



**NEWWater – a message driven Visitor Centre and
the evolution of issues-based exhibits**



**New Water
ReSources**

A DIVISION OF ASTOUND

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PRESENTATION OUTLINE

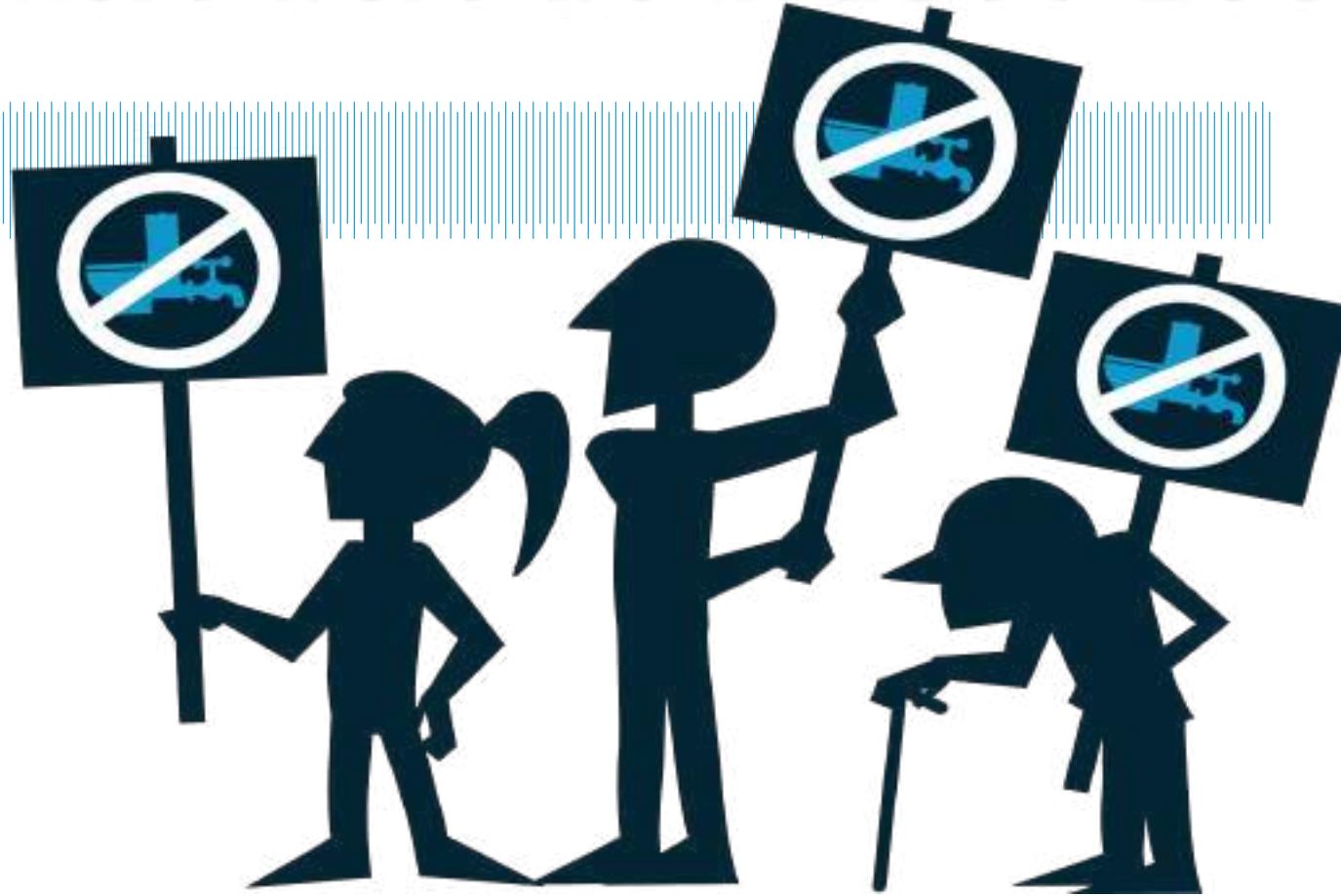
Learning from NEWater

1. Context
 1. Challenges faced in 2002
 2. Social Research becomes key to the Concept Plan
2. Content
 1. Strategic Concept Plan
 2. Walk-Thru of NEWater circa 2003
3. Subsequent Research
4. Global Influence

NEWater Visitor Centre Context

Challenges - In 2000 the lack of public acceptance was shutting down 'treated wastewater' projects.

Where were we in 2000-2003?



Fear



Media amplifies



Politicians avoid contentious issue

Where were we in 2000-2003?



Once people's minds are poisoned by language, images and fear it is nearly impossible to open them.



Gut reactions of disgust (i.e. 'the affect heuristic') leave the public unable to make reasoned, evidence-based judgments.

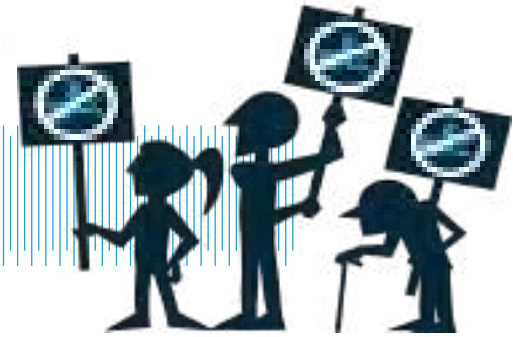


Where were we in 2000-2003?



- ❖ Judgments were being made on emotion and stigma rather than knowledge and understanding.
- ❖ People were having a very difficult time overcoming their emotional response to drinking water that was previously wastewater.
- ❖ Without some education prior to potable reuse project discussion, stigmatized reactions were killing the projects.
- ❖ Community was fearful of things they don't fully understand.
- ❖ The media amplifies these fears by using headlines like "Toilet to Tap".
- ❖ Politicians perceived fear and anxiety among the public.

We thought of the Water Cycle as linear - as though the world was flat.



Wastewater flows **AWAY**
into “the waters of
amnesia”.

