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The Allocation Dilemma and Logical Restructuring of the Burden of Proof for Causation in Environmental Civil Public Interest Litigation

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Abstract
Under the current legal framework, the effectiveness of the Environmental Civil Public Interest Litigation system is severely constrained by the unclear allocation of the burden of proof for causation. Empirical data show that between 2018 and 2023, environmental protection agencies in China lost 31.7% of Environmental Civil Public Interest Litigation cases, with the losing rate of local agencies reaching as high as 88%. This highlights the conflict between the existing allocation of the burden of proof in Environmental Civil Public Interest Litigation and practical needs. Taking the deliberation of the Draft Code of the Ecological Environment of the People's Republic of China as a critical juncture, this paper seeks to reconstruct the logic of burden allocation by proposing a three-step framework: the plaintiff bears the burden of proving relevance (causal link), the defendant bears the burden of proving objective facts, and the judge applies presumptions, supplemented by corresponding supporting mechanisms. This framework aims to effectively safeguard ecological and environmental public interests while enhancing judicial efficiency.

Keywords
Environmental Civil Public Interest Litigation; Causation; Allocation of the Burden of Proof; Environmental Code

1 Introduction

The causation between environmental torts and resulting damages—characterized by latency, multiplicity, and technical complexity—has become a core challenge in the practice of Environmental Civil Public Interest Litigation. From the perspective of international legislative experience, the presumption of causation established under the U.S. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as well as the theory of prima facie evidence developed under Germany's Environmental Liability Act, both resolve the judicial dilemma of proving scientific causation through technical adjustments to the allocation of the burden of proof. In China, although academic debates have long focused on relevant provisions of the Environmental Protection Law and the Civil Code, insufficient attention has been paid to the differences in the burden of proof between public interest litigation and private interest litigation. As a result, no systematic framework has yet been formed that is consistent with the evidentiary capacity of Environmental Civil Public Interest Litigation plaintiffs.

The ongoing codification of the Draft Code of the Ecological Environment of the People's Republic of China provides an opportunity for rule innovation. Restructuring the mechanism for allocating the burden of proof for causation not only concerns the judicial effectiveness of the Environmental Civil Public Interest Litigation system but also serves as a critical path to compel enterprises to fulfill their environmental duty of care and to modernize the ecological governance system through litigation rules. This study responds to the practical pain points of "difficulties in adducing evidence and inconsistency in judicial determinations," while also filling a theoretical gap in constructing a closed logical framework for the allocation of the burden of proof. It thus carries significant academic innovation value and practical guiding significance.

2 An Analysis of the Current Rules on the Allocation of the Burden of Proof for Causation in Environmental Civil Public Interest Litigation

2.1 Systemic Deficiencies in the Legislative Framework

China's rules on the burden of proof in environmental torts have undergone an evolutionary process from the Environmental Protection Law (1989) and the Tort Liability Law (2009) to the Civil Code (2021), thereby forming a normative framework centered on Article 1230 of the Civil Code. This provision establishes the principle of the reversal of the burden of proof, assigning to the defendant the burden of proving that "no causal relationship exists between the conduct and the damage." The original legislative intent was to balance the disparity in evidentiary capacity between parties in environmental tort litigation. However, when applied to the context of Environmental Civil Public Interest Litigation, this rule presents three institutional deficiencies.

First, conflation of applicable scenarios. Article 1230 of the Civil Code does not distinguish between the different evidentiary needs of private interest litigation and public interest litigation. In private interest litigation, the victim is usually an eyewitness to the occurrence of damage, whereas plaintiffs in Environmental Civil Public Interest Litigation—such as procuratorates or environmental organizations—often lack direct

evidence and must rely instead on indirect evidence such as environmental monitoring data and scientific assessment reports. The current rule fails to provide a specially designed preliminary evidentiary standard for Environmental Civil Public Interest Litigation plaintiffs.Second, discontinuity in the allocation of the burden of proof. The provision only imposes a rebuttal burden on the defendant but does not specify the plaintiff's preliminary burden of initiating the evidentiary process. This has led to judicial practice marked by polarization, where plaintiffs either provide "zero evidence" or engage in "excessive evidence production." Third, absence of operative presumption rules. The provision does not specify the factors to be considered or the standards to be applied when courts presume causation. This has resulted in a regulatory gap characterized as "reversal of the burden of proof but ambiguous standards for presumptions." Between 2021 and 2023, 28.7% of Environmental Civil Public Interest Litigation cases adjudicated by courts nationwide resulted in inconsistent judgments in similar cases, precisely due to the lack of uniform standards for judicial presumptions.

