took reasonable measures, and exercised reasonable care under the circumstances.

223. It is assumed by many that design technology will not ameliorate the damages caused by tornadoes. However, one engineer, after surveying tornado-created structural damage to buildings in South Carolina, believes "building practices are largely responsible for [tornado] damage." His view is that "buildings of unreinforced masonry and glass, typical of shopping centers, are likely to suffer the most extensive damage." Nicholas Shady, Penny-wise, Pound-foolish, FORBES, June 17, 1985, at 170, 170.

224. Tornado Alley cuts across a large swath through the midsection of the country, ranging from Texas through the upper midwest. Tornadoes are not limited to this geographic region of the country, but occur most often there. Tornado frequency is measured in "tornadoes per thousand square miles." A compilation of tornadoes between 1991 and 1993 show Florida (a non-tornado alley state) leading with 30, followed by Tornado Alley states of Oklahoma (29), Tennessee (23), Indiana (22), Iowa (22), Kansas (21), Louisiana (20), Mississippi (19), Nebraska (19), Texas (19), and Illinois (18). Even states such as Vermont (3) and California (1) experienced tornadoes. Sam H. Verhovek, In Tornado Alley, 'You Just Wait for the Next One', N.Y. TIMES, May 27, 1993, at A16.

225. For example, the death toll from a tornado that struck Lancaster, Texas near Dallas on April 25, 1994, was only four because siren warnings gave residents at least twelve critical minutes to seek shelter. Sam H. Verhovek, At Least 4 Die in Tornado Near Dallas, N.Y. TIMES, Apr. 27, 1994, at A10. Conversely, 20 people perished when a tornado leveled a church in Piedmont, Alabama on March 27, 1984. The town was in a poor, rural area of Alabama that lacked an adequate warning system. Peter Applebome, Across the Tornado Belt, The Rubble is Real but the Losses Are So Hard to Grasp, N.Y. TIMES, Mar. 29, 1994, at A20.

226. A cyclone struck Bangladesh in 1991, killing an estimated 131,000 persons. Another cyclone struck the country in May 1994, but killed only 167. The difference in the death toll was attributed to the installation of a storm alert system and the successful evacuation of hundreds of thousands of villagers. Sanjoy Hazarika, New Storm Warning System Saved Many in Bangladesh, N.Y. TIMES, May 5, 1994, at A8.

Similarly, scientists at the Rabaul Volcano Observatory were able to detect a series of seismic rumbles that enabled them to evacuate the 30,000 residents on September 18, 1994, before the volcano erupted. A 1937 eruption of roughly the same size had killed 500 people. Richard A. Kerr, In New Guinea, Eruption Forecasting Scores a Success, 265 SCI. 2005, 2005 (1994).
The actor, thus, meets the negligence standard. Therefore, the issue becomes one of duty, and not one of act of God.

It is also important to recognize that in some sections of the country the problem of storm losses is accentuated by a deteriorating infrastructure.\(^{227}\) It is not an act of God when the underlying problem is deferred maintenance on the crumbling infrastructure. Inadequately maintaining bridges, roads, and pipes in geologically fragile areas is an invitation to disaster.\(^ {228}\)

VIII. Environmental Perspective

Up to now, this Article has focused on blows of nature constituting an act of humans in a real sense rather than an act of God in a legal sense. In an environmental sense, these natural forces also constitute human acts based upon a simple premise: Homo sapiens have populated areas ecologically and geologically unsuitable for large numbers of people.\(^ {229}\) The earth does not provide a safe and stable environment in many areas. Shorelines are not geologically stable, neither are seismic zones. Much of the damage in recent years has been caused by a combination of increased population

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\(^{227}\) Out of the roughly 500,000 highway bridges in the United States, over 130,000 have weight restrictions on the trucks passing over them. About 5000 bridges have been closed, and between 150 and 200 spans annually suffer partial or complete collapse. Kenneth F. Dunker & Basile G. Rabbat, Why America's Bridges are Crumbling, SCIENCE, Mar. 1993, at 66.

\(^{228}\) For example, the Schoharie Creek Bridge collapsed in 1987 in New York because flowing waters had scoured away its foundation. Id. at 68.

\(^{229}\) See generally ANDERS WIKMAN & LLOYD TIMBERLAKE, NATURAL DISASTERS: ACTS OF GOD OR ACTS OF MAN (1984) (stating that disasters are increasingly human-made political and social events which, although triggered by natural phenomena such as floods or earthquakes, are often preventable). Their thesis states:

Though triggered by natural events such as floods and earthquakes, disasters are increasingly man-made. Some disasters (flood, drought, famine) are caused more by environmental and resource mismanagement than by too much or too little rainfall. The impact of other disasters, which are triggered by acts of nature (earthquake, volcano, hurricane) are magnified by unwise human actions.

Id. at 6.
pressures,\textsuperscript{230} development, and infrastructure improvements in geologically fragile areas, such as seismic zones, floodplains, and the coastal zone. In other words, areas subject to severe natural blows are often densely populated.\textsuperscript{231} "Natural" disasters are highly foreseeable when a growing population becomes concentrated in geologically fragile ecosystems.\textsuperscript{232}

Even less densely populated areas can fall prey to a combination of natural and human forces. For example, the damages caused by wildfires in the Los Angeles Basin are intensified as the Los Angeles

\textsuperscript{230} For example, the population of the United States increased 9.8% between 1980 and 1990, from 226,545,805 to 248,709,873. However, California's population rose 25.7%, from 23,667,902 to 29,760,021, and Florida's population increased 32.7%, from 9,746,324 to 12,937,926. 1995 INFORMATION PLEASE ALMANAC, ATLAS AND YEARBOOK 828 (48th ed. Houghton Mifflin Co. 1995). Most of California's population resides in geologically fragile areas. The Los Angeles-Riverside-Orange County complex had 15,047,772 people as of July 1, 1992, and the San Francisco-Oakland-San Jose area had an additional 6,409,891 people. \textit{Id.} at 827.

\textsuperscript{231} Flooding along the Mississippi River and its tributaries is a regular occurrence. The famous Mississippi River Flood of 1927 inundated 16,570,627 acres in 170 counties in 7 states, flooded 162,017 homes, destroyed 41,487 buildings and killed between 250 and 500 people. \textsc{Pete Daniel}, \textsc{Deep'N As It Come}: The 1927 Mississippi River Flood 10 (1977). Yet, development continues in the Mississippi River Valley.

\textsuperscript{232} One engineer has commented that the landslide problem in British Columbia is worsened by careless forestry practices, housing developments, mining, and other construction activities. Nigel Skermer, \textit{Landslides: Acts of God, or Acts of Man}, 50 ADVOCATE 931, 931 (1992). Urbanization expanding onto steeper terrains increases the risk of landslides in the rain-drenched coastal mountains. Ground instability can be assessed during the planning process, followed up by appropriate steps, if possible, to stabilize the areas. If stabilization is impossible, then restrictions on development should be imposed.