Purified recycled water was misunderstood.





How were the NEWater Education Concepts Developed?

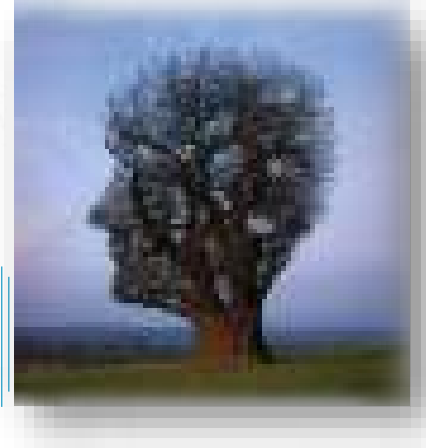
Social Research was Pivotal to the Development of the NEWater Concept Plan.



We reached out to Dr. Paul Slovic – an internationally acclaimed social psychologist related to risk and human judgment.



We drew heavily on Dr. Paul Slovic's study of stigma and risk.



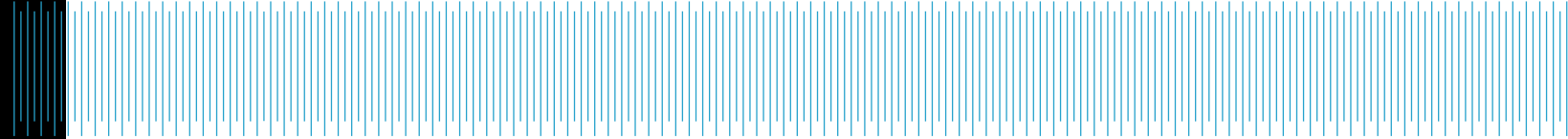
- ❖ Risk is a 'gut feeling' – we make snap judgments. Feelings grip us intuitively.
- ❖ Perception influences judgment – stigmatizing words have impact.
- ❖ Our brains are highly tuned to feelings so speaking about probabilities does not work.
- ❖ Things that are unfamiliar are perceived as risky – so we needed to make potable reuse familiar – water is nature's reusable resource.
- ❖ Attacking stigma with appropriate education content prior to decision making facilitates meaningful two-sided discussions.
- ❖ Our feelings about rarely shaped by data or data alone -- they are shaped by stories, by images, by consensus of our groups.
- ❖ Seeing is believing and helps to change perceptions – think about the connotation of 'treated wastewater'.
- ❖ Need and benefit must be understood.
- ❖ Learning can be fun.

Importance of Language Became Key.



- ❖ The way you define water use and reuse has impacts, creates ripple effects, enhances or minimizes stigma.
- ❖ New lexicon of water was decided upon even before we started to design the experience.

We decided to eliminate the stigma producing term “treated wastewater” and developed a new lexicon of water use and reuse that is still at the heart of the NEWater experience.



“NEWater is treated used water that has been purified by advanced membrane technologies to produce a water that is cleaner than normal tap water.”

NEWater Changed Minds



NEWater Visitor Centre Strategic Concept Plan

**The First Drinking Water Reuse Facility in the World to Incorporate a
World-Class Visitor Centre guided by social science, engineering and
technology**

NEWater Concept Plan



A Message-Driven Process

- ❖ We wanted a Visitor Centre that would forge both the emotional and intellectual connections about water and treatment technologies:
 - ❖ Each of the six key learning zones of the Centre was designed to transmit a specific message.
 - ❖ Over-all the Centre does not tell the visitor what to believe but creates the opportunity for a joyful learning experience that sows the seeds of understanding.

NEWater Concept Plan



Difficult Concepts Were Explained through the Power of Images

- ❖ The specific medium or format of message transmission was painstakingly designed.
- ❖ The Visitor Centre paid attention to creating an environment that could increase the probability of learning.
- ❖ Surroundings were understood to play a powerful role in the diffusion of information.

NEWater Concept Plan



The Transparency of a Visitor Centre Integrated into a Treatment Facility Was Considered an Advantage

- ❖ The Centre was designed to emphasize the ‘experiential mode of learning’.
- ❖ The Centre created a positive feeling about the facility, the processes and safety.
- ❖ The NEWater process area was kept incredibly clean.
- ❖ Now the student visitors wear white lab coats.

NEWater Concept Plan



Minds Were Changed:

- ❖ By not telling citizens what to believe but by reframing the issue and showcasing the technology
- ❖ By realigning public perceptions of the hydrologic cycle and the NEWater processes as part of the cycle created through scientific means
- ❖ By showcasing that a large part of the population of the world's industrialized countries already use water from upstream dischargers.



An Overview of the Experience

NEWater Overall Messages

“The Bedok NEWater Factory creates NEWater, which is a critical resource in Singapore’s effort to provide water for industry, for living, for life.”

The water in the pond around the VC is NEWater and there are Koi fish in it.





An Overview of the Experience

NEWater Overall Messages

The architecture and interior of the facility combines elements of pure engineering with spacious, comfortable and feel-good spaces to encourage absorption of the messages



NEWater Visitor Centre Walk-thru

The First Water Reuse Facility in the World to Incorporate a World-Class Visitor Centre guided by social science, engineering and technology



An investment in education yields huge dividends in acceptance.