2.2 Adaptive Adjustments through Judicial Interpretation

To remedy legislative deficiencies, Articles 5–6 of the Provisions on Several Issues Concerning Evidence in Civil Litigation of Ecological and Environmental Torts (2023) establish a three-step mechanism: "preliminary proof of relevance — judicial presumption — defendant's rebuttal of the absence of causation." According to this interpretation, plaintiffs are required to present evidence demonstrating the relevance between the polluting conduct and the resulting damage, including spatiotemporal correlations and the scientific nexus between the characteristics of pollutants and the types of damage. Courts then presume causation by comprehensively considering such factors as the mode of conduct, the nature of pollutants, and the properties of environmental media, while defendants must provide systematic evidence to rebut the presumption.This rule constitutes an adaptive adjustment to the evidentiary capacity of Environmental Civil Public Interest Litigation plaintiffs, lowering the preliminary proof standard from "high probability" to "prima facie credibility." For instance, in a public interest litigation case concerning soil contamination in a chemical industrial park, the plaintiff was only required to submit enterprise discharge records and reports of excessive heavy metals in the soil to trigger the presumption procedure.

Nevertheless, the judicial interpretation still presents evident limitations. First, the standard of "relevance" lacks quantified guidelines, resulting in divergent benchmarks between plaintiffs 'evidence presentation and courts' review. Second, the "high probability" standard for the defendant's rebuttal has not been differentiated by pollution type, failing to reflect variations between, for example, air pollution and soil contamination. Third, the factors considered in judicial presumptions have not been standardized into a checklist; in certain categories of cases, disparities in judicial scrutiny of the "migration pathways of pollutants" reached 41%, thereby undermining the predictability of judgments.

3 Judicial Predicaments in Proving Causation in Environmental Civil Public Interest Litigation

In the judicial practice of Environmental Civil Public Interest Litigation, the institutional dilemmas surrounding the allocation of the burden of proof for causation continue to hinder the effective functioning of the litigation mechanism. As plaintiffs in Environmental Civil Public Interest Litigation, procuratorates and environmental non-governmental organizations encounter insurmountable barriers in the process of evidence production. Environmental torts frequently involve complex industrial processes and specialized technical fields. From the detection of industrial wastewater components to the simulation of air pollutant dispersion, each piece of evidence requires reliance on sophisticated instruments and technical experts, with testing costs often amounting to several hundred thousand or even over one million RMB. For most environmental non-governmental organizations, this constitutes a heavy financial burden.More critically, plaintiffs face structural disadvantages in access to information. Polluting enterprises possess crucial evidence such as production records and pollutant monitoring data, while plaintiffs remain constrained by the dual limitations of the Regulations on the Disclosure of Government Information and the protection of corporate trade secrets, making it exceedingly difficult to break through informational blockades.[1] The compounded effect of technical thresholds, financial costs, and informational barriers often leaves plaintiffs trapped in the predicament of being "willing to defend rights but incapable of producing evidence" in causation proof.

The ambiguous boundaries of the defendant's evidentiary responsibility further complicate judicial practice. Current law only provides in principle that defendants bear the burden of proof to demonstrate the absence of causation, and explicitly frames this within the context of private-interest environmental litigation. Yet the precise scope of the defendant's evidentiary obligation remains undefined: must the defendant entirely dismantle the chain of causation, or is it sufficient merely to weaken the probability asserted by the plaintiff? In practice, some courts require defendants to produce systematic evidence such as comprehensive environmental impact assessment reports and pollutant discharge monitoring data, while others accept partial discharge records covering limited time periods as sufficient rebuttal evidence.

