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BURDENS AND MEANS OF PROOF IN CLIMATE CHANGE LITIGATION: DOES THE PROBLEM LIE UPSTREAM?

1. *Introduction*

It was 2013 when an article appeared in the Mississippi College Law Review predicting the end of climate change litigation[1]: not because of the usual issues around standing, but because it argued that the burden of proof couldn't be met due to the inadmissibility of expert evidence on the subject, especially climate models, which do not meet the Daubert criteria. In particular, according to Hasani, climate models are useful in the adoption of policies inspired by the precautionary principle, but they would be inadmissible in civil liability proceedings: on the one hand, because their predictive nature prevents both their testability and the determination of the error rate; on the other hand, because they do not meet the requirement of 'general acceptance', both due to the disagreement among experts on the phenomenon of 'global warming' itself and to their complexity, which results in a lack of transparency and would therefore make their assessment based on objective standards either impossible or useless.

Actually, and beyond the fact that only shortly before the scientific validity of the arguments of climate change skeptics had been subject-

[1] A. HASANI, *Forecasting the End of Climate Change Litigation: Why Expert Testimony Based on Climate Models Should Not Be Admissible*, in *Mississippi College Law Review*, n. 1, 2013, pp. 83 ff.

ed to similar criticism[2], it is the very validity of the Daubert test which appears questionable, as, upstream, the claim of the lawyer-judge to act as a gatekeeper of scientific knowledge in the trial, in the absence of proven epistemic competence to justify such a role: as already argued[3], in line with established US epistemological studies[4], recently adopted by Italian doctrine too[5], the relationship between judge and expert must be based on the model of 'epistemic deference', according to which the court is not required – nor could it be required – to understand the *reasons* behind the expert's conclusions; and this deference, given the absence of absolutely valid criteria for determining *once and for all* the requirements on the basis of which a person can be recognized as an expert (and, thus, the justified belief in the correctness of their conclusions), inevitably ends up resting on the *general acceptance* already underlying the *Frye test*, which is therefore found to have been badly superseded by the *Daubert* case law.

If what has just been observed undermines Hasani's criticism at its root and in general, it must also be noted – specifically addressing the issue of evidence in climate change cases – that there is now *general acceptance* by the international scientific community on a number of issues relating to climate change – both in terms of (measurable and measured) data and (defined) objectives[6]; and that even in terms of

[2] R. HACKNEY, *Flipping Daubert: Putting Climate Change Defendants in The Hot Seat*, in *Environmental Law*, vol. 40, n. 1, 2010, pp. 255 ff.

[3] V. CAPASSO, Tractent fabrilia fabri. *Contributo all'affermazione del «diritto al consulente tecnico» nel processo civile*, Torino, 2025.

[4] J. HARDWIG, *Epistemic Dependence*, in *J. Phil.,* vol. 82, n. 7, 1985, pp. 335 ff.; ID., *The Role of Trust in Knowledge*, in *J. Phil.,* vol. 88, n. 12, 1991, pp. 693 ff.

[5] M. UBERTONE, *Il giudice e l'esperto: deferenza epistemica e deferenza semantica nel processo*, Torino, 2022, *passim*.

[6] As M.F. CAVALCANTI, *Fonti del diritto e cambiamento climatico: il ruolo dei dati tecnico-scientifici nella giustizia climatica in Europa,* in *DPCE online*, speciale n. 2, 2023, p. 331, effectively summarizes, «[t]here is, in fact, a series of elements on which the international scientific community has reached a consensus: 1) the exceeding of 350ppm of CO_2 in the atmosphere, which constitutes the safety threshold for avoiding irreversible risks to humankind; 2) the ecological deficit of the entire planet; 3) the exceeding of three of the nine *Planetary Boundaries* scientifically identified as conditions for the stability of the Earth system; 4) the *Climate Breakdown,* i.e., the impact of extreme atmospheric phenomena on the stability of economic, social, and political sys-

causality, some correlations now seem, if not undisputed – due to the persistence of denialist attitudes – certainly authoritatively supported: thus, the IPCC (*Intergovernmental Panel on Climate Change*) has been able to state that «observed increases in well-mixed GHG concentrations since around 1750 are unequivocally caused by GHG emissions from human activities»[7], and that «[c]limate change has caused substantial damages, and increasingly irreversible losses, in terrestrial, freshwater, cryospheric and coastal and open ocean ecosystems»[8].

However, while this observation, together with the continuing (and, in fact, increasing) occurrence of climate litigation, seems to definitively disprove Hasani's prediction, it must be acknowledged that evidence issues still remain, and this also applies to civil law systems,

tems; 5) the imminent exhaustion of the available *Carbon Budget*; 6) the achievement of nine of the eleven Tipping Points identified by the UN, which constitute an existential threat to human civilization, against which the only possible precautionary measure is to keep the temperature within 1.5°C of pre-industrial levels, with a simultaneous reduction in fossil fuel emissions; 7) the emergence of risks whose severity is incalculable, known as the Green Swan hypothesis; 8) [the need to] achieve temperature stabilization at 1.5°C by 2030 at the latest in order to achieve *carbon neutrality* by 2050 at the latest, as indicated in the IPCC *reports*» (free translation).

