Hands-on Prompt Engineering: How to Communicate Effectively with AI

KOICA-ESCAP Joint Capacity Building Training Programme on
Digital Technologies for Addressing Climate Change Impacts in the Pacific
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Part 1. Theory and Examples

Hands-on Prompt Engineering: How to Communicate Effectively with AI

Day 2 Practice 1

30-Minute Theory and Examples + 50-Minute Exercise

Learning Outcomes and Session Plan

Learning outcomes

By the end of this practice, participants will be able to:

- design clearer and more detailed prompts
- understand the regional crisis, primary drivers, and impacts of saltwater intrusion
- utilize the RCTC (Role, Context, Task, and Constraint) framework
- apply human-in-the-loop (HITL) verification to prevent AI hallucinations

Session plan

- Theory and examples: 30 minutes
- Guided exercise: 50 minutes

What is an AI prompt?

- An AI prompt is the instruction you give a generative AI assistant to shape its response.
- The clearer and more detailed the prompt, the more accurate the output. A well-constructed prompt aligns the response with your needs and saves your time.



Example 1 – Environmental Policy and Management

- Vague Prompt

  ```
  Tell me about saltwater intrusion in Florida?
  ```

- Detailed Prompt

  ```
  Act as an environmental scientist specializing in coastal hydrology. Explain the primary causes of saltwater intrusion in South Florida's Biscayne Aquifer, and list three sustainable engineering solutions currently being used to mitigate it. Keep the tone professional and suitable for a local city council presentation.
  ```

Example 2 – Academic and Student Research

- Vague Prompt

  Why is Florida’s water turning salty?

- Detailed Prompt

  I am writing a high school biology research paper. Summarize how rising sea levels and over-pumping of groundwater combine to cause saltwater intrusion in Florida. Provide the explanation in four bullet points using simple, clear language, and highlight the impact on local drinking water.

Example 3 – Agricultural Impact

- Vague Prompt

  ```
  Saltwater intrusion
  and Florida farming.
  ```

- Detailed Prompt

  ```
  Analyze how saltwater intrusion affects
  crop yields in Southern Florida. Focus
  specifically on soil salinity changes
  and which types of crops are most
  vulnerable. Format the response with
  clear headers for ‘Soil Impacts’,
  ‘Vulnerable Crops’, and ‘adaptation
  Strategies’.
  ```

Direct Comparison

Feature	Vague Prompt	Detailed Prompt
Persona/Role	None (AI defaults to generic assistant)	Hydrologist, Student, Agronomist, etc.
Scope	Extremely broad (covers the whole state/topic)	Specific regions (e.g., Biscayne Aquifer, South Florida)
Target Audience	Unknown	City council, 10th graders, farmers, etc.
Output Format	Block text or unpredictable length	Bullet points, specific headers, or exact counts

AI Responses to Example 3

- **AI's Output to the <u>Vague Prompt</u>**

  Saltwater intrusion is a major environmental issue affecting agriculture in Florida. Because Florida is surrounded by the ocean and has a low elevation, it is highly vulnerable to rising sea levels. When groundwater is over-pumped, saltwater moves into the freshwater aquifers. This contaminates the water used for irrigation. As a result, farmers struggle to water their crops, soil salinity increases, and agricultural productivity declines. Many researchers are discussing ways to solve this problem, and managing saltwater intrusion is essential for the future of Florida's sustainable agriculture. Let me know if you have any questions.

AI Responses to Example 3

- **AI's Output to the <u>Detailed Prompt</u>**

Soil Impacts

Saltwater intrusion raises the water table in Southern Florida, forcing saline water into the root zones of agricultural soil. …

Vulnerable Crops

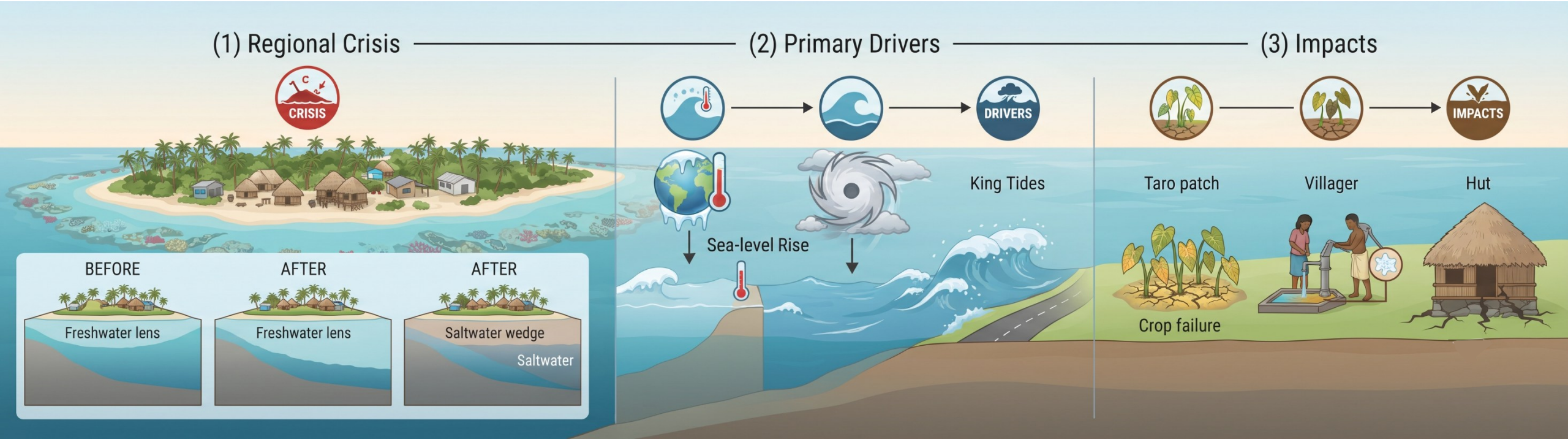
High soil salinity severely impacts the market value and yields of Southern Florida's signature crops…

