

Groundwater-based water services in the Mekong Delta

A complex socio-hydrogeological system

UTS Institute for Sustainable Futures

ĐẠI HỌC CẦN THƠ

Water For Women

Australian Aid

Introduction & background

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Australian Department of Foreign Affairs and Trade

Water for Women Fund

Achieving inclusive, climate resilient water, sanitation and hygiene services

- 7 years, 2018-2024
- 16 countries in Asia and the Pacific
- 20 WASH programs and 20 research projects
- In Viet Nam: 2 research projects and 1 WASH program

RECHARGE

Project overview

Three groundwater contexts



A. Mekong Delta, Vietnam



B. Cities in Indonesia



C. Islands in Vanuatu

Partners

UTS Institute for Sustainable Futures

Đại học Cần Thơ

USP The University of the South Pacific

Universitas Indonesia

Kementerian PPN/ Bappenas

DoWR

unicef for every child

Pacific Community Communauté du Pacifique

GGGI

RECHARGE Mekong

Research objectives

Leverage systems thinking to explore complex system interactions between **groundwater**, **household water use**, **social inclusion**, and **climate change**.

- Build a detailed picture of the current system
- Think about future climate change impacts
- Identify ways to strengthen water services

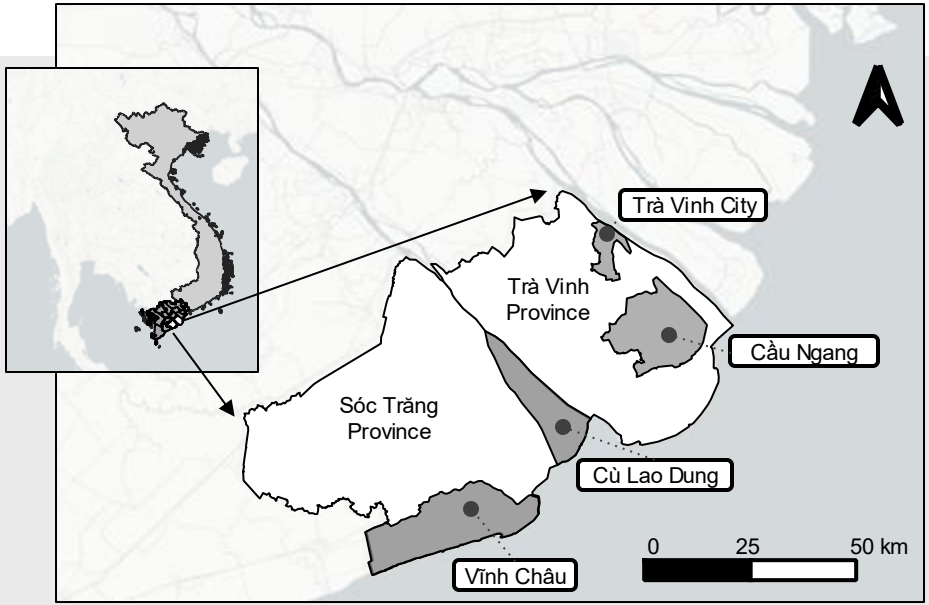
Approach 2

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Research sites

The research in Vietnam was conducted four districts across two provinces.

- **Soc Trang province:** Vinh Chau and Cu Lao Dung
- **Tra Vinh province:** Tra Vinh City and Cau Ngang



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Data sources

Secondary data

- Reports and published academic papers
- Environmental models and datasets (groundwater, rainfall...)
- Policies and government strategies