NEWater Entrance



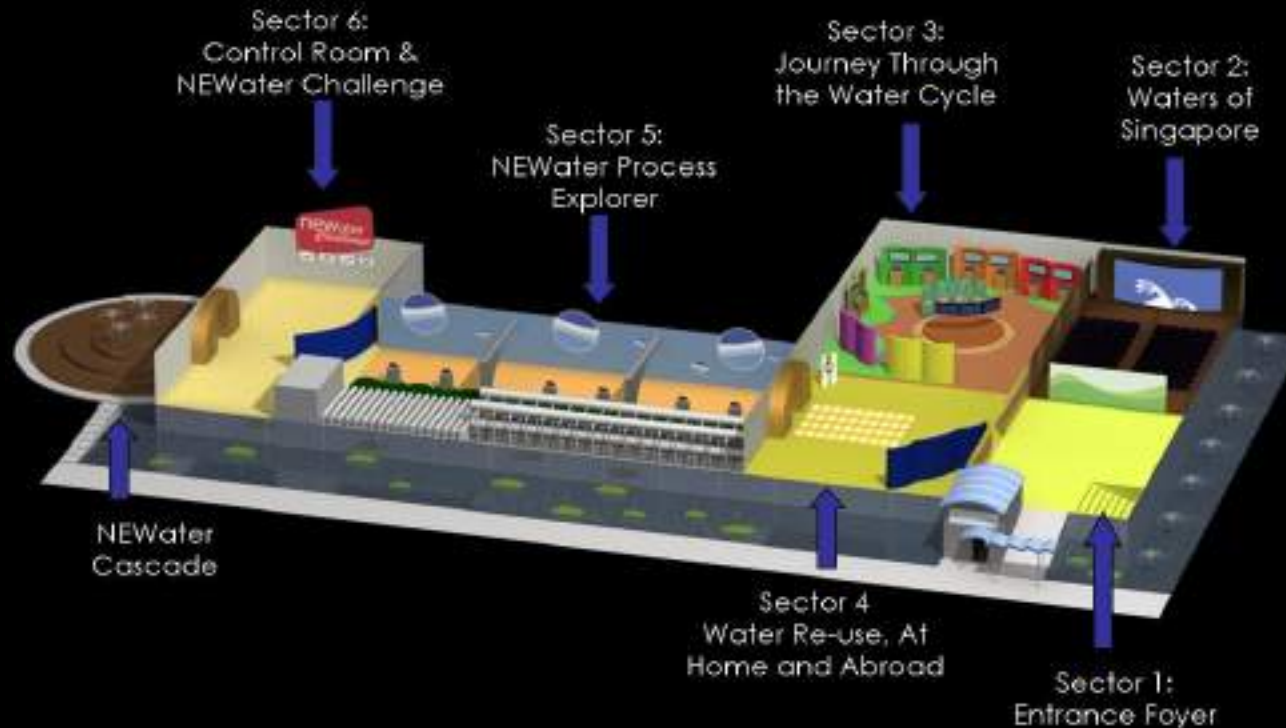


An Overview of the Experience

The Centre's mission was critical: Build public awareness and acceptance of leading-edge technologies that treat reclaimed, used water to a standard up to and beyond World Health Organization potable standards.

NEWater Design Plan

The Leaning Experience Was Divided into 6 Main Sectors



NEWater Sector 1

Message: Water is an essential part of life: our sustenance, daily living, lifestyle and industry. Globally, water is a precious resource that in many places is associated with emotional concepts such as spiritual elements of holiness, hope, fear and life itself.



The arrival foyer is a 167-square-meter (1,800 square foot) area. Walls are decorated with back-lit photos of water use around the world provided by the UN World Summit on Sustainable Development; a soundtrack plays softly in the background.





Waters of Singapore Theater

Message: Water is critical to life. Water is scarce in Singapore. Singapore's search for new technologies is never-ending

NEWater Sector 2



120 Seat Auditorium: Introductory Video

Technique: Video presentation



Journey Through the Water Cycle Central Feature

Message: Management and reclamation of water is a complete system that embraces the hydrologic cycle. There are Four National Taps working together to provide water supply in Singapore

NEWater Sector 3



Technique: Projected video animation from overhead — tour members gather around the central feature — video is displayed on plasma monitors and the circular screen on the floor

NEWater Sector 3 Included Fun, Engaging Interactive Games



Around the room are six large colorful interactive kiosks where individuals interacted with multiple exhibits. Each kiosk had two touch screen terminals, each with a large overhead flat panel slave monitor.

NEWater Sector 3

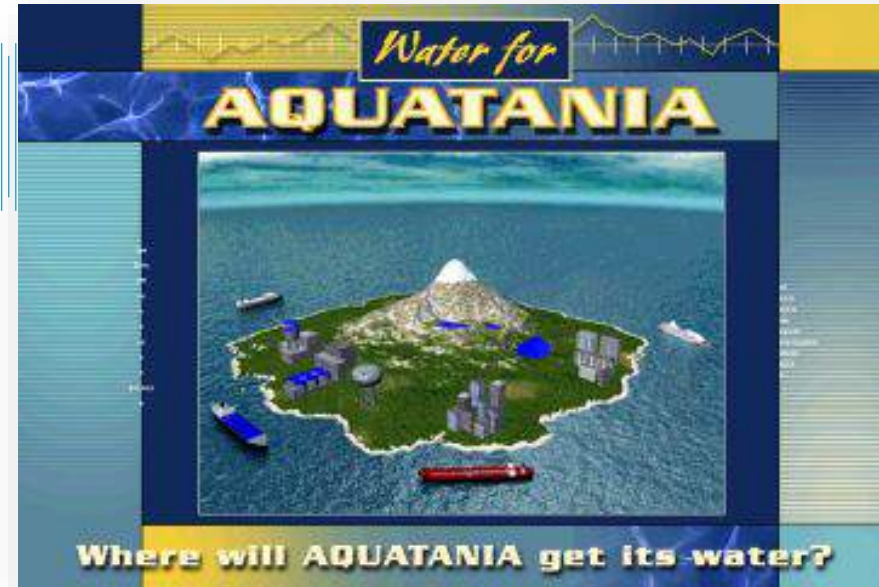


Message: “Fresh water is scarce in our world. It must be carefully managed, particularly in Singapore.”

Players are challenged to search through a timeline of global water history to find facts referred to in a challenge question.

Technique: Media-rich timeline

Acknowledgments: Adapted from Water Environment Federation (WEF) copyright 2000



Message: “Water is precious, and its supply and demand must be carefully managed to ensure sustainability -- in any country.”

Players are challenged to balance population growth rates, per capita water use, and various supply options and attempt to develop a water program that will be sustainable for 50 years. This highly realistic simulator shows how difficult it can be to balance growth in water demand with supply.

Technique: Water supply-demand simulation.