Adaptation Strategies

…

Problem Description: Saltwater Intrusion (SWI)

- Regional Crisis
- Primary Drivers
- Impacts



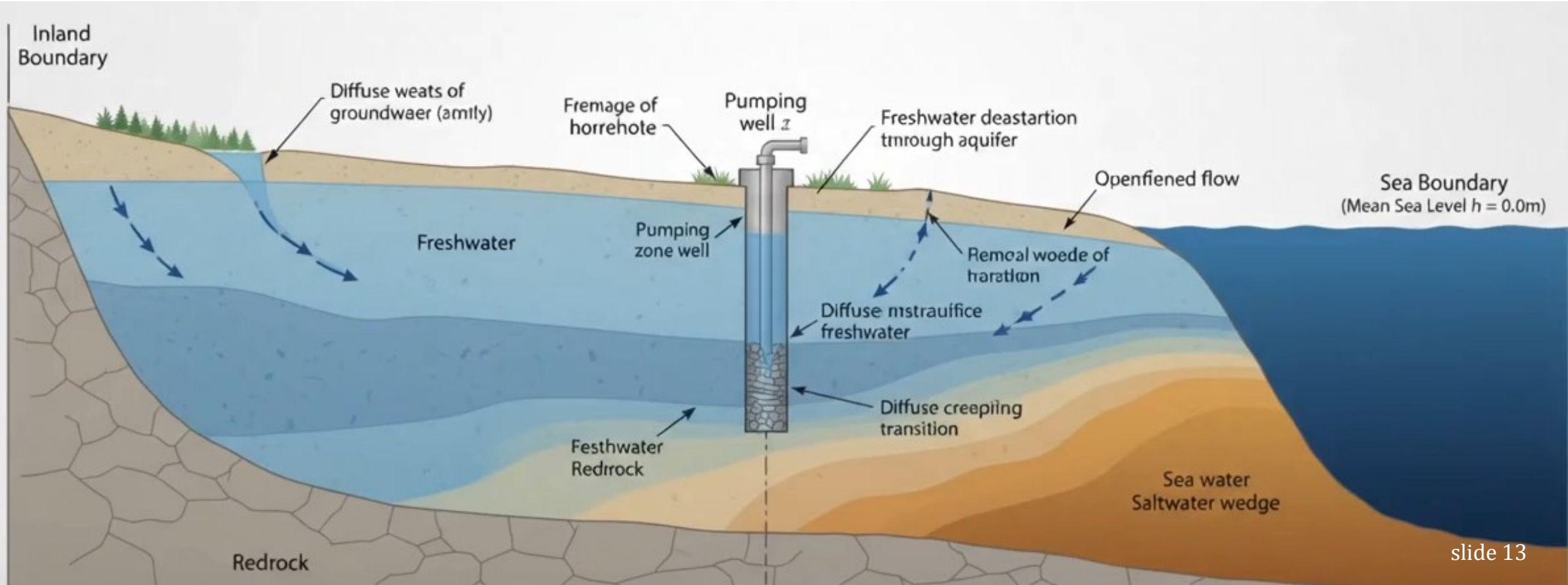
Regional Crisis

- Pacific Island Countries experience severe and disproportionate climate challenges despite contributing minimally to global greenhouse-gas emissions. These changes heavily disrupt the continuity of essential public services and local ecosystems.



Saltwater Intrusion (SWI)

- Pacific Island countries are suffering severely from saltwater intrusion (SWI) in their underground water.



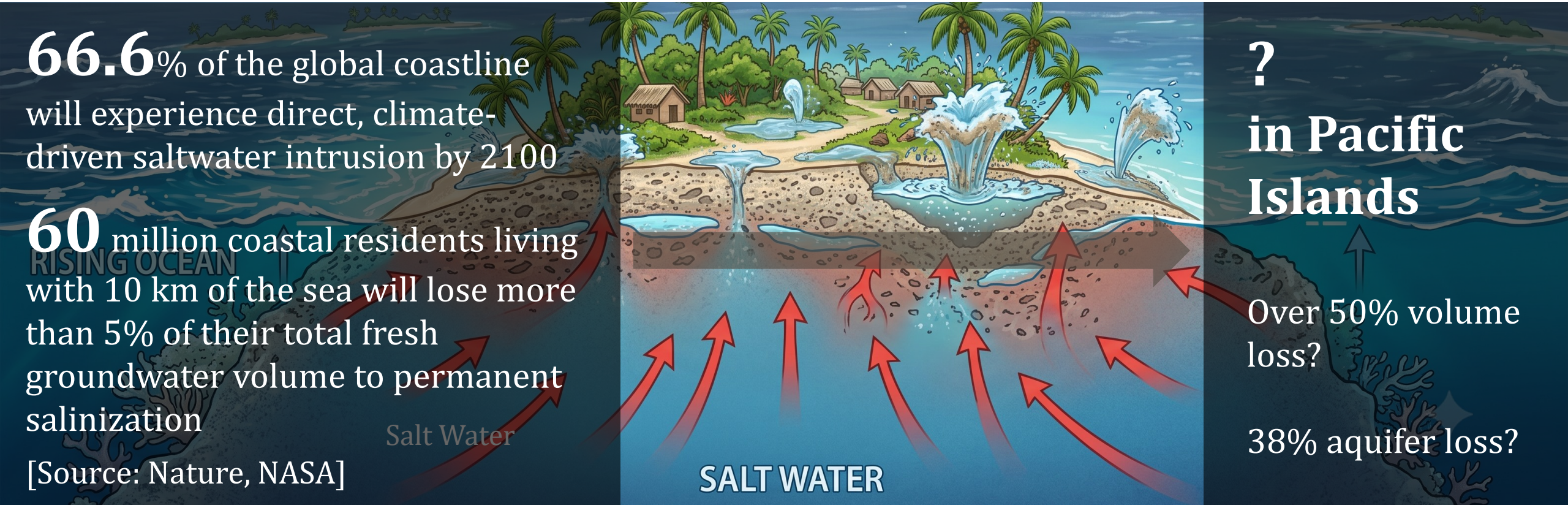
Saltwater Intrusion (SWI)

- Because many of these tropical islands are low-lying atolls with small landmasses, their fresh groundwater exists as a delicate “lens” floating right above the denser saltwater of the ocean. This makes their vital water security highly vulnerable.