Primary data

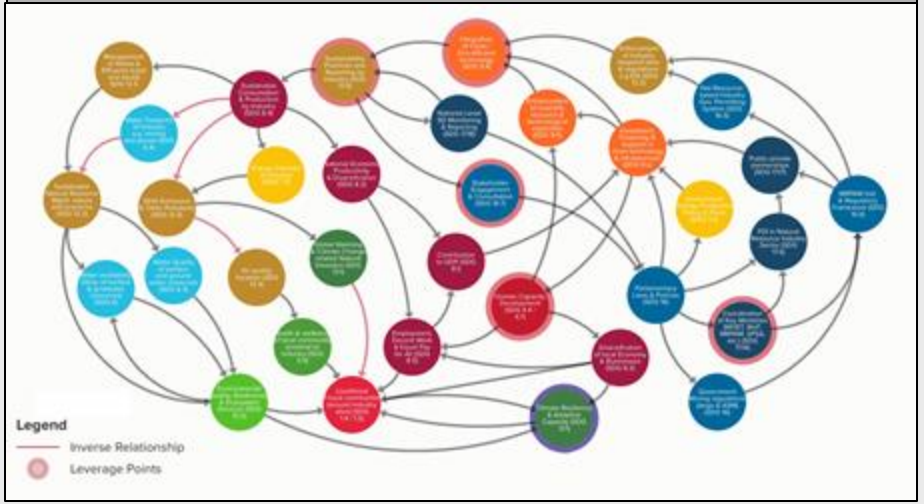
404	Household surveys
20	Household in-depth interviews
4	Water service provider in-depth interviews
1	Sensemaking workshops

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Data analysis and sensemaking

- **System maps** can help explore complex systems - such as the connections between of groundwater and social dimensions
- A systems map is a mental model of elements and connections, yet it is not a ‘true’ or complete representation of the system
- The process of systems mapping brings teams together to both better understand the system and identify how to transform it