NEWater Sector 3



Message: “Because we have limited resources in Singapore, we must do what we can to prevent pollution and conserve our water resources.”

Players explore an illustrated landscape of Singapore to learn about personal and industrial sources and water conservation.

Technique – Interactive exploration



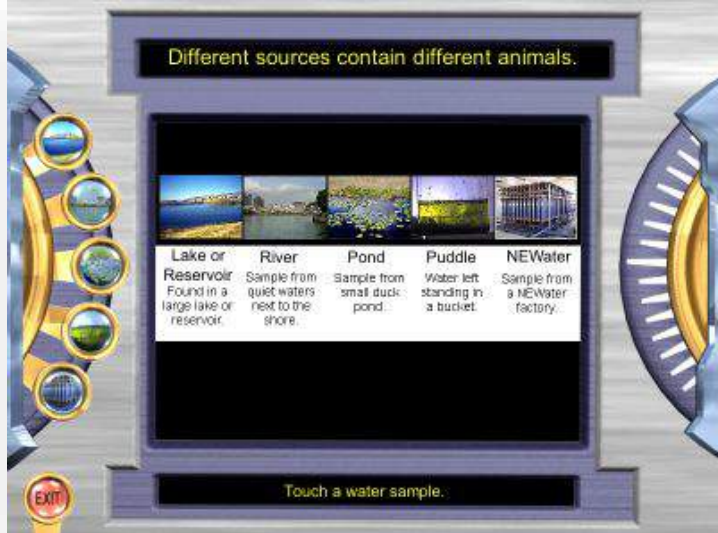
Message: “Singapore has a very comprehensive treatment system ahead of NEWater. The feedwater used for production of NEWater is already relatively clean.”

Players are taken on an animated tour of the used water infrastructure, which concludes in a tour through the processes in a water reclamation plant.

Technique - Virtual tour

Acknowledgments: Adapted from EcoMasters Interactive Program used in many US Water Reclamation Facilities

NEWater Sector 3



Message: “Showcases how clean NEWater is as compared to other sources of water. Visitors get a pleasant surprise when they click on NEWater and find nothing there.”

Players explore various water samples from different sources — from lakes to puddles — and view actual microscopy video of creates such as Giardia, Cryptosporidium, rotifers and e-coli bacteria.

Technique: Animated video microscopy



Message: “NEWater enables products and technologies that contribute to our life-styles, economy, quality of life.”

Players are challenged to match various water sources used in the production of various products. We learn how NEWater can be used.

Technique:
Matching game



Water Reuse at Home and Abroad – IPU Exhibit Area

NEWater Sector 4

Message: “NEWater is reliably pure and can be added to existing drinking water reservoirs as a supplement to Singapore’s raw water supplies. This concept is supported by worldwide experience and the conclusion of trustworthy experts.”



Techniques: Video and Interactive Displays



Walk on NEWater Transition

NEWater Walkway

The Tour now moves along the Walk on NEWater, past a panel showing the history of NEWater in still photos and news clippings, through a simulated vault door and into the highly valued NEWater Process area — the NEWater Process Explorer



Message: “Proven new technologies can treat water to a highly pure state, beyond the requirements of drinking water.”

NEWater Sector 5



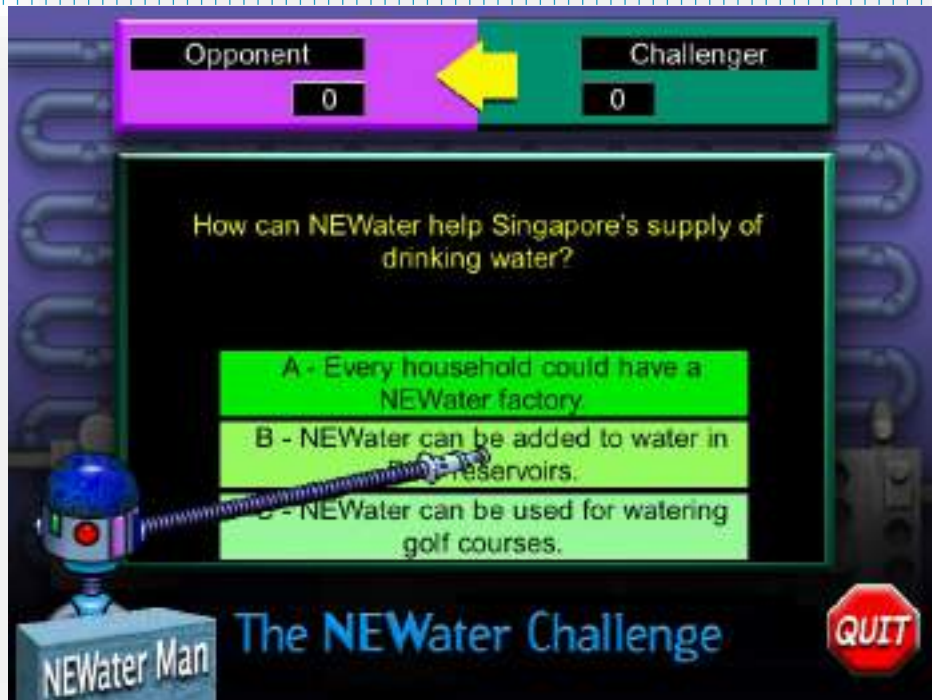
The elevated walkway is a 91 meter (100 yard) glassed in walkway through which the tour passes over the process equipment. At three stops along the way, touch screen kiosks and overhead plasma displays showed animations of individual processes — ultrafiltration, reverse osmosis, ultraviolet disinfection and water conditioning. Physical models

Technique: 3D models of process with interactive exploration



Control Room & NEWater Challenge

NEWater Sector 6



Technique: Quiz show interactive that reinforces the overall messages in other areas

Message: “The NEWater Factory creates NEWater, which is a critical resource in Singapore’s effort to provide water for industry, for living, for life.”



The tour exits the process area into the space where the visit concludes. Here visitors were challenged by an interactive game that pitted them against a computer character in a context of knowledge about water and the NEWater process. At the end, the visitors are treated to a celebration video before the doors open to the NEWater Cascade.



