AN INTEGRATED MODEL FOR LARGE-SCALE SOCIAL ENTREPRENEURSHIP: ADDRESSING GLOBAL WATER SUPPLY PROBLEMS

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ABSTRACT

This paper introduces a large-scale social entrepreneurship model to help address the growing need for the development of an international water resource sustainability system within a world water economy. We explore the relationships between government policy, geopolitical impacts, and business interests. In particular, we investigate why past policy has largely failed, while proposing an emerging entrepreneurial model that introduces a new perspective for large-scale green business start-up capability. We believe an appropriate overlay of multiple stakeholder interests and alternative structuring may be employed in innovative entrepreneurial start-ups that require complex manufacturing and distribution networks. Comprehensive long-term water shortage planning and short-term interventions coupled with an emerging prototype large-scale green entrepreneurship model may help to advance the conversation.

"How sad to think that nature speaks, and mankind doesn't listen."
-Victor Hugo, 1840

INTRODUCTION

Issues of sustainability are widespread and encompass all aspects of human global expansion and development including overpopulation, fossil fuel emissions, climate change, food shortages, human and animal abuse, and chemical pollution, to name a few. Although the U.S. and scores of other nations have been involved in numerous national and global protocols and agreements, significant progress in some critical areas remains lacking. One of the most significant areas of societal need that requires attention and policy review are water stress, water shortage and water crisis. Today, at least 1.8 billion or approximately 20% of the people around the globe lack clean drinking water. Currently, 2.8 billion people face water scarcity for at least one month every year (UNESCO World Water Assessment Programme, 2012). The societal implications of water scarcity and crisis exceed those of energy needs, yet private sector initiatives and government regulation or support in the U.S. and elsewhere to produce water-saving technologies has fallen behind the increase in human needs and population growth. Less than successful government policies and programs to meet global water requirements suggest the development of alternative resource sustainability models that better integrate government, business and society as the basis for a more promising future.

OVERVIEW OF WATER SCARCITY

It is rare that we find major environmental and human issues that span across continents, yet water scarcity is affecting every part of the globe. Water scarcity is generally defined as the aggregate usage and consumption of water under the prevailing institutional conditions including environmental needs, such that usage cannot be sustained or met. It should be noted that the terms water scarcity, stress, or shortage are not universally defined or measured with any consensus. However, there are several measures that in conjunction provide specific indicators of water issues. The most commonly used method is the Falkenmark Water Stress Indicator that defines scarcity according to renewable resources related to use per capita (Brown & Matlock, 2011). A second popular method is the Water Availability Index (WAI) which takes into account surface water and groundwater, and compares the total amount to the demands of all users including business, domestic, and agricultural usage (White, 2012). Another method, the Basic Human Needs Index, is based on the use of water as opposed to water availability (Gleick, 1996), quantified the basic water requirements (BWR) for domestic use such as hydration, food preparation, bathing, personal sanitation, and hygiene as averaging 50 litres per person per day.

The Index of Water Scarcity (IWS) includes water abstraction against water availability or freshwater removal as a percentage of internal renewable resources (Wendling, Emerson, Esty, Levy & de Sherbinin, 2018). The issue of renewable resources now becomes more important. For example, the use of desalinization plants in certain regions such as the United Arab Emirates corresponds to a crucial 18% of yearly abstractions at a high economic cost but is a minor variable cost in other regions (Christopherson, 2012). Another contributing index is the Water Poverty Index (WPI) which attempts to analyse the relationships between water scarcity issues and socio-economic impacts. It then ranks countries based on resources, access, use, capacity, and the environment (Sullivan, 2002). This can then be further classified according to countries that require financial investment. If these countries are financially handicapped, they will be considered economically water-scarce as opposed to physically water-scarce. That is, if financial investments are available, future demand will still outgrow water availability (OECD, 2009). All these complex measurements and numerous others require significant amounts of time and resources to conduct accurate evaluations.

