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[Obituary] Ernst Hajek (1934–2024): Pioneer of Ecology in Chile

Fabian Jaksic^{1*} and Pablo Camus²



Ernst Hajek (1934–2024): Pioneer of Ecology in Chile

Ernst Roland Hajek Girardi was born in Santiago, Chile, on July 29, 1934. He attended the Deutsche Schule in Santiago for his primary and secondary education. Between 1955 and 1960 he studied veterinary medicine at the School of Livestock Sciences and Veterinary Medicine of the University of Chile, also in Santiago. Next, he joined the Ecology Chair of that School, then directed by Francesco di Castri, and in 1968 the Institute of Biological Sciences of the Catholic University of Chile, from where he retired in 1999 at 65 years of age. In 1964 and

1974 he pursued two postgraduate degrees in Bioclimatology at the University of München, Germany. Regarding academic service, in 1968 he was founder and Head of the Ecology Laboratory of the Institute of Biological Sciences (later School) of the Catholic University of Chile and in 1990 he was Head of the Department of Ecology of said School. Regarding societal service, in 1966 he joined the Biological Society of Chile; in 1968 the International Society of Biometeorology; in 1970 the International Association for Ecology INTECOL; in 1972 the Argentine Association of Ecology ASAE; in 1981 he was elected President of the Biological Society of Chile; in 1982 he was appointed Editor of the Chilean Journal of Natural History (officially, *Revista Chilena de Historia Natural*); in 1992 he was a Founding Member of the Ecological Society of Chile; also in 1992 he became a Member of the Executive Committee of SCOPE, Paris; in 1993 he joined as a Member of the Executive Committee of the *Corporación Ambiental del Sur*, Chile; and in 1995 he was a Founding Member of the Environmental Commission of the Biological Society of Chile. During his academic life, he received four distinctions: two scholarships from the German Academic Exchange Service (DAAD) in 1964 and 1974; the Honorable Mention in Science by the Angel Faivovich Foundation, Chile, in 1982; and the Patricio Sánchez Reyes Lifetime Achievement Award in Ecology in 1999. He published around 150 scientific articles, many opinion pieces, and five influential books. In addition, he participated in about 50 environmental consultancies, for private companies, state agencies, international organizations, and non-governmental organizations. He read, wrote, and spoke Spanish, German, and English fluently. His hobbies included being a

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learned music lover and a self-taught navigator of cyberspace. He outlived his wife María Elena Ortiz (deceased in 2019) by five years and left no biological offspring but a fertile intellectual heritage.

As mentioned, Hajek began his academic career at the School of Livestock Sciences and Veterinary Medicine of the University of Chile, mainly through his relationship with Professor Francesco di Castri, which would be fundamental for the development of Ecology in Chile. During the 1960s, Hajek collaborated with di Castri in various courses and investigations, especially in the field of bioclimatology, which can be understood as an approach that foretold the crisis of climate change that would occur in the following century, anticipating by several decades emerging issues and problems.

In 1968, Renato Albertini –Director of Teaching at the Institute of Biological Sciences, later School, of the Catholic University of Chile– invited Hajek to teach the first ecology course at that University. The following year he was hired by the Department of Environmental and Population Biology (later shortened to Ecology), which allowed Hajek to start the formation of an ecology team with those who had been students of his ecology course in 1969. In Hajek's words (freely translated): "Leslie Yates, Julia Etchegaray, Rubén Cisternas, all students, were sent to specialize abroad; so, at some point, I was left alone again doing my endeavors. The group was later labeled Laboratory of Ecology and was part of the Institute of Biological Sciences where ecology, botany, zoology, and marine biology were all set up as separate Laboratories. Eventually, all this was merged, and the Department of Ecology was created." The initial idea of the Ecology Lab was to work in the areas of climate, bioclimatology, biometeorology, energetics of ecosystems, nutrient cycling, and ecological aspects of zoology and entomology. This was the beginning of a virtuous cycle that profoundly contributed to the development of the Department as a whole. According to the testimonies of his colleagues at the time, Hajek was characterized by his straightforwardness, conciliatory spirit, chivalry, respect for others, and by his sense of teamwork beyond personal ambitions, characteristics that enabled joining wills and mitigating conflicts even within complex and competitive settings. Also, beyond his human qualities, Hajek had a great capacity for work and a broad diversity of academic and scientific interests, because he was involved in research with dedication, but also in teaching and disseminating the environmental and ecological knowledge of his time.

