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Article

On Present-Day Wildfires: When Law, Society, Nature, and Anthropogenic Activities Combine. A Multi-to Inter-Disciplinary Analysis

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Summary: 1. On wildfires and natural disasters. 2. Mankind-Nature-Law: a particular triad. 3. Atmospheric composition is "Prometheic". 4. Towards a better sociological understanding. 5. The heterogeneity of legal frameworks: the EU.

Abstract: Social sciences are constantly developing, and new challenges posed by climate change and the intricate relationship between mankind and the environment are resulting into new approaches to various socio-juridical issues. However, these approaches are challenged by phenomena showing a dual natural-anthropogenic origin, such as wildfires. Where to draw the line between a natural event that helped shaping landscapes and contributed to the evolution of terrestrial organisms for hundreds of millions of years, and anthropic-driven natural disasters which are all but indistinguishable from actual crimes? These questions lead to new multi- to inter-disciplinary evaluation processes meant to characterize wildfires from several standpoints, each with a contribution from a specific discipline. Via one such approach, this paper demonstrates that – at least in the context of the European Union – heterogeneous laws and regulations should indeed focus more on the link between large anthropic wildfires and natural disasters. Furthermore, the effects of wildfire-related pollutants on both the climate and human health should be accounted for in rulings.

Keywords: wildfires; European law; human health; climate change

1. On Wildfires and Natural Disasters

The main purpose of this research paper is to evaluate the wildfire phenomenon not only in terms of its consequences on society and the environment, but also with a key focus on its socio-juridical features. This analysis involves a detailed description of the characteristics of this phenomenon in nature, plus the influence of anthropic activities on present-day wildfires and their changes over time.

Law evolves continuously around environmental issues and all scientific findings addressing these issues; therefore, the topic of public access to certain information concerning environmental threats is one that is worth discussing. The leading cause of most present-day wildfires calls for a socio-juridical analysis meant to integrate, in its framework, the new findings of environmental studies.

Federico Paolini, whose research focus is aimed at the environment from a historical perspective, remarked that:

because a coercive tool meant to modify individual behaviors which damage the environment does not exist, individuals do not feel the need to change their own negative behavior as they do not perceive the deterioration of ecological balances caused by their actions (translated from Italian).¹

Furthermore, as Paolini once claimed² with respect to Jared Diamond's thought on this topic, the history of mankind offers numerous examples of environmental crises caused by collective human behaviors and lifestyles in societies which have been all but unable to evaluate the impact of their actions on the environment³.

Francesco D'Amico, in the following chapters, will underline any standard individual's incapacity to measure the impact of their actions on the environment by reporting how present-day wildfires are rarely the result of natural causes, such as lightning. The phenomenon is as of today an anthropic-driven one, so laws and regulations need to account for that. In the context of social sciences, with Law being a remarkable example, the evolution of regulations and policies is often very closely tied to new scientific findings. Research papers from the field of social sciences usually address the emergency responses to natural disasters. That said, it is worth noting how in the past few years various experts from several fields have addressed the issue of environmental preservation from multiple standpoints, each accounting for their own discipline. Meetings and conferences have repeatedly taken place, though the effort behind a proper classification of these contents – normally fragmentary in nature – is considerable. The final result of these contributions is the intricate complexity of heterogeneous laws – both on a European Union level and in the context of each European country – which are often difficult to untangle and extrapolate from their original context⁴.

D'Amico will therefore underline and remark the need to address these events properly as part of the broader "natural disaster" category, and in doing so the coauthor will also offer new insights into the natural side of these phenomena.

That said, jurisprudence does offer a notable example on the socio-juridical side of the phenomenon: Ruga Riva's examination and discussion on the first legal ruling on the new definition of natural disaster, applied to a case of arson which resulted in a large wildfire. The Court of Pisa, Italy has in this case ruled that the crime of arson dually combined with that of anthropic-driven natural disaster by highlighting the effects of that fire on the ecosystem, the local landscape, the hydrogeological parameters of the area, and the local climate⁵. Rulings such as the one examined by Riva provide new insights and clues on new joint socio-juridical-environmental fields of research.

2. Mankind-Nature-Law: A Particular Triad

Any treatise on the relationship between mankind, nature and law as intended and evaluated in European regulations cannot refrain from reporting the impressive number of policies present in the field of environmental protection. These policies show an intrinsic complexity that deserves an analysis on its own.