THE CURRENT SITUATION

Water scarcity will be one of the main challenges faced by many during this century. Collectively, a grim picture emerges showing that over half the world will confront water shortages by 2032. Although some regions farther from the equator may experience less stress, other areas may see more drastic situations. The use of water has been growing at more than twice the rate of population increase which has also grown exponentially. Global human population growth is about 83 million annually or 1.15%. The current world population is approximately 7.6 billion compared to 1 billion in 1800. By 2035 it is expected to be 8.6 billion, and by 2055, it will be 30% higher than today at 9.8 billion, and by 2100, 11.2 billion. (United Nations, 2017).

Water scarcity may be caused by both environmental and man-made intrusions such as industrial waste, polluted run-offs, chemical agricultural practices, or animal and human contamination and waste. Water resources are not evenly distributed, and much is unsustainably managed. Some 80% of the world's wastewater and over 95% in the least developed countries are released into the environment without treatment (World Water Development Report, 2017). By 2025, some scientists estimate that two-thirds of the global population will be living in water-stressed regions. Currently, 700 million people in 43 countries face water scarcity, in arid or semi-arid regions including Africa, Sub-Saharan Africa and the Middle East (WWAP, 2012; Human Development Report, 2006). Further, 90% of all worldwide disasters are water-related, mostly the result of floods or severe drought (Mekonnen & Hoekstra, 2016).

BARRIERS TO WATER SUSTAINABILITY

The impacts to business are obvious as the price of a gallon of marketed or fashionable bottled water now equates to a gallon of gasoline. Yet, the funding and resources we put into private oil and gas production make invisible the paltry sums invested into potable water despite the water shortage. The U.S., although well-prepared and potentially well-funded to support such research, does not experience the difficulties faced by water shortages found around the globe. Perhaps for this reason, and others, we have turned a blind eye to both a major societal issue as well as a politically strategic area of potential strength. O'Connor (2017) points out the numerous transboundary conflicts that arise regarding disputes over rights to water. For example, Egypt uses 55.5 billion cubic meters of water from the Nile each year. However, it is subject to the upstream Nile activity of 10 other countries including the Democratic Republic of the Congo, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda before it even reaches Egypt. (Islam & Susskind, 2015). The United Nations General Assembly and Human Rights Council (United Nations, 2016) has also recognized the fundamental need of humans to have safe, sufficient and affordable water to positively affect health, dignity and well-being. Yet fear of water-resource depletion has likely contributed to varying degrees of global unrest. The U.S. National Intelligence Council stated that water conflict in North Africa and the Middle East, such as in Syria, may spark greater instability with the U.S. as water shortages and mismanagement also contribute to food shortages causing millions to leave their lands and spread destabilization to surrounding areas (Maddocks, Young & Reig, 2015). Water shortages in Bolivia and Ecuador have also led to political upheaval in South America. We need to understand that many of the causes and outcomes of water scarcity represent a multidimensional phenomenon encompassing cultural, political, and ecological impacts.

In addition to an already over-stretched water resource shortage, we can expect an alarming additional 3-5 billion people to the current population of 7.6 billion over the next 20 years. Currently, surface and groundwater are probably the most cost-efficient means to capture available water. However, pollution in China and India has contaminated over 20% of their water, making it unusable for either human consumption or agricultural purposes. India, China and Africa with their proportionately exploding populations will also increase demand for water by 30% over the next 20 years (Dobbs, Oppenheim, Thompson, Brinkman & Zornes, 2012).

China, in particular, will require new sources of water for its vast industrial expansion as well as for its increased demand for agricultural food supplies. Unfortunately, alternative water sources such as those widely used in the Middle East, i.e., desalination, cost approximately ten times as much to harvest and filter water as traditional surface and standard purification procedures.