Primary Drivers – Sea-Level Rise

- Rising oceans push seawater sideways and upward into the shallow coastal aquifers. In countries like Tuvalu and Kiribati, seawater is documented as bubbling up directly from beneath the soil during high tides.



Primary Drivers – Human Over-pumping

- Rapid population growth and urbanization force communities to extract groundwater faster than rainfall can replenish it. This drop in water pressure allows saltwater to rush into the freshwater space.

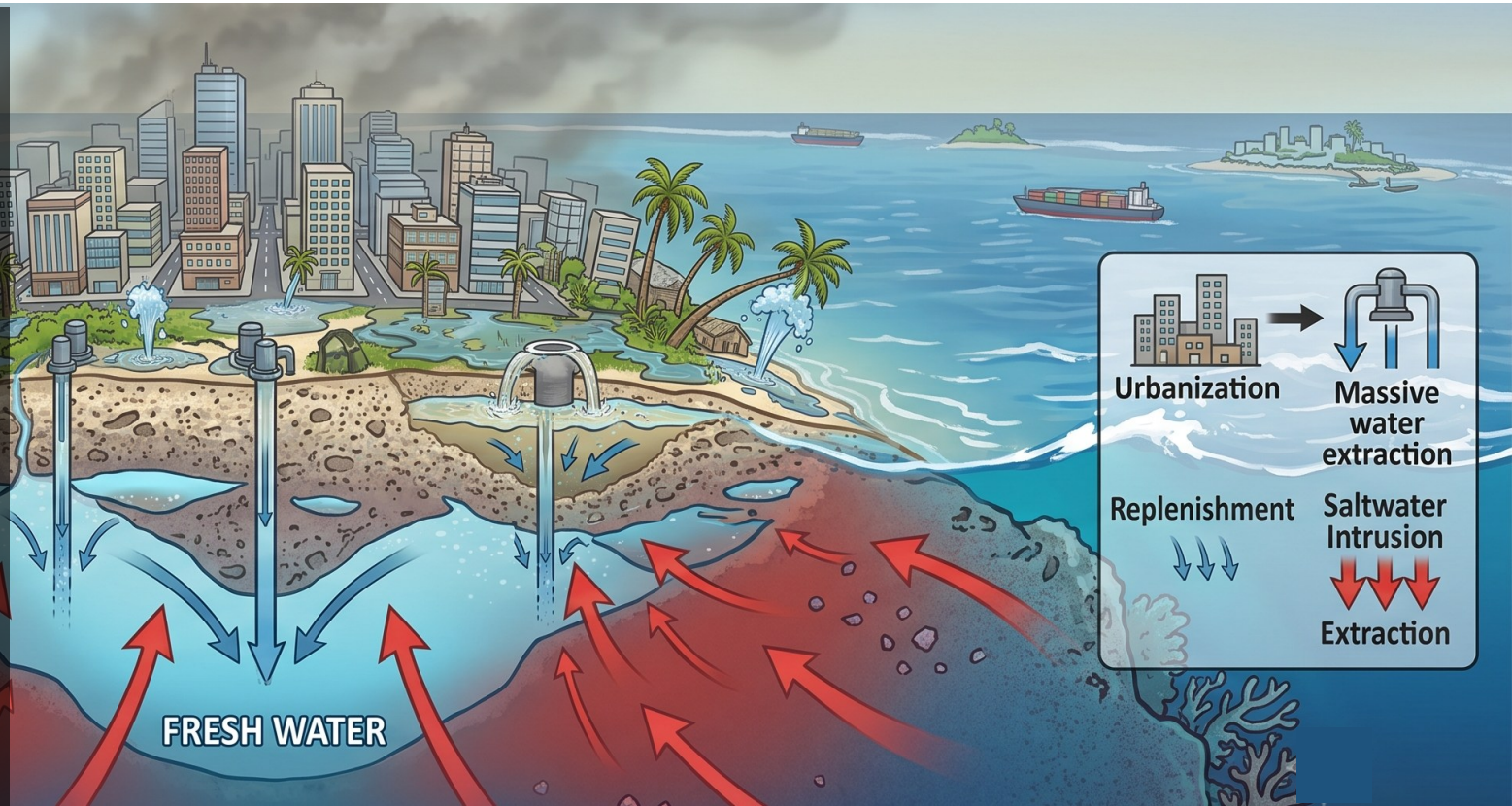
Tonga

Long-term degradation since 1971
Low rainfall absorption (20 to 30%) to the central groundwater table
High Chloride Intrusion

Kiribati

40% Reliance on Aquifers
Piped infrastructure deficit

[Source: WHO, NOAA]