Hajek's contribution to ecological research was fundamental in the seventies and following decades. His book *Bioclimatografía de Chile*, published in 1975 with di Castri, was the result of many years of research whose purpose was, based on a thorough statistical analysis, "to

represent the climate of Chile from a bioclimatic point of view; that is, by means of the use of climatic elements of biological significance." This book was complemented by another that appeared one year later: *Bioclimatología de Chile*, which is a reference work up to this day. For its two authors, the importance of these naturalistic investigations, in addition to their strictly scientific implications, was based on the consideration that "without precise knowledge of the country's natural regions and their ecological and biogeographical settings, it is not possible to plan agricultural activities and exploitation of natural resources unless based on rational basic principles." In their opinion, the existing soil maps in Chile were generally devoid of the historical-evolutionary approach that finally allowed "their best interpretation for a botanist or a zoologist." And later they indicated "of greater applicability is the use of climatic indices for the study of plant formations. We refer to the vegetation aspect, because a floristic study must be based on other considerations, especially of the paleoclimatic type." The bioclimatic classification proposed by Hajek and di Castri was projected essentially towards ecological and biogeographical perspectives, so "in no way does it seem to us the most appropriate for pure meteorological or climatological approaches."

To clear up anachronisms, we must point out that the studies originating in the School of Livestock Sciences and Veterinary Medicine of the University of Chile had an approach more oriented to animal production. Hajek and di Castri themselves recognized this when they indicated that from the bioclimatological logic "the possibility of adaptation of new species or races coincides much more with a broad bioclimatic type, than with isolated thermopluviometric values." It should also be noted that these bioclimatic works corresponded largely to the research promoted by the FAO as a complement to the studies on livestock production and animal health and by UNESCO in its Major Project on Arid Zones. Indeed, these studies were linked to the bioclimatic research that was carried out "within the framework of the Man and the Biosphere Program of UNESCO." In their collaborative work, very up-to-date and consistent with international literature and methods, Hajek and di Castri discussed the different methodologies for climate analysis, proposing the incorporation of biological variables into the general research. Thus, based on the analysis of several pioneering studies for Chile, the authors indicated, "It seems necessary to emphasize, once again, that the separate study of a single climatic element is of little biological significance. The study of the variations of a single climatic factor does not allow to fully understand, perhaps a 10% of it at the most, what are

the limiting factors for animal or plant life. Above all, the combined influence of temperature and humidity (or precipitation) is of fundamental importance for the distribution and growth of plants, as well as for the distribution and seasonal fluctuations of animals." Further, di Castri and Hajek specified that: "it is not regarded as opportune, for the moment, to consider the vegetation as a totally reliable climatic indicator to complete an eventual drawing of isolines, in part because the vegetation maps of Chile still are in a preliminary state of investigation; partly because in the Chilean environment it is not always easy to differentiate the climax formations from the associations derived from human intervention in historical times, or from the relicts of previous climatic periods." Thus, these authors concluded that: "the approach given to our work is more in line with the points of view of ecologists than of climatologists, and much less of meteorologists. In this sense, only the climatic elements of real and broad significance for the development of animal or plant life are analyzed, without discussing the meteorological factors that have conditioned the existence and intensity of these elements, such as, for example, cyclonal areas and anticyclones, polar fronts, etc."

In 1981, Hajek pioneered the study of the degradation of the Chilean scrub ecosystem (locally known as *matorral*) by acting as editor of the First Seminar-Workshop "Biological bases for the use and management of renewable natural resources: Resources from the scrub area and sclerophyllous forest of central Chile." In his presentation, Hajek recounts "This seminar-workshop was developed based on five lectures and three workshops on: a) Biological bases for forestry uses of scrub and sclerophyllous forest, b) Biological bases for livestock uses of scrub, and c) The conservation-preservation spectrum in the scrub and sclerophyllous forest; and also a forum on communication problems between researchers and the community. In addition, there was a Synthesis session, where opinions, comments, and suggestions regarding this and future seminar-workshops were expressed and where, at the same time, it was possible to pose some questions in relation to the objectives fulfilled by this type of meeting. All these activities were preceded by a presentation by the Director of the Institute of Biological Sciences and another by the Head of the Department of Environmental and Population Biology of the Pontifical Catholic University of Chile, in which historical aspects and the reasons and purposes of the meeting were set. This volume brings together the information generated from the activities just outlined. This publication is completed by a series of conclusions." What Hajek did not know in 1981 was that this book now constitutes the baseline against which to determine the impact that human use and climate change

are having on the already highly threatened scrub ecosystem of central Chile.

