

the
Singapore

WAY

**TEACHER
GUIDE**

**Water and Resource
Management**

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1. Introduction to the Case

Water as a Sovereignty Issue

In the early years of its independence, Singapore relied heavily on water imported from Malaysia—a dependence that created both a **strategic vulnerability** and an existential constraint. With rising urban demand and no natural lakes or aquifers, Singapore faced a stark reality: **no water, no future**.

Instead of managing crisis after crisis, Singapore chose a different path—**investing decades of strategic thinking into building a self-sufficient water system** that combines technology, policy, and public trust.

This case tells the story of how a nation turned **insecurity into innovation**.

What the Case Offers

- A **model for resource-scarce cities** facing climate pressure
- A study in **multi-decade planning and circular infrastructure**
- A deep look into how **public communication and trust** can overcome cultural resistance (e.g. drinking recycled water)
- An example of aligning **state, private, and citizen action** around a single resource

Why It Matters Today

Climate change is accelerating droughts, floods, and disruption of freshwater supply chains. In the next 10–20 years:

- **40% of the world's population may face water scarcity**
- Major cities (e.g. Cape Town, Chennai, São Paulo) have already come close to “Day Zero”
- Trust in public water systems—and the technologies that power them—is eroding

Singapore shows that a **closed-loop, diversified, and dignified approach to water management is not only possible—it's scalable**.

Core Questions to Frame the Case

- Can a country or city ever be truly “water secure”?
- What are the **trade-offs between cost, convenience, and sustainability**?
- How can governments **build trust in recycled or desalinated water**?
- Should water be free, priced, or subsidized—and what values do those choices reflect?
- How does a city shift public behavior in how water is consumed, conserved, and reused?

Key Systems and Concepts Explored

Concept	Description
Four National Taps	Singapore’s integrated water strategy: (1) imported water, (2) local catchment, (3) NEWater, (4) desalinated water
NEWater	Ultra-clean, recycled water used for industrial and indirect potable purposes—key to water independence
PUB (Public Utilities Board)	Singapore’s national water agency that combines utility management, innovation, and public education
Demand-side Management	Tools like pricing, education, and behavior campaigns to reduce water waste
Trust & Technology	A critical relationship: how citizens perceive the safety, dignity, and value of treated water systems

This case is about **resilience by design**, not just in infrastructure—but in mindset, culture, and governance.

2. Pre-Class Preparation

To meaningfully engage in this case, students should understand both **Singapore's context** and the **technical, cultural, and behavioral dimensions** of water security.

Required Reading

- **Chapter 8 of *The Singapore Way*** by Maher Kaddoura
Focus on:
 - The evolution from dependence to water independence
 - Singapore's **Four National Taps strategy**
 - Introduction and scaling of **NEWater and desalination**
 - Behaviour change campaigns and public education by **PUB**
 - Governance principles that made innovation and trust possible

Optional Multimedia Enhancers

Title	Format	Why It's Useful
<i>NEWater: Singapore's Water Story</i>	Gov.sg video	Visual explanation of the recycling process and trust campaign
<i>The Future of Water Security</i> - WEF	Podcast or panel	Frames Singapore in a global water crisis context
<i>Day Zero</i> - Cape Town's Water Crisis	Documentary (DW, BBC)	Case study for comparative analysis of what happens when planning fails
<i>Water is Life: Public Trust and Infrastructure</i>	TEDx / UN Talk	Explores the human right to water, dignity, and innovation

Reflection Questions for Students

Ask students to respond to the following in writing or discussion:


1. Do you know where your household water comes from—and where it goes?
2. How much would you trust your city's tap water if it came from recycled sources?
3. Should governments invest more in public education—or technology—for water security?
4. What would "Day Zero" mean for your community?
5. Who should pay more for water—industries, tourists, citizens, or should it be equal?

Optional Exercise: Water Footprint Audit

Have students estimate their personal water footprint using online calculators (e.g. watercalculator.org) and bring:

- One **surprising fact** about their water use
- One **idea** for reducing it—on a personal or policy level

Instructor Prep Checklist

	Task
<input type="checkbox"/>	Print or display infographic of the Four National Taps
<input type="checkbox"/>	Prepare short video or article on water scarcity in a different country (for comparison)
<input type="checkbox"/>	Assign stakeholder roles if running a Cabinet Simulation
<input type="checkbox"/>	Optional: Bring props or visuals (bottled NEWater, water use stats, global maps of scarcity)

This section grounds students in the case **emotionally and factually**—connecting big systems to personal choices and social consequences.