Primary Drivers – Extreme Weather and El Niño

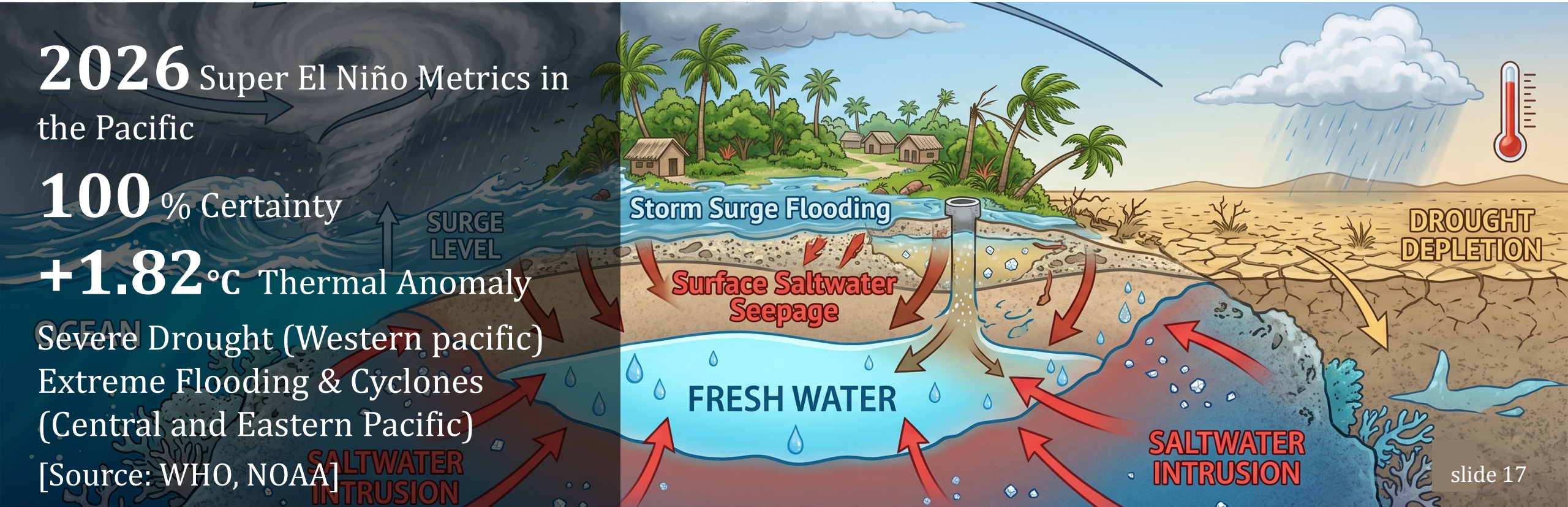
- Destructive cyclones bring temporary storm surges that flood coastal lowlands, causing saltwater to seep downward from the surface. Severe droughts (often tied to El Niño) further shrink the freshwater lens.

2026 Super El Niño Metrics in the Pacific

100 % Certainty

+1.82℃ Thermal Anomaly

Severe Drought (Western pacific)
Extreme Flooding & Cyclones (Central and Eastern Pacific)
[Source: WHO, NOAA]