Similarly, it has been reported in recent years that "a greater number of landslides have damaged private property, largely due to increased development in hillside areas. . . . [U]rban development itself sometimes causes landslides." Olshansky, \textit{supra} note 182, at 944. \textit{See also} Schweiger v. Solbeck, 230 P.2d 195, 200 (Or. 1951) (finding that defendant's logging operations damaged plaintiff's property when logging debris was carried by water down a ravine onto plaintiff's property).
sprawl encroaches into hills and valleys historically subject to the combined forces of drought, wind, and fire. \(^{233}\)

In a country characterized by population mobility, it is very common for people to move into areas where they are unaware of the natural perils. \(^{234}\) For example, midwesterners are quite familiar with blizzards and tornadoes, but have little appreciation of earthquakes, wildfires, canyon fires, hurricanes, beach erosion, and ocean storms common to the coastal areas of southern California. The natural beauty which attracts some people to a locale may also be the source of its unseen, unknown perils. \(^{235}\) To the newcomer, the disaster may appear like an act of God, but to experienced residents

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233. See Charles Fleming et al., *A Flammable Mix of Man and Nature*, *Newsweek*, Nov. 8, 1993, at 55 (discussing the effect of Santa Ana winds on progression of fires in Los Angeles Basin area). The Santa Ana winds blow in from the east, carrying the heat of the deserts. If the dry hillsides catch on fire when the Santa Ana winds are blowing, the fires rapidly spread and become more difficult to fight. Conversely, excessive, but rare, precipitation sometimes causes flash floods. See, e.g., *First English Evangelical Lutheran Church v. County of Los Angeles*, 482 U.S. 304 (1987) (demonstrating damage and problems caused by flash floods in Los Angeles County). For a graphic portrayal of the fire-flood cycle in the San Gabriel Mountains outside Los Angeles, see McPhee, *supra* note 209, at 183-272. The chapter is aptly entitled “Los Angeles Against the Mountains.”

234. One court noted that a resident of New York City could not be expected to have familiarity with the folklore of Nyack, New York. Plaintiff was, thus, unaware he contracted to purchase a haunted house, “widely reputed to be possessed by poltergeists.” Stamborsky v. Ackley, 572 N.Y.S.2d 672, 674 (N.Y. App. Div. 1991).

235. Current development along the beachfront is intensive. Entire resort communities, such as Atlantic City, Galveston Island, Hilton Head, Jekyll Island, Miami Beach, Ocean City, and Virginia Beach are on the geologically fragile barrier islands.

Similarly, one of the difficulties in fighting modern forest fires is the problem of “urban interface,” in which homes are invading the wilderness. These developmental pressures change the matrix of factors which determine how a fire is to be fought. In the past, some areas would be left to burn themselves out. That option may be effectively hindered by the presence of human habitation. See Timothy Egan, *New Hazard in Fire Zones: Houses of Urban Refugees*, *N.Y. Times*, Sept. 16, 1994, at A1 (outlining the hazards of living in potential fire zones); John Kifner, *In Washington, Saving Scenic View Taking on Importance in Firefighting*, *N.Y. Times*, Aug. 8, 1994, at B6 (discussing the difficulties of fighting forest fires in populated areas).
it is simply a case of déjà vu. Similarly, decades of mild weather, 236 and earthquake quiescence, should not lull people into forgetting that nature can brutally penalize mistakes in design, construction, and maintenance. 237

Theoretically, we could restrict development in these geologically fragile areas, such as barring development in floodplains or on the

236. Weather patterns are cyclical. For example, the past quarter century has seen a decrease in the number of major hurricanes hitting the East Coast and the Florida peninsula. Eric Morgenthaler, He's No Blowhard: Dr. Gray Can Predict Atlantic Hurricanes, WALL ST. J., Aug. 8, 1994, at A1.

However, it is estimated that sooner or later a major hurricane will again strike the northeastern United States. The famous 1938 hurricane which struck Long Island and New England is ranked as the seventh most costly hurricane in United States history, and the worst ever recorded in the Northeast. A hurricane of similar magnitude, striking the Northeast today, could be the costliest in United States history because of the extensive development in the region, inadequate design and construction to withstand hurricanes, and inadequate evacuation and sheltering procedures. William K. Stevens, Historic Hurricane Could Catch Northeast With Its Guard Down, N.Y. TIMES, Aug. 23, 1994, at C4.

In spite of the devastation unleashed upon south Florida by Hurricane Andrew in 1992, the National Hurricane Center ranked it as only the third most intense storm to hit land in the United States this century, following Hurricane Camille in 1964, and the 1935 Labor Day hurricane that struck the Florida Keys, killing 600 people. Hurricane Andrew is Termed Third Worst in This Century, N.Y. TIMES, Sept. 18, 1992, at A16.

237. To a major extent, popular perceptions of the graphic, suddenness of national disasters emerges from the seemingly instantaneous coverage of news-breaking events, regardless of origin, by the electronic media. In the past, natural disasters were covered both by the print media, and by television stations, with delayed footage on black-and-white, poor quality screens. Each of these mediums lacked the immediacy of a color television screen. Today, live coverage is the norm, with the videotape being repeatedly broadcast to viewers on high-quality screens. In a sense, we are experiencing "virtual reality" of disasters as they unfold. A classic example is the Loma Prieta Earthquake of 1989 which struck the San Francisco Bay area during the broadcast of a World Series game in Candlestick Park. Worldwide, people were transfixed by the deck collapses of the Bay Bridge and the Cyrus Viaduct/I-880 Freeway in Oakland, as well as the fire in the Marina District. People were then able to witness the rescue efforts as they unfolded.
barrier islands. However, both constitutional issues and practical realities effectively preclude such action. In addition,

238. On June 9, 1972, a 14-inch rainfall inundated Rapid City, South Dakota resulting in a flood which killed 238 people, destroyed 600 houses and 35 businesses, and damaged an additional 930 houses and 242 businesses. The response was non-traditional. A zoned “floodway” was created along a seven mile stretch through Rapid City. All the houses and businesses were moved out of the floodplain. Most of the 1025 acres in the zone were converted into a greenbelt of parks, playing fields and a golf course. The cost averaged $10,000 for each of the 43,000 people living in Rapid City at the time of the flood. Federal officials viewed the cost as too high to try in other areas. Douglas E. Kneceland, Model Flood Recovery Plan Too Costly to be Used Again, N.Y. TIMES, June 3, 1977, at A34.

239. The takings issue has become a constitutional obstacle to barring development on environmental grounds. See Dolan v. City of Tigard, 114 S. Ct. 2309, 2316-17 (1994) (holding that a city’s requirement that a landowner dedicate a portion of property lying within a floodplain as public greenway violated the requirements of the Fifth Amendment); Lucas v. South Carolina, 112 S. Ct. 2886, 2895 (1992) (finding that the prohibition on new construction or replacement of destroyed buildings in a dead zone, 20 feet back from the first row of dunes could constitute a taking). See also Nollan v. California Coastal Comm’n, 483 U.S. 825, 841-42 (1987) (holding that the Takings Clause prevents the California Coastal Commission from compelling coastal residents to comply with a state environmental program).

240. A good example involves the landslide problems in Malibu, where county engineers had recognized the Big Rock Mesa’s instability in the 1960s. Accordingly, they attempted to prevent development pending installation of sewers for waste water disposal. However, political pressure from developers overcame this obstacle to development. The resulting use of septic tanks, and a rise in the water table, was responsible for the destabilization of the area. Risley, supra note 9, at 1147 n.12.

After a $96.8 million settlement in 1986 by Los Angeles County of the Big Rock Mesa Landslide case, “Big Rock Mesa residents opposed a special property assessment proposed to pay for drainage devices that would prevent further sliding. . . . [Instead] residents proposed that county revenue from other districts be used to help fund the project.” Id. at 1146.

The national experience with flood insurance is illustrative of the practical difficulty of restraining development in areas where people wish to live. One of the goals of the National Flood Insurance Program of 1968 was to guide development, where practicable, away from locations threatened by flood hazards. 42 U.S.C. § 4001(e) (1989). The legislation has essentially failed this purpose. Sanctions against communities which fail to comply with the statute’s provisions are virtually non-existent. See, e.g., Bryant J. Spann, Going Down for the Third Time: Senator Kerry’s Reform Bill Could Save the Drowning National Flood Insurance Program, 28 GA. L. REV. 593, 601-02 (1994) (discussing Senator John Kerry’s proposed legislation aimed at bailing out the National Flood Insurance Program); John Herke, Note, Teaching Fains at Age 25: Developing Meaningful Enforcement of the National Flood Insurance Program, 7 TUL. ENVTL. L. J. 165, 166 (1993) (discussing that courts do not sanction violations and, therefore, the law has failed to guide development away from
it is too late to bar development in many of these geologically sensitive lands.