3. Session Plan

This case is ideal for **multi-disciplinary learning**—blending policy design, environmental science, behavioral economics, and public trust. The session aims to get students thinking beyond “pipes and pumps” and into systems of **resilience, justice, and innovation**.

Session Timing Options

Duration	Focus
60 min	Key case discussion + short scenario workshop or debate
90 min	Full case walkthrough + simulation or group redesign challenge
120 min	Deep dive with stakeholder debate + design sprint + policy critique presentations

Learning Objectives

By the end of the session, students should be able to:

1. Explain the **Four National Taps strategy** and its rationale
2. Analyse the **role of public trust** in infrastructure adoption (e.g., NEWater)
3. Evaluate the **trade-offs between supply and demand-side management**
4. Propose or critique water resilience policies adapted to different contexts
5. Reflect on water as both a **technical and cultural system**

Suggested 90-Minute Session Flow

Time	Segment	Purpose
0–10 min	Water Icebreaker: “Where does your water come from?”	Connect personal awareness to systems-level discussion
10–25 min	Case Walkthrough: Singapore’s Water Journey	Instructor or student-led, using visuals of the Four National Taps
25–45 min	Discussion: Innovation, Trust, and Sustainability	Explore NEWater, pricing, cultural buy-in, and climate goals
45–65 min	Simulation: Water Security Cabinet Meeting	Stakeholders debate expansion of NEWater or desalination subsidies
65–85 min	Team Proposals: Water Plan for a Vulnerable City	Teams redesign or adapt one element of Singapore’s strategy
85–90 min	Wrap-Up: “If I Were the Minister of Water...”	Each student states one policy or design choice they’d champion

Discussion Questions

- Is water a public good, a commodity, or a right?
- Should recycled water cost more, less, or the same as conventional sources?
- Why did Singapore succeed with NEWater, when other nations faced resistance?
- What happens when public trust breaks down in essential systems?
- How do we ensure water solutions are equitable—across class, geography, and time?

Visual Aids & Tools

- **Infographic: Four National Taps** (IMPORTS, CATCHMENT, NEWater, DESAL)
- **PUB Timeline** – from dependence to water independence
- **Global Day Zero Map** – cities under water stress projections (UN/WWAP)
- **Behaviour Campaign Posters** – sample PUB water-saving ads
- **Trust-Technology Matrix** – plot where various global strategies succeed or fail

4. Case Facilitation Tools

These tools are designed to help students **visualize Singapore's water ecosystem**, confront dilemmas, and explore the deep interconnection between **technology, trust, and long-term strategy**.

A. Infographic – The Four National Taps

Create or display a graphic showing Singapore's four water sources:

Source	Details
Imported Water	Historically from Malaysia; to be phased out by 2061
Local Catchment	Rainwater harvested from two-thirds of the island's surface
NEWater	Ultra-clean, high-grade reclaimed water, primarily for industrial and indirect potable use
Desalinated Water	Seawater treatment providing up to 30% of supply—energy intensive but reliable

Use this to explain how Singapore achieved **redundancy and resilience** through a diversified approach.

B. Trust vs. Technology Matrix

Plot different global water strategies on a 2x2 matrix:

High Trust, High Tech	Low Trust, High Tech	
Singapore (NEWater)	USA (some public resistance to reuse)	
High Trust, Low Tech		Low Trust, Low Tech
Denmark (public-owned water utilities)		Countries with weak infrastructure & poor public communication

Use this to explore why **technology alone isn't enough**—and how public education, transparency, and leadership shape success.