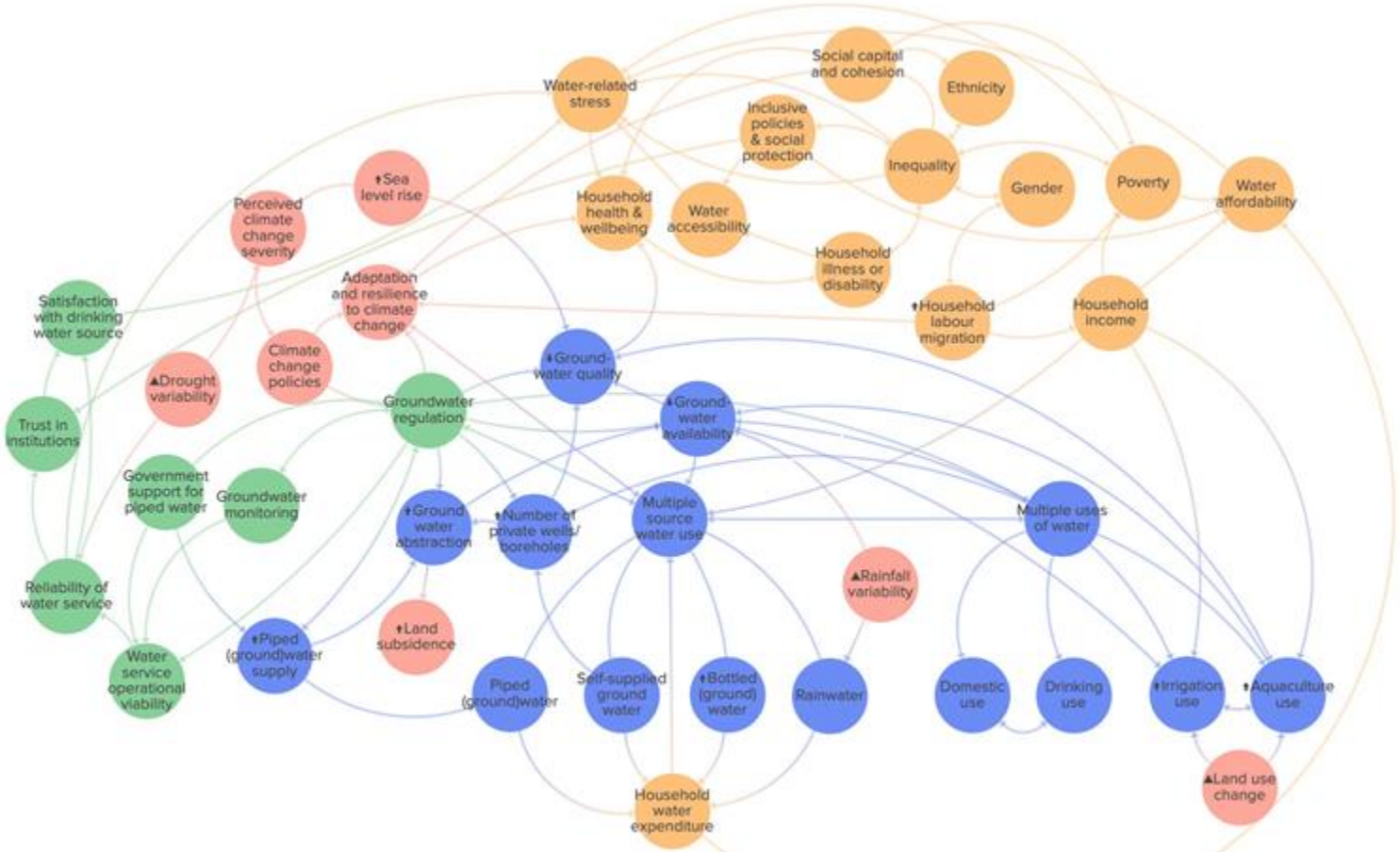
Example System Map



https://sdghelpdesk.unescap.org/sustainability-outlook-tool

Findings




Social capital and cohesion
Ethnicity
Water-related stress
Inclusive policies & social protection
Inequality
Gender
Poverty
Water affordability
↑Sea level rise
Perceived climate change severity
Household health & wellbeing
Water accessibility
Household illness or disability
Adaptation and resilience to climate change
↑Household labour migration
Household income
Satisfaction with drinking water source
Climate change policies
▲Drought variability
↓Ground water quality
Groundwater regulation
↓Ground water availability
Trust in institutions
Government support for piped water
Groundwater monitoring
↑Ground water abstraction
↑Number of private wells/ boreholes
Multiple source water use
Multiple uses of water
▲Rainfall variability
Reliability of water service
↑Land subsidence
↑Piped (ground)water supply
Water service operational viability
Piped (ground)water
Self-supplied ground water
↑Bottled (ground) water
Rainwater
Domestic use
Drinking use
↑Irrigation use
↑Aquaculture use
▲Land use change
Household water expenditure

FINDINGS

Key Findings



Groundwater serves as the primary water source for drinking, domestic and productive uses, accessed through multiple methods



Household dependence on multiple water sources contradicts government policy directions and creates regulatory and operational challenges



Climate events and climate change emerge as clear system drivers requiring further investigation



Water affordability and stress are exacerbated by underlying social vulnerabilities

Finding 1: Groundwater serves as the primary water source for drinking, domestic and productive uses, accessed through multiple methods

While households described using multiple sources of water for drinking water, domestic use and income generation, *groundwater* was the dominant source of water for multiple uses in all four case study districts.

Groundwater use = bottled water + piped water + self-supplied borehole or well water.

- 76% (wet season) and 83% (dry season) of surveyed households relied on groundwater for **drinking and domestic use**.
- 50% of surveyed households relied on groundwater for **productive use** (crops, aquaculture, small businesses).