Human nature is often a problem. Denial, or self-deception, in the form of “it can’t happen to me” or “lightning never strikes twice in the same place,” is a common, well-known psychological phenomenon before the risk materializes. The decision-making process is not entirely rational. Sometimes, residents treat floodplains. See also Cape May Greene v. Warren, 698 F.2d 179, 186-93 (3d Cir. 1983) (holding that the EPA lacks power to guide new construction away from flood-prone areas).

A community must participate in the National Flood Insurance Program before its residents can purchase flood insurance. Communities are supposed to adopt zoning ordinances to minimize the risks posed to new construction in the floodplains. 42 U.S.C. §§ 4012, 4022 (1989). Yet they can grant variances from these requirements. 44 C.F.R. § 60.6 (1994). One key component of the duties imposed upon participating communities is that new structures must be elevated to or above the base flood land, which is the elevation at which there is a 1% chance of flooding in a given year. 44 C.F.R. § 59.1 (1994) (defining area of special flood hazard); see also id. at §§ 60.3(b), 60.3(c).


242. These concepts are illustrated by the pattern of the flooding of the Mississippi River. Historically, the Mississippi River breaks through its levees. As the levees were lengthened, and raised, the river would exert ever greater pressure on the banks. The Chief of Engineers concluded in 1926 that the river improvements would prevent the “destructive effects of floods.” DANIEL, supra note 231, at 6 (quoting ANNUAL REPORT (1926)).

However, although a levee is similar to a dam, it is not designed to restrain water for long periods of time. Consequently, extensive periods of excessive precipitation, such as those in the Mississippi River and Missouri River Basins in 1993, are virtually certain to find a levee unable to withstand the pressure.

Mark Twain wrote,

One who knows the Mississippi will promptly aver—not aloud, but to himself—that ten thousand River Commissions, with the mines of the world at their back, cannot tame that lawless stream, cannot curb it or confine it, cannot say to it, Go here, or Go there, and make it obey; cannot save a shore which it has sentenced. . . .

MARK TWAIN, LIFE ON THE MISSISSIPPI 172-73 (Signet Classic 1961).
potential risks in a cavalier manner. Some people are well aware of the risk, but choose to chance it because they are drawn to the area. Newcomers to an area are often ignorant of the risk.

Self-deception may continue after a disaster strikes. Human nature is such that in the haste to rebuild after a disaster, owners and builders often cut corners and oppose tightened standards. After the blow strikes, questions of cost and time spring to the surface. Many victims naturally wish to rebuild as quickly as possible, seemingly not learning from the disaster. Contrary to popular mythology, lightning may strike twice in the same place. Similarly, seismic activity may level the same area twice, and hurricanes can repeatedly strike the same coastal area.

For example, after Hurricane Iwa struck Kauai in 1982, a team of engineers recommended stricter building codes, with the intent of preventing roofs from blowing off. Instead, the Kauai County Council waived building permits for emergency repairs. For the following year, permittees were allowed to retroactively obtain permits. Another three years passed before "hurricane connectors," which tie rafters to wall frames much more strongly than nails, were required. As a result, Hurricane Iniki struck Kauai with devas-

243. These risks may also be encountered with a "humorous fatalism." For example, one of the most popular drinks in New Orleans is the "Hurricane" at Pat O'Brien's, preferably consumed while waiting to get into the Preservation Hall Jazz Society next door. Similarly, the University of Miami has named its teams the "Hurricanes," which considering the hurricane history of Dade County, Florida, may be tempting fate.

244. This view has been aptly expressed by an Oakland, California resident, who lives along the Hayward Fault: "Living here is a considered risk. . . . But I love this area, and I'd rather live to be 50 in the Bay Area than 100 in Kansas." With Fault Like Kobe, Fears Rise in Oakland, N.Y. TIMES, Jan. 23, 1995, at A11.

245. A relatively short passage of time, often less than a decade after a disaster, may result in newcomers being ignorant of the natural risks while current residents are quick to put the problem out of their minds. This premise is one of the themes of THE CONTROL OF NATURE, McPhee, supra note 209.

246. In one documented case, a woman was struck by lightning on four occasions. In addition, lightning has struck the Empire State Building several times. Debbie Kong, Powerful Storms Offer Just Another Sizzling Tradition of Summer, BOSTON GLOBE, Aug. 16, 1994, at 18.


248. Id.
tating results in September 1992.\textsuperscript{249} Similarly, half the roofs rebuilt since Hurricane Andrew struck southern Florida in 1992 do not meet current building standards.\textsuperscript{250}

Despite the destruction they suffer, however, an amazing number of people rebuild in the same natural treacherous environs as before.\textsuperscript{251} Reasons for this seemingly perverse behavior include inertia, a belief that it cannot happen again, denial, counterphobic behavior, realization of insurance benefits, and the natural allure or siren call of the geography.\textsuperscript{252}

Legally, the subjective beliefs of these victims should not be deterministic of liability when the forces of nature recur. Negligence is measured by the objective reasonable person standard, not the subjective views of the actor.

\textsuperscript{249} Losses on Kauai from Hurricane Iniki were estimated at $1 billion in damages, with 3 deaths, 98 injuries, and half the houses and buildings on the island destroyed or severely damaged. William Wood & Greg Steinmetz, Estimate of Damage on Hawaii’s Kauai From Hurricane Iniki Reaches $1 Billion, WALL ST. J., Sept. 14, 1992, at A3.


An investigation by a Dade County Grand Jury in the aftermath of Hurricane Andrew found that the community failed to learn from prior hurricanes and was about to repeat the same mistakes in “the rush to rebuild.” Stephen T. Maher, Emergency Decisionmaking During the State of Florida’s Response to Hurricane Andrew, 17 NOVA L. REV. 1009, 1011-12 (1993).

\textsuperscript{251} Not just individuals can be deluded about risks. Homestead Air Force Base in Homestead, Florida was leveled by Hurricane Andrew in 1992. It had been destroyed by a hurricane 40 years before. During the 1992 Presidential campaign, President Bush proposed, for political reasons, rebuilding the base. Eric Pianin, Hill Votes 11 Billion for Hurricane Relief; Florida May Need More, Chiles Indicates, WASH. POST, Sept. 19, 1992, at A3.

\textsuperscript{252} See Salholz, supra note 2, at 27. For example, Liberty, Texas in the Trinity River floodplain is subject to annual flooding. Residents, in explaining why they continued to reside in the floodplain, stated that they were too poor to move anywhere else, had too much invested in the current residence, and possessed deep attachment to an area rich in wildlife and natural beauty. Adam Nossiter, Texas Town Used to Floods Is Stunned by Worst, N.Y. TIMES, Oct. 21, 1994, at A12.
Sometimes, residents may live under a delusion of safety, such as downstream from a flood-control project.\textsuperscript{253} Thus, residents of a floodplain, such as the Mississippi, may not believe that they are subject to the same historical forces so graphically portrayed by Mark Twain in \textit{Life on the Mississippi}.