The Cascade

The Cascade incorporates features allowing the visitors to touch and feel NEWater once again, which is all part of a very important learning journey to accepting NEWater — for industry, for living, for life.

NEWater Exit



NEWater Conclusion



A collaborative process devised the messages in the concept planning stage. Close adherence to messages were ensured during the design phase of the exhibits, including all text panels and electronic media. **The messages created an inspired visitor experience** to inform public opinion and re-establish the **emotional bond between people and water.**



What we Learned During the Project and Subsequently



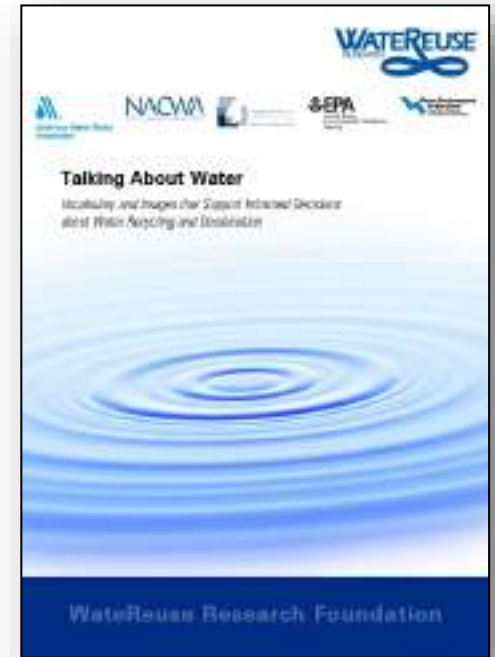
NEWater – What We Learned



- ❖ Feelings matter.
- ❖ The language of water can be used to minimize stigma.
- ❖ Context matters – water reuse for drinking is not new and unfamiliar.
- ❖ Being right scientifically is both critical and insufficient.
- ❖ Seeing and Tasting, is believing.
- ❖ Overcoming stigma can occur by creating familiarity and through testimonials of current users around the world.
- ❖ Engineering and science can remove chemicals and microorganisms from water and negative associations can be removed through application of social science research.

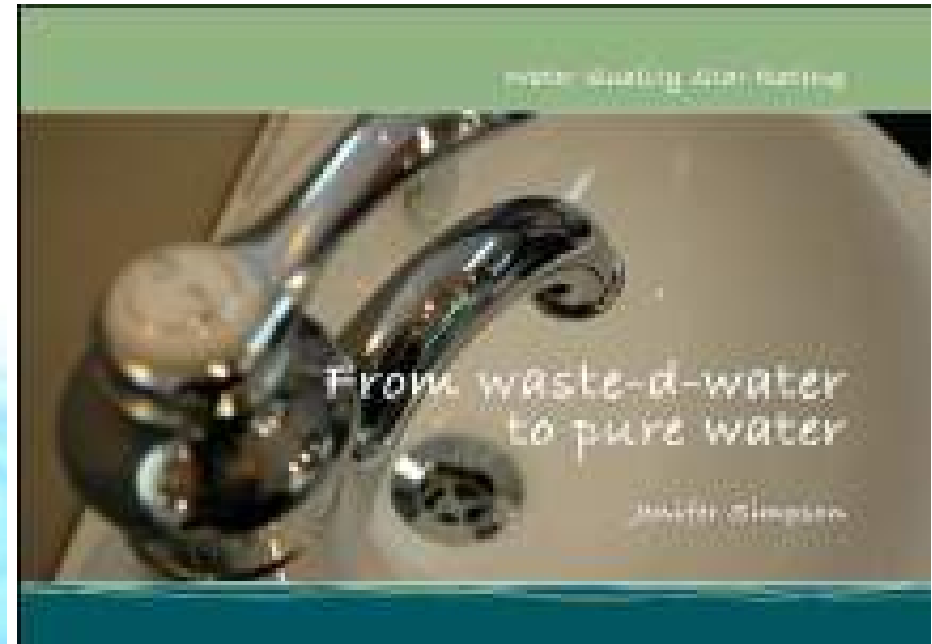
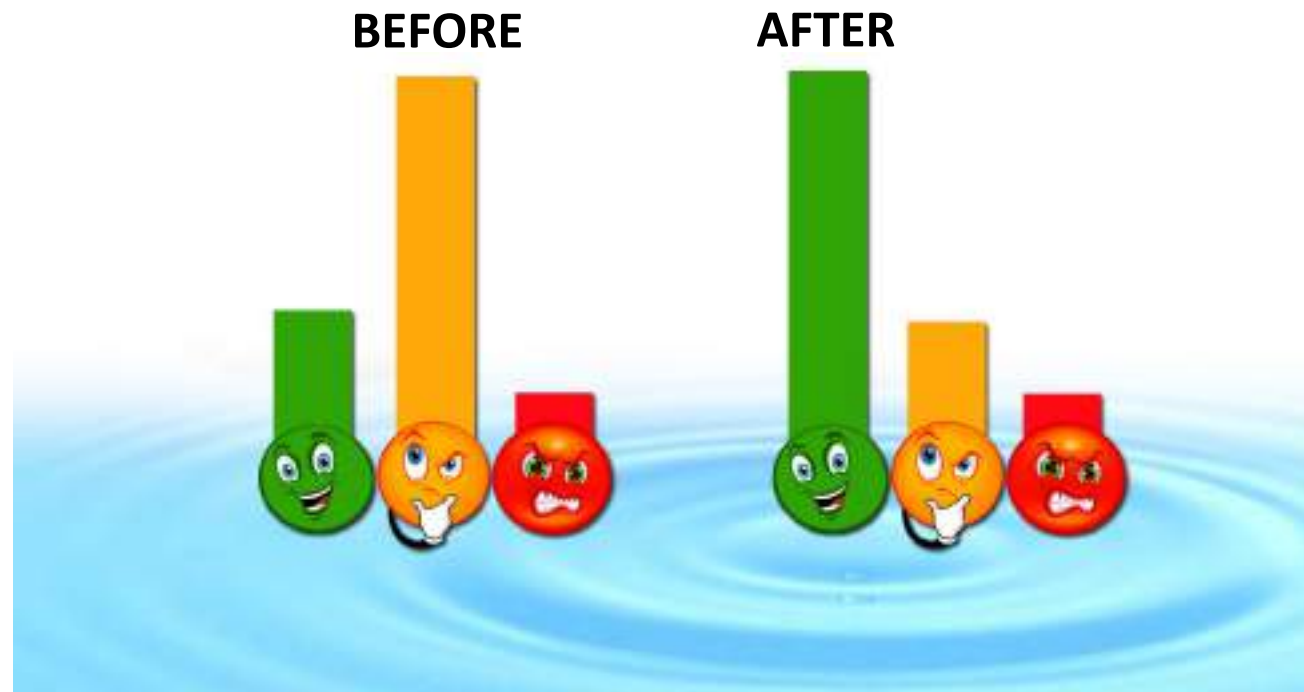
NEWater - Subsequent Research