CURRENT LARGE-SCALE EFFORTS

After several hundred years of what appeared to be unlimited or cheap resources, water supplies are finally being recognized as finite and unsustainable given both the current and anticipated population growth forecasts. The United Nations recognizes the importance of water with its UN-Water which coordinates the water and sanitation efforts of over 30 UN organizations (UN Water, n.d.). Unfortunately, there are few other organizations either private or public that have made water resource productivity a strategic or monetary priority. Moreover, in a global economy with increasingly scarce resources, those customers, businesses and governments that can move from short-term focus to more broad resource productivity activities may be well poised to increase their competitive positioning both economically and politically. In particular, businesses need to plan for resource innovation that will create new opportunities for profit growth, competitive advantage and regulatory influence. Resource-supplying companies may continue to evolve based on anticipated market needs and the large profit opportunity forecast across resource demand categories. Those industries that are resource consuming, especially in regions of water scarcity, will face more intense competition for access and rights.

Planning for these occurrences will require the consideration of innovation strategies that systematically explore growth opportunities, new service or product portfolios, and both business and consumer markets. Resource efficiency will play a greater role as will green supply chains, resource management, pollution and chemical reduction, environmental sustainability and consumer value propositions. Risk management will also become more predominant as it migrates from the current issues of government regulation and cyber security to new challenges regarding resource scarcity, climate change, political influences, operational disruptions, reputational capital, and, stakeholder reactions.

Current Sustainability Efforts

A number of management, engineering, and environmental consulting firms have determined that businesses with greater efficiency in resource management, including water scarcity, will be viable and profitable in the near future. Large corporations such as General Electric and Siemens have invested heavily in technologies that support clean water operations including massive wind turbines and energy-efficient industrial operations. Although these opportunities are not without other severe environmental criticisms such as visual pollution, noise and land devaluation, and community protests, they at least cause recognition of issues and profitable venues of ‘Black Swan’ opportunities with an early track record of modest profitability.

For much of the U.S. water is still treated as an inexpensive resource, but costs have been steadily rising with increasing usage in desert areas, agricultural applications, industrial processes and changing human preferences for natural products. Emerging-market countries, especially within cities, have become cognizant of improving extraction processes, recycling opportunities, water replenishment, and water waste management. Meeting these needs will likely increase competition for production, distribution, and sustainable end-to-end water management systems.

Numerous beverage companies including PepsiCo, Coca-Cola Co., Nestle, SABMiller, and even Anheuser-Busch have entered this market, but each of their paths have been unique, and not altogether without friction. The Coca-Cola Co., the world's largest beverage company, operates in 200 countries through franchises and independent bottlers with more than 500 beverages, and generates 70% of its revenue from outside the U.S. However, it was charged in India that its products contained pesticide residues and that it depleted villages of drinking and irrigation water causing boycotts in India as well as in the U.S. Coca-Cola sought to resolve this issue and conducted meetings with the World Wildlife Fund, The Nature Conservancy and various scientific groups. Through this process they reached a consensus to construct a self-improving goal of water neutrality by 2020 through three main initiatives: reduce, recycle and replenish. By 2011 it had made considerable progress by leveraging over 300 partnerships with governments and other organizations in 61 countries for water treatment facilities, improved watersheds and irrigation systems. At this point they appear on target to replace almost 70% of their water usage to communities and nature (Lawrence & Weber, 2017). Likewise, PepsiCo's operations in India now replenish more water than their operations consumes. However, as positive as this sounds there are large areas of India where farmers' water harvesting methods have proven to be unsustainable, causing communities and millions of people to be without access to drinkable water once again. It is estimated that India is draining its aquifers by 250 cubic kilometers every year. This would essentially deplete all the water in Lake Erie in two years (Human Development Report, 2006). While many organizations and government bodies have attempted to remedy this life-threatening issue by introducing new technologies, India's population has swelled to 1.2 billion people.

This trend of draining aquifers without adequate regulation repeats itself in much of Asia, Africa, the Middle East and the Americas. Currently, 1 billion people lack access to safe water and consumption is doubling approximately every 20 years. As a result of this unsustainable rate of growth, it is estimated that by 2025 one third of the world's population mostly in Africa and South Asia will face acute water shortages, increased disease, and regional hostilities (Human Development Report, 2006). Thus the current efforts, although admirable, are limited and suggest the need for a broader approach supported by innovative corporate leaders, policy reform, and large-scale entrepreneurial mindsets.

