Water in a Wellbeing Economy

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WELLBEING ECONOMY ALLIANCE

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“The art and practice of equitable distribution of and access to fresh water for all people in the 21st Century, as a fundamental human right and international obligation, is the mother of all ethical questions of all transboundary natural resources of a finite nature”

-Thomas R. Odhiambo, past President of the African Academy of Sciences

When Russian cosmonaut Alexei Leonov conducted the first space walk in 1965, he gazed upon the Earth for just over twelve minutes. Upon his return, he is quoted as saying the following: “the Earth was small, light blue, and so touchingly alone, our home that must be defended like a holy relic.” Significantly, in gazing back at his home planet, the cosmonaut was also looking at the only planet known to contain stable liquid water on its surface. It is in this liquid water, beautifully maintained and carefully regenerated in our planet’s water cycle, that life here began, evolved, was nurtured and fed. Water exists in the bodies of all people, animals and plants and is a crucial element of almost all the products and services that we rely upon today. The vast oceans of water that cover 70 percent of our planet can seem infinite in both volume and potential -- a commons (shared resource) too large to manage. However, water is a finite resource and it is humanity’s thirst for it that is infinite. Water, a simple compound so crucial to sustaining life on our home planet, must be defended as if it were a holy relic.

What is our vision?

The Wellbeing Economy sees a world where the economy works to promote human and planetary wellbeing, and not primarily individual and corporate profit. Food and water are fundamental human needs required for wellbeing (Smith and Max-Neef, 2011:142). In surveying people on what constitutes a ‘good life’ to inform the development of the UN’s Sustainable Development Goals (SDGs), access to clean water and sanitation was identified as one of the top priorities for people around the world (United Nations, 2013:3). As such, one of the principal goals of the United Nations (UN 2020) is to achieve fair availability and sustainable management of water and sanitation for all.

We envision a **Wellbeing Economy where all people are ensured safe and secure water access and sustainable water flows are created and maintained.** Through effective management of our water supply and distribution systems, we can strengthen this vision.

What is Water Sustainability?

1. Rates of water extraction do not exceed rates of replenishment
2. The rate of water pollution does not exceed the rate at which it can be recycled, absorbed or rendered harmless to people and planet

Taken from: Dyball and Newell, 2015

Principles of Water Ethics

A Wellbeing Economy must also consider who uses water and the quantity they use, how water is protected by and for ecological processes and human health and the ways in which water is accessed and distributed between and within generations. The Principles of Water Ethics (Jennings, Heltne and Kintzele, 2009) provides a useful way to represent these considerations. They are:

1. **Respect for human dignity by providing all people with water, the essence of our basic needs**
2. **Equity and proportionality in distribution**
3. **Solidarity between various stakeholders**
4. **Common good- with rules for governance and management**
5. **Responsible stewardship**
6. **Inclusive and deliberative participation of entities**

We can use these underlying principles as a guiding light for understanding water in a Wellbeing Economy. In this paper, we discuss the most urgent challenges facing our water system and solutions in the areas of governance, ecosystem services accounting, health and sanitation, agriculture, industry and urban water systems, with examples and case studies provided. These various water solutions are evaluated based on whether and how they meet the Principles of Water Ethics.

What is the current situation?

Water is crucial to life. This makes creating a water Wellbeing Economy to ensure clean and sustainable water access for all life on earth an important endeavour. However, in order to do so, we must overcome the challenges and flaws of our current situation. These challenges are outlined in this section.

1. Erratic rainfall patterns

Water is the medium through which nature and human societies experience most of the impacts of climate change, expressed through drought and floods (UN Water, 2020). Globally, available farmland is shrinking, causing significant concerns for food security (FAO, n.d.). The impacts of increasing rainfall variability extend beyond loss of crop productivity, as increasing water scarcity ultimately threatens our access to drinking water and destroys natural habitats upon which the ecosystem relies.

2. Access to clean water

From headwaters to tap, there are many ways in which our water supply is polluted, impacting human health and sanitation. This pollution can occur from human-caused sources (e.g. industrial by-products, run-off from cities, hard wastes, outdated infrastructure), natural sources (e.g. nitrates, saline intrusion, turbidity) or a combination of the two. Many water reservoirs take hundreds of years to return to a clean state, should pollution occur.

3. Transnational water legislation

Many of the largest water catchment regions in the world cross international borders. As such, transnational legislation is required to govern its sustainable management for all stakeholders throughout the catchment. However, these agreements are often ineffective and difficult to police.

4. Technology

Globally, significant technological gaps exist in water quality and supply management. Effective water purification solutions are often perceived to be costly, which can discourage developing countries from pursuing them. However, many inexpensive water purifications systems exist, including some which incorporate elements of natural processes (e.g. using marshlands). Therefore, for developing countries, the challenge lies in accessing funding to make improvements at city-level scales.

