



Optimizing Water Use in Coastal Agriculture Through Coastal Irrigation

Luis Fernandez*

Department of Agricultural and Water Engineering, University of Santiago de Compostela, Santiago de Compostela, Spain

DESCRIPTION

Coastal irrigation refers to the practice of supplying water to agricultural lands located near coastlines to support crop growth and maintain soil fertility. Coastal regions often face unique challenges compared to inland areas due to the proximity of saltwater, the risk of soil salinization, variable freshwater availability and exposure to climatic extremes. Proper management of irrigation in these areas is critical for sustaining agricultural productivity, protecting soil and water resources and supporting local economies that depend on coastal farming. As population pressure on coastal regions increases, coastal irrigation has become an important component of integrated coastal management. Water for coastal irrigation is typically sourced from rivers, groundwater, or reservoirs. However, unlike inland aquifers, coastal aquifers are highly sensitive to over-extraction, which can lead to saltwater intrusion and deterioration of water quality. Irrigation practices must therefore be carefully balanced to ensure that freshwater extraction does not exceed natural recharge rates. Additionally, rainfall patterns along coastlines may be unpredictable, requiring the use of supplemental irrigation to maintain crop yields during dry periods. Understanding local hydrology and water availability is essential to design sustainable irrigation systems in these regions. Soil salinization is one of the primary challenges of coastal irrigation. Salts present in seawater, groundwater, or in the soil itself can accumulate in the root zone of crops if drainage is inadequate or irrigation is mismanaged. Excessive salinity reduces plant growth, lowers yields and can render soils unsuitable for agriculture over time. To mitigate salinization, farmers and engineers employ techniques such as leaching, where additional freshwater is applied to flush salts below the root zone. Drainage systems are also installed to prevent waterlogging and remove excess saline water from the soil profile. Selecting salt tolerant crop varieties is another important strategy to maintain productivity in saline-prone coastal lands.

Efficient irrigation techniques are vital to reduce water wastage and preserve freshwater resources. Surface irrigation, including furrow and basin methods, has been traditionally used in many

coastal regions, but it often leads to uneven water distribution and increased salinity risks. Modern methods such as drip and sprinkler irrigation allow precise delivery of water directly to plant roots, reducing water loss through evaporation and runoff. These methods also help maintain soil structure, minimize salt accumulation and improve overall crop yields. Advances in irrigation technology, including automated systems and soil moisture sensors, further enhance water use efficiency in coastal agriculture. Integrated water management approaches are increasingly applied to coastal irrigation. By coordinating irrigation schedules with rainfall, tides and groundwater levels, farmers can optimize water use while minimizing negative impacts on aquifers and coastal ecosystems. Rainwater harvesting and the use of treated wastewater are additional strategies that provide alternative water sources, reducing pressure on freshwater reserves. Combining these practices with sustainable land management, including crop rotation and organic amendments, helps maintain soil fertility and reduce the risks associated with salinity and erosion. Human activities beyond irrigation can also affect coastal agricultural water use. Urban expansion, industrial development and tourism can compete for limited freshwater resources, altering the availability of water for farming. Pollution from fertilizers, pesticides and sewage can contaminate both surface water and aquifers, reducing water quality and posing risks to human and ecosystem health. Coastal irrigation planning must therefore consider not only the needs of agriculture but also the broader context of water allocation and environmental protection.

Climate change presents additional challenges to coastal irrigation. Rising sea levels increase the risk of saltwater intrusion into groundwater and low lying agricultural lands, while changes in precipitation patterns can create periods of drought or excessive rainfall. Extreme weather events such as hurricanes and cyclones may damage irrigation infrastructure and disrupt water supply. Adapting irrigation practices to these changing conditions involves flexible planning, improved infrastructure and resilient crop selection to ensure long term productivity and water security.

Correspondence to: Luis Fernandez, Department of Agricultural and Water Engineering, University of Santiago de Compostela, Santiago de Compostela, Spain, E-mail: luis.fernandez@usc.es

Received: 29-July-2025, Manuscript No. JCZM-25-31028; **Editor assigned:** 01-Aug-2025, Pre QC No. JCZM-25-31028 (PQ); **Reviewed:** 15-Aug-2025, QC No. JCZM-25-31028; **Revised:** 22-Aug-2025, Manuscript No. JCZM-25-31028 (R); **Published:** 29-Aug-2025, DOI: 10.35248/2473-3350.25.28.695

Citation: Fernandez L (2025). Optimizing Water Use in Coastal Agriculture Through Coastal Irrigation. J Coast Zone Manag. 28:695.

Copyright: © 2025 Fernandez L. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

In conclusion, coastal irrigation is a vital practice for maintaining agricultural productivity in coastal regions, but it requires careful management to address the risks associated with saltwater intrusion, soil salinization and changing climatic conditions. Efficient irrigation technologies, integrated water management strategies and sustainable land use practices are essential to optimize water use and protect both freshwater and

soil resources. By balancing agricultural needs with environmental protection, coastal irrigation can support resilient communities, enhance food security and maintain the health of coastal ecosystems in the long term. Sustainable irrigation practices are therefore central to the future of agriculture along the world's shorelines.