However, the reality is to the contrary. Significantly, the federal government does not guarantee success in its ongoing efforts to tame nature's waters. Even though the federal government has substantially waived sovereign immunity for other acts of negligence,\textsuperscript{254} it has expressly retained sovereign immunity for water control projects, for which one purpose is flood control.\textsuperscript{255}

People also ignore imminent warnings of danger. For example, nearly 75,000 people fled inland before the onslaught of Hurricane Camille in 1969.\textsuperscript{256} However, several remained, including twenty-five guests of the Richelieu Hotel near Pass Christian, Mississippi, who, ignoring the warnings, planned a hurricane party. Twenty-three of them died when the hotel collapsed.\textsuperscript{257}

Occasionally storm damage is intensified through the application of legal principles. For example, one proven technique for minimizing hurricane damage is the use of hurricane shutters, which prevent windows from being shattered by flying debris. Openings, such as

\begin{itemize}
\item[253.] Senator Proxmire noted in 1973 that "the presence of a large dam or series of dams can hull the downstream population into a false sense of security, thus encouraging expansion into flood plain areas which are the most susceptible to unusually severe floods." \textit{Cong. Rec.} S9792 (1973).
\item[255.] Originally enacted as part of the Flood Control Act of 1928, 33 U.S.C. § 702c (1928) provides: "No liability of any kind shall attach to or rest upon the United States for any damage from or by floods or flood waters at any place." See United States v. James, 478 U.S. 597, 605 (1986) (following the plain language of the statute and holding the government immune from suit). See generally William C. Fitz Jr. & Robert H. Marquis, \textit{Liability of the Federal Government and its Agents for Injuries to Real Property Resulting From River Improvements}, 16 Tenn. L. Rev. 801, 803-04 (1941) (discussing sovereign immunity for injuries resulting from federal action in navigation, flood control, and general watershed development); Michael S. Levine, Note, United States v. James, \textit{Expanding the Scope of Sovereign Immunity for Federal Flood Control Activities}, 37 Cath. U. L. Rev. 219, 220 (1987) ("Despite federal legislation to limit sovereign immunity, the United States continues to enjoy immunity against liability for claims relating to flood control activities.").
\item[257.] \textit{Id.}
\end{itemize}
broken windows, will expose the building’s interior to the forces of high wind and rain. The resulting moisture may weaken the internal drywall material, which deteriorates when wet. In addition, the wind, blowing inside the structure, may pressurize the structure’s interior, which can increase the load on the downwind exterior wall.258 Between the moisture and intense wind pressure caused by the open window, there is a great chance of the building collapsing. As it turns out, deed restrictions commonly used in south Florida preclude the use of hurricane shutters.259

IX. Strict Liability and the Act of God

The doctrine of strict liability has been widely extended to activities considered abnormally dangerous or ultrahazardous. The Restatement (Second) of Torts260 essentially adopts Rylands v. Fletcher261 in imposing liability for ultrahazardous activities. Such activities necessarily involve a risk of serious harm to others, cannot be eliminated by the exercise of utmost care, and are not a matter of common usage. Courts should consider such factors as the high degree of risk, the potential gravity of harm should the risk materialize, the exercise of reasonable care, whether or not the activity is one of common usage, the appropriateness of the activity to the locality, and its value to the community.262

In theory, liability does not depend upon such factors as intent, recklessness, knowledge, negligence, moral blameworthiness, or any other degree of culpability. Nor does it depend upon the degree of care that defendant exercised or failed to exercise. Rather, liability is based simply upon the risks involved. Consequently, a major policy consideration for imposing strict liability upon landowners who undertake abnormally dangerous activities is the high risk of

259. Id. at 1191-92.
261. 1 L.R.-Ex. 265 (1866); see supra text accompanying notes 32-34.
harm posed to others. These landowners should compensate the innocent victims for their injuries. 263

At first glance, the act of God defense should continue to play a role in strict liability cases. Part of the underlying purpose of the act of God doctrine was to ameliorate the seemingly draconian nature of strict liability. 264

However, the act of God defense is no longer necessary to serve this purpose. In essence, strict liability is no longer absolute liability. A number of exceptions have evolved which substantially limit its application.

One generally accepted limitation is that strict liability applies only to those consequences which lie within the extraordinary risk created. 265 In this sense, the defendant is not an insurer for everything that might go wrong. Strict liability is not, therefore, absolute liability. If the damage is within the risk encompassed by the application of strict liability, then the unforeseeable nature of the impact is irrelevant. The question becomes one of causation. 266

Another generally accepted exception is that if the activity is one of common usage—an activity customarily carried on by much of society, or by many people in the community—then strict liability is inappropriate. Consequently, general activities, such as driving an automobile, are so widespread that it is considered inappropriate to subject the operator to strict liability, even though automobile accidents occur daily with tragic consequences. 267 Conversely,


264. See supra text accompanying note 26.


266. See KEETON ET AL., supra note 140, § 79, at 559-60 (discussing the extent of liability when strict liability is imposed for physical harm to persons and tangible things from accidental invasions).

267. See, e.g., Hammontree v. Jenner, 97 Cal. Rptr. 739, 742 (Cal. Ct. App. 1971) (declining to apply strict liability to a driver involved in an accident which occurred during sudden illness).
strict liability was imposed when a gasoline tanker truck exploded in flames after falling off an overpass.\footnote{268}

Similarly, the normal or customary irrigation of farm land may not constitute an ultrahazardous activity, carrying the risk of strict liability.\footnote{269} In fact, a major split of authority exists as to whether strict liability should apply to dams, whose failure may entail a large risk to downstream residents and property. A slight majority of jurisdictions reject strict liability in dam failures.\footnote{270} An analogous case is Turner v. Big Lake Oil Co.,\footnote{271} in which Texas rejected

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\item \footnote{269} See, e.g., Chicago & N.W. Ry. Co. v. Tyler, 482 F.2d 1007, 1011 (8th Cir. 1973) (refusing to apply doctrine to soil conservation dam destroyed during heavy rainstorm); Clark v. Di Prima, 51 Cal Rptr. 49, 53 (Cal. Ct. App. 1966) (involving the usual and ordinary transportation of water by irrigation ditch, not a large dam); Reter v. Talent Irrigation Dist., 482 P.2d 170, 173 (Or. 1971) (finding that irrigation of orchard land in a dry area is not considered exceptional or unusual, and the risk of serious harm created by the activity is minimal such that Rylands is inapplicable); Mackay v. Breeze, 269 P. 1026, 1027 (Utah 1928) (holding Rylands held inapplicable to water in irrigation ditches and canals). See also Wheatland Irrigation Dist. v. McGuire, 537 P.2d 1128, 1140 (Wyo. 1975) (carving out exceptions to doctrine of absolute liability as imposed on rupturing of irrigation district's dam).
\item \footnote{270} Moulton v. Groveland Papers Co., 289 A.2d 68 (N.H. 1972). Two early cases in Connecticut and Vermont also rejected strict liability in dam failure situations. See Beaton v. Connecticut Light & Power Co., 3 A.2d 315, 318 (Conn. 1938) (requiring some negligent act for liability to attach); Lapham v. Curtis, 5 Vt. 371 (1833) (requiring only that a dam owner exercise ordinary care and diligence in making repairs). Although these states have subsequently accepted the doctrine of strict liability. See Whitman Hotel Corp. v. Elliott & Wattrous Eng'g Co., 79 A.2d 591, 595 (Conn. 1951) (applying strict liability to inherently dangerous operation of blasting); Malloy v. Lane Constr. Corp., 194 A.2d 398, 400 (Vt. 1963) (applying strict liability to a blasting operator).
\item A series of older cases in California also reject strict liability. See, e.g., Sutliff v. Sweetwater Water Co., 186 P. 766, 768 (Cal. 1920) (holding strict liability inapplicable to breaking of reservoir's dikes). However, considering the extent to which California has substantially expanded legal liability in recent years, the continued validity of these older cases is in doubt. See also Kunz v. Utah Power & Light Co., 792 P.2d 926, 931 (Idaho 1990) (requiring negligent acts in order to attach liability in a dam case); Bowling v. Town of Oxford, 148 S.E.2d 624, 629 (N.C. 1966) (attaching liability only for negligence in the original construction or subsequent maintenance of the dam); Wheatland Irrigation Dist. v. McGuire, 537 P.2d 1128, 1140 (Wyo. 1975) (holding landowner to duty of reasonable care in maintaining and operating irrigation ditches).
\item \footnote{271} 96 S.W.2d 221 (Tex. 1936).
\end{itemize}
Rylands in a famous decision involving the escape of saltwater from ponds constructed to store runoff from oil wells. It was technologically impossible to drill oil without drawing up saltwater. Under the circumstances, the Texas Supreme Court did not want to hinder the oil industry and, thus, not holding the oil company liable. As another case stated, liability exists only for negligent construction or maintenance of a dam. The minority approach, however, applies strict liability to dam failures, adopting the approach of the Restatement.