5. Urban Water Systems

Many countries experiencing rapid urbanisation are also unable to install and maintain water supply systems at a fast-enough rate. Large-scale storage projects that rely upon the cooperation of landholders and funding agencies are difficult to implement. However, projects like the W12 Congress are looking to improve this. Additionally, the design of old 'colonial' cities (such as Jakarta, Indonesia) is often outdated and can lead to informal usage of water systems (Maryati, Humaira and Kipuw, 2018). Updating this infrastructure can be expensive, especially within the constraints of the city's budget and the political cycle. Furthermore, a lack of interest in improvement from water supply providers can also deepen this challenge, especially when financially poor users are perceived as an economic liability.

6. Defining the 'true' value of water

Water and its associated outputs and processes benefit humans and are crucial towards enhancing societal wellbeing. Directly, drinking water, energy and agriculture are necessary for peoples' survival. Freshwater ecosystems and wetlands provide regulatory and purification functions to create clean water for life to thrive, while water flows improve soil stability and erosion resilience. Water is also integral to cultural beliefs and lifestyles, as sacred sites for many Indigenous communities throughout the world and as places of recreation and relaxation. Together, all the ways that water contributes to our wellbeing, also known as ecosystem services, are not taken into account while evaluating the costs and benefits of any water related activity.

7. Evaluating the 'true' value of water

The importance of water supply to environmental and human wellbeing is difficult to gauge in monetary terms. This difficulty can lead to 'pricing water at zero'- in effect, not pricing it at all- leading to overexploitation, misuse and waste (Lam, 2015). There are a range of issues - and interests - that prevent the 'true' value of water from being accurately represented. First, most cities receive revenue for water management from consumer tariffs. This can disincentivise cities from pricing water for affordability and does not reflect water's value for our basic survival (W12+ exchange, 2020). Second, the 'Colonised Greed' mentality makes it difficult for people to look beyond short-term gains of using resources in a particular way or using different metrics other than money to measure value (Massy, 2013). Third, the constraints of typical election cycles mean that costs are reflected before impact is felt on the ground, which disincentivises cities from evaluating water appropriately (Webb et al., 2018).

Proposed Solutions

The challenges of our current water situation require solutions across disciplines, boundaries and scales. Below we examine various solutions in the areas of governance, ecosystem services accounting, health and sanitation, agriculture, industry and urban water systems, with case studies and examples.

Governance

Good governance is essential to ensure secure, equitably distributed and sustainably managed water systems in a Wellbeing Economy. Water is a universal public good and a common-property resource, even though many of the benefits obtained from water can be individual. Since no one should be denied access to water, and it is in limited supply, it must be managed appropriately. Therefore, we must strive to create national (such as the 2019 South Africa National Water and Sanitation Master Plan), international, and local city-specific norms for governing this universal common resource. Such plans should encourage communication, transparency, and accountability between all actors involved, and be in line with the principles of water ethics (see box above).

CASE STUDY: VERMONT, USA (FARLEY ET AL., 2014)

Vermont proposed the creation of a Common Assets Trust (VCAT) in 2007, 2011 and 2012 which mandated state protection of common assets (such as air and water) for present and future generations, while establishing rules in which certain users (predominantly large industries) were charged fees, deposited into a common assets trust fund, which would be managed to protect those assets and serve the interest of present and future generations. In this way, rules are created and mandated for common stewardship, while also encouraging inter and intra-generational equity. Such a policy also has distributive impacts, as funds can be used for government spending and dividend payments to citizens, especially those on the lower end of the socio-economic spectrum.

CASE STUDY: WHANGANUI RIVER (TIGNINO AND TURLEY, 2018)

In 2017, New Zealand granted its third-longest river, the Whanganui, the legal rights of a person as an ancestor of the Whanganui Iwi people. Two guardians were appointed to act as "trustees" on behalf of the river and its current and future beneficiaries, and a financial redress of NZ 80 million was included in the settlement.

CASE STUDY: RIVERS GANGES AND YAMUNA (MULAY, 2019)

In 2017, the Uttarakhand High Court in India granted legal status as a person to the Rivers Ganges and Yamuna to prevent further pollution in the already heavily polluted river system. However, no financing was given to support the arrangement, and it received backlash from the Central Government and Uttarakhand High Court for being 'unimplementable by law', as it runs through different states.

Below we offer four possible approaches to water governance:

1. Commons stewardship

Common stewardship of water resources is when water resources such as aquifers, rivers, lakes etc are declared as commons, collectively owned by citizens of a region, locality or country, and collective rules and norms are formulated regarding management of the resource. Typically, a Common Asset Trust is set up to legalise the explicit obligations of protection and management and create binding, unalienable rights for current and future generations (Costanza, 2014). This solution meets Objectives 2, 4 and 5 of the water ethics framework.

