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Evolution of Environmental Law in India Post-Bhopal Disaster

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Abstract— The Bhopal gas disaster of December 1984 exposed serious gaps in India's regulatory, liability, and compensation framework for hazardous industry. This paper examines how Indian environmental law evolved in the four decades that followed. It combines a doctrinal review of statutes and rules with a coded content analysis of 240 Supreme Court of India judgments delivered between 1985 and 2023, and a structured survey of 112 environmental law practitioners, regulators, and academics. The judgments were divided into four periods and coded for the invocation of five principles: the constitutional right to a healthy environment, polluter pays, the precautionary principle, sustainable development, and the public trust doctrine. Invocation of all five rose significantly across the periods ($\chi^2(3)$ between 19.1 and 65.8, $p < 0.001$). Sustainable development was the most frequently invoked principle in the latest period (81.3%). The petitioner success rate, by contrast, rose only modestly, from 41.7% to 60.9%, a change that was not statistically significant ($\chi^2(3) = 4.30$, $p = 0.231$). Practitioners rated judicially created doctrines ($M = 4.12$) above statutory insurance and impact assessment mechanisms. The findings suggest that post-Bhopal environmental law developed mainly through judicial innovation, and that statutory implementation has lagged behind doctrinal expansion.

Keywords: **Bhopal gas disaster, environmental law, absolute liability, polluter pays principle, National Green Tribunal, public interest litigation, India**

Introduction

In the night of 2–3 December 1984, a leak of methyl isocyanate from the Union Carbide India Limited pesticide plant in Bhopal exposed hundreds of thousands of residents to toxic gas. It remains one of the worst industrial disasters on record. The tragedy occurred in a legal environment that was thin and fragmented. The Water Act of 1974 and the Air Act of 1981 addressed pollution control, but India had no umbrella environmental statute, no clear rule of liability for hazardous enterprises, and no specialised forum for environmental disputes [1], [4].

The disaster prompted legislative, judicial, and institutional change at an unusual pace. Parliament enacted the Bhopal Gas Leak Disaster (Processing of Claims) Act, 1985, and the Environment (Protection) Act, 1986. The Supreme Court, working through public interest litigation, reinterpreted Article 21 of the Constitution to include a right to a wholesome environment and developed a distinctive doctrine of absolute liability [11], [15]. The National Green Tribunal, established in 2010, completed the institutional shift by creating a dedicated forum with technical expertise [7].

Despite this scholarship, few studies measure how the doctrinal changes unfolded over time. Most existing work is descriptive or case-centred. This paper addresses that gap by tracing the evolution of environmental law after Bhopal through both doctrinal analysis and quantitative coding of judicial reasoning. It asks whether the expansion of legal principles has translated into better outcomes for those seeking environmental remedies.

Literature Review

Early scholarship on Bhopal focused on the failures of law in the aftermath of the disaster. Baxi [1] argued that the litigation strategy adopted by the Union of India, and the contest over forum, reflected a broader crisis in the accountability of multinational enterprises. Cassels [2] developed this critique, showing that the promise of law to deliver redress to disaster victims was limited by procedural obstacles, jurisdictional contests, and the dominance of

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settlement over adjudication. Jasanoff [3] widened the lens in an edited volume on risk management after Bhopal, comparing how India, the United States, and international institutions responded to industrial hazard.

A second body of work examines the constitutional and judicial response. Divan and Rosencranz [4] provide the standard doctrinal treatment of Indian environmental law and trace how the Supreme Court moved from nuisance-style reasoning to rights-based adjudication. Sathe [5] situates this movement within the larger phenomenon of judicial activism and the relaxation of locus standi. Dembowski [9] examines how public interest litigation altered the relationship between courts, the state, and civil society. Sahu [6] evaluates the Court's environmental innovations, including the continuing mandamus and the reliance on expert committees, and argues that these have enriched jurisprudence while raising institutional legitimacy concerns. Rosencranz and Jackson [10] study the Delhi vehicular pollution litigation and caution that sustained judicial supervision of administrative functions has limits.

The doctrinal cornerstones of this literature are a handful of decisions. *Rural Litigation and Entitlement Kendra v. State of U.P.* [16] was an early case in which the Court ordered closure of limestone quarries on ecological grounds. In *M.C. Mehta v. Union of India* (the Oleum Gas Leak case) [11], the Court departed from the English rule in *Rylands v. Fletcher* and held that enterprises engaged in hazardous activities bear absolute liability without exceptions. *Subhash Kumar v. State of Bihar* [15] affirmed that the right to life includes the right to enjoy pollution-free water and air. *Indian Council for Enviro-Legal Action v. Union of India* [17] applied the polluter pays principle to remediation costs, while *Vellore Citizens Welfare Forum v. Union of India* [12] declared the precautionary principle and the polluter pays principle part of Indian environmental law. *M.C. Mehta v. Kamal Nath* [18] introduced the public trust doctrine. *Union Carbide Corporation v. Union of India* [13] and *Charan Lal Sahu v. Union of India* [14] concerned the Bhopal settlement and the constitutionality of the 1985 Act.