Other recognized exceptions to strict liability include acts of agencies of the state (such as war), and malicious acts of third

272. Id. at 226.

It seems that the owner of a dam erected across a natural stream for the purpose of raising water for irrigation or power, or other useful purposes, in the event of damage from breaking, is liable only for negligent construction or maintenance. The act of God is of course always a defense.

Id. at 594.
274. Recent Florida and Massachusetts opinions adopt the doctrine of strict liability in dam failure cases. See Cities Serv. Co. v. Florida., 312 So. 2d 799, 801-03 (Fla. Dist. Ct. App. [2d Dist.] 1975); Clark-Aiken Co. v. Cromwell-Wright Co., 323 N.E.2d 876, 878 (Mass. 1975) (holding that “strict liability . . . is, and has been, the law of the Commonwealth” where upstream property owner’s dam broke and released water onto downstream owner’s property). The Florida case involved the breach of a phosphate settling pond, causing one billion gallons of phosphate slime to escape, “killing countless numbers of fish and inflicting other damages.” Cities Serv., 312 So. 2d at 800. The court, in adopting Rylands, set out policy grounds that are widely applicable today:

In early days it was important to encourage persons to use their land by whatever means were available for the purpose of commercial and industrial development. In a frontier society there was little likelihood that a dangerous use of land could cause damage to one’s neighbor. Today our life has become more complex. Many areas are overcrowded, and even the non-negligent use of one’s land can cause extensive damages to a neighbor’s property. Though there are still many hazardous activities which are socially desirable, it now seems reasonable that they pay their own way. It is too much to ask an innocent neighbor to bear the burden thrust upon him as a consequence of an abnormal use of the land next door. The doctrine of Rylands v. Fletcher should be applied in Florida.

Id. at 801.
parties (such as sabotage). Thus, courts generally have held that the owner of a reservoir "cannot be held liable where the escape of water has been caused by third party acts which the owner could neither control nor anticipate.""276

Pursuant to negligence analysis, as the risk increases, so too does the requisite standard of care, thus, approaching strict liability if the risk is sufficiently great. If foreseeability of the risk is the issue vis-à-vis act of God, then this issue is, in fact, one of negligence analysis. In light of the exceptions, and of the flexibility of the negligence duty standard, there is no need for a separate act of God defense in strict liability analysis.

The doctrine of strict liability has expanded as part of broad legal and social changes emphasizing tort law as a means for victim compensation. Therefore, courts have adopted an expansive approach to strict liability, limiting restrictions imposed on it.

X. Act of God as a Duty Issue

It is time to recognize that the act of God defense mirrors the standard issue of duty. One of the basic maxims of negligence is that the tortfeasor must owe the victim a duty before liability can be found. Several factors go into establishing duty, but the most

275. See, e.g., Pecan Shoppe, Inc. v. Tri-State Motor Transit Co., 573 S.W.2d 431, 437-38 (Mo. Ct. App. 1978) (holding that explosives carrier is not strictly liable when striking employee fired shots at trailer unit, causing it to explode); Wheatland Irrigation Dist. v. McGuire, 539 P.2d 1128, 1134-36 (Wyo. 1975) (holding no strict liability in case where the dam's rupture was purportedly caused by sabotage). See also Gutierrez v. Rio Rancho Estates, Inc., 607 P.2d 622, 625 (N.M. Ct. App. 1979) (listing exceptions to strict liability doctrine of Rylands), aff'd on other grounds, 605 P.2d 1154 (1980); Wigal v. City of Parkersburg, 81 S.E. 554, 557 (W. Va. 1914) (conceding that strict liability for water storage tank failure must be expected in cases of sabotage and act of God).


278. Id. at 290.

279. See KEETON ET AL., supra note 140, at 357.
important is generally the reasonable foreseeability of the risk.\textsuperscript{280} The issue then arises how should a reasonable person act in light of the foreseeable risks. Only reasonable measures need be undertaken since the cause of action is negligence, and not strict liability in which the actor is essentially an insurer.\textsuperscript{281}

This concept of reasonableness is mirrored by the act of God cases in which courts provide that an act of God exists only when reasonable foreseeability and reasonable measures would not prevent the incident.\textsuperscript{282} The act of God defense is premised upon the assertion that the occurrence is unforeseeable. Cases which factually reject the act of God defense often discuss the duty to use reasonable care on the part of the actor.\textsuperscript{283}

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{280} See, e.g., Mathis v. United Eng'rs & Constructors, Inc., 554 A.2d 96, 100 (Pa. Super. Ct. 1989) (asserting that manufacturer's duty of care does not extend to protection against reasonably unforeseeable third party acts); Charvoz v. Bonneville Irrigation Dist., 235 P.2d 780, 783 (Utah 1951) (stating that liability is premised on failure to use ordinary care to prevent reasonably foreseeable injuries). The California Supreme Court made foreseeability of the risk the major factor in establishing duty in a series of cases in the 1970s and 1980s. See, e.g., Bigbee v. Pacific Tel. & Tel. Co., 665 P.2d 947, 951-53 (Cal. 1983) (presenting all issues of defendant's negligence in context of inquiry whether accident was reasonably foreseeable); Weirum v. RKO Gen., Inc., 15 P.2d 36, 39 (Cal. 1975) (defining foreseeability as "a primary consideration in establishing" duty). See also Tarasoff v. Regents of the Univ. of Cal., 551 P.2d 334, 342 (Cal. 1976) (calling foreseeability the most important factor in determining duty). More recent cases revert back to the reasonable foreseeability of the risk. See, e.g., Ann M. v. Pacific Plaza Shopping Ctr., 863 P.2d 207, 213-14 (Cal. 1993) (stating that a landowner has a duty to protect others from third-party acts only when those acts may be reasonably anticipated).
\item \textsuperscript{281} See, e.g., Gerber v. McCall, 264 P.2d 490, 493-94 (Kan. 1953) (holding defendant not negligent when injury was caused by flooding of unexpected magnitude); Strobeck v. Bren, 101 N.W. 795, 796 (Minn. 1904) (holding defendant not negligent when heavy wind blew down fence, allowing plaintiff's cows to escape to their deaths).
\item \textsuperscript{282} For example, an act of God exists when no ordinary or reasonable harm, foresight, prudence, diligence and care could have anticipated and prevented the damages. Garrett v. Beers, 155 P. 2, 3 (Kan. 1916).
\end{enumerate}
\end{footnotesize}
The duty issue also goes back to old English cases. In the 1856 case of *Blyth v. Birmingham Waterworks*, the defendants did not free the plug in a water main during one of the severest frosts on record. The plug normally rose and fell, thereby relieving pressure; however, on this occasion, the plug was frozen shut. The ice incrustation was visible. As a result of the pressure building up under the frozen plug, water burst out of the main and flooded the plaintiff’s house. The jury found that the defendants failed to exercise proper care to prevent the accident.

The case was reversed on appeal. On appeal, Baron Alderson held that the defendants only had to provide “against such frosts as experience would lead men, acting prudently, to provide against.” Thus, Birmingham Waterworks was not liable for failure to provide against the extreme frost of 1855. Baron Martin believed that the defendants were not negligent. Baron Bramwell felt it “would be monstrous to hold the defendant responsible because they did not foresee and prevent an accident, the cause of which was so obscure, that it was not discovered until many months after the accident had happened.”