2. Rights to Nature approach

Conventionally, resources such as water do not have legal rights, such as the right to not be harmed or exploited. Instead they are managed from the perspective of participating states and territories. However, some countries such as Ecuador, Bolivia and Colombia have granted 'rights to nature', while New Zealand and India have granted the 'rights of people' to some of their river systems as a form of governance. This solution meets objectives 4 and 6 of the water ethics framework (in the case of objective 6, the entity that

3. Indigenous Custodial Rights frameworks

Indigenous Customary rights frameworks assign custodial rights over water (and other) resources to Indigenous peoples in the region. Globally, Indigenous knowledge is typically not considered, despite the fact that they often have thousands of years of science, experience and observation of local environmental conditions (Aliento, 2019). However, Indigenous people have the responsibility to protect resources enshrined in their traditional lore. Their self-determination and cultural knowledge (which must be allowed to thrive) is crucial for moving towards sustainable management of water. Indigenous custodial frameworks further Articles 11 and 29 of the United Nations Declaration of the Rights of Indigenous People, which guarantee Indigenous peoples exercise of traditional and revitalised laws, and the right to conserve and protect the environment and the productive capacity of their resources (UNDRIP, 2007). It meets 'water ethics' principles 3, 5, 6 - and most importantly 1 - by giving Indigenous peoples the dignity of autonomy and respect.

Governments are beginning to see the importance of Indigenous inclusion. Since 1989, the Jamestown S'Klallam people in Washington's Olympic Peninsula have worked with natural resources staff to complete over 40 watershed planning documents and rehabilitation projects, initiating habitat improvement projects in the lower Dungeness watershed and estuary, erosion control, floodplain restoration and a public education and outreach campaign (Born and Genskow 2000 in Cronin and Ostergren, 2007). In 2009, the Australian water commission established its first Indigenous advisory group for water management. In 2019, the Ministerial Council decided to include an Indigenous member to the Murray Darling Basin Authority, the independent body in charge of the Murray-darling Basin plan, while the Snowy scheme operational management included 5 Indigenous communities possessing a direct connection to the waterway in the decision-making process for Snowy 2.0 (Jackson and Moggridge, 2019).

4. Participatory stakeholder management

Since water is a common resource, a key ecosystem service, and a universal need for all, it must be managed by everyone who derives benefit from it. That is, its governance must involve participatory decision-making. Participatory decision making is a prerequisite for (and therefore can be paired with), the above solutions mentioned. For example, the commons and rights to nature governance frameworks also have the potential to increase the participation of traditionally lesser-heard stakeholders such as Indigenous peoples if paired with a customary rights framework. Most importantly, participation allows people to take responsibility for the resources within their communities. Collaborating with many stakeholders, including NGOs and the civil society sector, such as through citizen monitoring, can supplement government resources and provide a means for communities to understand their own water use and access clean water.

The water governance solutions presented above are typically suited to more local levels of management, such as specific countries, states and communities. In order to be scaled up in a Wellbeing Economy, they all require public-private-civil society partnerships and suitable blended financial models to fund them.

CASE STUDY – KITALE, KENYA (MAJALE, 2009)

Kitale in Kenya used public participation to bring water and sanitation to its slum areas by creating a collectively managed community inventory mapping out local institutions, women's groups and young people's groups. Public participation, if done in an equitable manner, allows for different value and knowledge systems to be heard and integrated into the decision-making process, creating more holistic frameworks and better governance outcomes. In this manner, it achieves principles 3, 4, 5 and 6 of the Principles of Water Ethics.

Accounting for the 'True Value' of Water

Accounting for the "true value of water" (5 in the water ethics principles) is crucial to help track the cost and benefits of the ecosystem services that water provides, and prevent avoidable damages to water availability, security and sustainability. Not surprisingly, this is a complicated undertaking. Many water ecosystem services frameworks focus on provisioning services - meaning the ecosystem's capacity to store, treat and regulate flows of water and nutrients for human activities (Baker et al., 2013; Helfenstein and Kienast, 2014). However, it is equally important to include cultural services, such as sacredness to certain communities of people, or as places of recreation. It is also important to account for other co-benefits such as biodiversity benefits and increased productivity, health, and opportunity for those with access to clean, drinkable water.

One way to account for the true value of water is the method of Payment for Ecosystem Services (PES), which is gaining traction in many countries today. Since most services provided by water are not included in the market transaction, PES seeks to internalise these environmental 'externalities' by ascribing a monetary value to water ecosystem services to capture its full value (Farley and Costanza, 2010). This method can work because, in our present economic system, estimating and demonstrating value in terms of money and national capital accounting makes the most sense to the public and policymakers. An example of this is Vittel's 1993 compensation program with the French dairy farming sector that aimed to preserve groundwater levels and water quality for sustained agriculture by paying farmers in cash, kind (technical assistance) and long-term contracts (Wunder et al., 2008).

Similarly, Water for South Sudan, an NGO working in the Bahr el Ghazal region of South Sudan, provides free wells to remote communities with a certain monetary amount attached to it (Water for South Sudan, 2020). This monetary amount can be loaned out to community members, and the interest generated from it is used to finance upgrades and well maintenance.