Roberto Leonardi explained the evolution of these norms⁶ and, specifically, how they became a field on their own⁷, «intended as a homogeneous group of legal skills, administrative powers, etc.»⁸. The evolution of this new field is the result of the combination of notions based on laws and

¹ F. Paolini, *Firenze 1946-2005. Una storia urbana e ambientale*, FrancoAngeli, Milano 2014, p. 192.

² Ivi, pp. 191-192.

³ Cf. J. Diamond, *Collasso. Come le società scelgono di morire o vivere*, Einaudi, Torino 2007.

⁴ G. Cordini, P. Fois, S. Marchisio, Prefazione al volume *Diritto Ambientale. Profili internazionali europei e comparati*, Giappichelli, Torino 2017, p. X.

⁵ C. Ruga Riva, *La prima sentenza di merito sul disastro ambientale. Un inaspettato caso di incendio disastroso per l'ambiente*, «Lexambiente. Rivista trimestrale di diritto penale dell'ambiente», 4, 2022, pp. 62-73.

⁶ R. Leonardi, *La tutela dell'interesse ambientale, tra procedimenti, dissensi e silenzi*, Giappichelli, Torino 2020, pp. 7-8.

⁷ F. Benvenuti, *Studi dedicati ai problemi dell'ambiente*, in «Arch. Giur.», 1982, 3-6, 255.

⁸ G. Rossi (a cura di), *Diritto dell'ambiente*, Giappichelli, Torino 2017, p. 20.

regulations at scales ranging from national to international, with the European category placed in between.

Giampaolo Rossi is clear on the matter in the preface of his volume *Diritto dell'ambiente* (Environmental Law): «the issue of environmental law is so broad that a treatise alone would not be sufficient to address all its characteristics». Furthermore, Rossi reports that «any effort in this direction would be quickly subject to obsolescence, as every aspect of law is undergoing major changes, but that of environmental law is undergoing even more rapid changes due to its ties with the crisis of current development models, globalization processes, and several traditional institutions»⁹. In a final remark, Rossi concludes that:

There are no disciplines in the field of Law that are not affected by this: it is not possible to venture into Environmental Law without considering the influence of international law (which is very important due to the supranational nature of this field), a comparison between national laws and, internally, on constitutional, tax, penal, procedural, commercial, labor and civil laws in general. With respect to community law, the specific field of environmental law goes in the direction that it cannot be separated from national laws: most international norms are in fact based on European laws (translated from Italian).¹⁰

From this standpoint, it is worth noting the achievement of a “minimal harmonization” in the field of environmental law that was ultimately achieved via several strategies on a European level. Barbara Pozzo, addressing this issue, reported that «since the beginning, community law in the environmental field had to deal with the profound differences in the laws and regulations of each European country, which in turn had different perceptions on environmental issues, as well as different degrees of assessing these issues, and how these issues are conveyed to students at basic education levels. This resulted into different responses to the same environmental challenges»¹¹.

At this point, there are more questions than answers. Although from one side it is safe to assume that improvements have been made and environmental protection is now a key focus in the context of the EU, on the other in this work it is not possible to venture deeper into a detailed evaluation of community law.

That said, a mention of collective behaviors as those defined by Diamond can be found in Sergio Pappalardo's works, especially in his study on how in the eighteenth century an interest in what would have later become the “sociology of disasters” emerged: in the case of disasters, in fact, it is societies and collective behaviors that are mostly subject to research¹². Bruno Bilotta further developed Pappalardo's concept, specifically “in the case of disasters, studies are channeled towards the society and collective behaviors” into a more articulated «we don't look just for geological and environmental causes, but also for social ones, which are not less relevant than the two mentioned above, as in fact they're frequently far more important than the others and help explain the choices made by mankind, both the rational and – more importantly – the irrational ones, which aren't less frequent than the others and may be considered more relevant than them in terms of consequences»¹³.

D'Amico will venture into an accurate analysis of wildfires using as a key fundamental Bilotta's view on the intrinsic complexity of mankind's relationship with disasters as joint natural-anthropogenic catastrophes: «by just looking at the stories, reports and journals of the past few centuries, just to have an idea of the time spans involved in our analysis, truly disastrous events have kept occurring with a frequency that, on its own, would not be sufficient at explaining their dramatic impact on territories.

⁹ Ivi, p. XVII.

¹⁰ *Ibidem*.

¹¹ B. Pozzo, *La tutela dell'ambiente*, in *Temi e Istituti di Diritto Privato nell'Unione Europea*, a cura di G.A. Benacchio e F. Casucci, Giappichelli, Torino 2017, p. 111.