During the 1990s, Hajek turned his gaze towards more social and environmental issues, understanding that it was not possible to explain natural dynamics and ecosystems without incorporating humankind, for which he investigated multiple research methodologies such as the Delphi method for the analysis of sociological and historical issues. In this context, he worked with the geographer Guillermo Espinoza and with the architect and urban planner Patricio Gross, with whom he published in 1990 the book *Problemas Ambientales de Chile* (Environmental problems of Chile), and with Gross in 1998, *Indicadores de calidad y gestión ambientales* (Indicators of environmental quality and management). It was through the latter that the undersigned Pablo Camus contacted Hajek, collaborating with him on several research projects and carrying out various jobs, one of which culminated in the publication of the book *Historia Ambiental de Chile* (Environmental history of Chile) in 1998 and another on *Pobreza y medio ambiente en Chile central* (Poverty and the environment in central Chile) in 2003.

Another notable endeavor of Hajek was the tireless work that he displayed to generate dissemination channels that would allow the research that his colleagues were carrying out to be made visible. In this sense, after arduous negotiations, he managed to get the Biological Society of Chile to allow the old and emblematic *Revista Chilena de Historia Natural* (Chilean Journal of Natural History), founded by the naturalist Carlos Porter in 1897, to be published again under its aegis and auspices. Hajek had been the Director of said journal between 1956 and 1963, the year in which, due to multiple administrative and economic difficulties, it ceased to be published. Since then, the journal had been on hold, perhaps waiting for an opportunity to re-emerge. This happened in 1981, precisely through the last Director and Member of the *Sociedad Chilena de Historia Natural* (Chilean Society of Natural History) –Hajek–, who at that time was also President of the *Sociedad de Biología de Chile* (Chilean Biological Society). This latter society –said he– then counted among its members "an important group of researchers from the so-called naturalist area." The Board of Directors of the Biological Society accepted this legitimate concern and carefully studied various alternatives, deciding that a good solution was the publication of a journal specifically dedicated to work in that area; to fulfill this purpose the convenience of reactivating the Chilean Journal of Natural History was recognized. Hajek was, of course, "appointed as a natural candidate to lead the magazine." In 1983, then, the journal resumed publication with N°1 of Volume 56, including a brief editorial where Hajek pointed out that "by adapting the

current magazine to the scientific reality of the present, the editors believe that they are preserving the innovative spirit of its founder." (i.e., Carlos Porter). This phrase, in the opinion of then Editor Patricio Camus in 2013, "materializes the meaning and continuity of the Chilean Journal of Natural History both in time and in the perception of naturalists. In fact, this reissue of the Chilean Natural History Journal preserved the spirit and many elements of the original publication, to the point that its almost 20-year absence seems just an anecdote." Hajek also took the decisive initiative of submitting the journal to the Institute for Scientific Information (ISI, nowadays replaced by Clarivate Analytics) for it to be included in the Current Contents/Agriculture, Biology & Environmental Sciences (CC/ABES) database. Nonetheless, ISI was not seduced by the long history of the magazine, and its response in September 1983 was negative, but giving the option to reconsider in about two more years, and as perceptively indicated, "after it had a chance to reestablish itself in the scientific community." Under the leadership of Hajek, the journal quickly resumed its regularity and quality standards, and in August 1985 it was accepted into the world group of ISI publications, which materialized with the appearance of its Vol. 58 N°2 in the CC/ABES edition of February 1986. Once this task was completed, after a few years the journal ended up becoming the main publication outlet of Chilean ecologists and one of the most important scientific journals in Latin America. In this way, it recognized its creator Carlos Porter, already portrayed as a forerunner and maverick of the natural sciences at the beginning of the twentieth century. Hajek's replacement came ten years later, in 1992, when Fabián Jaksic took over the edition of the *Revista Chilena de Historia Natural*, which allowed its consolidation, continuity, and recognition in the main indexes of international scientific journals.

