

Editorial

# Introducing *Fire*: A Transdisciplinary Journal to Advance Understanding and Management of Landscape Fires from Local to Global Scales in the Past, Present, and Future

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## 1. Introducing a New Transdisciplinary Journal

One of the many unique features of the Earth is landscape-scale fire [1]. Fire is a consequence of carbon-based life, an atmosphere enriched with oxygen and plentiful ignitions, mainly from lightning. Fire has been sufficiently frequent through geological time and geographic space to have shaped biotas because plant, animal, and fungal species have evolved to tolerate and regenerate from recurrent fire disturbance. Fire-adapted biotas have affected the occurrence and extent of fires, creating characteristic patterns of landscape fire known as fire regimes. Importantly, fire has been critical for the evolution of our and related hominin species, the only known lifeforms to have become an ignition source. Fire is essential to our existence and human civilization [2]. Pre-industrial cultures use fire for a multitude of quotidian purposes, including cooking, warmth, illumination, hunting, and habitat modification [3]. Agriculturalists use fire to convert wildlands, leading to the establishment of extensive human dominated landscapes [3]. Industrial civilizations depend on the combustion of fossil biomass. The ubiquity and scale of collective human fire usage has triggered planetary effects that are captured by the concept of the outgoing “Anthropocene” or, more aptly, according to Stephen Pyne’s definition of its follow-up geological epoch, the “Pyrocene” [4].

Fire is thus more than a physiochemical phenomenon as it involves the consideration of deep time and recent history, and local to global geographic scales. The entwinement of humanity demands understanding our history of fire and the diversity of cultures that developed industries, crafts, and traditional practices that have directly or indirectly shaped biotas, land cover, and landscape fires. The complexity of fire on Earth demands an appreciation of specialized knowledge across a plethora of fundamental and applied fields of inquiry, some of which have spawned sub-disciplines with a focus on fire, as well as holistic perspectives provided by Earth system scientists, environment historians, and pyrogeographers [5].

Unlike other natural disasters such as floods, hurricanes, and tsunamis, humans can both trigger and stop fire disasters. Achieving sustainable co-existence with landscape fire presents a substantial policy challenge given the combined, and often compounding, effects of societal and environment transformation, including deforestation that is reducing the strength of terrestrial carbon storage; anthropogenic climate change that is leading to longer and more extreme fire seasons; spread of highly flammable environmental weeds; establishment of fire-prone tree crops; abandonment of traditional fire management due to urban drift and establishment of the intermix of suburbs driven

by amenity-based migration; and fiscally unsustainable fire management practices due to spiraling costs [1,2,6]. There is growing recognition that traditional fire science perspectives and top-down command and control management approaches are incapable of charting a course to achieve effective, economically, and environmentally sustainable adaptation and mitigation to the current, and future, challenges of uncontrolled landscape fires [1,2,5,6]. Rather, to do this demands integration of multiple perspectives than can be used to design sustainable fire management interventions and build adaptive capacity that are suited for the specificities of the local environmental and cultural settings [2].

The resolution of these and many other challenges shares a similar theme: that to live or co-exist with fires requires an appreciation of the history and ecology of fire, fresh thinking that looks beyond current fire management paradigms, and forging integrative partnerships of scientists, communities, land management agencies, and non-governmental organizations [2]. Such innovation and exploration requires an intellectual ‘space’ where the global fire community can create a common language and understanding by framing environmental and policy challenges, reporting innovative management approaches, refining methodologies and building databases, and recording case studies of significant fire events, fire cultures, and fire regimes. It is hoped that this new journal *Fire* will fill this need.

## 2. *Fire*, a Brief History

*Fire* was founded following discussions with international fire scientists, operational managers, and wildland fire science organizations and welcomes submissions on the science and management of vegetation fires and global change from any group or individual.

The discussions to initiate *Fire* arose from three international workshops held between 2014 and 2017 in Idaho, USA, alongside a wide array of input solicited from fire scientists, operational managers, and wildland fire science organizations in North and South America, Africa, Europe, Asia, and Australia. A direct result of this input was the identification of a parallel effort to establish a new vegetation fire journal by members of the *Global Wildland Fire Network*. Consequently, *Fire* builds on the history of the *International Forest Fire News* (IFFN), which was launched by the Global Fire Monitoring Center (GFMC) in 1989 and published on behalf of the UN Economic Commission for Europe (UNECE) until 2014 and to phase out by 2020. From its beginning, IFFN served the Science–Policy Interface (SPI) and the interests and demands of information of the fire management community of practitioners. IFFN became the voice of the *Global Wildland Fire Network* which is coordinated by the GFMC and affiliated with the United Nations’ International Strategy for Disaster Reduction (UNISDR).

*Fire’s* international *Editorial Board* members reflect the diversity of these various organizations and disciplines as well as their breadth of knowledge in fire science. *Fire’s Editorial Board* members are widely recognized international leaders that cover a broad cross-section of disciplinary approaches to landscape fire

## 3. *Fire*: Aims

*Fire* is an international, open-access journal about the science, policy, economics, and technology of landscape fires and how they interact with communities and the environment. The journal emphasizes quality and innovation and has a rigorous peer-review process. *Fire* aims to provide a forum to help the fire science community convey how we can live with fire in a changing world. To achieve this open forum, *Fire* seeks to serve as an international outlet for diverse scientific and practical knowledge to converge in the interest of promoting more safe, effective, and scientifically driven expertise in the policy, community actions, and operational management of vegetation/landscape fires.

