

## Green criminology an emerging discipline. Bibliometric overview (2000-2022)

*Criminología verde una disciplina emergente. Revisión bibliométrica (2000-2022).*

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Received: October 2023

Accepted: December 2023

DOI: <https://doi.org/10.19053/uptc.01217488.v14.n3.2023.17422>

### ABSTRACT

Green criminology focuses mainly on the study of the negative impacts generated towards a natural environment. The objective of this article was to evaluate trends in scientific production on green criminology and, through a documentary review, to identify the main sources of water pollution. The search was conducted in English, in the Scopus database, limiting the search period from 2000 to 2022. A total of 405 documents were found. The main trends of scientific production at the international level show an average annual growth rate of 27.1%, with an increase in publications in journals indexed in different bibliographic reference databases. This research contributes to the knowledge of the dynamics of scientific production on green criminology and serves as a reference with contributions for the design of future research on the subject.

**Keywords:** Green Criminology, Bibliometric Indicators, Water Pollution, Crimes, Environmental Legislation.

### RESUMEN

La criminología verde se enfoca principalmente en el estudio de los impactos negativos generados hacia un entorno natural. El objetivo de este artículo fue evaluar tendencias de producción científica sobre criminología verde y a través de revisión documental, identificar principales fuentes de contaminación hídrica. La búsqueda se realizó en inglés, en la base Scopus, delimitando el periodo de búsqueda entre los años 2000 a 2022. Se encontraron 405 documentos. Las principales tendencias de la producción científica en el ámbito internacional presentan una tasa de crecimiento promedio anual del 27.1%, con un incremento de publicaciones en revistas indexadas en diferentes bases de datos de referencias bibliográficas. Esta investigación contribuye al conocimiento de las dinámicas de producción científica sobre criminológica verde y sirve de referencia con aportes para el diseño de futuras investigaciones sobre el tema.

**Palabras Clave:** Criminología Verde, Indicadores Bibliométricos, Contaminación Hídrica, Delitos, Legislación Ambiental.

## 1 INTRODUCTION

Growing awareness of the environmental problems facing our planet has led to a renewed focus on the intersection between criminology and the environment. Green criminology emerges as a discipline that seeks to understand and address environmental crimes, as well as to promote effective enforcement of environmental laws.

The term green criminology owes its beginnings to the Slovenian author Pecar who analyzed the environmental crimes that were occurring in Slovenia. However, his work entitled "Ekoloska kriminaliteta in kriminologija" did not achieve a wide scope

because of the language barrier [1].

Several authors agree that green criminology refers to the activity that leads to the generation of environmental damage and its sustainability, which should be labeled as a crime in and of itself [2, 3]

Environmental degradation has become more relevant and worrying during the last years due to its constant and accelerated growth, for which environmental legislation has been a very complete mechanism for its application in government plans. This tool establishes a set of regulations, laws, guidelines and in many occasions sanctions with the purpose of regulating anthropic

activities that generate great changes and negative impacts that affect the correct development of the environment [4].

The literature review shows contextualization approaches on green criminology: key concepts, variants, scope [5, 6]. Other researches make approaches from a general vision, analysis frameworks: political, economic, environmental, among others [7, 8]. However, in the last 5 years, there are no records of bibliometric analysis on the subject under study.

This research article aims to evaluate the scientific production on the subject of green criminology from the information published in the Scopus database between 2000 and 2022, a period in which environmental and economic changes have been generated and that envisage relevant publication trends [9].

Different types of bibliometric indicators will be integrated and coverage topics will be identified with emphasis on water pollution, as this natural resource is considered fundamental for human beings and social development. Based on the above, the aim is to contribute to the understanding of the dynamics of knowledge on the subject of green criminology and may serve as a reference for researchers to deepen the line of research.