The third strand concerns institutional design. The Law Commission of India [8] recommended specialised environment courts, and its 186th Report shaped the legislative debate that preceded the National Green Tribunal Act, 2010. Amirante [19] offers a comparative account of the Tribunal, noting its technical members and wide jurisdiction. Gill [7] provides the most comprehensive socio-legal study of the Tribunal and its role in environmental justice, observing both its activism and its resource constraints.

The literature leaves two gaps. First, the evidence is mostly qualitative and selective, drawing on landmark judgments without testing how widely doctrines spread through routine adjudication. Second, little work compares judicial innovation with practitioners' assessment of statutory mechanisms. This study addresses both gaps.

Research Objectives and Questions

The study pursues four objectives: to trace the statutory and institutional response to Bhopal; to measure the diffusion of core environmental principles in Supreme Court reasoning from 1985 to 2023; to assess whether doctrinal expansion corresponds to changes in outcomes for petitioners; and to document practitioner perceptions of the relative effectiveness of legal instruments.

The research questions follow from these objectives. How did Indian environmental legislation and institutions develop after 1984? Did the frequency with which the Supreme Court invoked environmental principles change significantly across time? Did the proportion of judgments granting relief to environmental petitioners change correspondingly? How do legal professionals rate the effectiveness of key instruments?

Research Methodology

The study used a mixed doctrinal and empirical design with three components.

The first was a doctrinal analysis of primary legal sources: the Constitution of India, central legislation and rules enacted in response to or after Bhopal, and the leading judgments cited above. This component addressed the first research question.

The second was a quantitative content analysis of Supreme Court judgments. The sampling frame consisted of reported judgments delivered between 1 January 1985 and 31 December 2023 and retrieved from SCC Online using the search terms environment, pollution, hazardous, ecology, and Article 21. Judgments in which environmental protection was a central issue were retained. A stratified sample of 240 judgments was drawn across four periods: 1985–1994 (n = 48), 1995–2004 (n = 62), 2005–2014 (n = 66), and 2015–2023 (n = 64). Each judgment was coded for whether it invoked each of five principles (right to a healthy environment under Article 21, polluter pays, precautionary principle, sustainable development, and public trust doctrine) and whether relief

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was granted to the environmental petitioner. Two coders independently coded a 10% subsample (24 judgments). Inter-coder agreement was high (Cohen's $\kappa = 0.82$), and disagreements were resolved by discussion before the full coding.

The third component was a structured survey administered to environmental law practitioners and officials. Of 160 invited participants, 112 responded (response rate 70.0%): 58 advocates, 31 officials of state pollution control boards and environmental departments, and 23 academics. Respondents rated the perceived effectiveness of five instruments on a five-point Likert scale (1 = not effective, 5 = highly effective). The scale showed good internal consistency (Cronbach's $\alpha = 0.86$).

Differences in principle invocation and success rates across periods were tested with Pearson's chi-square tests of independence ($df = 3$). Differences in survey ratings across instruments were tested using a repeated-measures ANOVA. The significance threshold was set at $\alpha = 0.05$. Percentages are reported to one decimal place, and all tables use the same sample sizes described above.

Results

Legislative and institutional response

The doctrinal analysis shows that the legislative response unfolded in three waves: immediate claims and safety measures (1985–1991), accident preparedness and impact assessment (1991–2002), and institutional consolidation (2002–2010). Table 1 summarises the principal instruments and Figure 1 places them on a timeline.

Table 1. Principal legal instruments in the post-Bhopal period

Instrument	Year	Core contribution
Bhopal Gas Leak Disaster (Processing of Claims) Act	1985	Vested the government with exclusive standing to represent victims
Environment (Protection) Act	1986	Umbrella statute empowering the Centre to regulate and prevent pollution
Factories (Amendment) Act	1987	Added provisions on hazardous processes and site appraisal
Manufacture, Storage and Import of Hazardous Chemicals Rules	1989	Duties for occupiers of hazardous installations
Public Liability Insurance Act	1991	Mandatory insurance and relief for victims of hazardous accidents
National Environment Tribunal Act	1995	Strict-liability compensation forum (never operationalised)
Chemical Accidents (Emergency Planning, Preparedness and Response) Rules	1996	Crisis groups and emergency planning at national and local levels
National Green Tribunal Act	2010	Specialised tribunal with technical members and no-fault liability