Such schemes aren't perfect. As with all ecosystem services, it is difficult to gauge the total value of water supply to people and the environment in monetary terms. It runs the risk of commodifying water resources, which are inherently public and common property resources, and must be treated as such. Additionally, assigning a monetary value to a resource or a practice has been found to reduce its intrinsic value in the eyes of managers, as motivations shift to merely financial (Rode, Gomez-Baggethun and Krause, 2015). This is not beneficial for sustained long-term water management in a Wellbeing Economy.

An alternative is using non-monetary instruments as well to value ecosystem services. These include nudges (such as more efficient, smarter water appliances), networks (such as advocacy groups, social media influencers who raise awareness) and building collective social norms regarding reducing the demand for and use of water. They also include Indigenous custodial rights frameworks that allow Indigenous people to govern, and therefore value, water according to their traditional lore that emphasises a more holistic valuation of water, including its social, cultural and ecological services (see governance section above).

Additionally, land and water management tools that take into account key components of landscape function and their inherent relation with ecosystem services are useful to account for water's true value. Examples of this include Landscape Function Analyses (LFAs) that quantify changes in necessary functions of the soil, such as its ability to withstand erosion, cycle nutrients and absorb water, in response to natural and human-induced changes (King, 2016). Monitoring through the use of such tools is crucial to generating simple, cost effective solutions for water management that maintain ecosystem services while bolstering resilience, incomes and sustainability.

As Costanza et al. (1997, 2014) emphasises, we must ensure that the various ways that water, food, energy, and ecosystems such as forests and oceans, contributes to our individual and social wellbeing, is properly accounted for and acted upon. A Wellbeing Economy must value water according to the myriad of ecosystem services it provides and any combination of the above solutions would be important steps towards doing so.

Health and Sanitation

A Wellbeing Economy must ensure that all people have access to safe drinking water. This is fundamental, meeting Principle 1 - Respecting human dignity- of our Water Ethics Principles. However, we have a long way to go for this to happen. Although 1.8 billion people have gained access to drinking water since 2000, one in three people currently still do not have access to safe drinking water, while two out of five people do not have access to basic handwashing with soap and water (UN SDGs, 2020). Every year, around 2,97,000 children under the age of 5 die due to diseases caused by poor water access, sanitation and hygiene (collectively known as WASH), such as diarrhoea, cholera, dysentery, hepatitis A and typhoid (UNICEF and WHO, 2019). These statistics show that providing and ensuring access to water is not enough.

A Wellbeing Economy for water must rethink how we manage, value and distribute water in a manner that is safe and hygienic to consume.

One way to tackle this problem, based on governance, is developing water-safety plans at different levels of administration (local, national and international). Such plans have been implemented in at least 93 countries today, with an additional 69 countries reporting to have them under development (WHO and IAW, 2017). These plans must identify and include different users in the planning process, prioritising unheard or marginalised voices such as women, informal settlement dwellers and groups who currently lack information. They must also monitor the satisfaction derived from the various users of the water, develop education and awareness programs for users, and constantly intake feedback to ensure public accountability and most importantly, trust. Trust and partnerships with existing local organisations are vital to ensure the efficacy of any public health initiative.

Overarching plans must also include on-ground action to uplift those impacted by WASH issues. Developed by CDC and the Pan-American health organisation, Safe Water Systems (SWS) protects communities from contaminated water by promoting behavioural change through affordable solutions (NCEZID, 2014). First, depending on existing sanitation conditions, technological feasibility or cultural acceptability, the organisation, in partnership with national, state or local government, provides households with water treatment methods, such as chlorination or solar disinfection, and a safe place to store treated water. Then, they engage in social marketing and community mobilisation with households in the community to promote behavioural change related to WASH.

CASE STUDY: CARE KENYA, WATERGUARD

In 2003, CARE Kenya began marketing and distributing a locally produced SWS product, a bottle of sodium hypochlorite solution branded. This product was promoted by many community organisations in collaboration with CARE, along with developing a hand hygiene training curriculum for nurses and introducing SWS and hygiene education in schools. Such endeavours ensure that communities have access to safe water and have the tools necessary to make water safe themselves.

Agriculture

In order to transition to more sustainable water management practices, it is integral to in turn reform agricultural practices so that we may see the equitable, resilient and sustainable food systems expected of a Wellbeing Economy. However, these reforms cannot occur without considering the function of water within these systems. Currently, agriculture accounts for 70% of global freshwater usage (Pretty & Barucha, 2014.) Changing this highly extractive nature is necessary to ensure that people and other water uses are not left out (principle 1) and create a more responsible, interconnected agricultural system (principle 5). Valuing and managing water supply better can also help create equity and proportionality in distribution (2) while integrating multiple stakeholders such as farmers, irrigators, companies and upstream and downstream communities into the process meets principles 3 and 6 of the water ethics framework.