4 Logical Reconstruction of the Allocation of the Burden of Proof for Causation in Environmental Civil Public Interest Litigation

4.1 Legal Presumption Rules

Legal presumption rules hold a unique significance in evidence law. They link basic facts (A) and presumed facts (B) through a causal relationship, providing a novel evidentiary reasoning pathway for judicial proof. The core idea is that once the foundational facts, as predesignated by law, are substantiated to meet the statutory standard of proof, the judge may directly recognize the presumed facts as established, unless the opposing party can present sufficient evidence to overturn the presumption. The existence of legal presumptions is not grounded in rigorous deductive reasoning but rather reflects the legislator's empirical generalization of the regularities of phenomena combined with normative objectives.The value of legal pre-

1 (2017) Su Min Zhong No. 232: Taizhou Environmental Protection Federation v. Jiangsu Changlong Agrochemical Co., Ltd. et al., Environmental Pollution Civil Public Interest Litigation Case.

sumption rules is particularly pronounced in the context of Environmental Civil Public Interest Litigation. Given that environmental torts are often concealed, protracted, and technically complex, plaintiffs face not only high technical costs and informational barriers when attempting to prove causation between polluting conduct and resulting damages, but may also encounter an extended evidentiary period during which environmental harm continues to accrue. Within this framework, legal presumption rules significantly reduce the difficulty of proof for plaintiffs by shifting part of the evidentiary burden to defendants who possess core evidence, thereby enabling Environmental Civil Public Interest Litigation to effectively overcome the limitations of traditional evidentiary models.

From the perspective of institutional functionality, the legal presumption principle carries multiple significances for Environmental Civil Public Interest Litigation. First, it saves litigation time by preventing the indefinite amplification of causation proof, which could otherwise prolong the duration of proceedings. For example, in cases of soil heavy metal contamination, requiring the plaintiff to sequentially demonstrate the complete migration pathway of pollutants from the emission source to soil accumulation could take several years of environmental monitoring and data analysis. Under the legal presumption principle, however, the plaintiff need only demonstrate the existence of heavy metal emissions by the enterprise and the excessive heavy metal levels in the soil, which substantially fulfills the evidentiary requirement and greatly reduces adjudication time.Second, the legal presumption rule rationally allocates the burden of proof, effectively correcting the imbalance in capacities between parties. In the field of environmental torts, enterprises often possess absolute advantages in technology, funding, and information, whereas Environmental Civil Public Interest Litigation plaintiffs—such as environmental non-governmental organizations—face severe resource constraints. By shifting the burden of disproving causation to the defendant, the legal presumption rule compels enterprises to proactively disclose critical information, including production processes and pollutant discharge data, thereby achieving a fairer distribution of litigation resources.Finally, the legal presumption rule embodies the policy objective of safeguarding environmental public interests. By lowering the threshold for Environmental Civil Public Interest Litigation, it effectively encourages greater participation in environmental governance, thereby exerting a deterrent effect on environmental violations and promoting the realization of ecological civilization goals. The design of this rule not only represents a significant technical innovation in evidence law but also reflects the practical application of environmental governance principles within the litigation system.

Therefore, the introduction of the legal presumption principle into the context of Environmental Civil Public Interest Litigation not only addresses the multiple predicaments encountered in litigation practice but also contributes to the refinement of the environmental governance legal system. By linking basic facts and presumed facts, the legal presumption rule transforms the highly challenging task of proving causation into the comparatively easier task of proving foundational facts that imply causation. This mechanism overcomes the technical and informational difficulties inherent in proving environmental torts and can substantially enhance the effectiveness of public interest litigation.

At the normative application level, the legal presumption principle exhibits strong relevance and coherence with Article 1230 of the Civil Code. On one hand, the rule of shifting the burden of proof under Arti-

cle 1230 provides the institutional foundation for the application of legal presumptions. On the other hand, the legal presumption rule operationalizes the legislative norm of Article 1230 in judicial practice by further specifying evidentiary standards and clarifying procedural steps. Compared with the direct application of Article 1230, the legal presumption rule guides judges in recognizing the relevant causal relationships through a one-to-one correspondence between basic facts and presumed facts, thereby mitigating the risk of discretionary overreach. This fully demonstrates the institutional value of the legal presumption rule in safeguarding the public interest in Environmental Civil Public Interest Litigation, facilitates the refinement of litigation rules, and serves as an institutional instrument to support the implementation of the Code and optimize the efficacy of public interest litigation.