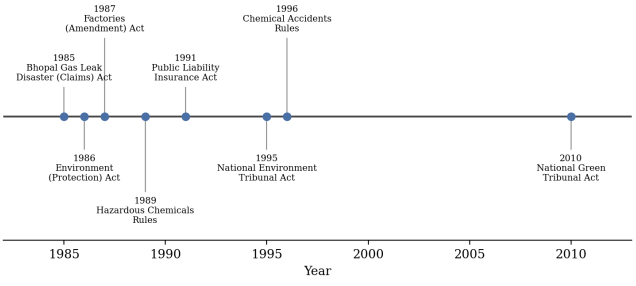


Figure 1. Timeline of principal post-Bhopal legislation, 1985–2010

Diffusion of environmental principles

Table 2 reports the share of judgments invoking each principle by period, and Figure 2 plots the same trends. All five principles show statistically significant increases.

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Sustainable development became the most frequently invoked principle, appearing in 81.3% of judgments in the latest period against 10.4% in the first.

Table 2. Judgments invoking each principle by period (percentage and count)

Principle	1985 – 1994 (n = 48)	1995 – 2004 (n = 62)	2005 – 2014 (n = 66)	2015 – 2023 (n = 64)	Total (N = 240)	$\chi^2(3)$
Right to healthy environment (Article 21)	29.2 % (14)	51.6 % (32)	63.6 % (42)	71.9 % (46)	55.8 % (134)	22.6
Polluter pays	12.5 % (6)	38.7 % (24)	53.0 % (35)	59.4 % (38)	42.9 % (103)	28.4
Precautionary principle	4.2% (2)	30.6 % (19)	51.5 % (34)	64.1 % (41)	40.0 % (96)	47.0
Sustainable development	10.4 % (5)	45.2 % (28)	71.2 % (47)	81.3 % (52)	55.0 % (132)	65.8
Public trust doctrine	2.1% (1)	12.9 % (8)	22.7 % (15)	32.8 % (21)	18.8 % (45)	19.1

All chi-square values are significant at $p < 0.001$.

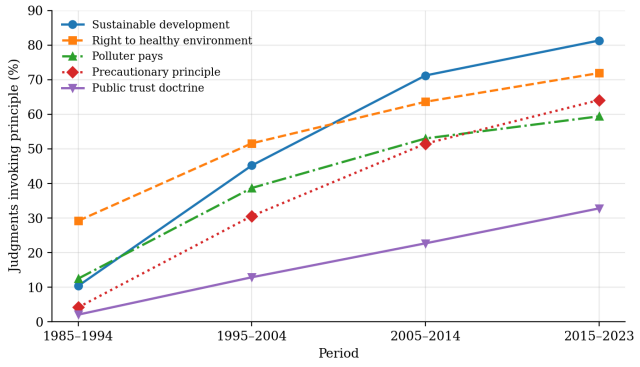


Figure 2. Share of Supreme Court judgments invoking each principle, by period

The largest single jump occurred between the first and second periods for the precautionary principle (4.2% to 30.6%), consistent with the Court's declaration of the principle in the mid-1990s [12]. The public trust doctrine remained the least frequently invoked principle throughout, reflecting its narrower application to natural resources held by the state.

Outcomes for environmental petitioners

Table 3 reports the proportion of judgments in which relief was granted to the environmental petitioner (see also Figure 3). Success rose from 41.7% in the first period to 60.9% in the latest, but the overall difference across periods was not statistically significant, $\chi^2(3) = 4.30$, $p = 0.231$.

Table 3. Relief granted to environmental petitioners by period

Period	Judgments (n)	Relief granted (n)	Success rate
1985–1994	48	20	41.7%
1995–2004	62	33	53.2%
2005–2014	66	37	56.1%
2015–2023	64	39	60.9%
Total	**240**	**129**	**53.8%**

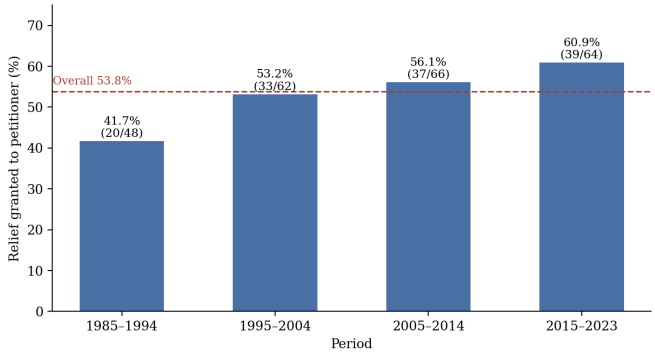


Figure 3. Petitioner success rate by period (relief granted / judgments)

Practitioner perceptions

Table 4 presents survey results and Figure 4 displays the mean ratings. Respondents rated the absolute liability doctrine as the most effective instrument ($M = 4.12$), followed by the National Green Tribunal ($M = 3.94$). Statutory mechanisms such as the Public Liability Insurance Act and the Environmental Impact Assessment Notification received the lowest ratings. Ratings differed significantly across instruments, $F(4, 444) = 41.7$, $p < 0.001$.