An Emerging Model for the *World Water Economy*

Water economy refers to the economic impact and conflicts created by the use of water for agriculture, industry and individual consumption. In discussing 'Nourished Planet', Danielle Nierenberg wrote that "The science of water economy studies the way in which water resources

are limited and how they must be managed to satisfy farming needs without creating social inequalities and unsustainable environmental impacts." Water is essential for any society to flourish, and freshwater resources are not distributed evenly (Nierenberg, 2018). Water usage and distribution has always been a collective concern as evidenced by such projects as the Roman aqueducts or even earlier irrigation projects. The study of water economics (also referred to as economics of water management) studies 'economic water scarcity' and goes back to the 1960's (Detwiler, 1968; Wolman, 1961). Escalating concerns with water scarcity have created the 'water justice movement' which calls for more democratic water policies and more sustainable development practices that promote a more equitable water distribution (Justicia Hídrica, 2016).

It should be apparent that the issue of water scarcity has not been resolved. There are excellent examples of progress such as the water regeneration efforts of Coca-Cola and PepsiCo in India, but the applications have been limited to regional areas or communities. As the population increases, water availability per person drops. This is further exacerbated as demand has also increased with economic development and improvements in quality of life. Other efforts, such as those of Massachusetts Institute of Technology's (MIT) Susan Murcott's extensive social entrepreneurship entity, Pure Home Water (PHW) system launch in West Africa underscores that accelerating consumer demand can easily outstrip the capability of philanthropy models causing both business and delivery failure for large-scale needs (Nelson, Ingols, Christian-Murtie & Myers, 2011). Murcott's work is certainly to be applauded, but she is also quick to point out that start-up and growth challenges as well as market definition, pricing, revenue, finances, operations and supply chain are as important as venture mission and intention in a real-world economy. Related small and regional ventures such as ceramic water filters, fog water catchers, small water filtration devices, and related products, although helpful, do little to make a dent in the world water economy and need for sustainability.

On a much greater scale are massive desalination plants of which there are now over 12,000 in operation around the globe, with approximately 50% in the Middle East. These plants greatly lesson groundwater mining where water levels are diminishing or running dry and replacement from scarce rain or deep aquifers is not nearly sufficient to offset saltwater intrusion. In Saudi Arabia, 70% of the drinking water is now supplied by 30 desalination plants. However, these large-scale plants can be cost prohibitive in many parts of the world as they typically cost $100 million to supply water to 300,000 people, not including a distribution network. The U.S. is also employing desalination reverse-osmosis technology in Tampa Bay. This facility supplies about 10% of the region's needs making it the largest desalination project in the country (Christopherson, 2012).

Although there have been incremental changes and scientific advancements to help stem isolated problems within the current water scarcity, there exists a need for much greater integration of efforts if we are to deal with the world water economy that is longer-term and comprehensive. The international systems dealing with water issues are often underfunded and subject to vested interests. Priorities are not always straightforward, and timeframes are usually a reaction to immediate urgencies. A movement towards either national or international

cooperation may require a new form of collaboration involving a variety of stakeholders, including passionate and "flexible" entrepreneurs with a new perspective.

Green-oriented Technologies

Green-oriented technologies and start-ups have faced major hurdles in attempting to enter the marketplace. Whether these companies are profit or non-profit, they essentially face the same financial difficulties as any other start-up. Even with a technological advantage, start-ups are faced with acquiring materials, manufacturing, distribution, and customer issues. Before this stage of 'market readiness' may lie years of research investments, apart from any commercialization activity. Some researchers have noted that many R&D labs associated with large organizations such as Xerox, Lucent Technologies, GE, and Boeing have come under close scrutiny resulting in highly focused time-based ROI research as opposed to long exploratory projects. Academic research has experienced similar pressures and finds itself highly subject to either government grants or industry investments. Venture capitalists have also become more risk-adverse, leaving "green" entrepreneurial start-ups, especially those without a fast and significant payback, much lower on investment priority lists regardless of past development costs.

