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Speech of Prof. Dr. Dr. h.c. mult. Johann Georg Andreas Goldammer, Max Planck Institute for Chemistry and Faculty of Environmental Sciences and Natural Resources, Albert Ludwig University Freiburg, Germany, at the ceremony of awarding the Honorary Doctor degree from the Faculty of Forestry and Natural Environment of Aristotelion University of Thessaloniki

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Cultural Landscapes and Fire in Transition: Challenges for Society and Transdisciplinary Science

Esteemed colleagues of Aristotelion University
Ladies and Gentlemen

Receiving the Honorary Doctor degree from the Faculty of Forestry and Natural Environment of Aristotelion University of Thessaloniki is a touching occasion to reflect about the historic philosophical, cultural and scientific relationships between our institutions in Greece and Germany – and finally at international level.

Αριστοτέλης is the eponym of your university. Αριστοτέλης was named, among other, the "father of natural law". With Empedocles, he considered fire as one of the four terrestrial elements – later adding the heavenly substance as fifth element, which was called by some – "quintessence" or "ether".

At Freiburg University, I grew up with forest science. The main entrance of Freiburg University is flanked by the sculptures of Αριστοτέλης and Όμηρος. Inside the building, a mural at the entrance hall of the Aula, the traditional meeting hall shows Prometheus. Prometheus, the titan, who defied the gods by stealing fire from them and giving it to humanity in the form of technology, knowledge, and more generally and civilization. This wall painting is framing all the main academic events of our university.

Under this impression of ancient Greek philosophers and titans – would you have studied other than fire science?

Here I need to become more precise. The following remarks and deliberations are very personal. They highlight, however, the value of cross-fertilization and mutual inspirations towards developing a roadmap for a global approach in fire science and for building bridges at the science-policy interface.

In the early 1970s, when I began my studies of forest sciences at Freiburg University, neither Germany nor any other European country offered a study of fire science, such as fire ecology and landscape fire management. When I started to explore the role of fire in ecosystems, I recognized that I needed to go abroad to explore the state of knowledge in fire ecology. In the United States of America, the 1970s were an era of waking up foresters and landscape ecologists, reminding them that fire was both a natural and an anthropogenic power that contributed to the evolution and shaping many ecosystems of North America and the people living therein.

The year 1974 saw a first crossing of paths with a Greek scientist from Aristotelion University – with Leonidas Liacos – the late Professor for Rangeland Sciences. In 1974, I spent my first exploratory scientific visit to the renowned Tall Timbers Research Station. Tall Timbers was the cradle of fire ecology science, an institution that translated fire science to management practices, located in Florida, in the Southeast of the United States of America.

In the same year 1974, at the Tall Timbers Fire Ecology Conference, Leonidas Liacos presented his views on "Present Studies and History of Burning in Greece". Coming from rangeland sciences, Liacos had recognized and promoted the concept of creating wildfire-resilient natural pine forests of Greece by silvicultural measures, combined with prescribed grazing and prescribed burning. Today, Greek scientists recognize Leonidas Liacos as pioneer in fire ecology and application-oriented fire science in Greece.

Jumping one decade to the 1980s. By invitation of Leonidas Liacos and sponsored by the IKY Foundation – *Idryma Kratikon Ypotrophion* – I spent the summer of 1985 in Greece. I had the privilege working with Leonidas Liacos here in Thessaloniki where he introduced me to his living laboratory – the experimental stands that had been intensively treated by his conceptual approach – pine stands of high resilience to wildfires.

The summer of 1985 was a hot summer in Greece during which many large, devastating fires affected the country. On 18 August 1985, after ending my work with Liacos, I visited Kavala, where an intense wildfire had charred the mountain forests of the city. Then I took a boat from to Thasos Island. With the freshly wildfire-scarred Kavala in the back, I looked forward to Thasos. Coming closer, a huge smoke column built up over the island, the signal from an intensive forest fire. On this day, it was one of more than 50 wildfires burning in Greece.

