ISSN: 2584- 0738 (Online)
Criticality Activism Foundation
Vol. 02, No. 02, December 2024, pp. 203 - 208 for Social Research & Action

Book Review : Causal Factors for Wetland Management and Restoration: A Concise Guide

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Paul A. Keddy (2023) Causal Factors for Wetland Management and Restoration: A Concise Guide. Springer Nature Switzerland AG. pp 158, ISBN 978-3-031-21787-6, e-ISBN 978-3-031-21788-3, https://doi.org/10.1007/978-3-031-21788-3, Price EUR 64.99

This is a book review of Causal Factors for Wetland Management and Restoration: A Concise Guide, is the eight edition of Wetland Ecology, by Paul Keddy. This review focuses on the book's content as it highlighted the causal factor approach to wetland ecology. Besides overall summary, comparisons are made with the first edition of the book and then very specific chapter-by-chapter discussions on major causal factors: i.e.; duration of flood, flood pulses, fertility, natural disturbances, competition, herbivory, burial, salinity, roads, coarse woody debris, invasive species, population size.

Keywords: wetland management, causal factor approach, biodiversity, protection & conservation.

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Summary of the book

The author has aims to cater a variety of stakeholders though this book, apart from academic scholars, this book will be immensely helpful to architects, consultants, planners, and engineers, environmental scientists, conservation authorities, NGOs & dedicated citizens who wants to restore sustainability on earth. The author has purposefully written his concise version of wetland ecology for them. The preface ends with an appeal to the audience to **protect and restore extensive areas of wetland.** The book has total sixteen chapters, first two chapters being the **introduction to wetlands and the causal factor approach**. The next twelve chapters, chapter number three to fourteen, describe twelve **different kinds of causal factors to the creation, management, protection and conservation of wetland ecology.** The final chapter, that is chapter sixteen, provides a set of review questions to the **managers for protection and restoration of wetland ecology.**

In chapter one, Introduction to Wetlands, author introduced the topic what is wetland, classification of wetlands and approaches to the study of wetlands. He described in detail the six kinds of wetlands that are, swamp, marsh, bog, fen, wet meadow, and aquatic. Chapter fifteen describes global context and challenge to wetland ecology.

In chapter two, The Causal Factor Approach to Wetland Ecology, the author has described twelve causal factors that are found around the world. Keddy describes those factors as shopping list. He also listed them as per chronology, flooding being the most important factor for the creation of wetlands. He requests managers, corporates to understand the scientific knowledge of twelve causal factors and to further apply them to the management, protection and restoration of wetland ecology.

In chapter three, Duration of Flooding Is the Most Important Causal Factor, the author describes Wetlands are mostly caused by flooding. The type of wetland that forms is primarily determined by the length of flooding. Flooding lowers the soil's oxygen content. As a result, flooded soils have a very different chemistry from terrestrial soils. Slowly decomposing organic matter frequently builds up as peat. Methane (CH_4) and hydrogen sulphide (H_2S) are two gasses produced by microbial communities in flooded soils. The aerenchyma of plants growing in wetlands frequently contains open channels that allow oxygen to reach the roots. Therefore, the two main features of all wetlands are oxygen-deficient soils and unique wetland flora.

In chapter four, Flood Pulses, the author argues that wetlands frequently experience fluctuations in water levels, especially those that are near rivers or lakeshores. Numerous plants and animals in wetlands rely on these naturally occurring flood pulses. Generally speaking, wetland organisms find a home when rising water levels drown terrestrial vegetation. They also make it possible for amphibians to procreate and fish to browse more extensively on flood plains. During times of low water, marsh plants can grow from seeds and form mud lats that migratory birds can consume. In addition to changing annually, water levels can also fluctuate over ten-year or longer cycles. The twin limit model illustrates how wetlands and entire watersheds are impacted by these long-term variations in water levels.

In chapter Five, Fertility, Keddy cites Tampa Bay, Lake Okeechobee, and the Florida Everglades as examples of nutrient enrichment and its effects. He raises concerns about the use of treatment wetlands, although this reviewer concurs that the scaling issue is crucial, noting that treatment wetlands have been used rather successfully in North America, Europe, and Australia. Therefore, there are widespread problems with nutrient enrichment impacting fertility, but there is also the possibility of using wetlands that treat water quality on a smaller scale to mitigate these effects.

In chapter six, Natural Disturbance, the author talks about the traditional uses of wetland resources, such as logging, peat harvesting, and mowing, and the effects that occur, particularly in the Mississippi Delta. A few sustainable wetland harvesting examples exist, such as the Mankote mangrove in St. Lucia, which is used to produce charcoal, although cautious management is required. Wetlands could therefore be used in certain sustainable and renewable ways, but not on a big scale that would disrupt the environment.