INTEGRATED MODEL FOR LARGE-SCALE SOCIAL ENTREPRENEURSHIP

Social Entrepreneurship

The issues surrounding water scarcity can be addressed by a social entrepreneurship approach. Social entrepreneurs look for a return to society and a return on investment. Where others (governments, NGOs, etc.) have not been successful in solving societal problems, social entrepreneurs have been effective. There have always been those who have made money augmenting the efforts of governments and charities; however, modern social entrepreneurs have combined altruism with a desire to make a profit. One example is the emerging field of microfinance, which serves those who were unable to find funding from traditional sources and need relatively low amounts of money.

Social Entrepreneurship is in a pre-paradigmatic state (Granados, Hlupic, Coakes & Mohamed, 2011) and as such it is difficult to formulate an exact definition of it (Conway Dato-on & Kalakay, 2016; Abu-Saifan, 2012). However, here is a simple definition that captures its essential elements:

> ***Social Entrepreneurship****: Using profit-making enterprises to address social, environmental, and other problems that were traditionally entrusted to governmental and non-profit organizations (Betts, Laud & Kretinin, 2018).*

Some terms associated with social entrepreneurship such as "philanthrocapitalism", B corporations, impact investing, and microfinance are among the Chronicle of Philanthropy's 2011 "10 Favorite Buzzwords of the Decade" (Jones & Donmoyer, 2015) In an attempt to separate social entrepreneurship from other activities, yet address the differences in approaches, Zahra, Gedajlovic, Neubaum & Shulman (2009) present a typology of social entrepreneurs which separates them into three types (see Table 1).

Table 1 TYPES OF SOCIAL ENTREPRENEURS*		
TYPE	**DESCRIPTION**	**EXAMPLE**
Social Bricoleur	Use innovation and the resources available to solve local problems	Fifteen - chef Jamie Oliver
Social Constructionists	Introduce societal change and reform in way wealth is created and distributed	Amul - milk cooperative
Social Engineers	Introduce revolutionary change and disrupt the equilibrium	Grameen Bank – microfinance

* From Zahra, Gedajlovic, Neubaum & Shulman (2009).

Large-Scale Social Entrepreneurship Model

We propose a model for large scale social entrepreneurship that is using the philosophies and principles of social entrepreneurship across many stakeholder groups such as governments, research universities, NGOs and so on. Figure 1 shows stakeholder groups who can help in servicing the world water economy.