Seven years later in *Steggles v. The New River Co.*, a factually similar case was tried with a different result. Again, an extraordinary frost caused the underground water pipes to start, allowing water to escape into the plaintiff’s cellar and causing significant damage. *Blyth* was distinguished “because [in Steggles] it appeared that it was known that the effect of frost might be to cause the plugs to start, and that some precaution might be taken to prevent the water from escaping through the soil; though what those precautions were did not very distinctly appear.” The frost, and resulting damages, were foreseeable in light of *Blyth*, and hence a duty arose.

These two cases could have been argued as acts of God. Yet, they were approached as duty cases, with reasoning analogous to the

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A.2d 68, 71 (Pa. 1948).
285. Id. at 1048-49.
286. Id. at 1049.
287. Id.
288. 11 Weekly Rep. 234
289. Id. at 235.
act of God cases. In reality, the concept of duty has expanded so rapidly in recent decades that caselaw now exists that imposes a duty to warn of natural phenomena.

For example, a duty has been imposed in California upon financial institutions to exercise their power over developers to protect purchasers from seriously defective design decisions and construction methods, which expose houses to such perils as landslides. A bank which not only financed a development, but also was actively involved in its planning, owed a duty to the purchasers, who were "ill-equipped with experience or financial means to discern such structural defects." 290 The court noted the importance of protecting purchasers against structural defects that could be beyond the purchaser’s capacity to remedy. Thus, one major reason for imposing a duty on brokers, developers, and sellers is the purchaser’s lack of knowledge and experience. 291

The California Supreme Court further held, in the landmark case of Sprecher v. Adamson, 292 that the owners of land have a general duty to exercise reasonable care to protect others from artificial or natural conditions on their land. 293 In that case, a portion of defendant’s land contained an active landslide. Heavy rains caused a slide which pushed plaintiff’s house against a neighbor’s. Even though the common law had imposed no duty with respect to natural conditions on one’s land, the court held that the possession of land "with its attendant right to control conditions on the premises is a sufficient basis for the importance of an affirmative duty to act." 294

Contrary to Sprecher, the common law held that the owners of land had no duty to remedy natural conditions on their land, however dangerous or threatening to neighbors the conditions might be. 295

290. Connor v. Great W. Sav. & Loan Ass’n., 447 P.2d 609, 618 (Cal. 1968). The developer negligently constructed the homes without regard to the underlying soil conditions. Id.
291. See, e.g., Easton v. Strassburger, 199 Cal. Rptr. 383, 388-89 (Cal. Ct. App. 1984) (adopting a broad definition of the duty of care owed by a real estate broker to a potential purchaser including an obligation to conduct a reasonable investigation and to disclose that which should be known to the ordinary buyer and seller).
293. Id.
294. Id. at 1127.
295. KEETON ET AL., supra note 140, § 57, at 390.
This rule is inapplicable in our situation for two reasons. First, development on a site, such as a seismic zone, alters the natural conditions. Second, we are dealing with a duty to warn purchasers of the property, not third parties.

One might argue that purchasers should investigate underlying natural features and historical records of natural phenomena, such as flooding or hurricanes. The dangers are recorded in history books, almanacs, newspaper archives, government records, and individual memories. However, this information is not routinely provided by chambers of commerce, tourist information centers, or real estate agencies to prospective investors, businesses, immigrants, tenants, or buyers. Newcomers to an area may possess, at best, an idea of some general risks, but little understanding of specific risks.

Many times the key is to place a duty to warn of the potential risk on the part of the developers, builders, and brokers—analo-

296. Id. See also Just v. Marinette County, 201 N.W.2d 761, 768 (Wis. 1972) ("An owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it was unsuited in its natural state and which injures the rights of others.").

297. See Key Sales Co. v. South Carolina Elec. and Gas Co., 290 F. Supp. 8, 27 (D. S.C. 1968) (stating that plaintiff was responsible for not checking the history prior to purchase); Gill v. Marquoit, 525 P.2d 1030, 1032 (Or. 1974) (holding that sellers are entitled to assume that purchasers will inquire about susceptibility of land to flooding). See also Fairmont Foods Co. v. Skelly Oil Co., 616 S.W.2d 548, 550 (Mo. Ct. App. 1981) (holding that purchaser had the burden of proving that the undisclosed information was not within its reasonable reach); Brown v. B & D Land Co., 823 P.2d 380, 382 (Okla. Ct. App. 1991) ("the means and knowledge of obtaining the truth regarding the property were readily available to plaintiff upon inquiry."). But see Chapman v. Hosek, 475 N.E.2d 593, 598-99 (Ill. App. Ct. 1985) (finding an action for fraud existed even though information that showed the property flooded was in the public record).

298. For an example of the lack of warnings by real estate brokers to purchasers of properties in the Los Angeles Hills, see MCPFEE, supra note 209, at 251-54. See also Chapman v. Hosek, 475 N.E.2d 593, 599 (Ill. App. Ct. 1985) (finding that an action for fraud existed even though information, that showed the property flooded, was in the public record); Olshansky, supra note 182, at 949.

299. See, e.g., Karoutas v. HomeFed Bank, 283 Cal. Rptr. 809, 811 (Cal. Ct. App. 1991) (placing duty to discuss on seller when purchaser alleged that property was subject to substantial, permanent, and progressive soil movement, and purchaser did not know or could not reasonably have discovered the undisclosed facts); Barnhouse v. City of Pinole, 183 Cal. Rptr. 881, 893 (Cal. Ct. App. 1982) (imposing duty to disclose on developer even though purchaser did not deal directly with the
gous to the informed consent doctrine applicable to the medical profession and to products liability litigation. Thus, while a manufacturer might not have been at fault in causing the original accident, the manufacturer may be liable for providing inadequate safety devices or warning notices.

Similarly, sellers of houses have a duty to disclose material facts or at least not to engage in fraud, misrepresentation, or omissions of material facts on or under the property, as well as facts concerning the building’s history, such as its use by developers; Buist v. C. Dudley De Velbiss Corp., 6 Cal. Rptr. 259, 263 (Cal. Ct. App. 1960) (imposing duty despite contract provision to effect that there are no other representations than those made in the written contract).

300. See RESTATEMENT (SECOND) OF TORTS § 402a cmt. k, (1979) (providing a duty to warn in cases of unavoidably unsafe products; a proper warning nullifies liability in these situations).

301. See, e.g., Clauser v. Taylor, 112 P.2d 661, 662 (Cal. Ct. App. 1941) (holding that vendor of land is bound to inform vendee that land is filled if aware that vendee has no other access to that information); Cohen v. Vivian, 349 P.2d 366, 368 (Colo. 1960) (holding that seller’s knowledge of a latent soil defect establishes a duty to disclose); Sorrell v. Young, 491 P.2d 1312, 1315-16 (Wash. Ct. App. 1971) (asserting that vendors have a duty to disclose latent defects in land to purchasers, regardless of any inspection of property that purchaser might make).

302. See, e.g., Burkett v. J.A. Thompson and Son, 310 P.2d 56, 58 (Cal. Ct. App. 1957) (holding vendor liable for misrepresentation that house was built on original soil rather than fill); Long v. Brownstone Real Estate Co., 484 A.2d 126, 128 (Pa. Super. Ct. 1984) (holding that seller had a duty to disclose since buyer was falsely informed that the house had never experienced flooding).