Between 1994 and 2000, Hajek became the editor of *Bionoticias*, a bimonthly publication of the School of Biological Sciences of the Catholic University of Chile, which was the means for dissemination and linkage with the media of its faculty members. Thus, the editorial effort and the perseverance to maintain a printed body for the dissemination of biological sciences allow us to affirm that Hajek was once again a relevant power in the settlement, legitimation, and dissemination of the ecological and environmental studies in Chile. By the already cyber-technological age of the 1990s Hajek also became the first administrator of the website of the School of Biological Sciences, and until 2020, kept his *Ecolyma* website current and updated.

Thanks to Hajek, the development of ecological sciences in Chile was progressively recognized by national academic and scientific circles. Thus, for example, the

Biological Society of Chile decided to launch its Ecology Section in 1978. Its first president was Hajek, who was succeeded by Roberto Murúa, Fabián Jaksic, Juan Armesto, Fabián Jaksic again, Javier Simonetti, Carlos Moreno, and Doris Soto, the last president of the Section. This was because in July 1992, its members voted to become a separate body (but still affiliated with that of Biology), thus initiating the legal procedures to establish itself as the *Sociedad de Ecología de Chile* (Ecological Society of Chile), which was legally constituted in October 1994. This initiative represented "the materialization of a long process of maturation of a scientific discipline that in recent years has acquired great relevance and national and international recognition." The Ecological Society would thus be responsible for promoting and encouraging research, becoming the corporate voice of national ecologists, perfecting strategies aimed at coordinating actions with other societies, and influencing environmental education issues. In 1999, the Society established the "Patricio Sánchez Reyes Lifetime Achievement Award in Ecology," and Hajek was deservedly the first to receive it.

In the early eighties, ahead of his time, Hajek began to promote a more applied ecology, more committed to the environmental problems of his country. More interdisciplinary, more focused on pressing realities, and more problem oriented. At that same time, he was co-founder (together with Guillermo Espinoza and Fabián Jaksic) of the first ecological consulting company in Chile, *Consultores Ecológicos y Ambientales, Consecol* (Consecol Ecological and Environmental Consultants). His work for private companies and the Chilean State took him to all corners of the country and he always took care of snapping hundreds of pictures, proclaiming that one day he would use them in the classroom. The prophecy was fulfilled almost a decade later, when the professional title of Biologist was created in the Biological Sciences School, and the important and formative course of Environmental Impact Assessment had to be designed and dictated. Hajek was at the forefront, with the experience gained in the field and not learned in books, and with the photo slides taken by himself and not borrowed from someone else.

After this brilliant career, Hajek was honored on his retirement from the Catholic University of Chile in October 1999. Now twenty-five years after his retirement, his emphasis on climate and environment has been crowned by the enormous worldwide effort devoted to the study of climate change, for the national development of research to understand the consequences of increasing aridity for crops and natural ecosystems, and for the emergence of socio-ecology as a novel scientific endeavor. Hajek was a pioneer in all these fields and can therefore be called

a visionary. In the pantheon of recent National Science Awards, which includes Juan Carlos Castilla (2010), Mary Kalin (2010), Bernabé Santelices (2012), Fabián Jaksic (2018), Francisco Bozinovic (2020), and especially Edmundo Acevedo (2020), all of them have touched on themes similar to those addressed by Hajek decades ago. According to Jaksic in his *Memorias de un naturalista magallánico* (Memoirs of a Magellanic Naturalist): "I hope there is still time to recognize him within this pantheon, especially in what refers to applied science. It is a matter of academic justice. At least I allow myself to name him as a mentor, my 'anonymous mentor' who never asked for credit for the many times he defended me and promoted my career at an institutional and national level."

Fabián Jaksic and Pablo Camus

Authors' contributions

Fabián Jaksic and Pablo Camus wrote the original draft of this Obituary

Competing interests

The authors declare that they have no competing interests.

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