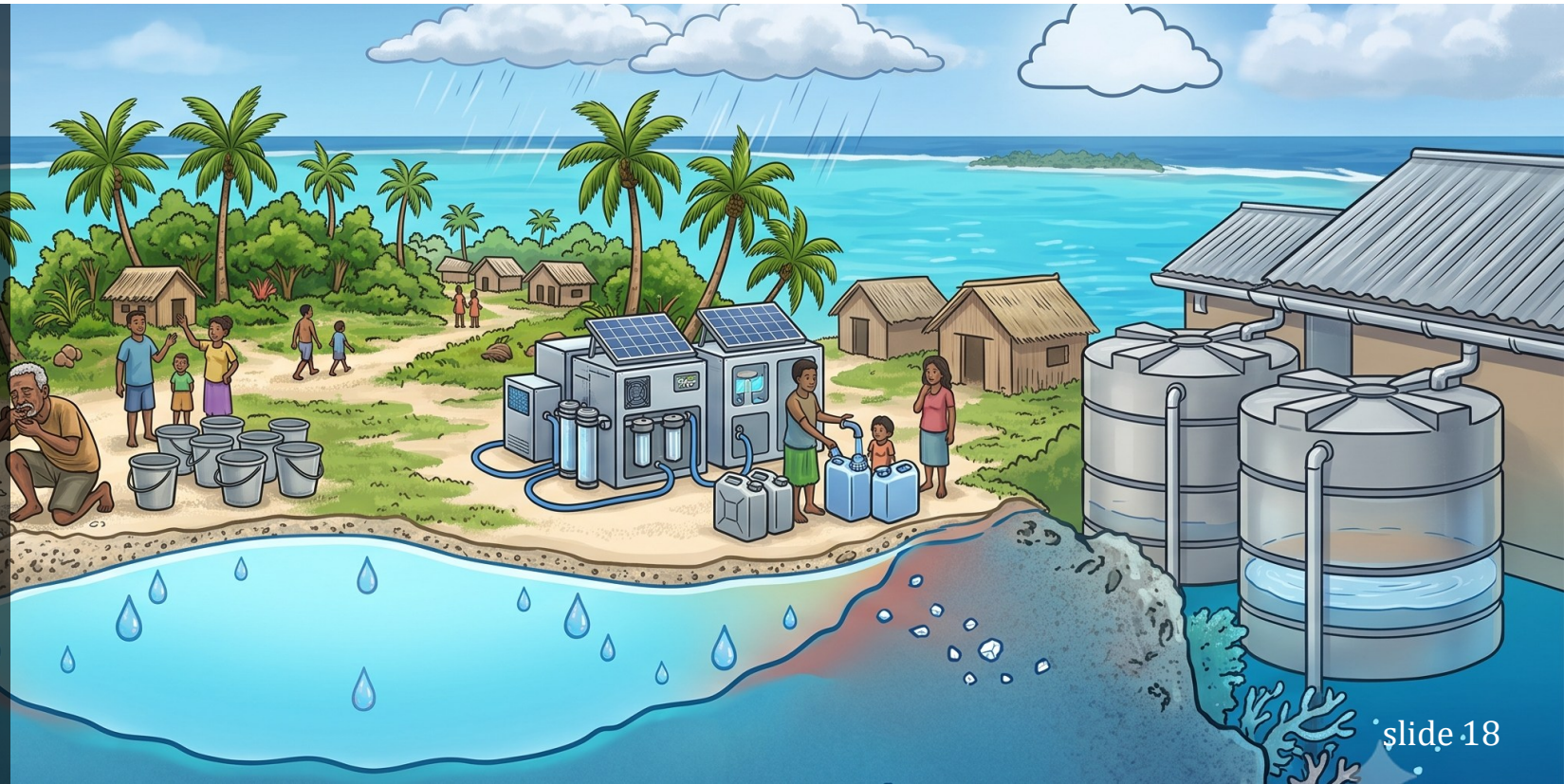
Impacts – Unusable Drinking Water

- Across nations like Vanuatu, coastal communities are reporting that "the wells are salty". When these shallow aquifers fail, locals are forced to rely on expensive desalination machines or highly inconsistent rainwater harvesting.

5 million people without basic drinking water in the Pacific

45 % of rural population completely lack access to safely managed drinking water

[Source: WHO 30 August 2025]



Impacts – Agricultural Failures



- Traditional Pacific "swamp crops"—such as pulaka (swamp taro)—grow directly in pits dug down into the groundwater table. Saltwater intrusion causes severe soil infertility, destroying these staple crops and threatening local food security.

~80% of all Pacific Islanders rely directly on localized, smallholder subsidence agriculture to supplement their daily diets

≦ 60% of localized yield loss in low-lying atoll environments

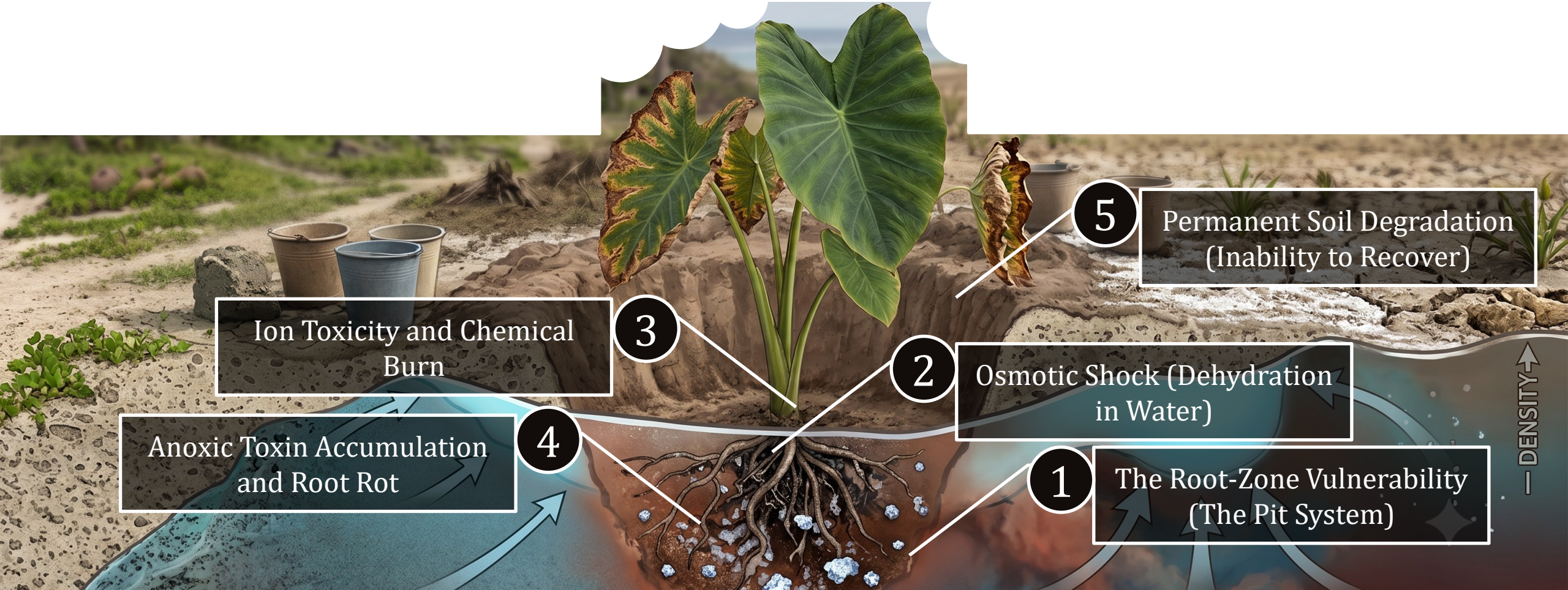
Catastrophic King tide events

[Source: UNDP]



Impacts – Agricultural Failures

- The agricultural failures of giant swamp taro due to SWI is a multi-step biological and chemical breakdown.



Impacts – Threats to Hospitality

- The loss of potable water and agricultural land is driving internal displacement, forcing families to abandon ancestral coastal villages.

> 50,000 refugees Pacific Islanders are displaced from their homes every single year

70% migration willingness (low-lying atoll nation) if further saltwater intrusion and droughts worsened

[Source: WMO]



Assessing the Base RCTC Prompt

To ensure the generative AI provides contextually accurate and culturally appropriate solutions rather than a generic textbook essay, the prompt is structured using the four explicit pillars of the RCTC framework.