"In order to transition to more sustainable water management practices, it is integral to in turn reform agricultural practices so that we may see the equitable, resilient and sustainable food systems expected of a Wellbeing Economy."

Identified below are three key areas for agricultural reforms crucial to improving its relationship with water:

1. Optimising crop distribution

At a fundamental level, consideration of the type of crops grown and their suitability to particular climates is essential to their present-day success. However, to achieve the vision of a Wellbeing Economy, it is also essential that these considerations take into account the future impacts of climate change. Optimising crop distribution based on water availability has the potential to reduce rainwater and irrigation water usage by 14 and 12 percent respectively (Davis et al., 2017). An example of where redistribution of crops could improve crop yields can be seen with rice. In India and other parts of south-east Asia, productivity has decreased by approximately 2% due to the impacts of climate change. Conversely, increases in productivity have occurred in Australia and the United States (Ray et al., 2019). While this effect can't entirely be attributed to water availability, it does demonstrate the need for farmers to reconsider the geographical distribution of crops globally to better prepare for the impacts of climate change.

2. Agricultural systems

Agroecology is a holistic approach to agriculture, utilising relationships between plants, animals and the environment as a whole to create more efficient systems. Additionally, agroecology has the potential for considerable social benefits through utilisation of Indigenous knowledge. For example: agroecology promotes the incorporation of a wider range of species within agricultural processes. These species may act to improve the fertility of soils or protect crops against pests. As such, issues related to pollution of rivers and lakes through fertilisers or pesticides can be combated while crop productivity is improved (DeLonge and Basche, 2017).

However, regardless of its holistic thinking, this approach has been criticised for its apparent disregard of modern technology (Montenegro de Wit and Iles, 2016).

At the opposite end of the spectrum is Precision agriculture. This method utilises technologies to ensure accuracy and efficiency in agricultural practices. Amongst these technologies are Global Positioning Systems (GPS), Geographic Information Systems (GIS) and soil sensors (example provided below). In improving the accuracy of technical application to water use and crops, there is significant potential for reducing water consumption in agriculture (Neupane and Guo, 2019). However, there are considerable costs associated with developing sophisticated precision agriculture systems on a larger scale, enhancing inequalities (Walter et al., 2017).

3. Irrigation Systems

Employing irrigation techniques specific to local contexts has the potential to improve the efficiency of water usage, thereby decreasing the quantity required. As opposed to surface irrigation (including crop flooding) and water-intensive sprinkler systems, localised irrigation techniques such as drip irrigation can be moderated to the specific needs of the crop whilst reducing loss of water due to evaporation. Furthermore, localised irrigation techniques allow for fertigation (direct injection of soluble fertilisers), reducing the need for excessive fertiliser usage. While these systems are very efficient for irrigation, their success depends upon technological availability and the knowledge and ability of the users (Bouwer et al., 1988).

The source of water for irrigation also has great potential for improvement. Increasing the capabilities for treatment and reuse of grey-water, not just on individual but city scales, could provide a means for overcoming insufficient water availability in some areas. For example, Greater Mexico City already uses wastewater to irrigate crops in regions to the north of the city (Jiménez-Cisneros and Chávez-Mejí, 1997). However, there are health concerns regarding the standard of treatment of wastewater which would require improvement in treatment facilities to overcome. Additionally, in areas where rainfall is expected to increase due to the effects of climate change, implementing rainwater harvesting technologies could expand available water supplies.

There has also been success with some smaller scale, cheaper irrigation strategies. Leaky weirs, a series of raised dirt embankments, have been used to regenerate severely degraded landscapes in southern New South Wales, Australia whilst also providing a source of water for irrigation (King et al., 2016). Similarly, the implementation of 'chameleon' soil moisture sensors, as mentioned above, in Tanzania has had significant success in reducing the water consumption of farmers.

In summary, the above examples show many ways that better agricultural practices lead to more sustainable, equitable and resilient management and use of water. Any or all of the above examples could be implemented in a Wellbeing Economy.

Industry

Industry must be seen as a key partner to creating the conditions for a Wellbeing Economy. But in order to do so, its relationship with water must improve. Globally, industrial processes account for approximately 19 percent of freshwater water usage (FAO, n.d). The share is larger in developed countries, meaning there is huge potential to implement sophisticated solutions in this sector.

Below, we offer three approaches, which can be implemented in tandem, to industry-led water solutions. These are ‘circular principles’, nature-based solutions and harnessing technology and innovation to produce behavioural and system change.

1. Water in the Circular Economy

The water cycle is one of the most fundamental systems that is taught in schools from kindergarten. Utilising its components (evaporation, condensation, precipitation, recharge) can be key towards developing a circular economy for water. A circular economy is an economic model that is regenerative by design (Ellen Macarthur Foundation, 2017). It seeks to keep resources in use for as long as possible through better design, and regenerate natural systems (Trebeck and Williams, 2019; Peck et al., 2019. Circular principles applied to industry can positively impact energy efficiency, water efficiency and reuse, maximise the value of all inputs and outputs, including bi-products, and lead to monetary gain (Spencer, 2018).