[7] *IPCC Climate Change 2023: Synthesis Report*, p. 6.

[8] Ivi, p. 15. It is worth noting that the privileged value accorded to IPCC reports is not at all comparable to the situation in Italy with regard to measures taken by independent administrative authorities [on this subject, see, most recently, P. MAZZA, *Sulla qualificazione dei provvedimenti delle autorità amministrative indipendenti nei processi civili* follow-on. *Il valore della decisione tra il giudicato e la prova (forse privilegiata)*, in *Nuove leggi civ. comm.,* n. 1, 2025, pp. 136 ff.], but, at least in the context of the United Nations and the EU countries, a natural consequence of the scientific reservation laid down in Article 3 of the UNFCCC. Indeed, the relevance and legitimacy of the scientific data disseminated by the IPCC through its reports derives from the authority the Panel has been recognized by the States that have ratified the United Nations Agreements on climate change. «This legitimacy has also been recognized by the European Union, which has identified the IPCC as the official scientific body on climate change data, incorporating the content of its reports into the definition of its policies»: cf. M.F. CAVALCANTI, *Fonti del diritto*, cit., p. 334. Consequently, «States that have signed international conventions and agreements cannot justify their negligence in combating climate change or contest the IPCC's conclusions on attribution science, having accepted the existence of a direct link between greenhouse gas emissions and global temperature rise, as well as between the latter and extreme weather events», Ivi, p. 341 (free translation).

notwithstanding the fact that, given the diversity of procedural models, the difficulty lies not so much in the *admission* of evidence as in its *assessment*. The impression, however, is that the underlying problem is shared and not new: the expectation that science will provide answers that it cannot give, forgetting that legal constructs, however elegant and well-established they may be, are not immutable, nor can they shape reality, but must instead adapt to it.

2. *The reasons for the difficulty: multiple, alternative, general and specific causation*

In establishing the causal link, at least three critical issues arise[9].

First of all, the multifactorial nature of the phenomenon[10] poses a problem of *multiple causation*, making it difficult to attribute exclu-

[9] The question is here addressed from the perspective of the claimant bearing the burden of proving causality, according to the traditional rule that *ei qui affirmat, non ei qui negat, incumbit probatio.* However, the problem also arises in cases where a reversal of the burden of proof can be predicated, possibly by express provision of law: this, as reported in the Global Toolbox on Corporate Climate Litigation published by the British Institute of International and Comparative Law (www.biicl.org/global-toolbox-corporate-climate-litigation), is the case in China, where «*Article 1230 of China's Civil Code and Article 8 of its newly-issued Several Provisions of the Supreme People's Court* on Evidence in Civil Litigation for Ecological and Environmental Infringement allow for a reverse burden of proof in environmental pollution or damage cases, placing the *onus* on defendants to prove their actions did not cause harm. Specifically, defendants should prove that the pollutants discharged and the ecological impacts produced did not reach the place where the damage occurred or the action was imposed after damage and without aggravation to damage, or other scenarios made the action impossible to cause the damage», *Ibidem*.

The uncertainty regarding the causal link, just as it seems to prevent the demonstration of a direct correlation between the defendant's (in)action and the damage, also seems to prevent the defendant from ruling it out with certainty; with the consequence that the rule governing the burden of proof, when related to traditional theories of causality, essentially ends up prejudging the outcome of the case.

[10] R. LANDI, *La causalità nella responsabilità civile per danno da cambiamento climatico,* in P. PERLINGIERI, S. GIOVA, I. PRISCO, *Cambiamento climatico, sostenibilità e rapporti civili. Atti del 17° Convegno Nazionale 11-12-13 gennaio 2024, Università di Roma La Sapienza*, Napoli, 2024, p. 480.

sively, or at least predominantly, to human factors the occurrence of those events that are already likely to arise from natural causes. Such a problem, however, is not new, as it has already arisen in toxic torts (where the problem of multiple causation translates into proving «that a particular injury was the result of one substance rather than another or a combination of substances. For example, while asbestos is known to cause lung cancer, so are the various toxins found in cigarettes and cigarette smoke»)[11], nor is it always insurmountable. For example, a study published on Nature states that the *chances* of the heat waves recorded in Europe in 2003 occurring would have been more than doubled by human contribution to global warming[12]; furthermore, the collapse of fishing activity in the south of Cape Cod in 2010 has been deemed to be a direct consequence of rising ocean temperatures[13].

However, what prevents specific liability from being attributed (and, therefore, the application of counterfactual reasoning underlying the *condicio sine qua non* rule, possibly also according to the corrective measure of adequate causality)[14] even in cases such as those mentioned above, and also in cases where, due to the peculiarities of the claimed damage (comparable to the *signature disease* claimed in the context of *toxic torts*)[15], it can be stated with relative certainty that, in the absence of climate change, a given event would not have occurred at all[16], is the

[11] K.E. SCHLEITER, *Proving Causation in Environmental Litigation*, in *AMA Journal of Ethics*, vol. 11, n. 6, 2009, p. 456; but also see D.L. FAIGMAN, D.H. KAYE, M.J. SAKS, J. SANDERS, *Specific and general causation*, in *Modern Scientific Evidence*., n. 3, 2005, pp. 21 ff.