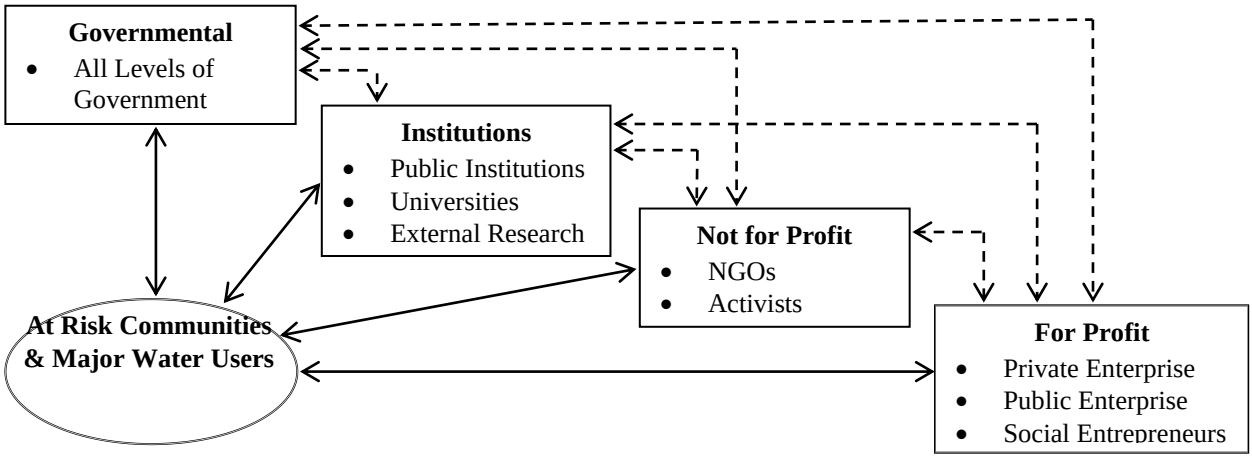

Figure 1 - LARGE-SCALE SOCIAL ENTREPRENEURSHIP: LONG-TERM COMPREHENSIVE PLANNING STAKEHOLDER MODEL

The model for a large-scale social entrepreneurship venture is based on an emerging paradigm used successfully in technology start-ups. The early focus is based upon what start-ups do well, i.e., innovate and generate prototypes, if only embryonic in development. Rather than attempt to acquire and manage resources against investment assets to maintain financial or ownership control, early efforts are made to identify established partners with the capability to drive new technology into commercialization. Identifying and leveraging the appropriate stakeholders lays the groundwork for a comprehensive input and direction. This provides a better probability of long-term marketplace survival for almost any breakthrough, especially those requiring some degree of technological complexity. However, these start-ups also need to resist the temptation of giving away significant portions of their intellectual property (IP) to capture early revenue. So long as the IP is rare, non-substitutable, inimitable, and valuable, it

can provide a sustainable competitive advantage (Barney, 1991). The IP represents the innovation necessary to address of the many problems in the water economy.

The links between each stakeholder group and the water users already exist; however, they are working independently of each other. The links among the stakeholder groups represent the flow of information, resources, and technology. These exchanges are necessary for efficient water management, but are currently not addressed in a coordinated manner. The model gives a framework for further development of a more integrated collaborative system. Researchers and stakeholder groups can examine each link to come up with ways to better coordinate efforts.

The World Water Economy Stakeholders

It will take many players in different kinds of organizations with diverse interests to enact the large-scale efforts that we propose. Figure 1 outlines the players in the Large-Scale Social Entrepreneurship Long-Term Comprehensive model. In the following sections we explore each group in the collaboration.

Governmental

To one extent or the other, governments have been players in dealing with water concerns for thousands of years. In ancient Greece, the water rights to freshwater lakes were granted by the government, and cities had water brought to them through large tunnels (Zanakis, Theofanides, Kontaratos & Tassios, 2003). In today's world, social entrepreneurship can benefit from governmental support (Goyal, Sergi & Jaiswal, 2016; Jung, Jang & Seo, 2016; Griffiths, Gundry & Kickul, 2013; Sullivan, 2007). The government has data and insight which can be used to help identify and provide access to the problems that can be helped by social entrepreneurs. They can use existing organizations (Goyal, Sergi & Jaiswal, 2016), and grants and other funding can be set aside for addressing social problems (Boehm, 2010). Lastly, policies and legislation can provide incentives and facilitate the efforts of social entrepreneurs (Lan, Zhu, Ness, Xing & Schneider, 2014; Prakash, Jain & Chauhan, 2015). In order for policy change to work, other players must be involved and networks formed. Then issues need to be strategically framed, forums controlled, and approaches adjusted to the peculiarities of the institutional system the entrepreneur is working in." (Huitema, Lebel & Meijerink, 2011).