After arriving in Limenaria I spoke to an Admiral of the Greek Navy, who coordinated the assistance of the military, including deploying personnel from a naval squadron, to fight the fires on Thasos. I offered my assistance to support the combat of the fire. Athens accepted my offer. On the same day, on 18 August 1985, the mayor of the wildfire-threatened village of Maries announced the evacuation of the village. After exchanging with the Commander of the First Greek Army, General Skoulas, a very careful and attentive incident commander, I was able to convince the mayor of Maries and the governor of Thasos not to evacuate and instead to mobilize all inhabitants to defend the village. This was finally successful. In the end, Maries was saved, despite the devastating effects of the fire in the surrounding forest.

The reason why I am mentioning the Thasos fire: Within a few days between Thessaloniki and Thasos, I could see that on the one side, Leonidas Liacos had developed science-based concepts and visions to create a forest with a high productivity of traditional forest produce – at the same time offering space for animal husbandry and thus supporting livelihood for local communities.

In Maries, on the other side, I could see that the village inhabitants were eagerly willing and capable to defend their village, their gardens and their lives.

Thasos and Maries opened my eyes. It became clear to me that the mountain landscape of Thasos was in transition from traditional cultural land use to an uncertain future. Inhabitants from Limenaria rushed to Maries, with supplies of food and water for the firefighters. Many of them said that they had moved to town but were concerned about the safety of their ancestral home villages and houses.

The trend of the rural exodus has accelerated since then. Urban citizens as well as tourists have high emotional feelings for the land that they adore. However, who will take care, who will continue cultivating these landscapes towards reduced vulnerability to wildfires?

Two years later, in 1987, I met first Alexandros Dimitrakopoulos. Like myself, he went abroad to study fire – with his Nestor Robert E. Martin – at the University of Berkeley, California. Alexandros and I shared many visions about the future of research cooperation. This continued until today, this evening, and will certainly last.

Later, my work with graduates from the School of Forestry and Natural Environment of Aristotelion University intensified. All members of the Epitropi National Committee on Perspectives of Landscape Fire Management in Greece, which I established and chaired on behalf of the Government of Greece in 2018, had graduated at Aristotelion. Three of them are members of your university: Besides Alexandros these are Prof. Giorgos Mallinis and, starting in September 2022, Dr. Ioannis Mitsopoulos. The Athens-based members of the Epitropi – Dr. Gavriil Xanthopoulos and Georgios Efthychidis – both graduated at the cradle of Greek forestry in Thessaloniki.

In 1989 the United Nations Economic Commission for Europe realized my proposal to establish an international journal, first called a newsletter – entitled International Forest Fire News (IFFN). IFFN was conceptualized as publication and information platform for the exchange between scientists and the community of practitioners and decision makers in fire management. After I had launched the first issues of IFFN, I received the first request for publication by Dr. Xanthopoulos – and later more Greek scientists, who wanted to share their views and research results with the international community.

Our vision to bring science to practice was tabled again in 1991 at a seminar on forest fires in Athens, jointly organized by *Kinisi Politon* and the German *Friedrich Naumann Foundation*. We highlighted the need for developing a system of Integrated Fire Management in Greece, which would take into consideration the consequences of land-use change, the role of sustainable land and forest management, the inclusion of civil society and a specialized forest fire unit within the Greek Forest Service. Looking back at the media reports of May 1991 – this was publicly debated with a supporting aspiration.

Let me leave Greece for a moment and give look at planet Earth, as the satellite sensors could see it from space. Starting in the late 1980s and further advanced in the 1990s, massive fires and smoke emissions became visible in regions where historically extended wildfires or burning activities in different land-use systems had not be seen before. Most striking were the fires burning in the equatorial tropical rainforests, in ecosystems where large-scale fires should not appear. Accelerating land-use change in South East Asia, notably in the Maritime Continent of Indonesia, were associated with excessive application of fire – with detrimental impacts on the environment, society, atmosphere and climate.