[12] D. STONE, P. STOTT, M. ALLEN, M. HAWKINS, *Human Contribution to European Heatwave of 2003*, in *Nature*, n. 432, 2004, pp. 610 ff.

[13] D. FRASER, *Cape Lobster Industry Faces Crisis*, in *Cape Cod Times*, 13 giugno 2010.

[14] M. ZARRO, *Danno da cambiamento climatico e funzione sociale della responsabilità civile,* Napoli, 2022, pp. 196-203.

[15] See, among others, P. MONACO, *La* toxic tort litigation. *Analisi e comparazione dell'esperienza giuridica statunitense*, Napoli, 2016.

[16] L. SERAFINELLI, *Responsabilità extracontrattuale e cambiamento climatico*, Torino, 2024, pp. 194 ff., refers to the example of the population of Kivalina's village: «in a world without man-made global warming (i.e., the counterfactual scenario required for an assessment based on an orthodox approach to civil liability), the village residents could have continued to live there for centuries without fear of rising water lev-

second problematic aspect concerning the determination of the causality of climate change, *i.e.* the distinction between *general* and *specific causation*: the first one «addresses whether a substance is capable of causing a particular injury or condition», while the latter «addresses whether a particular substance caused a specific individual's injury»[17].

Indeed, both the abovementioned studies and IPCC findings appear certainly capable of demonstrating the existence of a *general causation*; but both «may not solve specific causation problems that arise […] in proceedings against particular states or companies that (allegedly) have contributed to harmful effects of climate change on people, property, and ecosystems»[18]. Of course, neither this problem is new, nor is it inherently unsolvable: in fact, the same problem arises whenever there is a need to move from a scientific law of general application (whether expressed in absolute or statistical terms) to the assessment of its applicability in a particular case. But this issue too is not new, since it has already been addressed in both criminal and civil law (in the latter, for example, in the field of medical liability).

Finally, and turning to the third problematic aspect, the demon-

els, increased storms, melting permafrost, or other threats related to climate change. The problems associated with the compromise of the cryosphere underlying the village of Kivalina would therefore give rise to other phenomena that could be classified as 'signature impacts' of climate change»; However, the author continues, «this does not eliminate the fundamental drawback of the conditionalist approach applied to climate change damage: the inability [...] to link, retrospectively, a given event to a certain author, given the very high number of participants contributing to the phenomenon in various productive (and non-productive) sectors» (free translation).

[17] K.E. SCHLEITER, *Proving Causation*, cit., p. 456.

[18] A. NOLLKAEMPER, *Causation Puzzles in International Climate Litigation*, in *Italian Yearbook Int'l Law*, vol. 33, 2023, p. 26. As L. SERAFINELLI, *Responsabilità extracontrattuale*, cit., pp. 195 and 202, underlines, indeed, due to «the inability [...] to link, in retrospect, a certain event to a certain subject, given the very high number of participants contributing to the phenomenon in various productive (and non-productive) sectors» – which excludes the possibility of applying the theory of *condicio sine qua non* – «strictly speaking, a link should be ruled out, [even if one] appl[ies] adequate causality, since climate science itself, in terms of attribution, admits that the emissions of a single multinational company are not capable, on their own, of causing the rise in temperatures and the other reported consequences. Hence, it is impossible to assert that the emissions of a single entity are the cause of the damage caused by climate change» (free translation).

stration of *specific causation* in relation to climate change is hindered by the awareness that the anthropogenic contribution to climate change is general, fragmented and cumulative, so that everyone – States, businesses, but also individuals – contributes to it, albeit to a different extent. This raises the issue of *alternative causation*. And yet, this issue too has already been analyzed and resolved by the courts: in *common law*, for example, based on the *doctrine of alternative liability* (that is, by reversing the burden of proof, and so placing the *onus* on the defendant to prove that s/he did not cause the damage)[19] or the *Fairchild Exception*[20] (which recognizes the liability of all those who contributed to the determination of the damage or to the increase in risk, in proportion to their individual contribution) or, again, *market share liability* (which, inspired by Guido Calabresi's economic analysis of law[21], in the presence of a series of requirements – starting with the fungibility of the product – allows the attribution of *pro rata* liability to economic operators engaged in the production of the damage)[22].

[19] *Summers v. Tice,* 33 Cal.2d 80, 199 P.2d 1 (1948); but also see, with reference to European countries, article 6:166 of the Dutch Civil Code, article 3:102(1) PETL (*Principles of European Tort Law*) and article 4:101(2) PEL (*Principles of European Law*). In domestic literature, R. FORNASARI, *Il problema del nesso di causalità nelle controversie climatiche contro le imprese inquinanti,* in A.M. TANZI, L. CHIUSSI CURZI, G.M. FARNELLI, A. MENSI (eds.), *La transizione ecologica nel commercio internazionale. Tra aspetti di riforma procedurali, istituzionali e diritto sostanziale*, Bologna, 2022, pp. 99 ff., claims for the applicability of this doctrine to damage caused by climate change. *Contra*, L. SERAFINELLI, *Responsabilità extracontrattuale,* cit., pp. 204 ff.