In chapter seven Competition, author explains competition among plants is a natural and normal phenomenon. Competition amongst plants limits the types of habitat in wetlands.

In chapter eight Herbivory, invasive species overgraze wetlands, and marshes have historically been used for roof thatching and animal feed mowing. This is particularly important in poorer nations where wetlands are used for food and fiber production or to provide important ecological services for subsistence. Hippopotamus study at Nile

Basin grasslands of Queen Elizabeth National Park in Uganda has made this chapter all the more interesting.

In chapter nine Burial, the author discusses the significance of sediment load for floodplain and deltaic wetland systems, a topic that is rarely discussed in wetland texts. He also discusses the biological implications of changing GHG rates and rising sea levels using the Louisiana delta system. The Axios river delta system in Greece and other deltaic wetland systems worldwide also exhibit adequate sediment load, which is a crucial factor for long-term wetland sustainability.

In chapter ten Salinity, the author has warned that increasing sea level and melting of ice caps are dangerous for coastal wetlands. Author has suggested some policies for restoration.

In chapter eleven, Roads, the author urges that roads are to be made in a way which will decrease the wildlife mortality. Roads are so all pervasive that it is difficult to identify roadless areas on a global map for conservation & environmental planners.

In chapter twelve Coarse woody Debris, the author has explained that numerous types of wildlife habitat are provided by fallen trees and other woody debris. In rivers, this is especially well-documented for fish. Coarse woody debris is beneficial to many other wildlife species as well. Historical examples show that it used to be prevalent in rivers. These days, people frequently clear woody waste. Wetlands will be better protected and restored if natural woody debris is allowed to build up along water courses.

In chapter thirteen, Invasive Species Are an Emerging Causal Factor, the author explains invasive species not as a causal factor but as an effect of other causal factors. He further elaborates how invasive species displaces native species through competition. According to the author, the five types of invasive species can be controlled through prevention, monitoring and early eradication processes.

In chapter fourteen, Human Population Size, the author warns us that, Wetland management calls for ever-increasing efforts to reduce anthropogenic impacts as human population density rises. Wetlands must be protected from human influences through a strategic combination of enforcement and education. Working with nature

and utilizing natural causative elements to preserve and restore various types of wetlands found around the world is the long-term task.

Comparison between Causal Factors for Wetland Management and Restoration: A Concise Guide and Wetland Ecology: Principles and Conservation

Keddy's book entitled Wetland Ecology: Principles and Conservation is the basic comprehensive and elaborated version on the principles of wetland science. Whereas, in Causal Factors for Wetland Management and Restoration: A Concise Guide Keddy's major focus was on twelve causal factors to the creation of wetlands. The Author has prescribed a 'shopping list' of principles, method for the protection, conservation and restoration of these causal factors.

Appreciation

I appreciate the author's citation of international examples. Each and every single chapter has international examples, which can help a lay man on this subject to easily understand and relate to the causal factor approach to wetland management directly. This book is a concise guide to its true sense as it has almost covered every single aspect of causal factor approach to wetland management, conservation & protection.

Critical observation

The book might be expanded in a number of areas. Although the book offers valuable ecological insights, it has a tendency to overlook the socio-economic and cultural elements, rather than concentrating mostly on the ecological and technical aspects of restoration. Additionally, Keddy's book might present wetland restoration in a general sense, without giving enough attention to regional differences. Wetlands vary widely across different geographic regions, so the strategies for restoration need to be tailored to local environmental and social conditions. The book could benefit from more region-specific case studies or detailed discussions about how process of restoration should differ on the basis local conditions. Another critical gap can be identified in the long-term management of restored wetlands. Restoration doesn't end once the initial work is completed; it requires continuous monitoring and adaptive management. The book could provide more focus on how to track the success of restoration efforts over time, as well as how to adjust strategies when challenges arise.

Furthermore, the book lacks enough practical guidance and tools for those on the ground implementing restoration projects. The inclusion of detailed step-by-step

instructions, templates, or decision-making frameworks could make the book more useful for practitioners. The book also overlooks the importance of public awareness and engagement, which is essential for ensuring long-term success and local support for restoration projects.

Finally, Keddy's book does not fully explore the role of emerging technologies (like remote sensing or GIS) in modern wetland restoration, nor does it appear to address global-local challenges—such as how global conservation goals align with local realities. Addressing these gaps would help make the book a more comprehensive resource for wetland restoration practitioners, policymakers, and other stakeholders involved in the field.