These fires were a wake-up signal for the scientific community: It was recognized that one of the four elements that Αριστοτέλης described as essential natural powers, became a threat to our planet.

In 1990, the Fire Ecology Research Group, which I had established at Freiburg University in 1979, joined the Max Planck Society for the Advancement of Science – at the Biogeochemistry Department of the Max Planck Institute for Chemistry. With our continued location and affiliation with the Faculty of Forest Sciences of Freiburg University, this association reflected the timeliness and need for addressing fire science in a transdisciplinary approach. The 1990s was a decade of intensive transdisciplinary research, with a focus on the interaction between landscape fires and the impacts of fire emissions on biogeochemical cycles, the atmosphere and the global climate.

In 1992 late Paul Crutzen, Nobel Laureate in Chemistry of our Max Planck Institute for Chemistry, and I convened an international Dahlem Conference. The outcome was a joint endeavor with the most prominent international scientists. The subsequently published book volume entitled "Fire in the Environment: The Ecological, Atmospheric, and Climatic Importance of Vegetation Fires" was the first global analysis of the role of fire in the Earth System. Science-based evidence revealed that human-induced climate change and other human activities are responsible for changing fire regimes globally and that this should be taken into consideration by development of informed land and fire management policies.

In response to the escalating use of fire for the conversion of tropical rainforests and wetlands to agro-industrial plantations and considering that many government institutions and international organizations were not informed about the ambivalent roe of fire in the natural and cultural landscapes, I followed the recommendations of the Second International Wildland Fire Conference of 1997. Financed by the Max Planck Society and the German Foreign Office, we established a thematic clearinghouse – the Global Fire Monitoring Center (GFMC). The GFMC was inaugurated in 1998, at a public meeting of the Food and Agriculture Organization of the United Nations. Our center was designed to serve the United Nations system and – through an open-access online portal the international public. The overall mandate and objective of GFMC was to provide state-of-the-art and science-based knowledge on fire management to application. With this we created an institution working at the Science-Policy-Practitioners Interface.

Many of us recognized that the problem of increasing wildfire threats could be addressed only through working with civil society. Our natural and cultural landscapes – including forests, conservation or otherwise protected areas, agricultural and grazing lands, our cultural heritage sites and the residential areas ranging from scattered rural farmsteads to village and per-urban areas – all gradually became increasingly vulnerable to wildfires.

Back to Greece. In 2012 devastating fires burned on Chios and resulted in severe losses of livelihood, income and future of many rural inhabitants. This severe event triggered response by civil society. Foremost, it was Captain Panagiotis Tsakos, who took initiative, the founder of the "*Maria Tsakos Foundation – International Center of Maritime Research and Tradition*" based on Chios. Alerted and concerned by this destructive fires, Captain Tsakos approached the Secretary General of the United Nations, Mr. Ban Ki-moon, seeking his advice to follow up this major disaster. The Secretary General responded by expressing his regrets about the destructive fire that affected Chios and suggested that the Global Fire Monitoring Center would work with the Foundation.

So we did. Together with fire experts from Greece and neighboring countries of the Western Balkans, Eastern Europe and Central Asia we – forest and fire scientists – moved to the classical arenas of sociologists. How could we develop motivation and guidance to individual citizens or to local communities to recognize that they should take responsibility – in their

own interest – to create the conditions that their properties or the community become safe or resilient to wildfire.

In early 2013, we published the “Guidelines for Rural Populations, Local Communities and Municipality Leaders for the Defense of Villages, Farms and Other Rural Assets against Wildfires”. After the English and Greek versions were available, other countries flagged an interest to adapt these guidelines to local conditions in Eastern Europe and Central Asia. The Council of Europe, under its European and Mediterranean Major Hazards Agreement, supported this endeavor.