## 2 METHODOLOGY

Methodologically, the research has a mixed approach, combining the strength of quantitative and qualitative analysis; through bibliometric indicators and critical reading of documents. The Scopus database was used for the extraction of documents on the subject of green criminology, in the period 2000 to 2022. The query was performed on September 7, 2023, with the search descriptor "green criminology", in the fields of the document title, abstract or keywords. A total of 405 documents were obtained. The quantitative analysis was performed with R v. 3.2.5 software, supported by Excel 18.0 and the qualitative analysis with EndtNote 7.0.

On which the calculation and adjustment of the polynomial equation was obtained [10, 11], the normalization of fields and elaboration of graphs. The bibliometric indicators included in the research were: production of documents per year, average annual growth rate, top 3 authors with the highest publication and their H index, documents with the highest citation; top 2 journals with the highest publication in the subject with their respective quartile and Cite Score. A polynomial adjustment was made on scientific production and years of publication to determine the growth trend and the fit of the model was evaluated based on the revision of the assumptions on the residuals. The second part of the results focuses on coverage issues with special interest in the sources of water contamination.

## 3 RESULTS

The information flow for the analysis of the results was elaborated with 405 documents published in the reference base on the subject, under the search descriptor. The first part of the results presents a bibliometric approach showing production dynamics

on the subject. The second part focuses on the coverage of green criminology, focusing on sources of water pollution and their statistics.

Of the published documents, 53.3% correspond to articles and 30.6% to book chapters. The three authors with the highest number of publications on the subject are: Lynch Michael of University of South Florida in United States with index H 27; South Nigel of the University of Essex in the United Kingdom with index H 25, and Brisman Avil of Eastern Kentucky University in United States with index H 18.

In the search period, the most highly cited paper on green criminology, with 204 citations, was written by Lynch [2], who conducted an investigation of alternative definitions of the term, focusing their attention on contrasting positions. A second outstanding document, with 190 citations, is written by Gibbs [9], who presented a conceptual framework focused on conservation criminology, integrating criminology with the disciplines of natural resources and risk and decision sciences. Two journals with the highest number of publications on the subject stand out: American Journal of Criminal Justice and Theoretical Criminology, both in Q1 and with an average annual number of citations in the last 4 years (cite score) of 8.4 and 5.8 respectively.

Of the 405 papers, 97.7% were published in the last 10 years, which implies a latent pronounced growth dynamic, which registered for that decade an absolute growth percentage of 1000%, going from 4 to 44 papers published in the year 2012 and 2022, with an average annual growth rate of 27.1%; which evidences a high interest in researching and publishing on the topic of green criminology.

### 3.1 Production behavior by year and annual rate of change

Figure 1 shows an increasing behavior of scientific production in the last 12 years and a fluctuating growth, but with an increasing trend, during the study period, and in particular from the year 2013 onwards. Three relative peaks and three valleys are evident, with relative peaks in the years 2013, 2016 and 2020, suggesting a polynomial adjustment of order 4, with parameters estimated from the ordinary least squares method [12]. Being  $Y$  the annual scientific production in the area of study;  $T$  the time, i.e. the year in which it was published.

The coefficient of determination  $R^2$  is 0.85, with  $p$ -value = 0.02, indicates a good measure of the overall accuracy of the model, the theoretical maximum value being 1. Thus, the scientific production in the area has a good fit to the polynomial curve of order 4 Equation 1. The statistical significance of the goodness-of-fit test yielded a  $p$ -value of 0.02. The assumptions of the model and analysis of the residuals were satisfactorily met. .

$$y = -0.002T^4 + 18.8T^3 - 56646T^2 + 8 \times 10^7T - 4 \times 10^{10} \quad (1)$$