The journal *Fire* seeks to complement the existing specialist journals devoted to landscape fire by providing a broader intellectual remit to accommodate contributions from scholars across a range of disciplinary backgrounds from around the world. The intent of these article types is described below.

### *Perspectives*

*Fire* invites articles called *Perspectives* to explore innovative ways of thinking about landscape fire by giving voice to opinions in the fire community to reflect on current approaches and practices, and present plausible alternatives to current management orthodoxies. It is hoped that such *Perspectives* broaden our understanding of fire, stimulate transdisciplinary research, and drive innovation in fire management and societal adaptation to wildfire. Through these combined goals, *Perspectives* may lead to truly transformative advances and paradigm shifts.

### *Syntheses and Monographs*

Many problems in landscape fires are best addressed through the integration of existing knowledge and literature rather than by the more formal structure of a scientific paper that is designed to report research findings. In *Fire*, the presentation of interdisciplinary ideas into new concepts and research directions can be achieved through the category of a *Synthesis* article. The *Synthesis* paper type will provide an extended framework whereupon holistic concepts and ideas can be articulated using a variety of approaches ranging from mathematical modeling, meta-analysis, qualitative social science, and historical narrative. Some investigations require more extended treatments to report the findings of numerous studies, convergence of disciplines, or are generated during a researcher's career. Such reports often greatly exceed the usual page limits observed in traditional scientific article types. For such large, detailed works, *Fire* has a *Monographs* submission category.

### *Case Reports*

Pyrogeography has benefited enormously from the availability of remote sensing products enabling a truly global appreciation of fire on Earth. Yet, there has been far less attention given to descriptions and analysis of major fire events, description of governmental or community fire management treatments, quantification of fire regimes, and documenting fire cultures. Such information is essential to provide data to understand the geographic variation of landscape fires, fire management approaches, and to form a baseline to better understand the trajectory of change. For this reason, *Fire* has established a paper category of *Case Reports* to record the historical, ecological, cultural context, management responses, and socio-economic effects of fire events and fire regimes from around the globe. It is hoped that *Case Reports* will help ground in reality remote sensing and comparative pyrogeographic analyses and record fire events that are considered unusual or notable in terms of their scale, location, timing, or impacts.

### *Data Descriptors and Technical Notes*

Progress in a transdisciplinary field such as landscape fire will be expedited by achieving convergence through agreed upon definitions of key concepts, providing guidance on the correct procedures for effective measurement of variables routinely used in fire science and pyrogeography, and the archiving of data in formats suitable for future analysis. Such contributions are accommodated by *Fire* in the *Data Descriptors and Technical Notes* paper category. This category includes discussion of why some approaches may yield inconsistent results or inaccurate measurements, as well as provide descriptions of novel approaches and equipment that can provide innovative ways to quantify fire characteristics across different spatial and temporal scales.

## **4. Fire: Scope**

*Fire* seeks submissions from interdisciplinary studies that take a pyrogeographic perspective of vegetation fires occurring in natural, cultural, and industrial landscapes and how they interact with communities in the science–policy interface. The scope of *Fire* is thus holistic and inclusive. *Fire* primarily focuses on vegetation fires characterized by external ignition sources (i.e., outside of structures) and their impact on communities and the environment. *Fire* is intended as a home for submissions that consider

the growing challenge of landscape fires occurring in and around the interface between vegetated lands, rural structures, villages, and other residential areas including peri-urban areas. *Fire* is also interested in research focused on vegetation fires arising from transportation sources, power lines, munitions, and other human sources.

The Scope of *Fire* includes the following:

- Incorporation of fire processes within earth-system, socio-economic, landscape models, and smoke injection/transport models;
- agricultural fires, wildfires, planned/prescribed fires, and laboratory fires;
- history of fire policy, fire use, and fire impacts;
- governmental and community-based fire and fuels management;
- management of fire at the science–policy interface;
- planning, policy, economics, social, and psychological impacts of fires;
- sociology of fire risk/adaptation and global change vulnerability, adaptation, and mitigation;
- behavioral sciences, decision support tools and risk analysis relating to fire management policy and operational incident management;
- traditional and cultural uses of fire and the role of local and traditional ecological knowledge applied to fire science.
- Vegetation fire ignition sources, patterns, and projections;
- applied material sciences and engineering linked to exterior combustion properties at the fuel particle to landscape scale; 2
- applied combustion physics and chemistry including calorimetry, thermochemical reactions, energy apportionment, heat transfer, and ignition characteristics;
- fire behavior and modelling focusing on processes and complex biological, physical, and hydrological systems;
- fire effects on vegetation, soils, hydrology, food, and fiber;
- impact of fires on sensitive or protected environments, refugia, and species diversity;
- impacts of fire on seeds and seedlings, including controlled plant nursery experiments.
- Soil biogeochemistry, carbon sequestration, and microbial processes;
- paleoecology, dendrochronology, and the role of fire as an ecosystem disturbance variable;
- innovative technology for wildland fire suppression, operational planning, or research methods;
- model parameterization, testing, and validation.
- Algorithm development and monitoring through the remote sensing of fires with radiometers, unmanned aerial devices, aircraft, and satellite sensors;
- fires on dangerous or contaminated landscapes;
- health impacts associated with management of vegetation fires, such as smoke;
- pyrogenic emissions and emission estimates

## 5. Conclusions

In closing, on behalf of *Fire's Editorial Board and Associate Editors*, we welcome you to your new forum for sharing fire science perspectives, science, terminology, and case studies.

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**Conflicts of Interest:** The authors declare no conflict of interest.

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