In May 2013, our coalition of scientists from the greater European region convened in Greece. One of our partners, Dr. Gavriil Xanthopoulos of the Hellenic Agricultural Organization "DEMETER", Institute of Mediterranean Forest Ecosystems, prepared a National Round Table Discussion on “Integrated Fire Management in Greece in Times of Economic Crisis”. This Round Table was held under the aegis of the General Secretariat for Civil Protection and the Special Secretariat for Forests of the Ministry of Environment, Energy and Climate Change. It provided an open dialogue on the way ahead – with the recommended priorities for wildfire prevention and improvement of coordination between the multiple responsible state actors.

In the end, the spirit and the recommendations of this first Round Table on Fire Management in Greece remained unheard.

Five years later, Mati became a symbol for the Great Challenge. How would we – collectively in Greece, in Europe but also elsewhere in the world – prepare our societies and countries for the future, for a geological era, which is currently called the Anthropocene – as proposed by aforementioned Nobel laureate Paul Crutzen? Or an era that the American fire historian Stephen Pyne is calling Pyrocene, the age of fire?

In August 2018, the government of Greece asked me to establish and chair the “National Committee on Perspectives of Landscape Fire Management in Greece”. I accepted this challenging task by an inclusive approach. The experienced scientists, who had cooperated since two decades, formed the core group of the Epitropi. Our endeavor for defining recommendations for the way ahead included a national participatory survey and an inter-agency round table with participation of civil society. The underlying principles of the resulting “Analysis of the Underlying Causes and Explore the Perspectives for the Future Management of Landscape Fires in Greece”, which we handed over to the Parliament, the Government and the President of the Hellenic Republic in February 2019, mirrored but extrapolated the aims of transdisciplinary science to be applied in policies, institutional governance and practice – as follows:

1. Transdisciplinary and Innovation
Policy and strategic planning and relevant decision making shall be based on sound scientific knowledge and considering technological capabilities and innovation; this will include considering the revival of traditional, socio-economically sound and environmentally benign land-use practices. A multi-disciplinary scientific approach is mandatory to address the cross-sectoral nature of fire management at landscape level.

2. Holisticness, Integration and Inclusion
Policy development and strategic planning shall be holistic, i.e. address the fire problem at landscape level by including all relevant institutional mandates and the potential and capacity of contribution of the civil society.

3. Coherence and Convergence
The mandates and activities in fire management of State institutions and other stakeholders shall be coherent (harmonized), convergent and meet the overarching national fire management policy and implementation plan.

4. Cohesiveness and Coordination
The National Fire Management Plan shall be considered cohesive (obligatory) for individual institutional / sectoral planning and activities and coordinated by an independent national scientific, advisory and coordinating organization for the systematic management of landscape fires – tentatively designated "Forest and Rural Fire Management Organization (**Ο**ργανισμός **ΔΙ**αχείρισης **ΠΥ**ρκαγιών δασών και υπαίθρου – **ΟΔΙΠΥ**).

The severe wildfire burning in North Evia in summer 2021 have revealed the need for reforms. It is good to see that the scientific community is not locked in an ivory tower and ready to cooperate and bring the state of science to the community of policy makers and practitioners. Since 2021, the Epitropi is working with the Government of Greece and supporting the endeavor of DIAZOMA Association to bring the Reconstruction Program for North Evia to a success.

Let me conclude by expressing my warm thanks to the Department of Forestry and Natural Environment, the School of Agriculture, Forestry and Natural Environment and the Senate of Aristotelion University of Thessaloniki. Receiving the honorary doctor degree for me is a sign of trust, reflecting the spirit of cooperation between our institutions and countries.

Finally yet importantly, I would like to thank my family – my wife Dorothea and my daughter Katharina – for their tolerance and active support of my work in Greece and on an international level. Without them, I would not have achieved what I have conveyed today.