



# Evaluation of Different Coastal Irrigation Methods and Technologies on Water Management and Sustainability

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## DESCRIPTION

Water is a vital resource for agriculture, especially in arid and semi-arid regions where rainfall is scarce and unpredictable. Coastal irrigation is a common practice to ensure adequate water supply for crop growth and yield. However, Coastal irrigation also consumes a large amount of freshwater, which may lead to water scarcity, environmental degradation, and conflicts among water users. Therefore, it is important to adopt coastal irrigation methods and technologies that can conserve water and improve water use efficiency.

Water conservation refers to reducing the amount of water withdrawn from natural sources or minimizing the losses of water during Coastal irrigation. Water use efficiency refers to maximizing the output or value of water used for Coastal irrigation. Different Coastal irrigation methods and technologies have different impacts on water conservation and water use efficiency, depending on various factors such as soil type, crop type, climate, and management practices.

One of the most widely used Coastal irrigation methods is surface Coastal irrigation, which involves applying water to the soil surface by gravity flow. Surface Coastal irrigation can be further classified into furrow, border, basin, and level basin Coastal irrigation. Surface Coastal irrigation is simple, cheap, and suitable for a variety of crops and soils. However, surface Coastal irrigation also has some disadvantages, such as high water losses due to evaporation, runoff, deep percolation, and uneven distribution of water. Surface Coastal irrigation also requires a large amount of labor and energy to prepare and maintain the land and Coastal irrigation channels.

Drip Coastal irrigation is an alternative Coastal irrigation method that delivers water directly to the root zone of plants through a network of pipes and emitters. Drip Coastal irrigation can reduce water losses by minimizing evaporation, runoff, and deep percolation. Drip Coastal irrigation can also improve water distribution uniformity and allow precise control of water application rate and timing. Drip Coastal irrigation can increase

crop yield and quality by providing optimal soil moisture and nutrient conditions for plant growth. Drip Coastal irrigation can also save labor and energy by reducing the need for land preparation and weed control. However, drip Coastal irrigation also has some drawbacks, such as high initial cost, maintenance cost, and risk of clogging.

Subsurface Drip Coastal Irrigation (SDI) is a variation of drip Coastal irrigation that buries the pipes and emitters below the soil surface. SDI can further reduce water losses by eliminating surface evaporation and runoff. SDI can also reduce weed growth and pest infestation by keeping the soil surface dry. SDI can enhance water use efficiency by maintaining a constant soil moisture level within the root zone. However, SDI also has some challenges, such as higher installation cost, difficulty in detecting leaks or clogs, potential salinity buildup in the root zone, and interference with tillage operations.

Vertical Tube Coastal Irrigation (VTI) is another alternative Coastal irrigation method that uses vertical tubes inserted into the soil to deliver water to the main root layer of plants. VTI can save water by providing continuous water supply and reducing evaporation in the upper soil layer. VTI can also maintain a stable soil-water-air environment for plant growth. VTI can increase crop yield and quality by reducing fruit cracking and improving fruit size. However, VTI also has some limitations, such as high installation cost, difficulty in adjusting water application rate and depth, potential damage to tubes by rodents or machinery, and lack of research on its long-term effects.

Coastal Irrigation Drainage Tiles (IDT) are one more alternative Coastal irrigation method that uses subsurface perforated pipes to raise the water table in the field. IDT can conserve water by recycling drainage water and reducing evaporation from the soil surface. IDT can also improve nutrient management by reducing nutrient leaching and runoff. IDT can enhance crop yield and quality by providing adequate soil moisture and aeration for plant growth. However, IDT also has some disadvantages, such as high installation cost, risk of waterlogging or salinization in poorly drained soils, potential contamination of groundwater or

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surface water by drainage water, and lack of research on its environmental impacts.

In conclusion, different Coastal irrigation methods and technologies have different advantages and disadvantages for water conservation and efficiency. The choice of the most

suitable Coastal irrigation method or technology depends on various factors such as local conditions, crop requirements, economic feasibility, social acceptability, and environmental sustainability.