4.2 Constructing a Logical Closed Loop

To address the evidentiary burden challenges in Environmental Civil Public Interest Litigation, scholars have proposed a "three-tiered" evidentiary logic framework, consisting of the plaintiff's preliminary proof, the defendant's rebuttal evidence, and judicial presumption. The core of this system lies in the legal presumption rule, which aims to provide an operational adjudicative guide by clearly defining the evidentiary obligations and proof standards of each litigation party. This layered and progressive allocation mechanism not only clarifies the division of responsibilities among parties but also offers effective support for the evaluation of evidence in practice.

First, the plaintiff must demonstrate whether the defendant has engaged in conduct that pollutes the environment or damages the ecosystem, such as discharging pollutants beyond permissible limits or illegally dumping hazardous waste. Second, the plaintiff must establish that the public environmental interest has been harmed or faces a significant risk, for instance, deterioration in water quality or a substantial reduction in biodiversity within a specific area. Finally, the plaintiff must establish a preliminary link between the conduct and the resulting harm. Specifically, causation can be reasonably inferred through evidence such as spatiotemporal correspondence and the scientific correlation between pollutant characteristics and types of environmental damage.At this stage, the standard of proof is set at "reasonable possibility" or "prima facie credibility" , which is markedly lower than the "high probability" standard traditionally required in civil litigation. [1]For example, in a public interest litigation case involving soil contamination in a chemical industrial park, the plaintiff may satisfy the preliminary evidentiary requirement by submitting enterprise discharge records, reports of excessive heavy metals in the soil, and scientific analyses correlating the characteristics of heavy metal pollutants with soil properties. This relatively relaxed evidentiary standard significantly reduces the plaintiff's burden of proof, thereby laying the foundation for the smooth conduct of Environmental Civil Public Interest Litigation.

After the plaintiff has presented the preliminary evidence, the burden of proof shifts to the defendant, entering the second stage of rebuttal evidence. At this stage, the defendant is required to produce evidence addressing the central proposition that "there is no causal relationship between the conduct and the resulting harm" , with the evidentiary standard set at "high probability" or "sufficiently conclusive evidence." The defendant may employ various defensive strategies to sever the causal chain, such as demonstrating the in-

1 (2021) Ning 01 Min Chu No. 178: China Biodiversity Conservation and Green Development Foundation v. Ningxia Ruitai Technology Co., Ltd., Soil Pollution Case.

volvement of a third-party polluter, the occurrence of force majeure events, contributory negligence by the victim, or providing evidence that its production and operational activities complied with statutory emission standards and did not pose technical pollution risks.For instance, [1]in a public interest litigation case involving an offshore oil spill, if the defendant can submit a complete drilling platform operational log, real-time monitoring data, and an accident causation assessment report issued by a third-party institution, and establish that the spill resulted from unforeseeable submarine geological activity, it may successfully overturn the presumption of causation. Assigning substantive proof obligations to the defendant, who possesses greater evidentiary capacity, not only adapts to the practical information asymmetry inherent in environmental torts but also reflects substantive procedural fairness.

In the third stage of judicial proceedings, the court is responsible for presumption recognition, which constitutes the core of the entire evidentiary system. If the plaintiff successfully completes preliminary proof and the defendant fails to provide sufficient evidence to disprove causation, the court will rely on the legal presumption to establish the existence of causation, and the defendant will bear corresponding tort liability. Conversely, if the defendant can meet the statutory evidentiary standard through effective rebuttal, the presumption does not hold, and the plaintiff bears the risk of losing the case.During this review, judges must continue to follow the principle of free evaluation of evidence, conducting a comprehensive assessment of all submitted materials. The legal presumption rule provides a clear logical framework and key review points for judicial decision-making. Judges should focus on whether the plaintiff's preliminary evidence meets the threshold to trigger the presumption, and whether the defendant's rebuttal sufficiently undermines the credibility of the presumed facts. For example, when evaluating a third-party assessment report submitted by the defendant, judges should examine multiple elements, including the qualifications of the appraisal institution, the scientific validity of the sampling methodology, and the sufficiency of the conclusions, to ensure that the presumption recognition process adheres to evidentiary rules and procedural fairness.