[20] *Fairchild v. Glenhaven Funeral Services Ltd* [2002] UKHL 22, [2003] 1 AC 32; more recently, for an application, see *Heneghan v. Manchester Dry Dock & Others* [2016] EWCA Civ 86, commented on, from a comparative perspective, by F. G'SELL, *Alternative Causation Under French* Law, in *European Rev. Private Law*, vol. 25, n. 6, 2017, pp. 1109 ff.

[21] As noted by L. SERAFINELLI, *Responsabilità extracontrattuale*, cit., p. 212.

[22] Actually, the technique is closely linked to the case that gave rise to its development [*Sindell v. Abbott Laboratories*, 26 Cal. 3d 588 (1980), originating from a lawsuit brought by a large group of women for damages suffered from the use of the drug diethylstilbestrol], and for a long time remained almost exclusively confined to US case law (but see Hoge Raad, 9 ottobre 1992, *DES-Daughters*, on which, among others, Hondius, *A Dutch DES Case: Pharmaceutical Producers Jointly and Severally Liable*, in *Eur. Rev. Private Law*, 1994, pp. 409 ff.); interest in market share liability in European

As should be apparent at this point, each of the abovementioned three profiles is already known and governed (or, at least, governable) in other fields of litigation; thus, the overall impression is that it is rather the sum of the critical issues that (at least apparently) prevents any attempt at an analogical solution[23].

This, on the one hand, explains the reasons why the *drop-in-the-ocean argument*[24] is frequently invoked by defendants (and often upheld by Courts); on the other hand, helps understanding jurisprudential's attempts to circumvent the obstacle. Attempts which result, in turn, in granting of injunctive relief only[25] (since, as it has been noted – both with reference to collective injunctions *tout court*[26] and, more specifically, to the use of this instrument in climate change litigation[27]

continental legal doctrine has, in fact, only developed recently, in parallel with interest in climate change litigation.

For a comprehensive overview, see L. SERAFINELLI, *Responsabilità extracontrattuale*, cit., pp. 211 ff., who concludes that, at least according to current scientific knowledge, this technique is the most suitable for resolving the issue of causality in climate change litigation; in this sense, see M. ZARRO, *Danno da cambiamento climatico*, cit., pp. 206 ff., who also finds a possible normative basis for such a technique in article 311, paragraph 3, of Legislative Decree 152/2006, according to which, in matters of environmental liability (which the author considers to include climate liability), «in cases of concurrent liability for the same damage, each party shall be liable within the limits of their personal liability».

[23] This would appear to be the conclusion reached by G. PULEIO, *Rimedi civilistici e cambiamento climatico antropogenico,* in *Pers. e merc.*, n. 3, 2021, pp. 481-482.

[24] J. PEEL, *Issues in Climate Change Litigation*, in *Carbon and Climate Law Review*, vol. 5, n. 1, 2011, pp. 15 ff.

[25] For S. VINCRE, A. HENKE, *Il contenzioso "climatico": problemi e prospettive*, in *Rivista di BioDiritto*, n. 2, 2023, p. 153, the difficulty of establishing a causal link explains why, «despite the plaintiffs' express requests for monetary compensation, national courts have so far limited themselves to ordering concrete actions (in some cases even very 'aggressive') to limit polluting emissions (e.g. *facere* or *non facere*), without ever going so far as to order compensation for damages (and their quantification)».

[26] With reference to Article 840 *sexiesdecies* c.p.c., see M. STELLA, *La nuova azione inibitoria collettiva* ex *art. 840* sexiesdecies *c.p.c. tra tradizione e promesse di deterrenza*, in *Corr. giur.,* n. 12, 2019, p. 1454, and A.M. TEDOLDI, G.M. SACCHETTO, *La nuova azione inibitoria collettiva ex art. 840* sexiesdecies c.p.c., in *Riv. dir. proc.*, n. 1, 2021, pp. 241 ff.

[27] R. TISCINI, *Tutela inibitoria e cambiamento climatico*, in *Riv. dir. proc.*, n. 2, 2024, pp. 331 ff. See also R. FORNASARI, *La struttura della tutela inibitoria e i suoi pos-*

– the granting of preliminary relief largely disregard the existence of both an actual damage and, more importantly, a causal link) and/or in the use of less stringent causality tests, such as to allow the causal link to be established on the basis of the mere proof of general causation[28].

3. *From international to national law: damage resulting from loss of* chances: *a) as a normative test for internalizing the theory of contribution as causation*

It is precisely from the observation of this latter trend that a recent contribution has attempted to provide an answer to the causation puzzle: the reference is to Nollkaemper's thesis on contribution as causation*;* a thesis that is, however, explicitly limited – both in its scope and, consequently, in its conclusions – to those cases where the dispute can be resolved in accordance with the rules and principles of international law, and whose transferability and/or adaptability to the domestic context could therefore be questioned.