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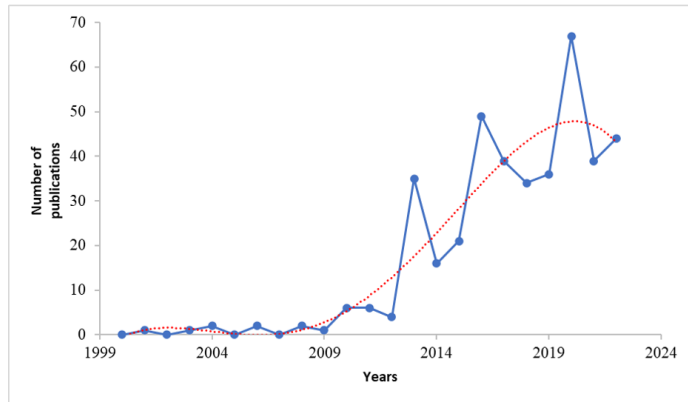


Fig. 1. Scientific production in Scopus, on green criminology.

### 3.2 Green criminology coverage topics.

The review of different documents conflates the term "green criminology" with eco-criminology. Publications on the subject focus on the study of environmental crimes, their causes and consequences [13]. Other authors focus their research on determining the policies and legal responses that governments have made to these crimes [14]. From a more social and humanistic approach, other lines of research on the topic of green criminology are aimed at understanding how individuals, organizations, and industries interact with the environment or how these interactions might lead to violations of environmental laws [2, 15, 16].

### 3.3 Sources of water pollution

Water is a natural resource that enables the development of different sectors and is vital for the sustenance of living beings (FAO) [17]. It is of interest for this article to investigate in the framework of green criminology, crimes or attacks against water resources. Information obtained from Scopus from the documents published or referenced on the subject. Basically, water pollution is caused by the entry of dangerous substances or toxins that damage ecosystems or threaten human beings. Some sources of pollution or crimes against water are identified and highlighted in the literature, including: wastewater management that is not adequately treated; industrial waste that pollutes land, air or water; oil pollution, plastic pollution, contamination by radioactive materials, pesticide and fertilizer runoff, among others [15, 18].

According to the United Nations, 42% of wastewater is not adequately treated, which implies damage to ecosystems and human health [19]. Figure 2 summarizes 6 main sources of crime against water resources in an international context.

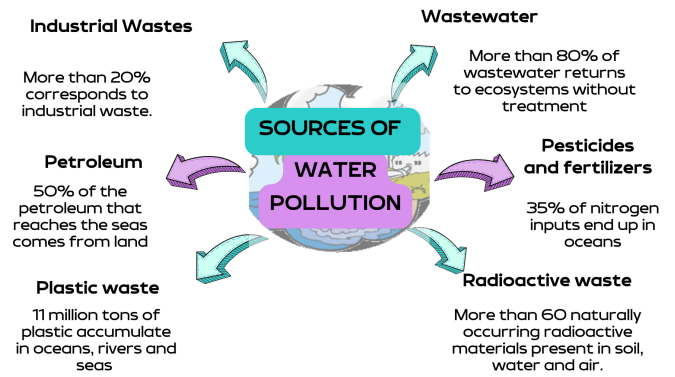


Fig. 2. Main sources of water pollution [14].

## 4 CONCLUSIONS.

In a world where environmental degradation has devastating effects, green criminology emerges as an emerging and current topic in the lines of research that seeks to investigate crimes related to the sustainability and preservation of natural resources for future generations.

The results show that green criminology addresses a variety of issues, from the illegal exploitation of natural resources to environmental pollution, the exploitation of water resources or the trafficking of protected species, among others.

Green criminology is a discipline that contributes to the formulation of effective policies, the prevention of future violations and progress towards a more sustainable world. The studies found on green criminology encompass the importance of environmental protection, which is vital for the survival of present and future generations.

The polynomial model of order 4 shows a growing tendency to publish on green criminology, which implies a growing community of researchers to think about and investigate its problems. The approach of green criminology from the bibliometric indicators, allowed a retrospective evaluation of production dynamics and the positioning that the subject has been acquiring in

scientific communities, thus glimpsing its development and potential deepening or areas of study.

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