¹² S. Pappalardo, *Un terremoto per amico. Potere, trasgressioni e dispute dopo una calamità naturale*, FrancoAngeli, Milano 1994, p. 136.

¹³ B.M. Bilotta, R. Saija, *Il territorio violato. Paesaggio, territorio e criticità sociali*, Cedam Wolters-Kluwer, Padova 2014, p. X.

Assumptions going well beyond the inevitability of a given natural event must therefore combine with that¹⁴.

3. Atmospheric Composition Is “Prometheic”

Though fire as a physical and chemical process seems a constant of the Universe, its existence is the product of specific parameters and circumstances without which the phenomenon would not occur. Despite the fact that the general public may perceive nuclear fusion reactions occurring deep in the nuclei of stars as “fires” and the stars themselves as “flaming” celestial objects, those are completely different mechanisms acting on the atomic level; people may be in fact surprised to realize that wildfires as we know them are so far only documented on planet Earth and are by no means to be considered a truly universal process. They most likely occur elsewhere in the vast void but, so far, all of the available and tangible proof point to the Earth as the only place where such phenomena are indeed possible. What’s more surprising is that fires have affected the surface of our planet for approximately 10% of its existence, as the remaining 90% of Earth’s history was not favorable for fires to be ignited and spread. This time range is no coincidence, as it marks the milestone when living organisms and their metabolism ensured that the percentage of atmospheric oxygen could exceed the 16% threshold required for fires to naturally occur, though it would take no less than 18.5% of atmospheric oxygen to actually maintain fires as we know them today¹⁵. In short, wildfires are less likely to occur than the appearance of life forms on a terrestrial planet: out there, somewhere in the Universe, there may be places where the miracle of life has marvelously sparked but creatures over there cannot be affected by proper wildfires – and it may not necessarily be a good thing for such living beings, depending on the stage of evolution. That is why in this particular context, with one big *caveat* being invoked due to the mythology involved in the following reference, we define atmospheric composition as “Prometheic”. The term associated with the mythological figure of Prometheus and his choice to give the power of fire to mankind, an action for which the ancient gods punished him. Obviously, our species – among many others – could not survive in environments with poor oxygen concentrations, so the fact that mankind has mastered fires is itself proof that evolution and the presence of fires on a planet are connected, but the broader assumption by which the key regulator of the phenomenon is atmospheric chemistry and composition still stands.

Without venturing deep into the characteristics that make fire possible, the phenomenon itself can be defined as something that needs specific requirements to occur and be maintained at all times. The lack, or interruption, of any of them would immediately prevent or stop the entire process. Some may think that the earliest proof of fire affected ancient trees, but what we know from fossil charcoal tells a different story: the paleontological record points to what we deem large fungi named *Prototaxites* (Dawson¹⁶), potentially as tall as nine meters, as the first living beings on the planet to be struck by lightning and catch on fire over 430 million years ago. back then, proper plants were in early stages of evolution and could not compete with these towering fungi¹⁷. Once the fire phenomenon became a possibility on our planet, fluctuations in its frequency also occurred: there are tangible reports of time ranges, such as the “charcoal gap” 250-240 million years ago, during which fossil remains of wildfires became scarce due to a complex combination of less common wildfires,

¹⁴ Ivi, p. XI.

¹⁵C.M. Belcher, J.M. Yearsley, R.M. Hadden, J.C. McElwain, G. Rein, *Baseline intrinsic flammability of Earth’s ecosystems estimated from paleoatmospheric oxygen over the past 350 million years*. Proceedings of the National Academy of Sciences, 2010, 107(52): 22448-22453.

¹⁶J.W. Dawson, *On the fossil plants from the Devonian rocks of Canada*. The Quarterly Journal of the Geological Society of London, 1859, 15: pgs. 477–488.

¹⁷I.J. Glasspool, R.A. Gastaldo, *A baptism by fire: fossil charcoal from eastern Euramerica reveals the earliest (Homerian) terrestrial biota evolved in a flammable world*. Journal of the Geological Society, 2022, 180: jgs2022-072.

lower chances to preserve charcoal and inertinite in the sediments of that time, and other factors¹⁸. Broadly speaking, however, once they were first ignited in the Silurian, they never stopped, and we can see their effects even today, though the advent of flames brought by mankind has totally reshaped the role of purpose of this phenomenon on Earth. In fact, present-day fires are rarely caused by the same naturally occurring triggers: according to an estimate provided by Vilar and collaborators, when considering the 1980s–2010s time span, only 5% of forest fires were the result of natural events such as lightning strikes, while the remaining 95% is to be attributed to more or less deliberate human actions¹⁹. The phenomenon is therefore largely driven by human activities, and regulations – as described elsewhere in this paper – have to deal with this kind of occurrence.

