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Advancement of Subsurface Drainage Frameworks

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Introduction

Water-dependent sectors like agriculture, nature, industry, and drinking water all require sufficient freshwater. However, it will be more difficult to guarantee sufficient freshwater for all sectors even in low-lying, flood-prone nations like the Netherlands due to climate change, extreme weather, economic growth, urbanization, land subsidence, and increased food production. Additionally, it is anticipated that extreme dry and wet weather will become more frequent and pronounced. These extremes cannot be anticipated with the current Dutch water management system. Groundwater tables have decreased over the past few decades as a result of urbanization, land consolidation, and drained Dutch agricultural fields. The regional groundwater system was also put under more stress as a result of an increase in the fresh water demand from various sectors, including agriculture, industry, and drinking water.

Description

As a result, the annual groundwater table in sandy soil areas decreased over time, resulting in a shortage of fresh water during dry periods. The changing water management strategy in the Netherlands from 1950 to 2020, as well as the drainage systems that have evolved from conventional drainage (approximately.1950–1990), climate adaptive drainage (from 2010 onward), controlled drainage (from 1990 onward), and subirrigation systems (from 2018 onward).Based on measurements taken by Dutch field pilots and international research, we also shed light on how subirrigation affects groundwater levels and crop yields. We demonstrate that the volume of water required for sub irrigation can be substantial, putting a significant strain on the available regional water sources, despite the fact that it can improve soil moisture conditions for crop growth on a field scale. Sub irrigation necessitates the effective and responsible use of external water sources like surface water, treated waste water, or groundwater. Last but not least, proper regional balance is required for controlled drainage and subirrigation to be implemented: It requires a comprehensive, catchment-wide strategy. The Netherlands is a low-lying, flood-prone nation in Western Europe, between 50 and 54 degrees North and 3 and 7 degrees East. The sectors that rely on water, such as agriculture, nature, industry, and drinking water, require sufficient freshwater. These industries make up 193 billion euros, or about 16 percent of the Dutch economy. However, it will be harder to make sure that these industries have enough freshwater because of things like climate change, extreme weather, economic growth, urbanization, land subsidence, and more food production. The majority of agricultural fields in the Netherlands have been drained to remove excess water quickly. The outcomes were lower groundwater tables and increased crop production. However, excessive drainage over the past few decades contributed to desiccation. Additionally, groundwater is used for industrial purposes and the production of drinking water, which has a negative impact on groundwater tables. These activities cause drought stress, less upward water seepage, and dry brooks and fens in nature areas. More fresh water scarcity and the need for more effective use of fresh water resources will result from an increase in food production, a decrease in the quantity of fresh water that is available, and an increase in the demand for fresh water. A thorough comprehension of past developments and anticipated requirements for the utilization of drainage systems in regional water management is necessary to meet these future challenges because the groundwater table is otherwise too low, subsurface drainage is required to make the area suitable for agriculture. The Netherlands has had a number of drainage systems in place since around 1000 A.D. After the Second World War, the Dutch population increased and required more food production [1].

In order to lower groundwater levels, agricultural fields were extensively drained. Additionally, land consolidation and urbanization had an effect on water levels. Drainage systems still quickly remove fresh water from areas today. Groundwater abstractions increased as a result of an increase in irrigation (agriculture), production of drinking water, and industry demand for water. The average annual groundwater table in the sandy Pleistocene uplands has decreased by 33 cm over the past century as a result of intensified drainage, urbanization, and increased groundwater abstractions. Biodiversity is negatively impacted by this desiccation. Other than measures to expect to flood and waterlogging, measures for water maintenance are required to have been ready to expect climate limits, to bring down the anthropogenic strain on the groundwater framework, and to ensure the water accessibility for various areas in dry periods [2,3].

Conclusion

This can be influenced by drainage systems. Other than releasing water, they can possibly hold and re-energize water in the dirt water framework also. Sub irrigation is carried out with drainage systems in the latter scenario. Because of the urgency of decreasing groundwater levels and rising demand for irrigation water, these systems typically apply to areas with relatively shallow phreatic groundwater levels, such as the Dutch sandy Pleistocene uplands. This article's goal is to shed light on the evolution of drainage systems, including the drainage strategies that go along with them and their effects on the groundwater and surface water systems. Based on research conducted in the Dutch sandy Pleistocene uplands and international literature, this article examines how various agricultural drainage systems function and how drainage/sub irrigation systems affect groundwater table and water balance components. We talk about drainage and subirrigation systems that have been used in the Netherlands for decades and how they affect the water balance in the field. In addition, we discuss the difficulties associated with achieving a balance between discharge, retention, and recharge when implementing drainage and subirrigation systems in the (regional) water system in the future [4,5].

References

1. Barkhordarian, Armineh, Sassan S. Saatchi, Ali Behrangi and Carlos R. Mechoso. "A recent systematic increase in vapor pressure deficit over tropical South America." *Sci Rep* 9 (2019): 1-12.

2. Chen, Ning, Changchun Song, Xiaofeng Xu and Xianwei Wang, et al. "Divergent impacts of atmospheric water demand on gross primary productivity in three typical ecosystems in China." *Agric For Meteorol* 307 (2021): 108527.

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3. Breshears, David D., Henry D. Adams, Derek Eamus and Nate G. McDowell, et al. "The critical amplifying role of increasing atmospheric moisture demand on tree mortality and associated regional die-off." *Front Plant Sci* 4 (2013): 266.

4. Bonan, Gordon B., Peter J. Lawrence, Keith W. Oleson and Samuel Levis, et al. "Improving canopy processes in the community land model version 4 (CLM4) using global flux fields empirically inferred from FLUXNET data." *J Geophys Res Biogeosci J Geophys Res-Biogeo* 116 (2011).

5. Brilli, Federico, Lukas Hörtnagl, Albin Hammerle and Alois Haslwanter, et al. "Leaf and ecosystem response to soil water availability in mountain grasslands." *Agric For Meteorol* 151 (2011): 1731-1740.

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