Government can help encourage entrepreneurs, but it does not always do so. In many places poorly formulated and inappropriate fiscal policies have slowed down the process of social entrepreneurs (Chukwuemeka, 2011). The government needs to recognize that entrepreneurship drives economic growth and innovation and social entrepreneurs can help with essential service concerns and provide an enabling and secured environment for economic development, job creation and youth employment. An essential part of such an environment is access to clean water, which can be implemented by local entrepreneurs once governmental (and other) support is established (Chidiebere, Iloanya & Udunze, 2014). Governments can set policies that encourage corporations to conduct their corporate social responsibility (CSR) activities visibly and explicitly, rather than having a controlling rule-setting regulatory approach. Public water service companies can also engage in CSR to obtain more authenticity and a higher level of legitimacy in the field (Lauesen, 2014). Taking actions that limit corruption and waste have the effect of facilitating growth in many industries. (Prahalad, 2018) One approach to encouraging and enabling social entrepreneurship is through innovative legal forms, such as the low-profit limited liability company (L3C) and benefit corporations. Current results of these

forms have not shown them to be highly effective; however, with modifications and adjustments they may become more effective in the future (Weismann, 2017)

Institutions

Universities and research organizations are frequently the originators and developers of innovative technology used in pumps, filters, storage and distribution systems. Data collected from existing projects can help estimate water needs and usage. One example is "The Gravity Recovery and Climate Experiment (GRACE). Their satellites can observe water storage changes at regional scales which can then be augmented by other methods for basin-scale water storage changes (Longuevergne, Scanlon & Wilson, 2010; Shamsudduha, Taylor & Longuevergne, 2012).

Universities can do a great deal to teach, encourage and facilitate social entrepreneurship directly (Mititelu, Fiorani & Litardi, 2017). They can provide and encourage experiential learning (Gundlach & Zivnuska, 2010), service learning (Kinsella, & Wood, 2014; Peric, & Delic, 2016), and social entrepreneurship competitions (Huster, Petrillo, O'Malley, Glassman, Rush & Wasserheit, 2017). The Dell Social Innovation Challenge (DSIC) at UT has awarded prizes for water-related issues. For example, in 2012 an international team of five engineering students developed a water-filter for use in Bangladesh (Grobmeier, 2012).

Non-research institutions such as banks and other organizations that provide microfinancing have been recognized as useful partners for the large-scale delivery of health products such as water in low-income countries." (Baum, Elize & Jean-Louis, 2017). Microloans and microcredit are increasingly used in the poorest areas, frequently to help with water issues (Duy & Ngoc, 2018; Mondal, 2012).

Not-For Profit

NGOs (non-governmental organizations such as not-for-profits, charities, etc.) have many potential roles in a large -effort. They can directly fund entrepreneurs, or partner with social entrepreneurs through universities (Stephenson & Mace, 2009). A company called Verb was licensed to run Dell Social Innovation Challenge (DSIC) from the University of Texas. DSIC is the largest student social entrepreneurship competition in the world (Business Wire, 2014). The Queen Rania Centre for Entrepreneurship (QRCE) in Jordan holds a National Entrepreneurship Competition that has water as a competition field (Emam, 2015).

NGOs can work with local communities. for example, Gram Vikas is an NGO that deals with water and sanitation programs in India. They have a philosophy of inclusion and develop self-governing management systems (Pless & Appel, 2012).

Social workers, community organizers and activists all have a place in the social entrepreneurship landscape. Social workers are part of the traditional governmental and non-profit approach to addressing social issues. Activists and organizers focus attention on issues and situations that are not adequately addressed by charities, CSR, social workers, and others. In doing so, they help attract support, and frame the opportunities for value creation by the social entrepreneur.

For-Profit

In the for-profit grouping we have private and public enterprises and social entrepreneurs. Social entrepreneurs are different from traditional entrepreneurs (Massetti, 2008). Entrepreneurs and social entrepreneurs use both discovery and creation strategies for getting opportunities (Gawell, 2013); however, the traditional entrepreneur is more likely to try to discover opportunities, whereas the social entrepreneur is more likely to create them (Korsgaard, 2011; Shaw & Carter, 2007). Similarly, traditional entrepreneurs are more interested in capturing

value, and social entrepreneurs are more interested in creating value (Agafonow, 2014; Crisan & Borza, 2012; Santos, 2012). One example of where social entrepreneurs are used to help solve water issues is in Malaysia where the government gives water-related contracts (Tan, 2015). Without such controls, pumps can drain aquafers dry as they do in some areas of India (James, 2015).