Indeed, although the decisive role of case law in climate change litigation would seem to suggest to start the investigation by analyzing (mainly foreign and/or supranational) precedents and scientific literature, it must certainly be acknowledged that, from an Italian lawyer perspective, the attempt to conduct a unified discourse which also takes into account such legal formants is complicated for a number of reasons: contingent ones — such as those obviously deriving from the heterogeneity of the requested *petita* (and, therefore, remedies) and of the defendants, for each of whom a different title of liability must be identified, where appropriate, with possible different implications from the point of view of the burden of proof –, but also, and above all, systematic ones, since account must be taken of differences in the rules governing causation in at least three respects.

First of all, as mentioned above, the relevant principles and case law seem to have to be assessed differently depending on whether or

sibili utilizzi nel contrasto al cambiamento climatico, in *Resp. civ. e prev*., n. 6, 2021, pp. 2061 ff.

[28] A. NOLLKAEMPER, *Causation Puzzles,* cit., p. 27 and *passim*.

not international law is involved, as only the latter allows for (tendentially) uniform answers, whereas those that can be predicated with reference to individual legal systems clearly need to be derived first and foremost from domestic law, which is not necessarily superimposable.

Indeed, and moving on to the second aspect, national systems differ as to the "moment" in which causality is established: while in French and Belgian legal systems causality assessment is ascertained at the same time as the existence of damage and attributable liability, in other systems it is only carried out after a further element has been established (whether it be «an interest worthy of protection», as in Italy, or «a legally protected position», as in Germany, or a «duty of care», as in the Netherlands, which on this point follow an approach which is similar to that adopted in common law countries); furthermore, in other systems – such as the United States one – the assessment, albeit *prima facie*, is even brought forward at the time of the eligibility assessment of the claim[29]. And it is easy to imagine how weighty the "chronological element" is in the intensity and extent of the causality test.

Finally, it cannot be ruled out that the theory of causality is influenced by the very function attributed to the type of liability invoked[30]: thus, for example, it is well known that Italian civil liability has long since become «diversified in terms of content and purpose», so that it is now accepted that, «alongside its actual compensatory function», it also serves «dissuasive, reparative, compensatory, retributive, and purely punitive» purposes[31]. This should (and has already) raise(d) doubts about the relevance of using causal reasoning based on the criminal law model[32]: both in general and, *a fortiori*, in the context of a discussion focused on climate change liability.

[29] L. SERAFINELLI, *Responsabilità extracontrattuale*, cit., pp. 154 ff. (free translation); but also see P. PERLINGIERI, *Il diritto civile nella legalità costituzionale secondo il sistema italo-europeo delle fonti. IV. Attività e responsabilità*, Napoli, 2020, pp. 324 ff.; M. BUSSANI, *L'illecito civile*, in P. PERLINGIERI (dir.), *Trattato di diritto civile del Consiglio Nazionale del Notariato,* VI, 1, Napoli, 2020, p. 160; M. ZARRO, *Danno da cambiamento*, cit., pp. 146 ff.

[30] M. ZARRO, *Danno da cambiamento climatico*, cit., p. 193.

[31] M. PARADISO, *Cambiamento climatico e funzioni della responsabilità civile,* in P. PERLINGIERI, S. GIOVA, I. PRISCO, *Cambiamento climatico*, cit., p. 471 (free translation).

[32] Ivi, pp. 492 ff.

Even with these caveats in mind, Nollkaemper's thesis, as anticipated, seems to fit the domestic landscape as well, albeit with some adjustments.

This certainly applies first and foremost to the objection that the author raises against the core of the thesis of irresponsibility, namely the *drop-in-the-ocean argument*: to challenge to this argument, when it comes to States, it suffices to say that «under International Law there is good authority for the proposition that a State cannot absolve itself from responsibility by arguing that its contribution is too small or that the contribution by others was more significant»[33]; as a consequence, «[c]ausation is to be assessed individually, and the relative contribution need not to be compared to those of other States to determine responsibility»[34]. Obviously, this argument is based on the assumption that States have an unfulfilled duty and therefore may be held liable for its non-compliance. But then, the same can be said of any other entity, including private ones: assuming that there is a breach[35], responsibility (whatever its basis) must be recognized on an individual basis[36].

[33] A. NOLLKAEMPER, *Causation Puzzles,* cit., p. 35.

[34] Ivi, p. 37.

[35] Determining when such liability exists is beyond the scope of this contribution and is a matter to be resolved on the basis of substantive law. This is often a difficult issue to resolve, especially in private relationships, when the subject who caused the (current or perspective) damage did so in the exercise of their own rights and/or of a lawful activity.

Indeed, Basilico's considerations still seem relevant and generalizable, even though they were made with exclusive reference to preventive protection and well before climate change litigation took on its current dimensions. As the Author (G. BASILICO, *La tutela civile preventiva*, Milano, 2013, pp. 243 ff.) underlines, it is not sufficient to recognize that the claimant (whether an individual or an entity) is the holder of an absolute right, because it is also necessary to verify whether the conduct of the other party was unlawful. The injunction, therefore, will only be granted if the right has been exercised improperly, or if the conduct in question has no relation to the exercise of the said right and can therefore be considered unlawful in itself. «If the second scenario occurs, there is no question: the illegality generated by the violation of a rule [...] must simply be restrained; if, on the other hand, the first scenario occurs, the problem arises and the solution can only be sought in the principles and rules of substantive law», Ivi, p. 246 (free translation).