4.3 Advantages of the Logical Closed Loop

Constructing this logical closed loop not only respects the unique characteristics of environmental tort litigation but also ensures the integrity of the civil litigation evidentiary system. By implementing a layered allocation of responsibilities and differentiated standards of proof, the system effectively balances the evidentiary capacities of the parties. This approach provides a clear and operational adjudicative pathway for the determination of causation in Environmental Civil Public Interest Litigation, contributing to enhanced litigation efficiency, increased institutional deterrence, and the effective protection of environmental public interests.

The ingenious institutional design establishes a closed logic of "plaintiff's preliminary evidence—defendant's rebuttal—judicial determination" , achieving an intrinsic equilibrium among different value systems. The essence of this logic lies in the procedural value orientation, rule-setting, and the internal mechanism of procedural operation. In terms of burden-of-proof allocation, it breaks through the traditional principle of formal equality in civil litigation by considering the actual evidentiary capacities of parties in environmental tort cases, thereby distributing the causation proof responsibilities between plaintiffs and defendants.On

1 (2022) Yu 03 Min Chu No. 127: The Third Branch of the Chongqing People's Procuratorate v. Pangang Group Chongqing Titanium Co., Ltd., Water Pollution Liability Dispute Case.

one hand, the plaintiff bears only a relatively modest preliminary evidentiary burden, enabling Environmental Civil Public Interest Litigation to be genuinely initiated, rather than excluding a large number of environmental damage cases from this litigation type. On the other hand, the defendant must assume a greater burden to disprove causation. In this way, the plaintiff's claims can be realized while the defendant's rebuttal ensures the adversarial nature of the litigation process.

The clarification of the rule system represents a prominent feature of this logical closed loop. Compared with the current legal provisions, which are often vague regarding the proof of causation, this system specifies the object and standard of proof at each stage of litigation. The plaintiff's initial evidence must meet the standard of "prima facie relevance" , while the defendant's rebuttal must reach a "high probability" threshold. Both standards are scientifically determined based on the characteristics of environmental torts, thereby reducing the uncertainty in the application of the law. Such rule clarification inevitably lowers the litigation risk, preventing divergent judgments arising from excessively broad judicial discretion, and ensures that the adjudication of Environmental Civil Public Interest Litigation cases follows a traceable and systematic procedure.

From the perspective of judicial practice, this logical consistency provides judges with a highly operational framework for decision-making. In technical disputes and evidentiary contests in environmental tort cases, judges can rely on the proof process embedded in the logical consistency to progressively verify whether the parties' evidence meets the statutory standards. For example, to determine whether an environmental impact assessment report submitted by the defendant is sufficient to presume causation, judges can evaluate its sufficiency and professionalism against the rebuttal standard of "sufficiently conclusive evidence" , and so on. By using evidentiary standards as normative benchmarks for adjudication, this approach mitigates overreliance on evidence standards, aligns judicial conclusions with both evidence law and procedural law, reduces judicial costs, and enhances the credibility of judicial decisions.

It is precisely this system's adaptability to the unique characteristics of environmental torts and public interest litigation that distinguishes it from other related evidentiary rules. For instance, in response to the adverse and complex nature of environmental damage, the low standard of proof at the preliminary evidence stage can overcome the plaintiff's technical and informational disadvantages. Simultaneously, for the concealed or complex nature of environmental harm, the allocation of the burden of proof to the defendant, who controls the information source, aligns with the basic principle that the polluter bears the burden.Moreover, in the domain of public interest litigation, the allocation of evidentiary responsibility to the defendant, accompanied by a relatively lower evidentiary threshold, ensures the timeliness of remedies provided by public interest litigation. This institutional design is thus compatible with the overarching social value of safeguarding public interests through public interest litigation.

From a policy perspective, this logical closure reflects the policy orientation of national legislation and judicial practice concerning environmental public interest protection. From the perspective of ecological civilization construction, Environmental Civil Public Interest Litigation carries the policy function of preventing environmental damage and protecting the ecological environment. By designing the plaintiff's burden-of-proof allocation mechanism, the judiciary emphasizes the deterrent function against environmentally

harmful conduct, guides enterprises to prioritize the prevention of environmental harm, and strengthens corporate environmental responsibility. This reflects a judicially proactive governance model, in which courts participate in environmental governance, constructing an integrated environmental governance framework of "judicial protection, corporate environmental responsibility, and social participation," thereby promoting the harmonious coexistence of humans and nature.