2. Nature-Based Solutions (NBS)

NBS emphasises ‘green’ rather than grey infrastructure i.e. it focuses on preserving ecosystem function rather than building artificial water infrastructure such as dams. Much like circular principles, this recognises water as an integral part of a complex natural process of evaporation, precipitation and absorption through soil (WWAP and UN Water, 2018). Therefore, valuing the ‘true cost’ of water, as mentioned in governance, is integral to its success. NBS include constructing wetlands, forests and green spaces to regulate water flow, prevent soil erosion, filter toxic substances and build resilience into water and urban systems.

CIRCULAR INDUSTRIAL WATER USE EXAMPLES

Yorkshire Water at its Esholt Wastewater Treatment works in West Yorkshire reuses waste filter media from sludge filter beds by processing the material into construction grade aggregate. Through this, 37000 tons of aggregate have been used in the construction of two railway stations on the Leeds and Bradford line (Spencer, 2018).

Singapore’s NEWater Project - In 2003, Singapore introduced its NEWater project which recycled treated sewage (“used water”) using a three-step purification process involving microfiltration, reverse osmosis and ultraviolet (UV) disinfection. This water is then injected intro reservoirs to mix with rainwater before being collectively treated for potable use. Over the years, NEWater has grown to meet up to 40% of Singapore’s total water demand. For more info on the case study and the critical factors that allowed it success, see Thai and Rawat, 2018; Lefebvre, 2018).

CASE STUDY- WALLASEA ISLAND WETLANDS

In response to the erosion and habitat loss along the Crouch and Roach estuaries of England due to port construction and other developments, in 2006 the Wallasea island project recycled sediments from its salt marshes to build an integrated flood protection system. This system was allowed to flood, letting its mudflats and salt marshes evolve naturally with the water cycle, and around 514 hectares of wetland was restored. It is now the largest human-made wetland in Europe, a habitat and breeding ground for birds. An additional 269 hectares to be added by 2025.

There is a huge financial incentive to engage in NBS. IUCN Water (2020) estimates that mangroves save USD 57 billion in flood damages in China, India, US and Vietnam every year. Additionally, NBS is in line with target 6.6 of the SDGs (Protecting and restoring water-related ecosystems including mountains, forests, wetlands, rivers, aquifers and lakes) and fits into the UN’s current priorities regarding ecosystem restoration (IUCN, 2020). (For more information on NBS see: https://www.iucn.org/theme/climate-change/resources/key-publications/strengthening-nature-based-solutions-national-climate-commitments)

3. Technology and Innovation

Industries can harness technology to use water more efficiently. For example: The company Schneider Electric uses its IoT-enabled, open source platform Ecostruxure to help customers that rely on water for industrial applications use it more effectively by providing them with more information (Schneider Electric, 2020). ‘SCADA’ farms in New Zealand have leveraged Ecostruxture (paired with Microsoft’s AzureIoT software) to provide them with big data on land and weather patterns to use the optimal amount of water depending on conditions.

Innovation can also be used to reduce industry water consumption. For example: in order to reduce the water used in its manufacturing process of its denim jeans (6% of the total water consumed in its lifecycle), the fashion company Levis launched Water<less jeans in 2011. These products used innovative savings techniques that averaged 28% to 96% water savings between styles. Since 2011, they have open-sourced their water-conservative finishing techniques to encourage other denim companies to use them (Levi Strauss and Co., 2018).

Open source information regarding industry water consumption (for example: water use dashboards, monitored by sensors and accessible to the public) is crucial for a wellbeing water economy. It creates responsible stewardship in industry through transparency and industry accountability to reduce water consumption (Principle 5). Additionally, the public can use the information provided to become more involved (Principle 6) and support those industries that actively try to reduce their water consumption.

Urban Water Systems

Sustainable, equitable and resilient cities are integral to the Wellbeing Economy. Urban centres are the fastest growing regions in the world. Rapid urbanisation combined with a growing population, energy consumption and material waste present major challenges for urban water systems (Bai et al., 2016). This is coupled with the management and budgetary realities faced by cities. Below are three urban water solutions in the realms of water supply, wastewater treatment and water-friendly architecture.

1. Water Supply

There exist two main streams of thought on improving the sustainability of urban water supply systems - improve the efficiency of existing systems or find a new water source. In reality, a Wellbeing Economy should incorporate elements of both. To begin with, current urban water systems largely rely upon one centralised source from which water is transported. Decentralising the source through individual collection of water could fundamentally improve the sustainability of water systems by making the supply more circular. This could occur through collection of rainwater (rainwater harvesting) or the recycling and improvement of greywater (greywater recycling). On a larger scale, utilising treatment plants (e.g. wastewater recycling, desalination plants) could also provide alternate water supply sources. For example, water is supplied to the citizens of Windhoek, Namibia through utilising water recycling plants. Given its lack of nearby natural water sources (there are a few small dams), the city relies heavily upon the treatment of domestic wastewater as a means of maintaining a secure water supply for its citizens (Lewis, Staddon and Sirunda, 2019).