- ❖ WaterReuse (2008 - WRRF 07-03) conducted research about the language of water.
- ❖ One aspect was focus group investigations in the US and Australia (Perth) which explored whether the interactive information from the NEWater Visitor Centre helped people to understand and accept water recycling in other places.





NEWater - Subsequent Research



Focus group outcomes seeing education materials from NEWater and other materials such as waste-d water to pure water (from Jenifer Simpson).

NEWater - Subsequent Research



Awareness of the words we use makes a difference

❖ Avoid using jargon, acronyms, and stigmatizing terms.

Acronyms

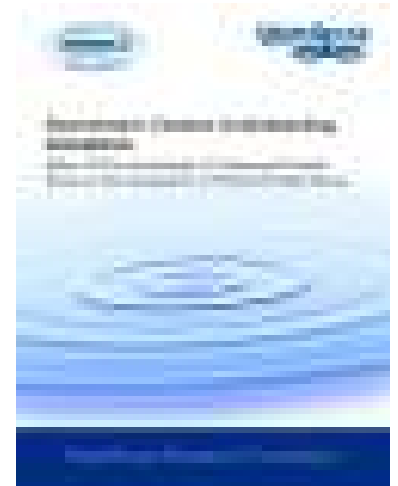
Jargon

Stigma

NEWater - Subsequent Research

Water Cycle Learning is Critical

In 2010 WRRF explored whether learning about the urban water cycle made a difference outside of Singapore. The research product “**Downstream**” video has now been translated into Spanish & German and is used in many demonstration and visitor centre presentations and on websites.



The water that flows down
your drain may connect to
the source of drinking water
for another community.



We are all living
downstream.




Water reuse does **NOT**
involve drinking water
directly from the toilet.






Subsequent Research from WaterReuse's "Downstream"

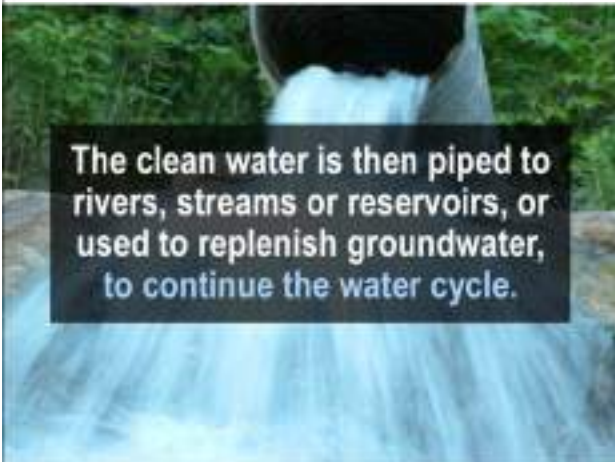
Here's how it **actually** works:




First urban waste water is treated to remove harmful contaminants through a number of steps.




Sometimes advanced technologies are used to further clean the water. Reverse Osmosis is the same treatment used by the premium bottled water companies.



The clean water is then piped to rivers, streams or reservoirs, or used to replenish groundwater, to continue the water cycle.



Eventually it reenters the urban water system where it is treated at a water treatment plant again.



Only then does the water flow back to your tap to repeat the cycle again.

Acceptance of water after viewing Downstream happened quickly.



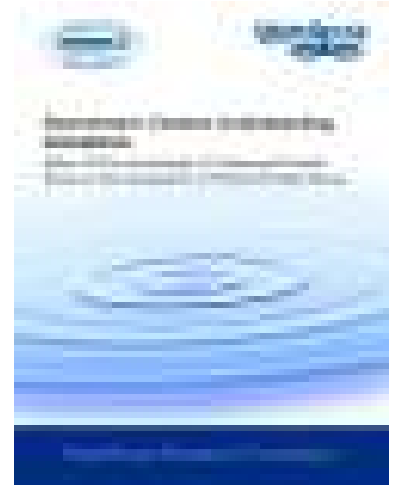
Downstream Research reinforced NEWater findings - words and context advance understanding



Quotes from the Focus Groups indicate the influence of terminology. Ms. N. from Sydney said this about reservoir augmentation:

"I don't know if it's the word purification or it exceeds the standard that makes me feel safer with this kind of process, but I'd be very happy to drink it."

Downstream Research reinforced NEWater findings - words and context advance understanding.



Making purified recycled water familiar, minimizes stigma and risk by showing:

- ❖ **This is a proven technology.**
- ❖ **Other communities around the world have been using it successfully.**
- ❖ **Our community members are not Guinea pigs.**
- ❖ **It has passed rigorous public health monitoring.**

The Ways of Water Research



- ❖ A short, engaging animation told the story without complex definitions.
- ❖ Simple, appealing graphics reduced the cognitive load of people trying to understand complex ideas.
- ❖ Water scarcity was presented as a problem to be solved through human intervention.
- ❖ The story was peppered with unusual, unexpected graphics.