303. A fact is material if a reasonable person would attach importance to it in determining the choice of action in the transaction. Griffith v. Byers Constr. Co. of Kan., Inc., 510 P.2d 198, 205 (Kan. 1973); Kaze v. Compton, 283 S.W.2d 204, 207 (Ky. 1955); Ollerman v. O’Rourke Co., 288 N.W.2d 95, 100 (Wis. 1980). See also Godfrey v. Steimpress, 180 Cal. Rptr. 95, 104 (Cal. Ct. App. 1985) (if the buyers had known the information “they would not have gone through with the purchase”).

304. See, e.g., Bethlahmy v. Bechtel, 415 P.2d 698, 702 (Idaho 1966) (noting that plaintiff-purchasers may bring action for fraud against defendant who knew and did not inform plaintiffs of several defects on the property which were not discovered by reasonable inspection); but see Swinton v. Whatinsville Sav. Bank, 42 N.E.2d 808, 808 (Mass. 1942) (rejecting liability for non-disclosure of termite infestation).

305. The problem of “stigmatized property” has become a major issue in recent years, especially in cases where the prior occupant suffered from AIDS. See generally Ross R. Hartog, The Psychological Impact of AIDS on Real Property and a Real Estate Broker’s Duty to Disclose, 36 ARIZ. L. REV. 757, 764-65 (1994) (discussing that brokers in Arizona have a wide duty to disclose both physical and nonphysical defects in property which may affect its value, including past events); Michael D.
as a bordello, or a house possessed by poltergeists, or as the site of a mass murder. It is fair to say that both common law and statutes have increasingly imposed a duty on sellers to disclose material problems, such as termite infestation or lead paint.

This duty has also been imposed in cases when a builder located a house in the path of a landslide, in the floodplains of a stream, or on an improper landfill. Failure to provide these warnings may result in liability.

Isacco, Jr., A Massachusetts Real Estate Broker's Duty to Disclose: The Quandary Presented by AIDS Stigmatized Property, 27 NEW ENG. L. REV. 1211, 1220-21 (1993) (discussing whether a real estate broker has a duty to disclose or even legally can disclose to a potential buyer information about the previous owner or occupant).

313. See, e.g., Sabella v. Wisler, 377 P.2d 889, 893 (Cal. 1963) (holding that contractor is liable to property owner for building on an improperly compacted fill); Clauer v. Taylor, 112 P.2d 661, 662 (Cal. Ct. App. 1941) (affirming the rescission of a transaction to sell property when the buyer was not informed that the property was filled).
The disclosure requirement is a corollary to the implied warranty of habitability. The Twentieth Century has witnessed the evolution of the common law from the doctrine of caveat emptor at the turn of the century to the widespread acceptance of the doctrine of the implied warranty of habitability. The essence of this warranty is that the seller will transfer to the purchaser a house suitable for habitation. For example, the builder has the duty to ensure that the foundation is firm and secure. A breach of warranty may result from "the unsuitable nature of the site [where] the house [is] built." Thus, the warranty applies to a professional developer who improves land for residential home building but withholds disclosure of a latent defect in the real estate that renders the land unsuitable for building homes. There is, thus, a duty to provide a safe site for construction, whether damage is likely to arise within the confines of the lot's boundaries or from forces originating beyond its limits.

The warranty originally applied to defects in the structure itself, but has since been extended to cover the unsuitability of the site, such as soil conditions. In both instances, the purchaser must rely on the seller's expertise; however, the builder is in a better


319. ABC Builders, Inc., 632 P.2d at 935.

320. Id. at 938.

position to examine and discover defects. It is negligence if a builder does not ascertain soil conditions prior to building a house.

In recent years, a duty has also arisen for the builders and sellers of new houses to disclose to potential purchasers the existence of off-site conditions that might affect property values, such as a closed landfill contaminated with hazardous wastes, or the proximity of an obnoxious business development. For example, a New Jersey decision recently imposed a duty on sellers "to disclose the existence of off-site conditions unknown to the purchaser, . . . [which] are known or should have been known to the seller . . . . and [which], based on reasonable foreseeability, might materially affect the value or the desirability of the property." Thus, a duty was imposed upon the builders and brokers of a new subdivision to disclose the existence of a closed landfill. The landfill, located within half a mile of the homes, was suspected of being


contaminated with toxic wastes. Leachate was seeping from the landfill, and methane gas was migrating to the subdivision.

The broker’s duty may include a “competent and diligent inspection of the residential property listed for sale, [as well as disclosure] to prospective purchasers [of] all facts materially affecting the value or desirability of the property,” which such an investigation would reveal. 326 Substantial secondary authority exists for the disclosure of off-site environmental dangers. 327

A series of developments in California has amplified the duty to disclose. The leading case on broker disclosure is a 1984 California Court of Appeals decision, Easton v. Strassburger. 328 The case involved the sale of a 3000 square foot home, a swimming pool, and a guest house on an acre tract of land. The seller’s purchase price was $170,000, in 1976.

Massive earth movements in 1977 and 1978 substantially damaged the property. The sellers, having previously experienced two major slides in the preceding three years, took corrective measures, but withheld these facts both from their brokers and the purchasers. Expert testimony established that improper engineering and compacting during construction partially caused the damage.

However, the brokers were not totally ignorant of the situation since they were aware of tell-tale clues, such as netting on a slope

326. Easton v. Strassburger, 199 Cal. Rptr. 383, 390 (Cal. Ct. App. 1984) (discussing evidence that showed brokers were on notice of potential soil problem). See also Zimmerman v. Northfield Real Estate, Inc., 510 N.E.2d 409, 413 (Ill. App. Ct. 1986) (upholding common-law fraud action on assumption that vendor owed purchaser duty to disclose, and that failure to disclose constitutes fraud); O’Rourke Co., 288 N.W.2d 95, 107 (Wis. 1980) (discussing the vendor’s duty to disclose information not readily knowable by the purchaser).


of the property to repair the slide, and uneven floors in the guest house. The broker’s agents made a limited examination of the property, and knew it was built on fill. The court recognized that brokers have an affirmative duty to disclose known material facts:

    It is not disputed that current law requires a broker to disclose to a buyer material defects known to the broker but unknown to and unobservable by the buyer. . . . If a broker fails to disclose material facts that are known to him, he is liable for the intentional tort of “fraudulent concealment.”

    . . .”

The court further held that implicit in this obligation is the duty to disclose defects which are discoverable through reasonable diligence. In short, the broker’s duty includes a reasonably diligent inspection of the property.

The court reasoned that the seller’s broker is often in the best position to obtain and provide reliable information on the property. Purchasers must be protected from the unethical broker and seller by ensuring the purchaser is provided sufficient accurate information to make an informed decision whether to purchase. The court did not want to create a disincentive for a seller’s broker to make a diligent inspection; purchasers often rely upon the seller’s broker’s expertise. Consequently, the broker incurs an affirmative duty to inspect.

In addition, the court cited the Code of Ethics of the National Association of Realtors, which provides that the broker “has an affirmative obligation to discover adverse factors that a reasonably competent and diligent investigation would disclose.”

The California legislature responded to the judicial decision in Easton by enacting disclosure legislation. The California legis-

329. Id. at 387-88.
330. Id. at 388.
331. Id.
332. Id. at 389.
333. Easton, 199 Cal. Rptr. at 389 (citations omitted).
334. CAL. CIV. CODE § 1102 (West 1995).
lution has become a model for states elsewhere. A disclosure statement in the prescribed form must be delivered to the purchaser. The disclosure statement must include existing defects in the structure of the home, and defects on the property or other matters affecting the property itself. The statute explicitly applies to listings and cooperating brokers, who are required to conduct a reasonably competent and diligent visual inspection of the property. The required information includes fill, settling from any cause, flooding, drainage, or grading problems, and any major damage caused by fire, earthquakes, floods or landslides.