RCTC Framework

- It is a structural prompt engineering methodology designed to help users communicate effectively with Generative AI.
- Moving away from vague, search-engine-style queries, this model ensures that the AI returns highly reliable, accurate, and contextually precise information.
- The acronym “RCTC” stands for the four core pillars required to build an effective prompt.

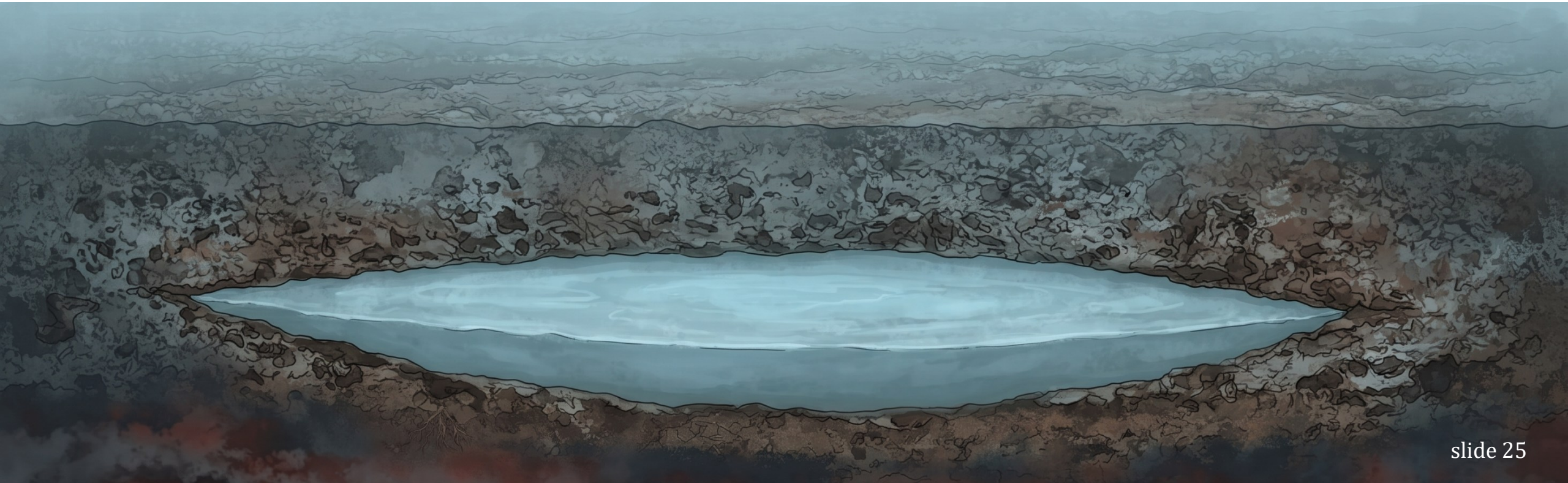
Role (R)

- Dictate the specific professional identity or viewpoint the AI should simulate.
- For example, instructing the AI to act as a “Disaster Risk Manager” or an “Agricultural Extension Officer.”



Context (C)

- Provides the exact localized background setting, constraints, or situational parameters. For example, framing “the scenario around a Post-Category 4 Cyclone” or “low-lying village dealing with rising high tides and agricultural groundwater salinity.”



Task (T)

- Defines the precise action, output, format, or type of document that needs to be generated. For example, requesting “a community radio script” or “a 3-paragraph explanation on crop degradation.”



Constraint (C)

- Establishes explicit boundaries for the output, such as length, reading level, and tone. For example, requiring “the response to be under 2 minutes with a respectful tone” or “under 250 words in clear, non-jargon English.”



Why the Framework is Important

Using generic prompts (e.g., "Write about sea-level rise") often results in textbook, boilerplate responses that fail to account for regional nuances, local customs, or specific infrastructure vulnerabilities.

By systematically applying the RCTC framework, public officials can:

- Mitigate “Hallucinations”: It prevents the AI from inventing false statistics or facts by tethering it to explicit constraints.
- Ensure Regional Relevance: It tailors the tone and data specifically to the targeted geographical and cultural landscape.



Part 2. Guided Exercise

Hands-on Prompt Engineering: How to Communicate Effectively with AI

Day 2 Practice 1

30-Minute Theory and Examples + 50-Minute Exercise

Task 1: Vague vs. Detailed Prompt

- **Vague Prompt**

  Saltwater intrusion and the South Pacific farming.

- **Detailed Prompt**

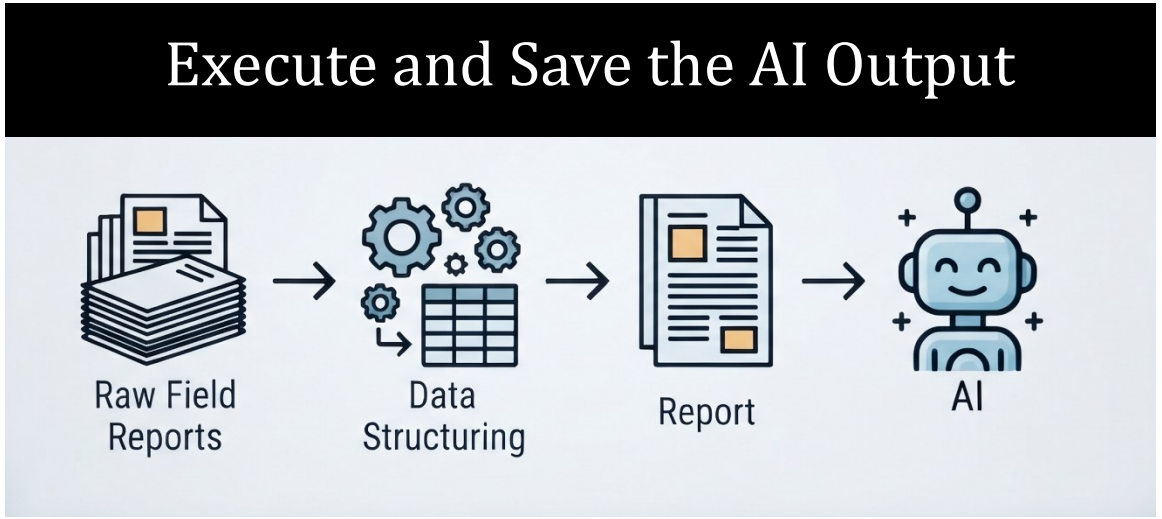
  Analyze how saltwater intrusion affects crop yields in the South Pacific. Focus specifically on soil salinity changes and which types of crops are most vulnerable. Format the response with clear headers for ‘Soil Impacts’, ‘Vulnerable Crops’, and ‘adaptation Strategies’.