4.4 Safeguarding the Practical Implementation of the Logical Closed-Loop Mechanism

4.4.1 Determining the Content and Conditions for Preliminary Evidence According to Case Types

The effectiveness of applying the logical closed-loop mechanism—"preliminary evidence – rebuttal – presumption-based determination" —in environmental public interest litigation (Environmental Civil Public Interest Litigation) largely depends on the refinement of procedural rules and the robustness of institutional safeguards. At the stage of preliminary evidence submission, different types of environmental damage necessitate different evidentiary approaches. For instance:In water pollution cases, evidence may include discharge monitoring data at pollutant outlets, analytical monitoring reports of pollutant compositions downstream, and assessments of pollutant flow trajectories.In air pollution cases, relevant evidence includes ambient air quality monitoring data, emissions inventory data from stationary sources, and meteorological diffusion modeling results.In soil contamination cases, required evidence involves soil sampling and analysis data, land-use records, and information on pollutant discharges in surrounding areas.In cases of ecological degradation, evidence may include data on changes in vegetation coverage, biodiversity monitoring, and records of anthropogenic disturbances affecting flora and fauna.he evidentiary requirements differ between claims based on actual environmental harm and those based on preventive litigation. The former requires quantitative data on environmental damage and temporal variation, while the latter is supported by risk assessment reports, analogical reasoning, and environmental impact assessments from comparable projects to establish a high probability of significant risk.A notable disparity exists between procuratorates and civil society organizations in their capacity to collect evidence. Procuratorates possess the authority to access documents such as corporate EIA reports and administrative penalty records. In contrast, civil society organizations often must rely on third-party environmental testing agencies or conduct independent investigations, resulting in a significant gap in the breadth and depth of evidentiary resources. To mitigate this imbalance, it is imperative to strengthen mechanisms for collaborative investigation in public interest litigation and to consider granting civil society organizations certain compulsory investigative powers to enhance their evidentiary capacity.

4.4.2 Scope and Standard of Rebuttal Evidence

Defendants in the rebuttal stage should adhere to strict institutional norms aimed at safeguarding the fairness of the law. Statutory exemptions from liability should be strictly limited to the following situations: force majeure (e.g., sudden natural disasters), fault of a third party (which must demonstrate that reasonable care obligations were fulfilled), and other circumstances explicitly prescribed by law. This provision seeks to prevent defendants from abusing the right of rebuttal to evade their legally mandated responsibilities. To demonstrate the nonexistence of causation, defendants must submit systematic evidence with a scien-

tific basis, such as pollutant migration simulation experiments and comparative analyses of environmental baseline data, reaching the high probability standard that effectively excludes other reasonable doubts. In practice, however, some enterprises often use compliance with emission standards as a simple denial. It should be emphasized that this rationale can only serve as a reference for mitigating liability and cannot, by itself, sever the chain of causation. Therefore, it is necessary for courts to establish a substantive review mechanism, wherein expert evaluation and data traceability are applied to the submitted reports, in order to prevent litigation inefficiency caused by formalistic defenses.

4.4.3 The Role of Courts and Judicial Cognition Rules in Presumptive Findings

In the judicial presumption stage, judges serve as both fact-finders and rule interpreters. When examining the plaintiff's preliminary evidence, judges need to pay close attention to three key aspects: the spatiotemporal overlap between the polluting conduct and the resulting harm, the scientific attributes of pollutants and their correlation with the type of damage, and the reliability and authenticity of evidence sources.When confronted with the defendant's rebuttal evidence, judges must strictly adhere to the high probability standard, employing methods such as cross-examination and verification by professional agencies to ensure the sufficiency of evidence and the rigor of the argumentation. In addressing complex technical disputes, judges should comprehensively utilize expert witnesses, judicial appraisal opinions, and on-site inspections to establish a robust judicial cognition system.It is noteworthy that once a presumption is established, it carries legal binding force. Unless the defendant can provide new critical evidence, such as a subversive testing report certified by an authoritative institution, the court should uphold the established findings to ensure the stability and authority of judicial decisions.

4.4.4 Alignment with the Code of Ecological Environment (Draft)

To achieve effective alignment with the Code of Ecological Environment (Draft), it is necessary to compare it with existing environmental regulations and promptly identify any conflicts. At the same time, an efficient implementation mechanism should be established to ensure consistency with local policies. Furthermore, attention should be given to public participation and information transparency to enhance social recognition. These measures will provide critical support for the smooth implementation of the Code.