C. Water System Evolution Timeline

Showcase key moments in Singapore's transformation:

Year	Milestone
1961	First water agreement with Malaysia signed
1970s	Reservoir and drainage upgrades begin
2003	First NEWater plant opens
2010s	Desalination capacity rapidly expands
2020 +	Smart meters, greywater reuse trials, and PUB climate adaptation roadmap launched

This helps students understand that **resilience was not built overnight—it was policy-backed and iterative.**

D. Stakeholder Role Cards (For Simulation)

Provide roles and positions for a Water Cabinet Simulation:

Role	Perspective
Minister for Sustainability & Environment	Wants bold independence by phasing out imports
Water Scientist (PUB)	Advocates for NEWater scaling but highlights cost barriers
Community Leader	Concerned about affordability and public skepticism of recycled water
Industrial User (Semiconductor sector)	Needs uninterrupted high-quality water for operations
Budget Minister	Worried about costs of desalination and public subsidies
Youth Environmentalist	Pushes for pricing reform and climate-adaptive policies

Each role brings tension to the table—forcing students to **balance innovation, equity, and trust.**

E. Dilemma Flash Cards (Optional)

Pose provocative “either/or” prompts:

- “Spend \$1B on desalination or on behavior campaigns—choose one.”
- “Would you drink NEWater if it came from your own home’s wastewater?”
- “Is water a human right if it costs more than electricity?”

Use these to **ignite debate** or transition into ethical discussions.

5. Group Activities & Teaching Tactics

These activities challenge students to **design, negotiate, and reimagine water systems**—while grappling with public trust, climate stress, and political trade-offs.

Activity 1: Water Security Cabinet Simulation

Objective: Decide how to invest \$500 million toward Singapore’s next phase of water independence.

Stakeholder Roles (assigned or chosen):

- PUB Water Engineer
- Community Elder
- Youth Activist
- Finance Minister
- Housing & Development Board Rep
- Semiconductor Industry Executive

Instructions:

- Review options: expand desalination, scale NEWater, invest in green infrastructure, or launch a national awareness campaign.
- Debate priorities, risks, and values.
- Each team proposes a 3-point investment plan.

Debrief Questions:

- Who had the most influence—and why?
- What was hardest to compromise on?
- How did public perception factor into decisions?

Activity 2: Design a Water-Secure City (Anywhere But Singapore)

Prompt:

Your team has been hired to design a future-ready water system for a city with limited rainfall, political constraints, or poor infrastructure.

Deliverables:

- Visual system map (supply, reuse, education, innovation)
- Public trust strategy (outreach, transparency, media)
- Pricing and access policy (subsidies, tiered rates, industrial tariffs)
- A “pitch deck” for city leaders or citizens

Encourage teams to be bold but realistic—what would actually work?

Activity 3: “Would You Drink It?” Trust Test

Instructions:

- Present students with 3 water sources (tap, NEWater/reclaimed, bottled) without labels.
- Ask them to vote privately on which they’d drink and why.
- Reveal which one was reclaimed.

Use this to open a discussion on:

- Perceptions vs. science
- Emotional trust vs. data
- How Singapore changed the conversation through **branding, transparency, and confidence-building**

Activity 4: Flash Debate – “Water Should Be Free”

Pro Team:

- Water is a basic human right
- Pricing penalizes the poor
- Public utilities should not profit from nature

Con Team:

- Pricing encourages conservation
- Revenue funds infrastructure
- Access ≠ unlimited use

Follow-up: Ask students to consider **where equity and sustainability collide—and how to reconcile them.**

Quick Engagement Tactics

Tactic	Purpose
“Water in My Life” Circle	Each student shares one surprising insight or emotion about water in their home/city
“Water Meter Wall”	Use post-its to visually map behaviours: long showers, bottled use, irrigation, reuse
“Innovation Jam”	In 5 mins, design a water-saving invention for your school, home, or city

6. Assignments and Post-Class Engagement

These assignments are designed to help students explore water security as a **personal, political, and planetary issue**, while applying lessons from Singapore's model to their own contexts and creativity.

Assignment 1: Policy Memo – “Would Singapore’s Water Model Work Here?”

Length: 1,000–1,200 words

Prompt:

Evaluate whether your country, city, or region could adopt one or more elements of Singapore's water strategy.

Your memo should include:

- A summary of the local water landscape (e.g. sources, vulnerabilities)
- What makes Singapore's strategy succeed
- Barriers to adoption: technical, political, cultural, or economic
- A proposal for adapted implementation, including trust-building tactics

Assessment Focus: Systems thinking, contextual adaptation, realism, and insight

Assignment 2: Design Brief – “Build a Water-Secure Neighborhood”

Format: Poster, presentation, or slide deck

Task:

Design a hyper-local water resilience plan for a school, village, or district.