Bottled water



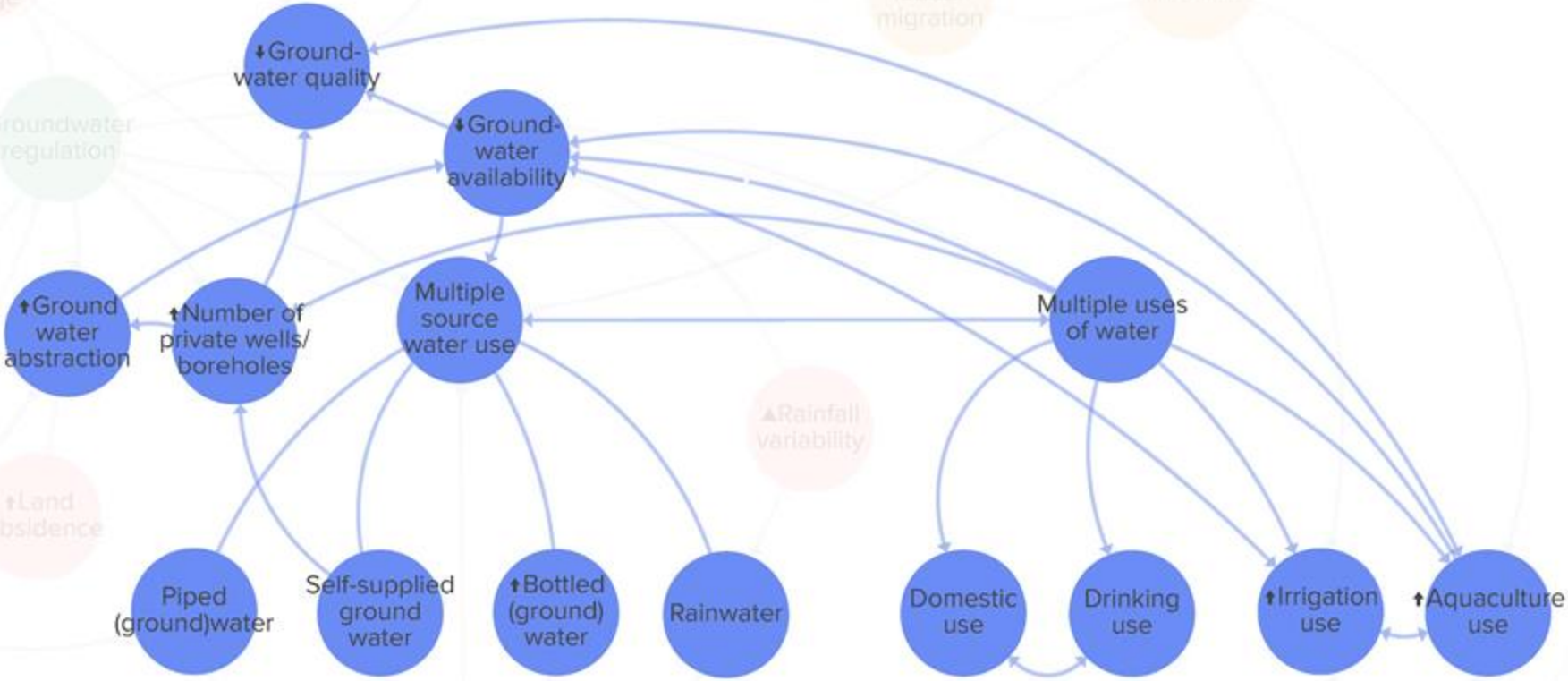
Rainwater



Piped water (private)