For many reasons, the issue of pyromania as one of the driving factors of human-induced fires is hereby mentioned but will not be further analyzed. Pyromania is a notable issue in society, and in the past few years there have been successful attempts at reviewing how it was considered over time, *i.e.* whether pyromaniacs were subject to punishment, treatment, or a combination of the two depending on leading medico-legal views of their epoch²⁰. The paper will focus primarily on agriculture-related fires as anthropic means to alter landscapes.

These events are a “forced expression” of fires as regulators of Earth’s flora and, by extension, fauna. Human intervention aside, there are plants that adapted and evolved to resist fire, while others have developed a specific vulnerability to combustion so that their next generation could greatly benefit from ashes and nutrients left behind²¹. The phenomenon is in fact far more intertwined to nature than its apparently destructive function would imply. Though the disruption brought by anthropic activities is well proven, these occurrences should at best be regarded as a mere emulation of something that has been happening by natural means on this planet for over four hundred million years: the problem, as stated above, is the immense frequency by which they occur nowadays and how they stress environment in ways that wouldn’t normally be possible in nature. Agricultural activities, which already are an extremely important driver of LUC (Land Use Change) across the planet, add a precise cyclic pattern to these events while nature tends to be more stochastic when it comes to catastrophic occurrences. It is known from literature that these fires are deeply rooted in human culture and may be a leading factor in the alteration of landscapes for several centuries, if not more²². Also, their actual impact on soils is not constant, as notable differences have been reported depending on the area where these fires occur, and their frequency²³.

Concerns have been raised with respect to the social consequences of fires as threats to human populations. While there’s no doubt that the massive release of pollutants and small particles which pose health hazards is of serious concern on its own²⁴; studies have also covered the social

¹⁸A.M.B. Abu Hamad, A. Jasper, D. Uhl, *The record of Triassic charcoal and other evidence for palaeo-wildfires: Signal for atmospheric oxygen levels, taphonomic biases or lack of fuel?* International Journal of Coal Geology, 2012, 96-97, pgs. 60-71.

¹⁹L. Vilar, A. Camia, J. San-Miguel-Ayanz, M.P. Martín, *Modeling temporal changes in human-caused wildfires in Mediterranean Europe based on Land Use-Land Cover interfaces*. Forest Ecology and Management 378, 2016, pgs. 68-78.

²⁰L. Dalhuisen, *Pyromania in court: Legal insanity versus culpability in Western Europe and the Netherlands (1800-1950)*. International Journal of Law and Psychiatry 58, 2018, pgs. 36-47.

²¹H. Lambers, F.S. Chapin, T.L. Pons, *Plant Physiological Ecology*. Springer: Cham, Switzerland, 2008, vol. 2, pgs. 4–6.

²²S.J. Pyne, *Fire in America. A cultural history of wildland and rural fire*. Princeton University Press, 1988, 654 pp.

²³D.P. Dick, R. Martinazzo, R.S.D. Dalmolin, A.V. Ávila Jacques, J. Mielniczuk, A.S. Rosa, *Impacto da queima nos atributos químicos e na composição química da matéria orgânica do solo e na vegetação*. Pesquisa Agropecuária Brasileira, 2008, 43(5).

²⁴A.A. Romanov, A.N. Tamarovskaya, B.A. Gusev, E.V. Leonenko, A.S. Vasiliev, E.E. Krikunov, *Catastrophic PM_{2.5} emissions from Siberian forest fires: Impacting factors analysis*. Environmental Pollution 306, 2022, 119324.

implications of direct damage to human settlements, as well as the broad range of effects on the economy and society²⁵.

Overall, we can infer from a cross-analysis on the history of fires starting from their roots deep in geological time, their physical properties, their connection with human culture, and present-day alteration of landscapes, that the phenomenon is an intricate combination of natural and anthropic factors which have to be considered by lawmakers and regulators in their efforts to preserve safety and the environment.