2. Wastewater

Treatment of wastewater has significant potential for reuse in urban water systems. Where stringent quality standards have been established (on both local and national policy levels), there is even potential for its usage in drinking water systems (such as in Windhoek). Current leading systems use membrane filters and UV lamps for disinfection of wastewater. As this can be expensive, they are implemented in large treatment plants as opposed to household level filtration. Similarly, there exist many new technologies that work at an industrial scale, including reverse osmosis (a process that can remove chemical contaminants) and nanoparticle treatment (this has broader potential for removing biological contaminants as well as heavy metals) (Melian, 2020). Wastewater treatment goes hand-in-hand with governance. Introducing such a method requires policy and regulatory changes at the municipal and national level to support and incentivise such diversification.

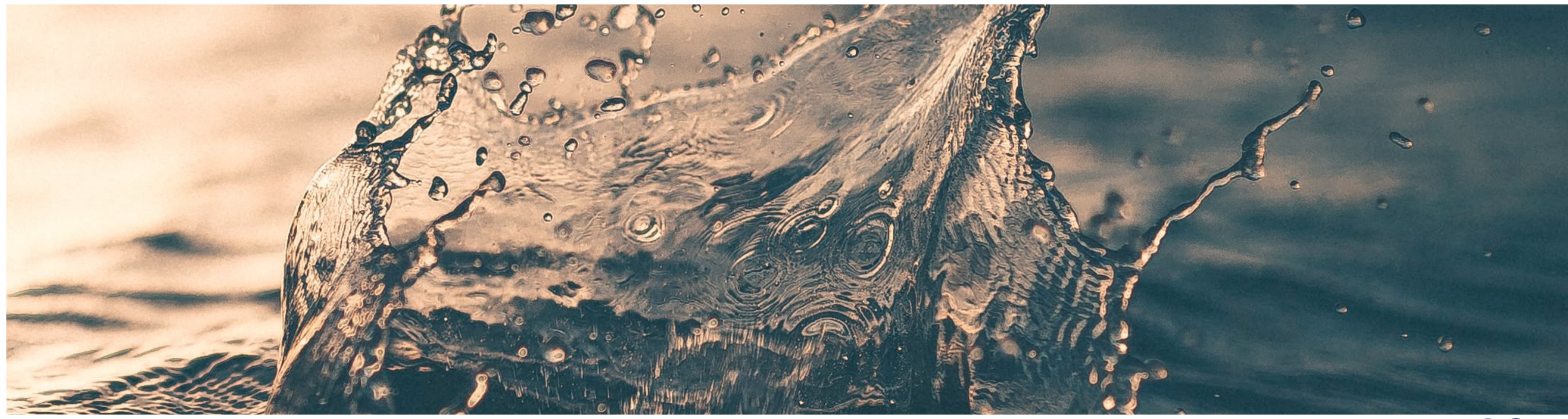
3. Water-friendly architecture

Cities can partner with industry to deliver water friendly architecture- another version of NBS - to manage water. One such solution is the concept of rain gardens. Rain gardens utilise biological processes to treat waste and stormwater before it re-enters river systems. They remove biological contaminants and assist in preventing algal blooms. In addition to rain gardens, water friendly architecture also includes using water absorbent concrete (that can both allow for the infiltration and recharge of groundwater and as a water source for plant communities growing on buildings), designing landscapes to reduce the risk of flooding and creating or preserving wetland ecosystems. China has committed to develop cities that incorporate these technologies, known as 'sponge cities'. However, such ideas also exist globally under various names, such as water sensitive urban design in Australia, Low Impact Development in the United States and Blue-Green cities in the United Kingdom. This indicates that water-friendly architecture is sure to become a mainstream part of the water Wellbeing Economy.