At the legislative alignment level, the legal presumption rule for proving causation should be incorporated as a core provision within a dedicated chapter on ecological and environmental responsibility or environmental public interest litigation. Scholars recommend employing a "general clause + enumerative approach" in legislation, which can not only clarify the basic "preliminary evidence – rebuttal – presumptive findings" logic framework but also set out principle-based rules for key elements, including the types of evidence in the preliminary stage, statutory grounds for rebuttal, and conditions for the application of presumption.This design approach provides room for subsequent judicial interpretation and practical application. By codifying this rule, the systematization of the Environmental civil public interest litigation framework can be strengthened, while achieving effective normative synergy with the tort liability section of the Civil Code.

4.4.5 Improvement of Supporting Mechanisms

A robust supporting institutional system is a strong guarantee for the effective implementation of established rules. Enhancing the plaintiff's evidence-gathering capacity can be achieved by legislatively stipulating the investigative powers and procedures of procuratorates, granting environmental non-governmental organizations (ENGOs) the right to request environmental information from administrative authorities, mandating environmental information disclosure by violating companies, and improving the pre-litigation evidence preservation system, which allows courts to adopt measures such as seizure and sampling to secure perishable or easily lost evidence.In reforming the expert assistance system and the judicial appraisal system, the focus should be on standardizing the selection of experts, establishing a specialized expert database in fields such as environmental science and law for public interest litigation, unifying the appraisal institutions' procedures and standards, and promoting a cross-examination system for appraisal opinions to enhance the judicial credibility of technical evidence.Training the professional competence of judges should be incorporated into the environmental judicial capacity-building plan. By regularly organizing training on environmental science and evidence rules, as well as guidelines based on typical case judgments, judges' ability to handle and adjudicate complex environmental cases can be substantially improved, ensuring that rules are applied effectively in judicial practice.

5 Conclusion

The effectiveness of the Environmental civil public interest litigation system has always been constrained by the deep-seated dilemma in the allocation of the burden of proof for causation. Persistent theoretical debates—such as the "direct allocation theory," "reverse allocation theory," and "subject-differentiation theory" —the significant divergence in judicial standards in practice, and practical conflicts such as the difficulty of plaintiffs' evidence gathering and the ambiguity of defendants' evidentiary obligations, together constitute obstacles to the development of environmental public interest litigation.

Faced with the complexity, technicality, and information asymmetry inherent in environmental torts, traditional rules of proof are increasingly unable to meet the practical demands of contemporary environmental governance. Against this backdrop, taking Article 1230 of the Civil Code as the normative foundation, the construction of a legal presumption system following the pattern of "plaintiff's preliminary evidence – defendant's rebuttal evidence – court's presumptive determination" emerges as an inevitable solution to the dilemma.

This rule system, through a layered and progressive allocation of evidentiary responsibilities, scientifically balances the evidentiary burdens of both plaintiffs and defendants. The plaintiff initiates the litigation with a relatively low threshold for preliminary evidence, the defendant must meet a highly probable standard for rebuttal, and the court makes presumptive determinations within this framework. This approach not only respects the special characteristics of environmental tort litigation, but also preserves the integrity of the civil litigation evidentiary system. Its theoretical legitimacy lies in correcting the substantive inequality of the parties' evidentiary capacities, while its practical operability is manifested in the detailed specification of the evidentiary objects, standards, and procedures.

The improvement and implementation of this rule system will substantively lower the judicial threshold for environmental public interest protection, significantly enhance litigation efficiency and judicial fairness, and transform the Environmental civil public interest litigation system from a set of "paper rules" into a "ractical instrument." By strengthening the judiciary's deterrent effect on environmental violations, this system will tangibly improve the effectiveness of environmental governance, providing a solid judicial guarantee for the modernization goal of harmonious coexistence between humans and nature.

Looking ahead, it is expected that this rule will be formally incorporated into the Code of Ecological Environment, and continuously refined through judicial interpretations and guidance from typical cases. At the same time, complementary mechanisms—such as evidence collection safeguards, expert assistance, and judicial training—should be strengthened in parallel, to advance the environmental public interest litigation system to a higher stage of development.

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