Your brief should include:

- Supply diversification (e.g., rain capture, greywater reuse)
- Behaviour-change strategy (education, signage, nudges)
- Infrastructure overview (low-cost innovations or green infrastructure)
- Equity and dignity considerations (affordability, public trust, inclusion)

Bonus: Use real data from your community or a global water-stressed city.

Assignment 3: Personal Reflection – “A Water Memory That Shaped Me”

Length: 700–900 words

Prompt:

Describe a moment when you or someone close to you experienced the impact of water—in abundance, absence, or conflict.

Reflect on:

- What that moment taught you about dignity, justice, or vulnerability
- How Singapore’s model might have changed that outcome
- What kind of water system you’d like to help build—and why

Post-Class Engagement Ideas

Activity	Purpose
#WaterIsPersonal Photo Diary	Invite students to capture a day in the life of water (drinking, washing, flushing, watering, leaking)
Podcast Pitch: “Voices of Water”	Students script and record short audio stories about water in their lives or cities
Mini Campaign Challenge	Create a slogan, poster, or campaign concept to make people value water like Singapore’s PUB did with NEWater

7. Assessment and Feedback Tools

This section offers detailed rubrics and reflection tools to assess student performance across **policy analysis, design thinking, systems critique, and personal reflection**—aligned with real-world problem-solving and communication skills.

A. Policy Memo Rubric – “Would Singapore’s Model Work Here?”

Criteria	Excellent (5 pts)	Good (3–4 pts)	Needs Work (1–2 pts)
Contextual Analysis	Deep understanding of local conditions	Basic alignment with context	Generic or misapplied
Use of Case Insights	Strong integration of Singapore’s model	Mentions core ideas but lacks depth	Minimal or unclear use of the case
Policy Adaptability	Clear and creative adaptation	Mostly realistic proposals	No specific strategy or shallow proposal
Trust & Equity Consideration	Considers social and political dimensions	Acknowledges some public concerns	Ignores people, trust, or inclusion factors
Clarity & Structure	Organized, polished, and compelling	Clear but needs refinement	Disjointed or rushed

Total: ____ / 25

B. Design Brief Rubric – “Build a Water-Secure Neighbourhood”

Criteria	Excellent (5 pts)	Good (3–4 pts)	Needs Work (1–2 pts)
Innovation & Feasibility	Balanced creative thinking and real-world logic	Practical but conventional	Unrealistic or too vague
System Integration	Connects supply, behavior, infrastructure	Covers most components	Fragmented or lacks integration
Social Inclusion & Equity	Prioritizes trust, access, and dignity	Shows some awareness	One-size-fits-all or overlooks equity
Visual/Verbal Communication	Clear and engaging storytelling or layout	Understandable with minor confusion	Hard to interpret or messy design
Connection to Singapore Case	Strong use of case tools or principles	Mentioned, but not core to the design	No visible connection to case

Total: ____ / 25

C. Personal Reflection Rubric – “A Water Memory That Shaped Me”

Criteria	Excellent (5 pts)	Good (3–4 pts)	Needs Work (1–2 pts)
Emotional Resonance	Powerful, authentic, and reflective	Honest but surface-level	Vague, impersonal, or rushed
System Awareness	Connects personal story to infrastructure or policy	Some system awareness	No link beyond personal experience
Case Relevance	Applies Singapore insights thoughtfully	References case but underdeveloped	No case connection
Values & Social Insight	Highlights dignity, justice, or access issues	Acknowledges these themes	Misses social dimension
Writing Quality	Well-crafted and voice-driven	Mostly clear, with minor issues	Clunky or unclear

Total: ____ / 25

D. Exit Reflection / Rapid Feedback Prompts

Give students 5 minutes at the end of class or in post-activity journaling to respond to:

“The one thing Singapore taught me about water is...”

“If I could change one thing about how my community treats water, it would be...”

“The hardest part of solving water insecurity is...”

“Now I see water as not just a utility—but as _____.”

Use these to **evaluate mindset shifts and value alignment**, not just knowledge retention.

8. Instructor Notes and Commentary

This section equips you with teaching insights and guidance on navigating **sensitive themes, technical questions, and global comparisons** that emerge in class. It also helps you centre the discussion on **human dignity and design for resilience**.