Lifestyle Changes / Individual Action

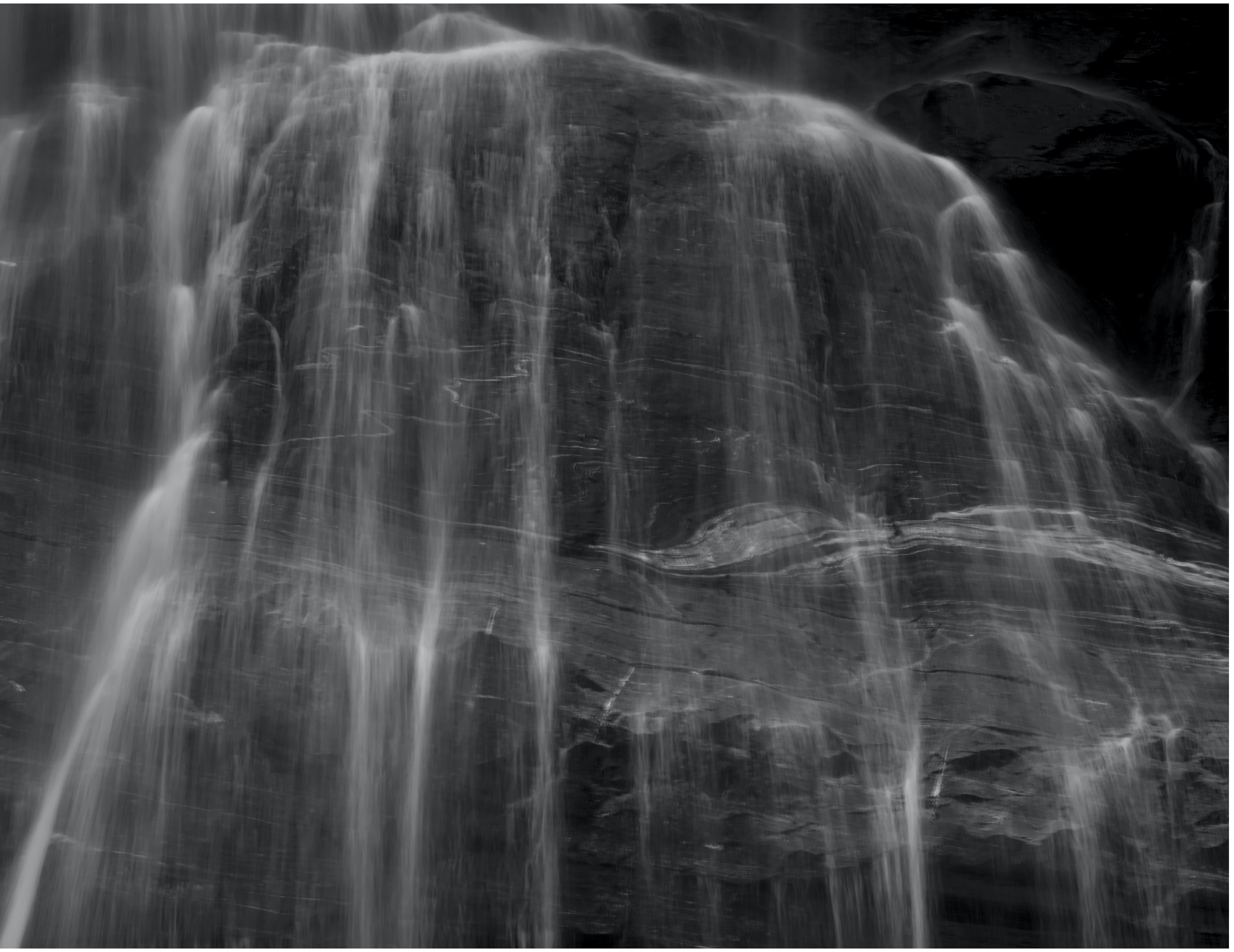
The solutions outlined above are crucial for the way water is to be valued, accessed, distributed and managed in a Wellbeing Economy. They each involve multiple participatory bodies and scales, and combinations of them can help create a water system that promotes human and ecological wellbeing. However, for them to work, they also require us to actively change our lifestyles, consumption pattersand mindsets regarding water.

- Clearer, accessible information must become available to the general public. The source of water, its condition and ways to conserve it (eg: rainwater harvesting, reducing the amount of water consumed, water labels) and effective sanitation and hygiene practices must be taught in schools, community workshops or through smartphone apps to enhance circular thinking among current and future citizens. Businesses and local governments must create clearer standards, indicated by water labels or information packages to assist in consumer choice and conservation.
- We must nudge businesses and society into sustainable water practices through changes in consumer demand. This includes utilising purchasing power and buying less water-intensive goods, recycling or upcycling and demanding water and energy efficient appliances in their homes. It also includes cultural lifestyle choices such as reducing meat consumption or shifting towards a more plant-based diet.
- We require trust and rapport-building between public, private and civil society and new financial models to fund such partnerships. This can only happen if there is open communication and participation across sectors and stakeholders. A shared vision for the future is also key.



Such a vision is emerging. By sharing examples of the solutions and case studies that exist in the areas of good governance, ecosystem services accounting, health and sanitation, agriculture, industry and cities, we seek to demonstrate that a vision for water in a Wellbeing Economy is both desirable and achievable.

This is by no means an exhaustive list of solutions. In fact, this is only the beginning. In order to learn more and get involved with WEAll in charting the future of water in a Wellbeing Economy, readers can join the WEAll Citizens platform to stay up to date on upcoming opportunities and explore the WEAll Members community for organisations that support water access, equity and sustainability. Readers are also invited to identify and share their own knowledge, in the form of books, films, experiences and literature to the authors of this paper and the wider WEAll community. We hope that this paper allows us all to rethink how our organisations, workplaces and lives can contribute towards a wider Wellbeing Economy for water- that holy relic so crucial for life to thrive.



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Water in a Wellbeing Economy

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