

# Beyond demand-driven adaptation: A governance perspective for MAR implementation in Guanacaste, Costa Rica

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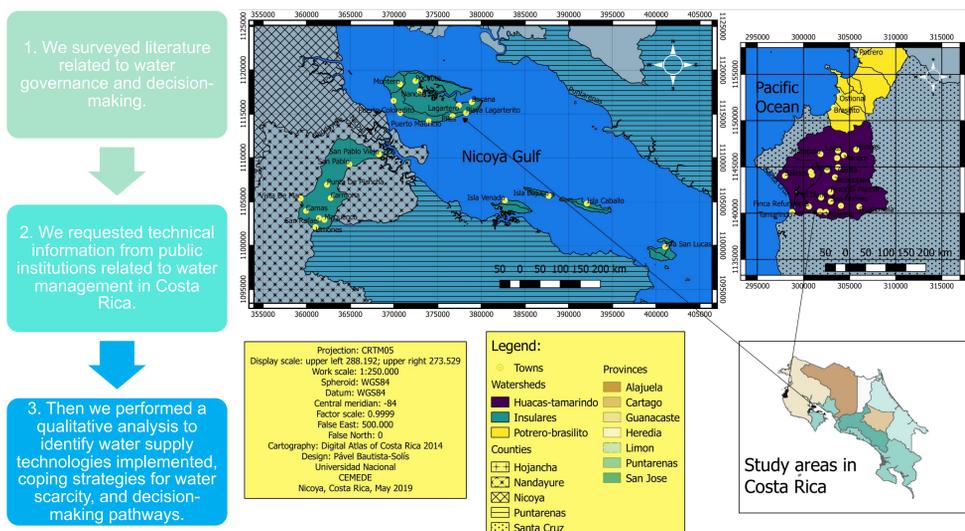
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## INTRODUCTION

- Water scarcity is a recurrent issue in communities located in the Mesoamerican dry-corridor. In Costa Rica
- The Guanacaste province is one of the most vulnerable areas to water scarcity in Costa Rica
- Water security in this area is negatively impacted by climate variability, limitations in human capital, technical limitations, and weak water governance
- The sustainability of fishermen communities and beach tourism in insular and coastal communities is threatened by the lack of fresh water availability.
- In this context, IWRM is urgently needed. Especially, it is necessary to analyze water governance to identify alternative management pathways and technologies to facilitate water security.
- This paper aims to assess governance framework conditions for the implementation of green adaptation options, including MAR for enhancing water security in coastal aquifers with salt intrusion issues, and insular communities facing water scarcity.

## METHODS

We targeted: 1) Coastal aquifers from the Santa Cruz county presenting salt intrusion issues, namely: (a) Huacas-Tamarindo; and (b) Potrero-Brasilito. 2) Island or coastal aquifers providing water to insular islands from the Nicoya Gulf: (c) Isla Caballo; (d) Isla Chira; and (e) the Rio Nandayure watershed in Nandayure (Figure 1).



## RESULTS

- Academic organizations, NGOs, and Costa Rican institutions have been working to increase the technical information related to water resources.** A participatory process for the sustainable use of coastal aquifers facilitated by SENARA increased the institutional presence in coastal areas and the understanding of the technical and biophysical challenges for addressing water issues.
- Current adaptation options are based on hard alternatives, e.g. building aqueducts from neighboring areas** which include the Nimboyores aquifer; or building PAACUME, a large infrastructure project transferring water from the Arenal-Tempisque irrigation district (Figure 2-3).
- Soft adaptation options are less evident and often implemented at smaller scales** with a notable exception: the organization of a regional water governance platform named CONIMBOCO, which integrates representatives from the private sector, water related institutions, local governments and community-based drinking water organizations.



Figure 2 – Recent investments on water supply infrastructure for the coastal areas of Santa Cruz, Guanacaste, Costa Rica.

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## DISCUSSION



Figure 3 – Coastal well vulnerable to salt intrusion (left). Aerial view of Playa Conchal, Brasilito showing real estate infrastructure in the coastal area of Santa Cruz, Guanacaste, Costa Rica (Google Earth 2018).

The challenge posed for water scarcity on insular and coastal areas from Puntarenas and Guanacaste requires a shift in water governance. Customarily, local populations relied on hard, grey, and large-scale infrastructure projects built by the Costa Rican state. However, such approach is increasingly showing limitations for facilitating water security, especially in small rural communities with limited economic potential and political capital. We argue that the decision-making process for selecting water technologies must be reviewed to identify sustainable options. Large investments in traditional hard infrastructure would be maximized if these are supported with soft adaptation approaches, including co-management for IWRM.



Figure 3– The inhabitants of Isla Caballo receive two water gallons/household/day for their domestic needs (left). The same community has a water harvesting and potabilization system built by CEMEDE as alternative supply source (right).

## CONCLUSIONS

- We conclude highlighting the **great potential from academic institutions to collaborate with public institutions, private sector, and NGO's for facilitating water security.**
- The pathway for targeting sound **investments on water related technology must be decentralized and contextualized** to the reality from insular and coastal areas.
- More integration of soft adaptation options and support from social processes for facilitating IWRM are needed.**
- We also highlight the **great need of piloting alternative green technologies technologies for water security, including water harvesting, artificial wetlands, and MAR.**
- Capacity building is essential for understanding the challenges posed by water scarcity and global change on insular and coastal communities