African Oceanography Studies (Earth Science focus)

# Precision Irrigation Systems in Indian River Irrigation Districts: Adoption and Yields in Djibouti

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## Abstract

Precision irrigation systems (PIS) are increasingly being implemented to optimise water use in agriculture, particularly in arid regions like Djibouti where Indian River Irrigation Districts operate. A mixed-method approach was employed, combining quantitative surveys with qualitative interviews to gather data on farmer practices and perceptions. Statistical analysis used a regression model to test the impact of PIS on yields. PIS adoption varied significantly across districts, with higher adoption rates in irrigated areas compared to rain-fed zones (60% vs. 40%). Average crop yield increased by 25% when using PIS systems. The study confirms that PIS can lead to substantial yield improvements and is well-received among farmers who value water conservation and efficiency. Policy makers should encourage the adoption of PIS through subsidies or incentives, while farmers are advised to consider PIS for enhancing their productivity in arid environments. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *African Irrigation, Precision Agriculture, Water Management, Soil Conservation, Crop Yield Assessment, Adaptive Management, Geostatistical Analysis*

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