“After viewing a short animation of water supply (The Ways of Water) survey respondents in California (West Basin Water District) expressed a remarkable level of support for direct potable reuse when survey respondents were aware direct potable reuse is the lowest cost option and most direct pathway.”

NEWater Visitor Centre: Global Influence

The global impact of the NEWater Visitor Centre still resonates .

NEWater + Subsequent Research paved the way for the Australian Water Recycling Centre of Excellence education products (now known as WSAA's Water 360 Tools)

Water cycle learning continues to make a difference.

- ❖ WATER: Think and Drink – “We drink the same water as the dinosaurs” (Available from WSAA: Water 360)
- ❖ Water Cycle Explorer – The urban water cycle mimics nature’s way of cleaning water (WSAA: Water 360)



NEWater – Global Influence

The Global Connections Map (now a Water:360 tool) expanded and continued the impact of making water reuse familiar.

Global Connections Map

- ❖ 23 sites at present
- ❖ Over 100 short videos
- ❖ Over 30 FAQs answered by US and global experts
- ❖ (12) Science Animations

Global Connections Map

Use this interactive map to learn about places around the world that are using recycled water for drinking. The map includes case studies and videos for the profiled projects.



NEWater – Global Influence

San Diego Demonstration Centre uses water cycle learning.

Both Singapore and San Diego showed evidence of “unacknowledged reuse” in their visitor experience -- few have followed their leadership.



NEWater – Global Influence

The Global Connections Map is being used in the US in visitor centres and on websites. It is on the WaterReuse Association website.



Orange County Water District



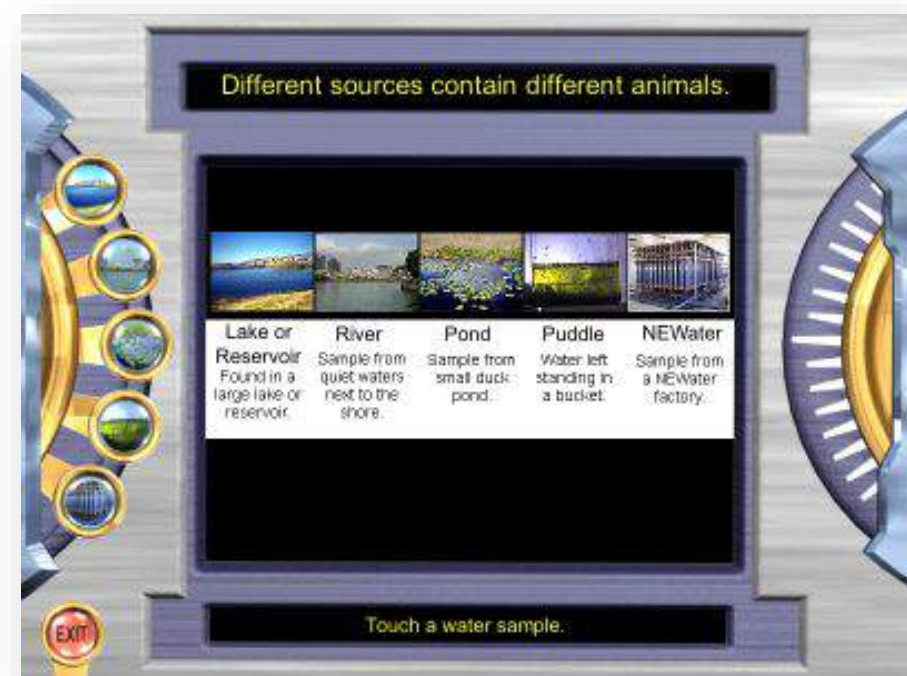
Water Replenishment District of Southern California Projection Globe

NEWater – Global Influence

Exhibits that show what we put into water and how we take it out again helps showcase purity of NEWater and Purified Recycled Water.

What Lessons does it teach:

- ❖ Reveals what is actually in water that needs to be taken out to make it fit for purpose
- ❖ Illustrates the relative sizes of bacteria and viruses
- ❖ Explains that water can be treated differently for various uses



NEWater – Global Influence

Orange County CA - What's In A Drop?



Orange County Water District Interactive



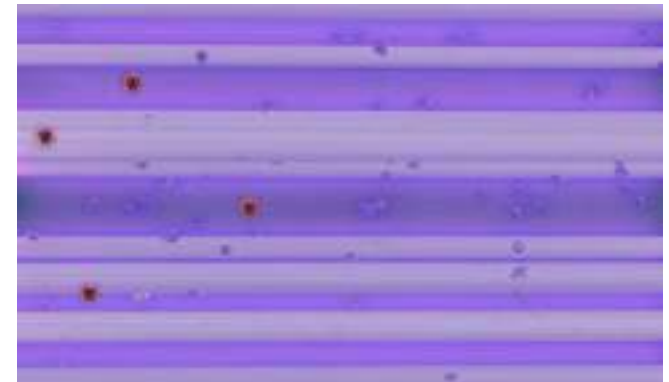
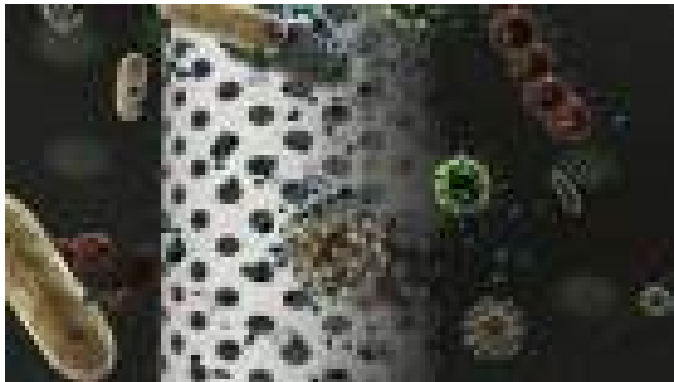
5 Short videos featuring different water samples.

NEWater – Global Influence

Understanding the science of purified recycled water treatment enhances trust.