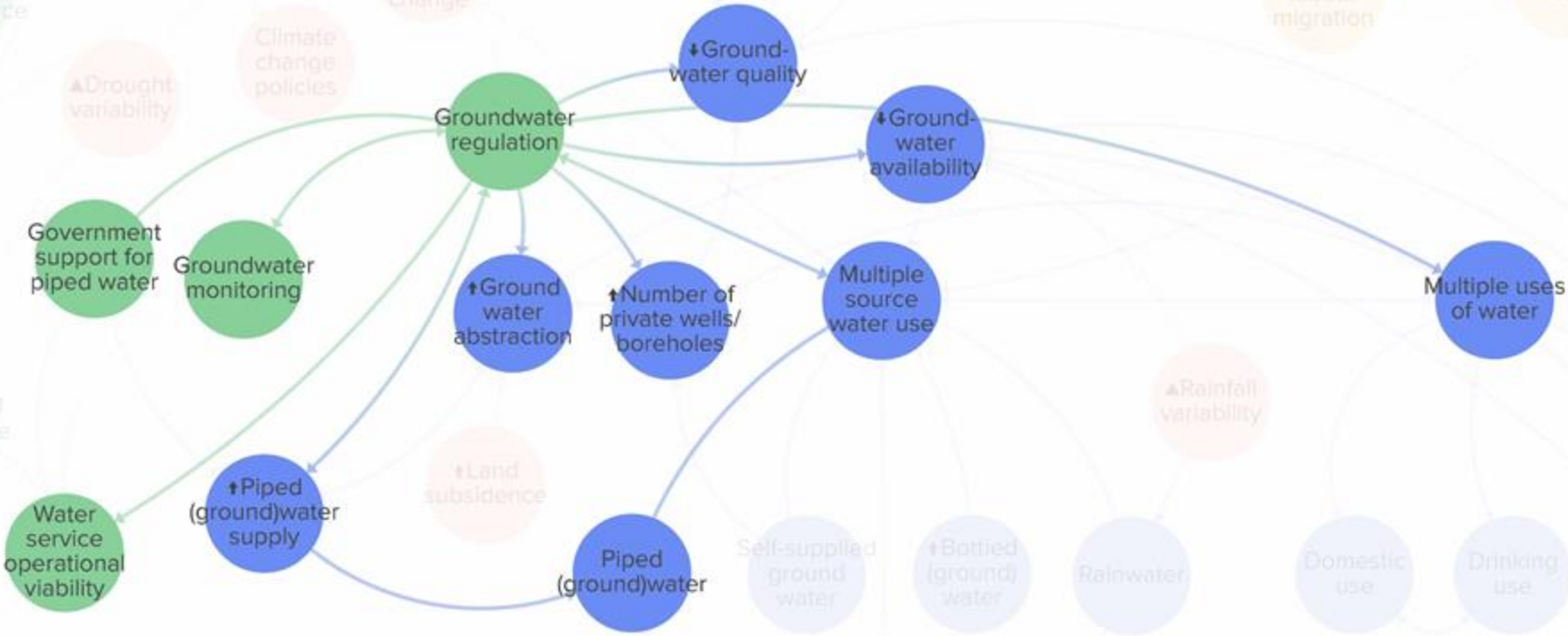
Self-supply private well


↓Ground-water quality
↓Ground-water availability
↑Ground water abstraction
↑Number of private wells/ boreholes
Multiple source water use
Multiple uses of water
Piped (ground)water
Self-supplied ground water
↑Bottled (ground) water
Rainwater
Domestic use
Drinking use
↑Irrigation use
↑Aquaculture use

Finding 2: Household dependence on multiple water sources contradicts government policy directions and creates regulatory and operational challenges

- Authorities emphasize **piped water services as the preferred household water service** delivery method as they are more straightforward to monitor, regulate and price.
- Household **prefer to use multiple water sources,** which presents challenges for effective government monitoring and regulation (e.g. of quality standards, groundwater extraction)

> "The local authorities have provided a clean water system and offered water meters, encouraging people to switch to tap water. However, the community has not yet agreed to do so.
>
> Residents believe that using tap water for livestock and farming would be too expensive, so they continue to rely on well water and surface water to save costs."
>
> (Male householder, Tra Vinh District)