No other information must be statutorily disclosed. However, the disclosure form specifically states: "The specifications of items for disclosure in this article does not limit . . . any obligation for disclosure created by any other provision of law or which may exist in order to avoid fraud, misrepresentation, or deceit in the transfer transaction." A significant limitation in the statute is that disclosure applies only to past or existing damage from external geologic causes. It does not require disclosure of prospective threats.

The California legislation further amplifies the requirement that a broker conduct a "reasonably competent and diligent visual inspection of the property offered for sale and to disclose to that prospective purchaser all facts materially affecting the value or desirability of the property that such an [inspection] would reveal." However, the statute provides that adequate disclosure exists for common environmental hazards and geologic and

336. CAL. CIV. CODE §§ 1102.2, 1102.6 (West 1995).
337. Id. § 1102.6.
338. Id. § 1102.6(c)(6)-(9).
339. Id. § 1102.8.
340. Id. § 1102.5.
341. CAL. CIV. CODE § 2079(a) (West 1995).
342. Id. § 2079.7.
seismic hazards\(^3\) if the prescribed consumer information and homeowners' guide to earthquake safety are provided to the prospective purchaser.

The California Legislature enacted the Seismic Hazards Mapping Act in 1990\(^4\) in response to a series of earthquakes which caused extreme loss of life and property damage in the state. The purpose of the statute is to "provide a statewide seismic hazard mapping and technical advisory program to assist cities and counties in fulfilling their responsibilities for protecting the public health and safety."\(^5\) A critical provision of the statute provides that when information on a seismic hazard zone is "reasonably available,"\(^6\) the seller, or agent acting for the seller, shall disclose to a prospective purchaser that the property is located within a seismic hazard zone.\(^7\)

This actual notice requirement provides the genesis of this Article's duty to warn recommendation. Therefore, the law should impose, based upon reasonable foreseeability, a duty on developers of new developments, and sellers of existing facilities, to warn purchasers that they are buying in a geologically fragile area, such as an earthquake zone or tornado alley.\(^8\) Persons purchasing homes on the San Andreas Fault should be aware of that fact. Personal autonomy would then allow the purchaser to decide. If people wish to reside in ecologically fragile areas, they should at least possess an informed basis for their decisions.\(^9\)

The requisite warning should include:

1. the nature of the risk,
2. historical occurrences of the risk in the area,
3. the potential impact should the risk materialize,

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\(^3\) Id. § 2079.8.

\(^4\) CAL. PUB. RES. CODE §§ 2690-2699.6 (West Supp. 1995).

\(^5\) Id. § 2692(a).

\(^6\) The phrase "reasonably available" is defined to mean "that for any county that includes areas covered by seismic hazard maps, a notice is posted at the offices of the county recorder, county assessor, and county planning commission 'identifying' the location of the maps and the effective date of the notice." Id. § 2694(c)(1).

\(^7\) Id. § 2694(a).

\(^8\) Two commentators suggested hazard information be provided to mortgage lenders, who would presumably avoid lending to hazardous areas because of the risks of loan defaults. Oshansky, \textit{supra} note 182, at 956.

\(^9\) One study indicates residents often behave as though there is no risk when confronted with an annual landslide risk of 1 in 500. Such a risk is, in fact, substantial, and may pose a large cumulative risk to society. Id. at 949.
4. the estimated chance of the risk materializing.

XI. Conclusion

The forces of nature cannot be turned on and off by a toggle switch. Natural disasters may technically be triggered by forces of nature, but the resulting damages are often the result of human activity. An event caused by human activity does not constitute an act of God. For example, droughts, earthquakes, mudslides, brush fires, and wildfires are common in southern California. Failure to take precautions against these risks constitutes negligence. Similarly, there is nothing novel about floods in the midwest or hurricanes striking the Atlantic and Gulf coasts. Precipitation is a natural phenomenon, but floodplains development, and wetlands filling are acts of people. It is not an act of God when civilization encroaches upon geologically unstable areas.

Nature provides, both through history, and scientific advances, warnings of the potential magnitude of these forces. Natural hazards are no longer a mystery to us. Failure to heed these warnings, and to take reasonable measures to mitigate the potential impacts, constitutes acts of people, and not of God. To paraphrase the great philosopher Santayana, a society which does not remember the geological and meteorological past is condemned to repeat it. 350

Negligence liability has expanded rapidly in recent years in parallel to broadening concepts of foreseeability. Conversely, the applicability of the act of God defense has shrunk in inverse proportion to rapidly expanding concepts of foreseeability.

Whether it is the assertion of duty based upon reasonable foreseeability, or the existence of an act of God based upon lack of foreseeability, the identical issue of foreseeability is a jury question. It seems unduly confusing to have juries consider issues of foreseeability of the risk, duty, and causation in establishing negligence, and then have them reconsider precisely the same factors in applying the act of God defense.

That which is foreseeable is not an act of God, nor is it a supervening cause. Liability still may not lie, but that determination

is decided by whether or not the actor exercised reasonable care in light of the risk. This issue is a traditional application of negligence analysis by the trier of fact.

If an event is truly so unforeseeable as to constitute an act of God, then there would, in fact, be no duty under traditional negligence analysis. Therefore, the act of God defense can be viewed as a no-duty defense.

The purpose of this Article is not to posit that we can prevent the forces of nature from striking devastating blows to a community. Such prevention is impossible in many situations.

However, some destruction can be prevented. Other risks can be minimized and the resulting damages mitigated through reasonable measures. There is a substantial difference between failures to act in the first instance, and actions which turn out in hindsight to be inadequate. Engineering is a continuing learning process. It may be that we cannot presently build freeways to withstand major earthquakes. However, we must try. Failure to fully understand the potential magnitude, gravity, force, and direction of a foreseeable blow of nature does not justify failure to act at all. Reasonable care must still be exercised in light of current understanding and technology. The measurement of the reasonableness of the actions taken is a question of duty under traditional tort analysis.

Clearly, not all damage caused by forces of nature can be prevented. The critical point of analysis is often at the design stage. As seen in this Article, a negligence standard is used for design professionals. The issue, therefore, is whether the actor has employed reasonable measures to prevent or ameliorate the foreseeable consequences. If so, the actor has not been negligent, and there is no need for an independent act of God defense.

If a force of nature is itself so overwhelming as to cause devastation in spite of any reasonable human efforts that could be taken to restrain it, then legal liability will not lie. Instead of

351. See, e.g., Petition of United States, 425 F.2d 991, 996 (5th Cir. 1970) (finding no liability when defendants were not negligent and damage was caused solely by an act of God); Sloss-Sheffield Steel & Iron Co. v. Wilson, 62 So. 802, 803 (Ala. 1913) (stating that defendant controlling a dam above plaintiff's land is not liable to plaintiff in the absence of negligence on the defendant's part); Joseph Resnick Co. v. Nippon Yusen Kaisha, 241 N.Y.S.2d 134, 138 (N.Y. Civ. Ct. 1963) (stating that a common carrier's liability to plaintiff can be exercised if there is no intervention, foreseeability, or control on the part of the defendant).
labeling the natural force an uncompensable act of God, negligence principles allow us to conclude that no liability exists either because of the absence of a duty to control such a force, or because the requisite causation element is not met.

In light of these realities, most acts of God in fact involve human error at some stage of the process. The act of God defense necessitates acts, which are totally of natural origins, free from human fault. The rare instances, when such a situation arises, are best resolved under a duty analysis. Consequently, normal rules of negligence apply.

In conclusion, the act of God defense is a theory which no longer makes legal or factual sense. It is time to recognize that when looked at in the context of the specifics, the act of God defense is simply an application of normal negligence principles. Therefore, it should be incorporated into general negligence standards. The English jurists, as with their American counterparts, have been attempting to distinguish acts of God from acts of people. They too have increasingly restricted the application of the act of God defense to rare situations, free of human blame.