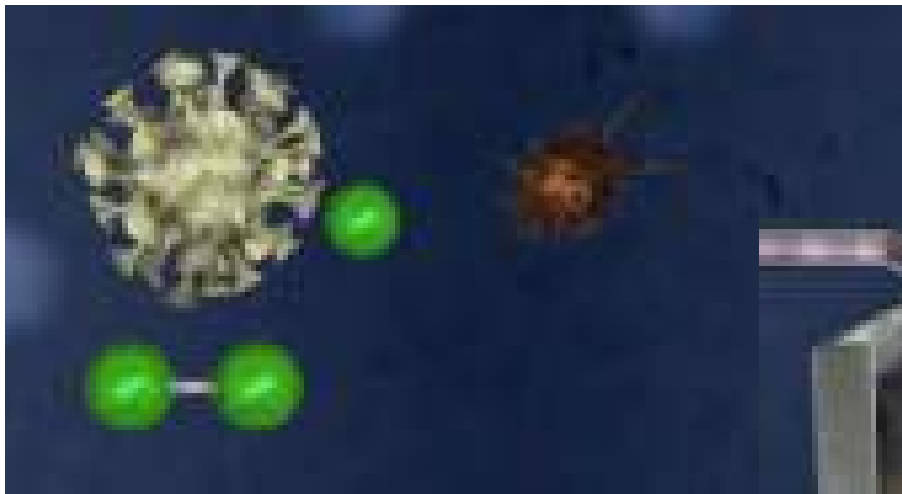
San Diego Science Animations

- ❖ Micro-filtration
- ❖ Reverse Osmosis
- ❖ UV Disinfection



NEWater – Global Influence

Water 360 science animations make the invisible visible and understandable.



Ozonation



Dual Media Filtration



Biological Active Carbon

NEWater – Global Influence

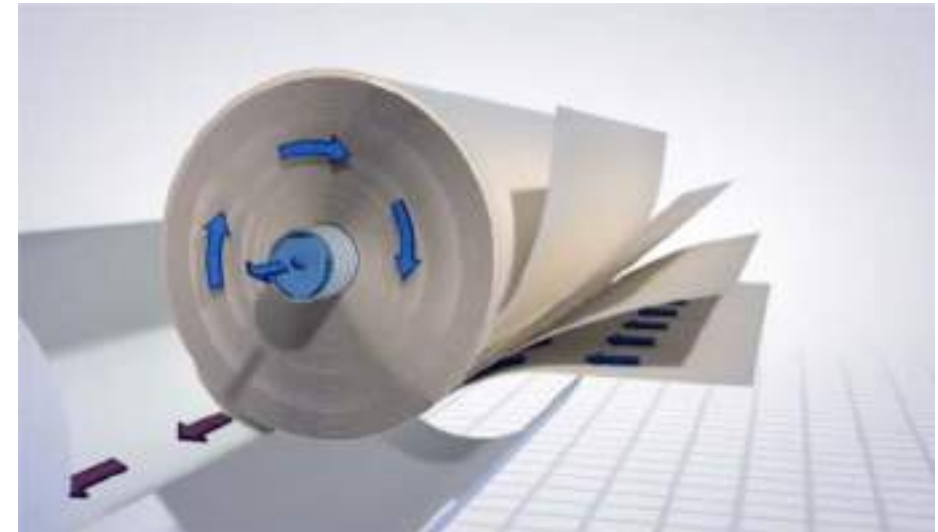
Understanding science of treatment continues to help advance acceptance.



**Hampton Roads, Virginia
Interactive Kiosks**



**Las Virgenes – Triunfo Visitor Centre
Interactive Kiosks**



**Metropolitan Water District of Southern
California - Animations**

Ideas and Lessons that grew out of NEWater

Ideas and lessons that grew out of NEWater can be combined with new communication tools to inspire visitor centre designs that merge existing materials with new communication technologies.

NEWater – Global Influence

New Process Interactive Program Display Technologies



The Legacy of NEWater is that communities now have a proven path to gain acceptance for potable reuse that can be communicated through a multitude of new tools - like the use of smart glasses, tablets and smartphones or even providing an environment where users can be immersed in virtual and augmented reality (AR & VR).

NEWater – Global Influence

Global Water Connections Map can be expanded to add more places



The Global Connections Map has been popular in the United States and can be updated to include more places in the US, Australia and around the world

NEWater – Global Influence

“Water should not be judged by its history, but by its quality.”

Dr Lucas van Vuuren (1927-2014)



This quote first used in Windhoek; Namibia was used in the quote wall at the NEWater Visitor Centre. It has now been used many times in presentations and other visitor spaces.

NEWater helped influence the education research and visitor centres that followed.

Some of the education materials it fostered can be enhanced and adapted.

Thank You

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Video Links

ONE WATER UNDERSTANDING

<https://vimeo.com/225437202>

Password: (no password needed)

WATER CYCLE EXPLORER

<https://vimeo.com/165153833>

Password: cycle

AUSTRALIAN WATER RECYCLING CENTER OF
EXCELLENCE MOTHERS ASSEMBLY

<https://vimeo.com/179227018>

Password: cycle

RESEARCH SUMMARY

<https://vimeo.com/525170783>

Password: h2o

RE-IMAGINING WATER VIDEO

<https://vimeo.com/147738152>

Password: (none required)

AMERICAN WATER EXHIBITS

<https://vimeo.com/523506716>

Password : AWater

HAMPTON ROADS VIDEO WALL

<https://vimeo.com/260478651>

Password: SWIFT

NWR/ASTOUND VIDEO

<https://vimeo.com/525841790>

Password: (none required)

THE VORTEX GLOBE– GIPPSLAND, VICTORIA

<https://vimeo.com/7542058>

Password: (no password required)

GLOBAL WATER SUSTAINABILITY CENTRE - DOHA PROJECTION GLOBE

<https://vimeo.com/525863635>

Password: (not required)

WRD PROJECTION GLOBE

<https://vimeo.com/526312987>

Password: (not required)

NEWater – Global Influence

Next, Diane Taniguchi-Dennis is going to talk about an initiative in Oregon that took root and influenced Singapore to make beer.