[36] After all, when discussing private entities, the issue of breach by another party could only be relevant if the respective obligations could be reconstructed in synallagmatic terms: this certainly cannot be said with regard to climate change obliga-

By contrast, the second, essential element of the author's argument seems to raise some greater difficulties. According to Nollkaemper, liability can actually be based on proof of general causation, but only on condition that it is accompanied by the applicability (and effective application) of a normative test; normative tests which – as the author himself admits – are certainly (more) easily recognizable when a State is a party to the proceedings, the question to be resolved being – in most cases – «not whether that State has caused significant harm but whether it has done enough to prevent it»[37]. In other terms, «even though this obligation refers to an "event" to be prevented (significant harm), it is an obligation of conduct» stemming from a duty of due diligence, so that the need to prove *specific causation* simply *does not arise*.

Now, given that the duty of due diligence underlying the author's conclusion seems likely to no longer be limited to States alone (both because of specific legislative provisions[38] and, more generally, because of the gradual acceptance of the view that international law can be a source of obligations in civil relationships, and therefore capable of constituting the *cause of action* in a non-contractual action between private individuals)[39], it can already be observed that Italian landscape

tions, which are not established in favor of other polluters, but of the community as a whole.

[37] A. NOLLKAEMPER, *Causation Puzzles,* cit., p. 40.

[38] This is certainly the case for companies operating in the EU, given the recent (UE) Directive 2024/1760 on corporate sustainability due diligence (already mentioned, before its approval, by N. ABRIANI, *Attività d'impresa e cambiamento climatico,* in P. PERLINGIERI, S. GIOVA, I. PRISCO, *Cambiamento climatico,* cit., p. 361 ff.) which allows us to hypothesize, *pro futuro*, an even more direct extension of Nollkaemper's theory to private companies.

[39] In this sense, recently, G. ZARRA, *I principi di diritto internazionale come fonte di obbligazioni nei rapporti di diritto civile*, in *Riv. dir. intern*., n. 2, 2025, pp. 327 ff.

The same argument is used to support the claim brought by Greenpeace O.n.l.u.s., Recommon A.p.s., and several private individuals against ENI S.p.a., the Ministry of Economy and Finance, and Cassa Depositi e Prestiti S.p.a., aimed at ascertaining the defendant company's failure to comply with its obligations to achieve internationally recognized climate targets and ordering it to limit its aggregate annual CO_2 emissions. During the proceedings, which is currently pending before the Court of Rome, the Court of Cassation, to which the case was referred for a ruling on jurisdiction, recently

already offers a mechanism which is capable of leading to the same result.

Before demonstrating this last assertion, however, it seems necessary to address the criticism recently levelled at the contribution as causation model in the domestic arena. In particular, it has been observed that it risks becoming «a shortcut for the attribution of generalized and indeterminate liability»[40]; hence the proposal to resort instead to the instrument of circumstantial evidence, which would make it possible to «overcome the difficulties associated with proving causality» and «avoid liability being established in too broad or indeterminate a manner»[41]. As an example, the author refers to the Urgenda case, which, according to the above argument, could have been an excellent field of application for presumptive reasoning, to be «articulated in the following terms: *i*) the known fact from which to start would have been the significant amount of emissions produced by the Netherlands, compared to the European and global total, as shown by official data (e.g., statistics published by the European Environment Agency or national emissions registers); *ii*) the requirement of seriousness would have been met because it is very likely that these emissions have actually contributed to climate change, according to experience and current scientific knowledge (such as that contained in IPCC reports or research by the World Meteorological Organization); *iii*) consistency would be ensured by the presence of numerous elements pointing in the same direction (e.g., historical data on Dutch emissions, IPCC reports, scientific studies on global warming, and statistical analyses of climate trends), all confirming the idea that the State has a responsibility for failing to take effective and timely measures.

issued its decision. Cass. civ., sez. un., July 21, 2025, no. 20381, in confirming the decision of the Italian civil court, nevertheless (and rightly) left it to the lower Court to «verify whether the international and constitutional sources invoked […] are suitable for imposing a duty of intervention directly on the defendants, such as to establish their non-contractual liability and therefore justify their conviction to pay compensation in specific form, pursuant to Article 2058 of the Civil Code».

[40] C. PAGLIARI, Climate change litigation: *il ruolo della prova presuntiva* ex *art. 2729 c.c.*, forthcoming in *Nuove dimensioni della strumentalità del processo* (free translation).

[41] *Ibidem*.

Such a structure would have allowed the Court to base its decision on a coherent body of evidence, tailored to the requirements of seriousness, precision, and consistency characteristic of a simple presumption»[42].