4. Towards a Better Sociological Understanding

The previous chapters of this work have analyzed the phenomenon of wildfires in their dual natural-anthropic role ahead of a more detailed analysis on the lawmaking aspects of this issue. However, prior to venturing into that detail, it is worth addressing the nature of anthropic fires as an unbalancing over a natural equilibrium, and the fact that nature itself can perturb it on its own. Fires are a relevant issue because of their destructive nature, which was described before: planting trees, which may be considered the opposite action, is no crime yet it is still an anthropic perturbation of ecological niches. Though the planted trees are likely to contribute to that niche, it doesn't change the fact that without human intervention, that soil would have had a different fate: some of the organisms in that ecosystem may be affected by these trees in a way that may not be truly beneficial for them. Moreso, planting trees may not always be the best possible solution to increase carbon sequestration and counter rising CO₂ levels²⁶.

The paper is far from discouraging anyone from planting trees, but this example was necessary to indicate the criteria used to discriminate human perturbations of nature: constructive perturbations, such as planting trees, have a different treatment compared to destructive perturbations, such as fires. Another thing that is worth debating is the mere concept of "natural phenomenon". Nowadays, natural has consolidated itself as the "positive" alternative to "negative" anthropic influences over the environment. If something's natural, it is generally regarded as good; the term itself and related words carry a connotation of positive meanings²⁷.

Yet, several mass extinctions that nearly brought life on Earth to the verge of disappearance were natural and caused by a number of different events, at times a combination of two or more of them: colossal flood basalt eruptions, asteroid impacts, glaciations, continental collisions and the consequent closure of entire oceans, only to mention a few. All these phenomena are natural, yet catastrophic in nature, perhaps more catastrophic than anthropic fires will ever be. The differentiation is even more articulated than that: great oxygenation events that enriched Earth's atmosphere in oxygen were beneficial for our ancestral predecessors, but truly catastrophic for other organisms. From our perspective, rising oxygen concentrations are a milestone of Earth's history, but our point of view on the matter is clearly biased in its very essence. This means that an interdisciplinary approach to the issue needs to go beyond the concepts of "natural versus anthropic" as the sole means to discriminate the positive or negative characteristics of phenomena.

In the case of fires, human perturbation could be identified using two key criteria. The first is of pure mathematical scope, and this paper already mentioned it: as of today, only 5% of fires are natural, so the remaining 95% is an overwhelming majority of anthropic perturbation acting on the environment which itself could be sufficient to be considered of concern. This 95-5 ratio is particularly high, especially when compared to other ratios such as the amount of carbon dioxide (CO₂) released annually by fossil fuels and other anthropogenic sources, which is just a fraction of the total CO₂

²⁵S. Gómez-González, F. Ojeda, P.M. Fernandes, *Portugal and Chile: Longing for sustainable forestry while rising from the ashes*. Environmental Science & Policy 81, 2018, pgs. 104-107.

²⁶J. Maschler, L. Bialic-Murphy, J. Wan, L.C. Andresen, C.M. Zohner, P.B. Reich, A. Lüscher, M.K. Schneider, C. Müller, G. Moser, J.S. Dukes, I. Kappel Schmidt, M.C. Bilton, K. Zhu, T.W. Crowther, *Links across ecological scales: Plant biomass responses to elevated CO₂*. Global Change Biology 28, issue 21, 2022, pgs. 6115-6134.

²⁷ C. Menzel, G. Reese, *Seeing nature from low to high levels: Mechanisms underlying the restorative effects of viewing nature images*. Journal of Environmental Psychology 81, 2022, art.no. 101804.

released yet is enough to alter the climate due to its buildup. In the case of fires, it is the ratio itself that is totally unbalanced compared to natural sources.

A second criterion is the actual damage caused by these events, which goes well beyond the alteration of specific landscapes: as mentioned before in the paper, fires may pose a direct threat to human settlements, and also release a number of pollutants which may increase the odds of death in regions far away from the location where the fires themselves occurred. Considering that law does address direct damage caused to the environment as well as other people, a deliberate act damaging others also meets the criteria to be of concern.

Though the core issue were pure natural disasters such as earthquakes and floods, Antonio Dimartino's assessment on the social aspect of natural disasters²⁸ invoked the need for an approach involving multiple disciplines:

[...] it is therefore not possible to address a purely natural disaster, as disasters always have an impact on society. For this very reason it is at times difficult to use the term "natural" when referring to disasters (translated from Italian).

The social, and more importantly the sociological aspects will be further discussed in the final chapter.