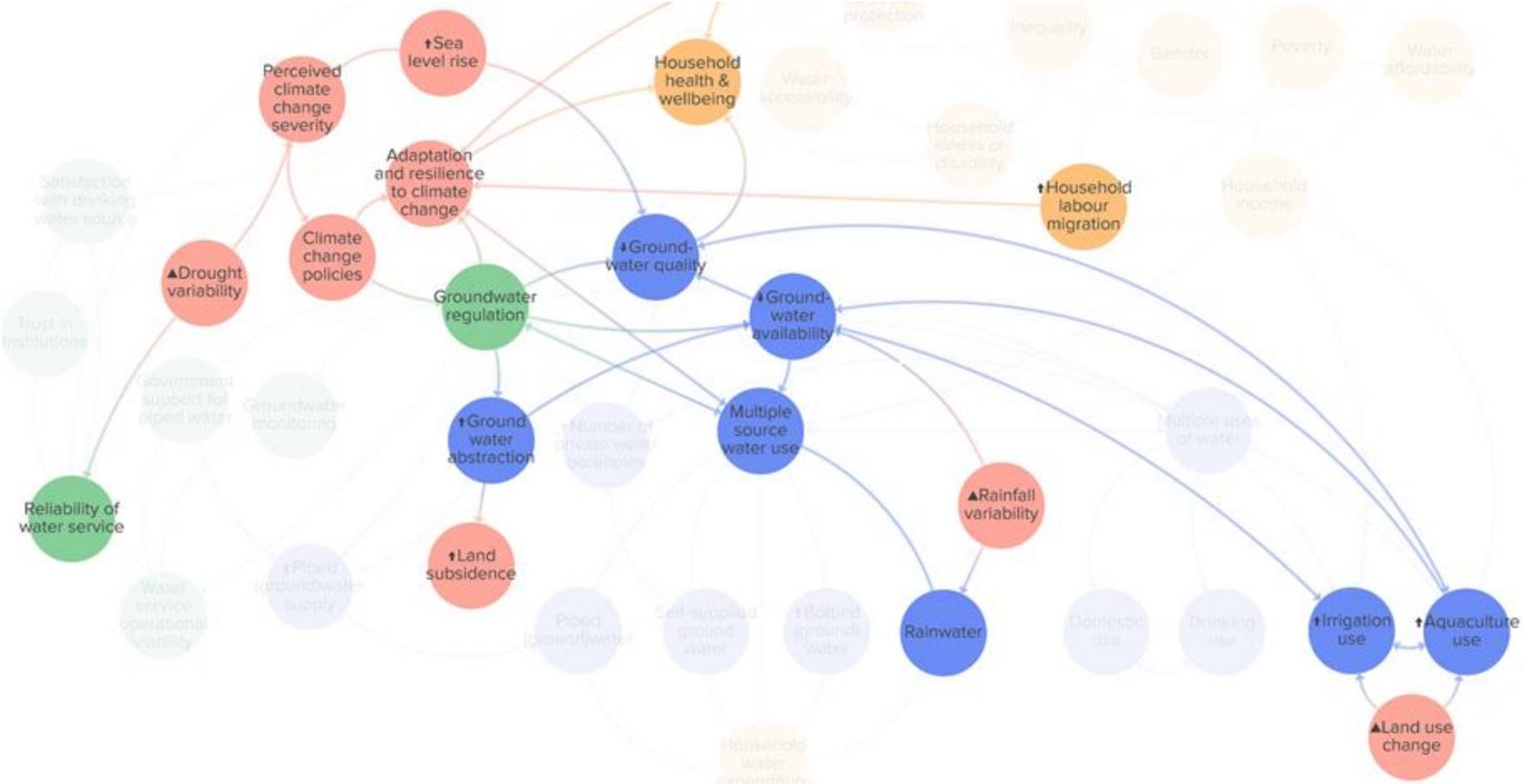

Groundwater regulation
↓Ground-water quality
↓Ground-water availability
Government support for piped water
Groundwater monitoring
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↑Number of private wells/ boreholes
Multiple source water use
Multiple uses of water
Water service operational viability
↑Piped (ground)water supply
Piped (ground)water

Finding 3: Climate events and climate change emerge as clear system drivers requiring further investigation

Climate change is already influential in system behaviour, with impacts likely to intensify over time.

- **Climate change** is predicted to intensify salinity (with sea level rise), intensify seasonal rainfall variation (more droughts/floods) and increase the frequency and severity of storms.
- National and Mekong region policies articulate climate change response actions, but these were not evident in the studied system. Service providers **do not have climate adaptation plans**, and household intend to 'endure' the impacts of climate change.
- From a climate change resilience perspective there are **benefits in household multiple water source** use practices, which government should factor into water service planning.