However, although plausible, this interpretation does not seem to prove its point: it certainly outlines the existence of an alternative path that could justify the same solution reached by the Dutch court, but, precisely for this reason, it does not allow us to grasp the alleged superiority of the presumptive scheme in terms of its ability to prevent the excessive expansion of the area of liability.

Actually, however understandable the temptation may be for civil procedural scholars to seek the solution to the problem *within the proceedings*, the latter seems rather to lie *upstream*, and in particular in the substantive law theory about loss of *chances*. It is true that the concept, originally imported but now 'naturalized', is still debated, first and foremost in the very configuration of '*chances*'; however, as recently observed, «the reconstruction of the loss of '*chance*' in causal terms is the common premise of both approaches around which the discussion has developed [...] the ontological theory no less than the etiological one. While the former, starting from the causal issue, in order to overcome the obstacles, refers […] the link to a good […] different from the main one relating to the loss of the final result, the other perspective does not make a similar 'qualitative leap' and prefers a more conservative approach, in the sense of conceiving the *chance* as a portion of the final good – that is, not a change but only a quantitative moderation of the *petitum* – rather than as a good in its own right, determining a retreat from the threshold for ascertaining the causal relationship between the unlawful act and the damage event/consequence considered in its entirety. Both the ontological and etiological theories – which are not as distant as is traditionally understood – are based on the *trick* of reduced causality: the former to justify the *chance* upgrading to the rank of an autonomously protectable legal entity, the latter – almost to the opposite effect – to guarantee compensation for the

[42] *Ibidem*.

damage to a situation (conceived not in itself, but as) instrumental to the achievement of a final utility»[43].

If, therefore, the loss of *chance* can be defined as a «remedy for uncertain causality and, in concrete terms, for the failure of scientific evidence»[44] (at least, compared to the traditional construction of causality), it is clear that it is well suited to the question at stake. Nor this conclusion is prevented by the fact that, in the field of climate change it would seem more correct to speak of an increase in the risk of damage, rather than of a damage resulting from the loss of a final benefit: after all, even in France, the birthplace of the theory, despite the fact that the loss of *chances* is usually referred to cases in which the injured party claims the deprivation of the prospect of a favorable event occurring, case law also allows compensation for the loss of the *chance* of avoiding damage[45].

The concept of loss of *chance* can therefore constitute the normative test that – once the existence of a civil wrong has been established – justifies the liability of the defendant (whether a State or a company) by virtue of its mere *contribution* to the global phenomenon. And this result seems not only – in abstract terms – perfectly consistent with the aforementioned current function of civil liability, but also – in concrete terms – with the normative framework. In fact, although civil causality is traditionally inspired by criminal causality, it is appropriate to distinguish between the two and treat them separately. It has been observed that «the main objective of criminal liability is to punish the offender» and this justifies «in a system where, for example, in the case of multiple offenders, each is fully liable for the consequences that criminal law attaches to the act, regardless of the specific causal weight of each person's conduct». Civil liability, by contrast, «aims to prevent or remedy harm, sometimes even with punitive sanctions, as a general deterrent. This means that the scope of the tortfeasor's liability may vary in proportion, for example, to the contributory negligence of the

[43] S. BARONE, *La tutela giurisdizionale delle* chances *illegittimamente perdute*, Roma, 2023, pp. 48 ff. (free translation).

[44] Ivi, p. 37 (free translation).

[45] I. DESBARATS, *Le dérèglement climatique: une source de (nouveaux) dommages pour les salariés ? État des lieux et perspectives*, in *Droit social,* n. 4, 2023, pp. 294 ff.

injured party». As Articles 1227 and 2055 Civil Code demonstrate, «civil causality, unlike criminal causality, does not use contributory causes to affirm (Article 41, § 1, Criminal Code) or exclude (Article 41, § 2, Criminal Code) liability, but to quantify the compensation for damage according to the causal weight of each cause». Furthermore, civil liability has to «comply with the guarantee set forth in Article 23 Const. – which requires the legal provision of personal and financial services – but not with that set forth in Article 27 Const. – which instead establishes the necessary personal nature of (sole) criminal liability». All this suggests that civil liability elements, including the causal link, can be applied flexibly when dealing with a complex phenomenon such as climate change, which is caused by a huge number of factors with different impacts, some of which are still uncertain[46].

4. *Following: b) as an adjudication rule equivalent to market share liability*

The need to seek a not-exclusively-procedural solution appears to be further demonstrated by the fact that, as long as the reasoning is based on classic theories of causality, it is substantially impossible to prove both the causal link *and* the damage at the same time; thus, even if the former is considered proven, possibly by means of presumptive evidence, the problem of quantifying the latter stands[47].

This latter issue is also briefly addressed by Nollkaemper; and, like those relating to the determination of causality, his conclusions on the assessment of damages (to be commensurate, according to the author, with the emission quotas)[48] seem to be transferable to our legal system,

[46] R. LANDI, *La causalità,* cit., pp. 492 ff. (free translation).

[47] It should incidentally be noted that the same difficulty in determining the amount of damages arises in relation to injunctive relief, although, as already mentioned, establishing the causal link between conduct and injury is there simplified, since this latter is «substantially absorbed in the assessment of the unlawfulness of the conduct»: cf. R. FORNASARI, *La struttura della tutela inibitoria*, cit., p. 2070 (free translation).