5. The Heterogeneity of Legal Frameworks: The EU

The problem of wildfires and their joint natural-anthropogenic causes has been widely discussed up until this point of the research paper. The next logical step is providing an additional insight on the sociological views on such phenomena. Though in his milestone work the main foci were other calamities, it is hereby assumed that Sorokin's views from *Man And Society In Calamity: The Effects Of War, Revolution, Famine, Pestilence Upon Human Mind, Behavior, Social Organization and Cultural Life* are perfectly applicable to the unpredictable consequences of a wildfire in terms of damage to the society which in turn can be defined as an illegal activity²⁹. In fact, Sorokin's views on how calamities affect human society do match the occurrence of extreme wildfires: with people being forced to relocate, buildings being either damaged or completely destroyed, and landscapes being permanently affected, an extreme wildfire does match the definition of a calamity as intended by Sorokin, sociological implications included. It is not possible to determine, *a priori*, the true extent of an anthropic wildfire: unless it is under constant control, factors determining its capacity to spread (*e.g.*, wind direction and speed, fuel availability and vulnerability to ignition) are deemed unpredictable. A small anthropic wildfire turning into an extreme event is a calamity.

Issues may rise on how much information the general public has on the potential of a wildfire, as well as in terms of the health hazards caused by pollutant release into the atmosphere: do people know the actual risks of throwing a cigarette, or burning biomass to clear land for livestock and agriculture? This returns to a topic that was discussed in a previous work with respect to how scientage is relayed to the public. The work specifically addressed climate change communication, but for the purpose of this paper, the core points of that work are extended to the risks of anthropic wildfires³⁰:

[...] if we were to convey information on methane to the public without an active involvement of social sciences, we could trigger and fuel pessimism in the form of the so called "climate anxiety", which is consolidating itself as a true challenge for modern psychologists. [...] wouldn't it be more beneficial for the population as a whole if young adults were better informed on climate change, as well as the proper actions that have to be taken to counter, or at least mitigate, the phenomenon? [...]

²⁸ A. Dimartino, *Verso un'analisi socio-giuridica delle questioni ambientali in Europa*. Società e Diritti 14, 2022, pg. 64.

²⁹ P.A. Sorokin, *Man And Society In Calamity: The Effects Of War, Revolution, Famine, Pestilence Upon Human Mind, Behavior, Social Organization and Cultural Life*, Dutton: New York, 1942, 352 pp.

³⁰ F. D'Amico, *The "methane problem" as an ongoing challenge to climate change communication and understanding. When data estimate uncertainties become a social uncertainty*. Rivista internazionale di sociologia giuridica e diritti umani 6, 2023, pgs. 81-96.

These are among the questions that go in the direction of promoting more collaboration between social and other forms of sciences when it comes to climate change communication.

In the case of wildfires, more information would not act against climate anxiety. Instead, it would likely reduce the occurrence of anthropic wildfires, once the general public realizes what their actual consequences are. In the United States of America, a motto from the popular Smokey the Bear messaging campaign summed up the core of this issue: "Only you can prevent forest fires." Although some of these wildfires would keep occurring (e.g., those ignited by farmers and obviously related to the agricultural sector), others may be reduced in frequency and extent of their damage to the environment.

Environmental risks aside, an induced calamity, which is also a crime, needs an adequate legal system to counter it. In the context of the European Union, as already reported in chapter 2, one of the primary challenges is the deep heterogeneity of laws, regulations, and procedures applied by different countries throughout the continent. In this legal framework, a straightforward notion can bring light upon the apparent chaos of different laws addressing the same issue. The 2004/35/CE Directive issued by both the European Parliament and the Council on the legal responsibility – in terms of prevention and containment – of the environmental damage, as Mariachiara Alberton reports, is a key reference that EU countries can use in the effort to mitigate such damage under the principle that "whoever pollutes, pays for it", which is also in accordance with a broad principle on sustainability³¹. Holding a European citizen accountable for environmental damage in terms of pollutants released into the atmosphere is the next step towards a proper legal framework addressing wildfires for their indirect health hazards, in addition to the more evident and instantaneous direct damage caused to the environment and human infrastructures. Pollution, as a form of "damage", needs to be fully considered by legal frameworks at all scales and the proper assessment of such a damage in turn requires an active involvement of Earth and Atmospheric Sciences.

With this final remark, it has been proven once again that the proper management of environmental issues having a direct impact on society ultimately requires an active involvement of social sciences, such as the sociology of law. This principle, now well consolidated by this paper and other works, is expected to become the basis of future research.

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