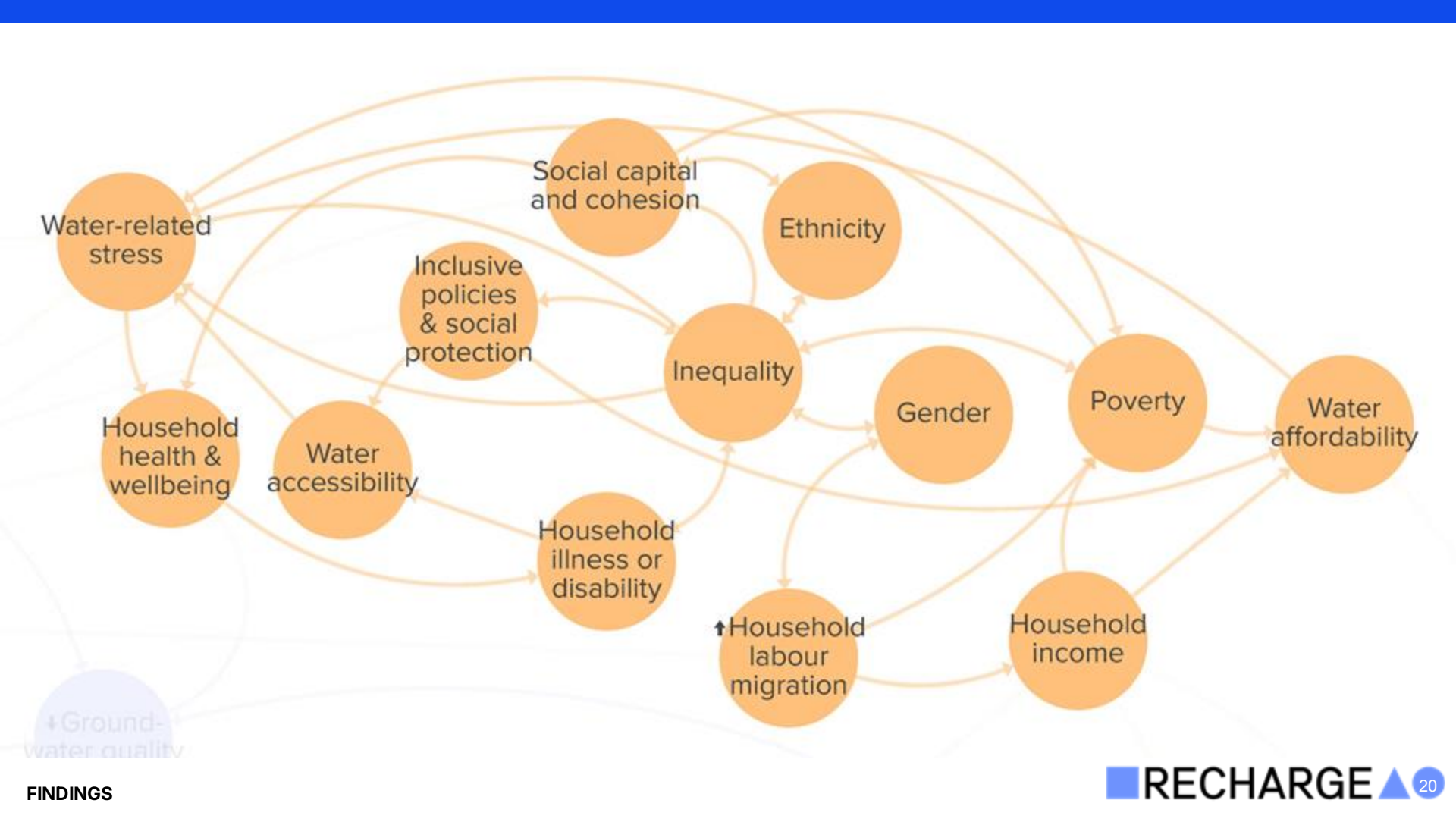

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Rainwater
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▲Land use change

Finding 4: Water affordability and stress are exacerbated by underlying social vulnerabilities

- **Water affordability** - Many families face significant financial barriers due to the costs of piped water connections, monthly fees, bottled drinking water, and electricity for pumping groundwater.
- **Water stress** - Stress was experienced by approximately half of survey respondents related to accessing water.
- **Compounded by social vulnerabilities -** Challenges around access and affordability are compounded by other social vulnerabilities such as age, ethnicity, illness, disability and gender.

"When using water, I feel the issue of payment is top priority, because I do not have the ability to make money."

"If we had enough money, we would switch to tap water. We prefer tap water but cannot afford the additional costs."


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