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Table 4. Perceived effectiveness of legal instruments (n = 112; scale 1–5)

Instrument	Mean	SD
Absolute liability doctrine	4.12	0.74
National Green Tribunal	3.94	0.81
Chemical Accidents Rules, 1996	3.37	0.88
Environmental Impact Assessment Notification	3.21	0.92
Public Liability Insurance Act, 1991	3.08	0.96

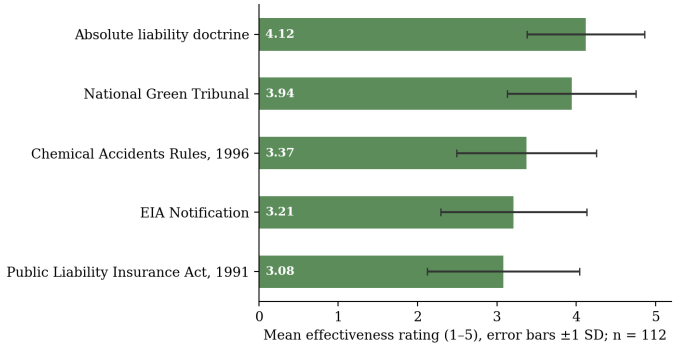


Figure 4. Mean perceived effectiveness of legal instruments (error bars show ±1 SD)

Discussion

The results support a central claim: post-Bhopal environmental law in India was driven predominantly by judicial innovation. The sharp rise in the invocation of constitutional and common-law principles across the four periods shows that doctrines first announced in landmark cases [11], [12], [15] became routine reasoning tools in the Supreme Court. The pattern is strongest for the precautionary principle and sustainable development, which were rare before 1995 but present in a majority of later judgments. This matches doctrinal accounts of the Court's turn toward international environmental norms in the 1990s [4], [6].

The finding on outcomes is more complicated. Success rates rose by about 19 percentage points across the study period, but the rise could not be distinguished from sampling variation at conventional levels. One reading is that wider doctrinal availability did not by itself change how often petitioners prevailed, because courts balanced environmental claims against developmental and livelihood interests. This is consistent with the concern raised by Rosencranz and Jackson [10] about the limits of judicial supervision and with the legitimacy questions raised by Sahu [6]. Larger samples or case-level covariates could reveal a smaller effect that this study cannot detect.

The survey results indicate a perceived gap between judge-made and statutory instruments. Respondents rated absolute liability and the National Green Tribunal highest. This agrees with Gill's [7] account of the Tribunal as an active forum and with the Law Commission's earlier recommendation for specialised environmental adjudication [8]. The lower rating of the Public Liability Insurance Act (M = 3.08) fits the criticism that statutory compensation machinery has been underused relative to the scale of industrial risk. The 1995 Tribunal Act's failure to operate, noted in Table 1, is a further example of legislation that was enacted but not implemented.

The results also reflect the lasting influence of the Bhopal litigation itself. The settlement and the review proceedings [13], [14], together with Cassels's critique [2], showed that outcomes for victims depend on institutional capacity as well as on substantive rules. The later emphasis on no-fault liability and on technical expertise in the National Green Tribunal can be read as a response to that experience.

Limitations

The study has four limitations. The sample is restricted to Supreme Court judgments and does not capture High Courts, tribunals, or the large volume of unreported orders. Coding of principle invocation measures whether a principle was cited, not how strongly it shaped the outcome. Environmental petitioners vary in the strength of their cases, so success rates are not controlled for case merit. Finally, the survey used a non-probability sample, so ratings may not represent all stakeholders.

Conclusion

Four decades after Bhopal, Indian environmental law looks very different from the framework that existed in 1984. A framework statute, hazardous industry rules, a liability insurance regime, and a specialised tribunal now exist alongside a constitutional right to a healthy environment. The evidence in this paper shows that the most striking change occurred in judicial reasoning. Environmental principles were rare in Supreme Court judgments before 1995 and are now routine. Doctrinal diffusion has not, however, been matched by a statistically clear improvement in outcomes for environmental petitioners, and practitioners rate several statutory mechanisms as only moderately effective.

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Three policy implications follow. First, statutory compensation and insurance mechanisms should be strengthened and monitored so that they function as intended. Second, the National Green Tribunal should be supported with adequate technical members, benches, and enforcement capacity. Third, regulators should publish systematic data on environmental clearances, accidents, and compensation payments, which would allow future studies to test the links between legal change and real-world outcomes. Future research could extend the analysis to High Courts and tribunal orders and could use multivariate models to separate the effect of doctrine from case characteristics.

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