[48] The author, in fact, acknowledges the existence of at least three theoretical bases for justifying a different solution (namely, full compensation); however, this is rightly

once again thanks to the theory of loss of *chance*.

As is well known, according to authoritative doctrinal opinion[49], recently adopted on at least one occasion by the Council of State[50], *chance* should be employed as a criterion for damage quantification. And such an approach has recently been rightly considered «balanced and simplifying (but not in a negative sense) because it aims to preserve the traditional system of liability [...] and thus to harmonize, with that system, the importance that *chance* can have in the assessment of damage, without departing from it»[51].

It is true that the above approach is advanced as an alternative – and therefore incompatible – with the idea of *chance* as a means of dominating uncertain causality (indeed, the author who promoted it fundamentally contests the «idea that *chance* is a good, an object that is immediately and unquestionably subject to legal protection, such that the causal relationship must be assessed in relation to it as a condition of liability»)[52]; and this would seem to preclude the idea, put forward here, of using it simultaneously for the purposes of determining both the existence *and* the *quantum* of the offense. However, as rightly observed, even Trimarchi's thesis does not escape «the inevitable need (which is a concrete requirement in any case, regardless of any qualifying option) to "entify" the *chance*»: because «arguing that the loss of *chance* is merely a technique for liquidating damage does not allow us to dispense entirely with the model of *chance* as an "entity" [...], whose existence must necessarily be alleged in a timely man-

discarded on the grounds that «[s]ince no single State will have caused the entire damage, allocating an obligation to provide full compensation to any single State may seem unfair to that State […] in particular since jurisdictional barriers would make recourse between multiple wrongdoers difficult, if not impossible»: A. NOLLKAEMPER, *Causation Puzzles*, cit., pp. 51 ff.

[49] P. TRIMARCHI, *La responsabilità civile: atti illeciti, rischio, danno*, Milano, 2021, pp. 614 ff.

[50] Cons. Stato, Ad. Plen., 23 aprile 2021, n. 7. However, the ruling is not unanimously read: according to S. BARONE, *La tutela giurisdizionale,* cit., p. 66, it makes use of *chance* for damage quantification, while G. CRICENTI, *La* chance *come bene autonomo*, in *Resp. civ. e prev*., n. 4, 2021, pp. 1247 ff., considers that it grants compensation for the *chance* lost *tout court*.

[51] S. BARONE, *La tutela giurisdizionale,* cit., pp. 66 ff.

[52] P. TRIMARCHI, *La responsabilità civile*, cit., p. 620.

ner and then proven in court, at least with regard to those individual elements that contribute to its identification, so as to be included in the assessment of the extent and value of the damage that can be compensated»[53].

This observation, while confirming once again the idea that the different theories may be subject to *reductio ad unum*, seems to legitimize the use of loss of opportunity, at least for the limited purposes at issue here, not only for determining partial liability, but also for apportioning the economic consequences of individuals' contributions to exposure to risk (of climate damage), ultimately leading to results that are *substantially* identical to those resulting from the application of *market share liability*: because if the increase in risk is certain (*an*) to the extent that each climate-changing activity contributes to the global phenomenon, it is precisely to that extent (*quantum*) that the damage caused by that activity must be estimated.

And, as should now appear obvious, this result can be achieved without demanding science for more than it currently allows in terms of both the burden and the means of proof. Thus, the initial impression is confirmed: perhaps the problem does not lie in the inadequacy of the answers, but in the questions themselves.

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Abstract[*]

Ita

Il contributo parte dai tradizionali problemi relativi agli oneri e ai mezzi di prova nei contenziosi sul cambiamento climatico per suggerire che il problema non risiede in tali questioni, ma in un altro che si colloca a monte, e cioè la difficoltà di adattare i normali modelli di causalità alle peculiarità del cambiamento climatico. Tuttavia, una volta scomposto il problema nelle sue varie componenti, esso sembrerebbe essere risolvibile anche all'interno del sistema nazionale, secondo gli *standard* già suggeriti dalla dottrina internazionale rela-

[53] S. BARONE, *La tutela giurisdizionale,* cit., p. 70.

[*] Articolo sottoposto a referaggio fra pari a doppio cieco (*double-blind peer review*).

tiva ai contenziosi contro lo Stato. Tutto ciò riscoprendo uno strumento già noto per la sua capacità di affrontare la causalità incerta: la perdita di opportunità.

Parole chiave: onere della prova, prove, causalità, responsabilità, perdita di chance

En

The contribution starts from the traditional problems of burdens and means of proof in climate change litigation to suggest that the problem does not lie in these issues, but in one that is placed upstream: the difficulty of adapting the ordinary patterns of causality to the peculiarities of climate change. However, once broken down into its various components, the problem seems to be solvable even within the domestic system, according to standards already suggested by international doctrine for litigation against the State. All this by rediscovering a tool already known for its ability to deal with uncertain causality: loss of *chances*.

Keywords: burden of proof, evidence, causality, responsibility, loss of opportunity