Teaching Mindset: Water Is More Than Infrastructure

This case provides a unique opportunity to challenge students to think across **systems, cultures, and values**. Water is:

- A **technical system**—with engineering, recycling, and efficiency
- A **public trust issue**—involving safety, communication, and behaviour
- A **social contract**—revealing who gets access, dignity, and voice

Students should leave understanding that **trust and infrastructure are co-dependent**—and both take decades to build.

Common Student Reactions and How to Frame Them

Student Reaction	Instructor Reframing Tip
"Drinking recycled water is gross."	Ask: How do you know your current water is clean? What builds trust in systems?
"Desalination seems expensive—why not just import?"	Highlight the risks of geopolitical dependence and climate volatility.
"We can't afford this in my country."	Explore low-cost, community-level adaptations and behavioural shifts.
"Water should be free—it's a human right."	Discuss pricing vs. access: is free water sustainable or equitable at scale?
"This would never work here—people wouldn't accept it."	Ask: What public education or leadership would be needed to change that?

Suggested Opening Quote to Anchor the Session

"We never had water. But we had foresight."
— *Singapore Water Planner*

Use this to frame water not as a **resource problem**, but as a **design challenge**.

Key Teaching Themes to Emphasize

- **Water independence ≠ isolation.** Singapore still invests in diplomacy and regional resilience.
- **Trust matters as much as tech.** NEWater succeeded because it was socially and scientifically designed.
- **Behaviour is infrastructure.** Conservation is not just pipes and pumps—it's mindset and habit.
- **Equity must be embedded.** Water systems should serve the poor, vulnerable, and future generations.

Facilitation Tips

- **Start personal**—ask about students' water habits or water-related childhood memories
- Use **case visuals** (Four Taps diagram, PUB campaigns, Day Zero maps) to anchor abstract concepts
- **Compare with global examples**—Cape Town, São Paulo, California, Namibia, UAE
- Encourage **local application**—what would it take to pilot a NEWater program in their hometown?

9. Additional Resources

These curated materials will help you and your students explore **Singapore's model**, understand **global water challenges**, and examine the **intersection of infrastructure, equity, and innovation**.

Recommended Readings

Title	Source	Focus
<i>The Singapore Water Story</i>	PUB (Singapore's Public Utilities Board)	Full narrative of Singapore's transition from dependency to innovation
<i>Recycled Water: Good Enough to Drink?</i>	The Guardian / Nature	Scientific and cultural insights into public resistance and adoption
<i>From Scarcity to Security: A Global Blueprint</i>	World Resources Institute / World Bank	Comparative case studies on water resilience and policy trade-offs
<i>Water Reuse and Desalination: A Toolkit for Cities</i>	International Water Association	Technical approaches, case examples, and economic modelling
<i>UN World Water Development Reports</i>	UNESCO / WWAP	High-quality annual reports on water challenges, rights, and sustainability worldwide

Videos & Documentaries

Title	Platform	Focus
<i>NEWater: The Journey from Waste to Wonder</i>	Gov.sg / PUB	Explains Singapore's reclaimed water system with science and storytelling
<i>Day Zero: Cape Town's Water Crisis</i>	DW Documentary / BBC	A cautionary tale of water mismanagement and emergency response
<i>Why Recycled Water is the Future</i>	TEDx / Vox	Public perception and future-focused innovation in water recycling
<i>The Value of Water</i>	UN Water Campaign Short Film	Poetic and practical insight into water's role in human dignity and systems
<i>Smart Water Cities</i>	World Economic Forum / MIT	Highlights global urban innovation using real-time water sensors and AI

Data Tools & Technical Platforms

- <https://www.pub.gov.sg> – Official portal of Singapore’s water agency
- <https://ourworldindata.org/water-use> – Visual global data on consumption, reuse, scarcity
- <https://www.unwater.org> – UN system-wide water resources portal with SDG6 tracking
- <https://www.iwa-network.org> – International Water Association’s urban resilience tools
- <https://watercalculator.org> – Personal and national water footprint analysis

Global Cases for Comparison

Country / City	Why It’s Useful
Namibia	Pioneered direct potable reuse of wastewater (before Singapore)
Israel	World leader in agricultural drip irrigation and wastewater reuse
Cape Town, South Africa	Day Zero nearly reached—lesson in crisis communication and rationing
Los Angeles, USA	Current investments in aquifer recharge and decentralized reuse
Abu Dhabi, UAE	Heavy reliance on desalination; policy efforts to conserve and diversify