Task 1: Comparing the Responses

Submit each prompt to a standard generative AI interface and compare the resulting responses.

Use any (Generative) AI for the Simulation:

- Google AI Mode
- Google AI Studio
- Open API Platform
- Anthropic Console…



📐 Task 2: Construction of an RCTC Prompt

When all four elements are merged into a unified paragraph, an optimized prompt looks like this:

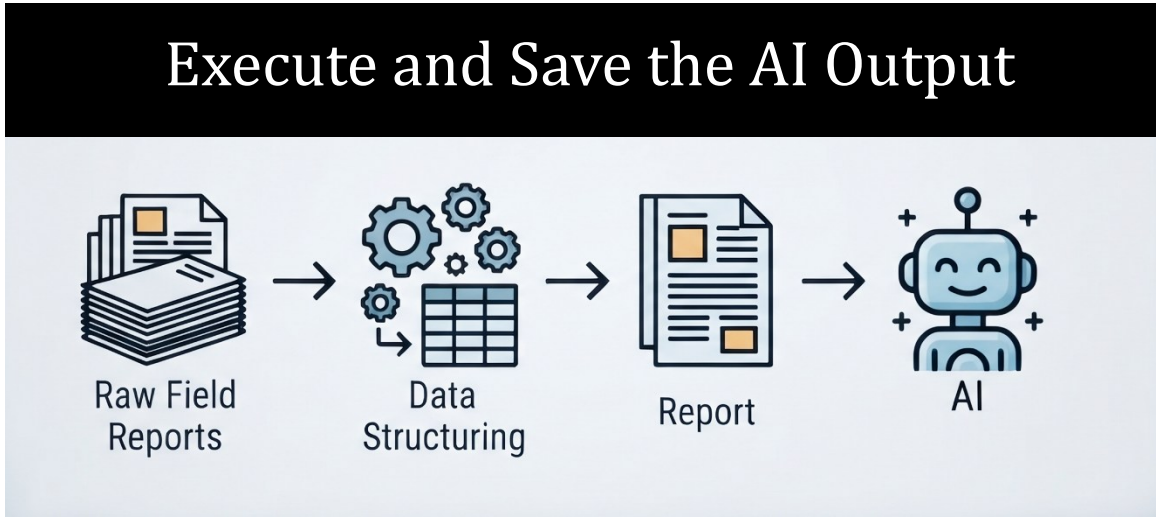
"Act as an Agricultural Extension Officer specializing in Pacific climate resilience [**Role**]. We are working with a low-lying village experiencing rising high tides and agricultural groundwater salinity [**Context**]. Please draft a 3-paragraph explanation detailing why taro leaves are yellowing and how to protect remaining soil beds [**Task**]. Use clear, non-jargon English, maintain a respectful community tone, and keep the total response under 250 words [**Constraints**]."

Task 3: Simulating the Initial AI Response

When the prompt made is submitted to a standard generative AI interface, the tool ingests the constraints to produce an output focused directly on community-level adaptation.

Use any (Generative) AI for the Simulation:

- Google AI Mode
- Google AI Studio
- Open API Platform
- Anthropic Console…



Task 3: AI Generated Output, to be cont.

“Malo e lelei and warm greetings to the community council and elders. Recently, many of you have noticed that the leaves of our vital taro crops are turning yellow and struggling to grow. This is happening because rising high tides are pushing saltwater into the underground freshwater lens that feeds our agricultural beds. When taro roots drink this salty groundwater instead of fresh water, it blocks them from absorbing nutrients, causing the leaves to dry out and change color.

Task 3: AI Generated Output, cont.

To protect our remaining taro patches from this saltwater intrusion, we need to implement immediate adaptation strategies. First, we can build raised agricultural beds using local organic matter, soil, and compost to elevate the taro roots safely above the saltwater level. Second, planting salt-tolerant coastal vegetation along the edges of our farming plots can act as a natural green buffer against high tides.

We understand how deeply tied these crops are to our livelihoods, nutrition, and traditions. By working together to build these raised beds and improve local drainage, we can actively protect our food security against these changing environmental pressures. Thank you for your time and continued dedication to our village’s resilience.”

Task 4: Human-in-the-Loop Verification Audit

Before using this draft for official administrative or outreach work, the official conducts a mandatory “Human-in-the-Loop” verification audit:

- **Constraint Audit**: A word count check reveals the text is approximately 210 words. This successfully satisfies the constraint limit of remaining under 250 words.
- **Tone Audit**: The language avoids overly dense, academic scientific phrasing. It uses an appropriate, formal, and respectful community greeting tailored to village leadership.

Task 4: Human-in-the-Loop Verification Audit

- **Hallucination Check**: The AI successfully stayed within the boundaries of the provided background data. It did not invent fake scientific statistics, mention unverified chemical names, or fabricate a specific real-world village name that was not authorized.

Task 4: Human Verification and Auditing

Audit Checklist Item	Verification Question	Status (Pass / Fail)
Constraint Check	Is the draft word count within the specified limit (under 250 words)?	[ ] Pass [ ] Fail
Tone Check	Is the phrasing respectful, non-academic, and tailored to village elders/farmers?	[ ] Pass [ ] Fail
Hallucination Check	Did the AI avoid fabricating unverified data points, fake chemical names, or real village names?	[ ] Pass [ ] Fail

Task 5: Applying Iterative Refinement

If the official determines that the text is still a bit too rigid for a spoken community town hall forum, they practice iterative prompting to pivot the style:

- Follow-Up Refinement Prompt:

```
"Rewrite this response using
a highly conversational tone
suitable for an oral
presentation at a community
town hall meeting. Focus
heavily on speaking directly
to the local farmers."
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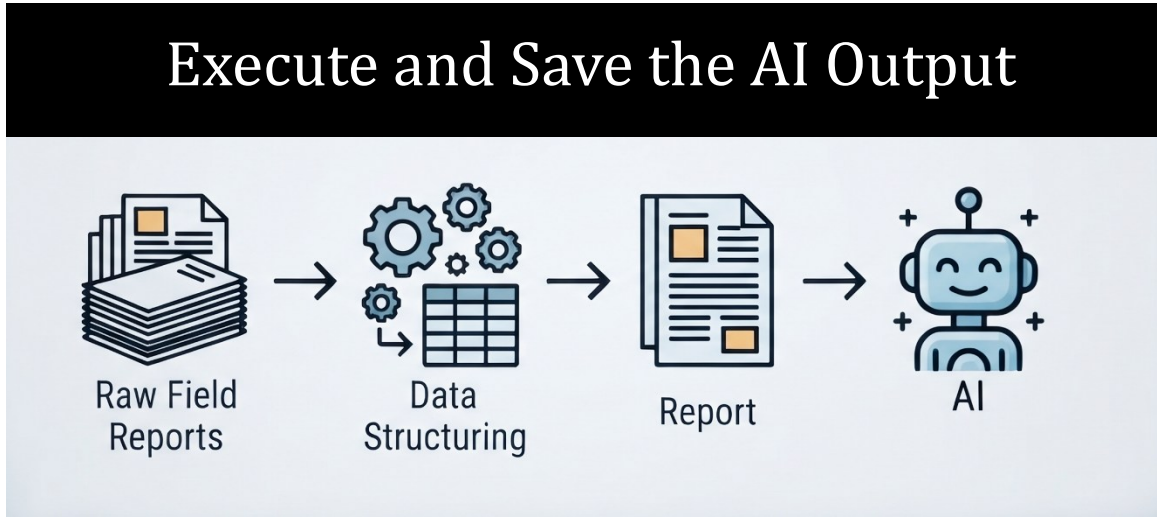


📐 Task 5: Final Refined Output (Spoken Speech)

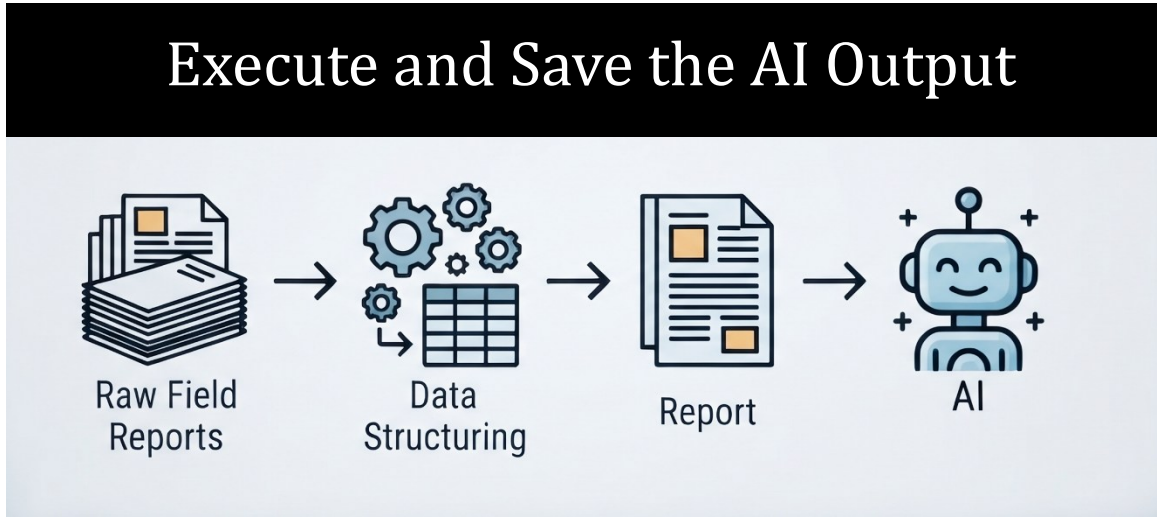
"Hello everyone, thank you for gathering today. Look around our fields—we've all seen our taro leaves turning yellow. It’s heartbreaking because this crop is what feeds our families. The reason this is happening isn't a mystery; the ocean high tides are rising higher, pushing saltwater deep into the ground where our taro roots drink. The plants are simply getting choked by the salt.

But we aren't powerless. To save our crops, we need to lift them up. We must build raised soil beds using heavy compost and local organic material to keep the roots high above the salty groundwater. Let's also plant natural green buffers along the coast to slow the tides down. We can protect our food if we build these raised patches together starting this week."

Task 6: Use Another RCTC Prompt

Use another RCTC prompt to complete Tasks 2 through 5.

- Task 2: Construction of an RCTC prompt
- Task 3: Simulating the initial AI response
- Task 4: Human-in-the Loop verification audit
- Task 5: Applying iterative refinement



Thank you for your attention.