Social enterprises are like social entrepreneurs, but on a larger scale. They make a profit by addressing social problems and are often involved with privatization of services formerly supplied by the government (Sepulveda, 2015). There are many examples of social enterprises addressing water problems. The social issue of high levels of nitrates in the waters in Romania inspired Aqua Carpatica to combine a technological innovation (testing tool) with marketing communication. This innovative approach increased customer loyalty and brought in new ones (Hadad, 2018). In Denmark, a combination of political and organizational forces allowed for the water utilities to be privatized (Lauesen, 2016).

Water problems are being addressed by companies through their corporate social responsibility (CSR) efforts. CSR does not avert the tragedy of the commons (Karnani, 2014) because it is not the primary focus of the organizations, and the providing of goods and services is haphazard. A recent study of CSR related to sustainability in France showed a short-term orientation rather than more analytical or long-term approaches. Economic concerns outweighed social and environmental concerns (Husser, Jean-Marc, Barbat & Lespinet-Najib, 2012). In India, the National Aluminium Company (Nalco) creates drinking water infrastructure, but only for communities near their operations (Satpathy & Singh, 2013). Researchers have found that corporations consider rural people as stakeholders regarding their CSR efforts (Das, 2015); however, among categories of CSR activity, water and sanitation were the least preferred, compared to education, health issues, environmental issues, disaster relief, employability and others (Ghosh, 2014). It is important to note that many companies do address water issues in their CSR activities. For example, Tom's Shoes has 100 partners who together have provided 600,000 weeks of safe water (Prahalad, 2018). Such efforts can be helped through using more partners in our collaborative approach.

There are many innovations initiated by collaborations outside of traditional organizational and leadership contexts (Bragg, 2003). A good example of multiple stakeholders solving a social problem is a multinational effort supported by community contributions and international donor funds to design, produce and distribute bio-centers that produce bio-gas which is used for energy (Dixon, 2017). Although energy is an important concern, investments in activities related to water resource have even greater returns (Sepúlveda & Mendizabal, 2011). However, the world's patience is needed: providing clean toilets in Nigeria took four years ("Entrepreneur of Human Waste", 2015).

Community-level engagement including prototyping and pilot testing are necessary for non-traditional partnerships and collaborations with knowledge institutions, government institutions, and social enterprises operating at the grassroots level (Goyal, Sergi & Kapoor, 2014). As stakeholder participation increases, the need for administrative reform and capacity building increases. Reforms in the water sector may follow any of a number of paths, such as the bureaucratic or the entrepreneurial (Tankha & Fuller, 2010). The large-scale model proposed is flexible enough to facilitate these different paths. For example, in Papua New Guinea (PNG), 'top-down' bureaucratic approaches have been unsuccessful, therefore an entrepreneurial 'bottom-up' approach is advocated for creating value and raising rural wellbeing. Private sector involvement and seed funding drive the creation of social value (Saverimuttu & Cochran, 2018).

The linkages in the model allow for the flow of funds, technology, and other components where they are best able to facilitate addressing specific water-related issues. In Table 2 we outline key factors in the large-scale collaborative social entrepreneurship model and compare them with small scale efforts.

Table 2
KEY FACTORS IN A LARGE-SCALE COLLABORATIVE SOCIAL ENTREPRENEURSHIP MODEL

Categories	Small-Scale Cooperative Social Entrepreneurship	Large-Scale Collaborative Social Entrepreneurship
Products/Services	• Designed for small-scale social impact • Exploit existing or low-tech solutions • Smaller distribution network	• Best suited for social purpose with a high-tech solution • Products/services must be significantly better than current solution (cost, price, distribution, functionality)
Stakeholders	• Business owners • Customers • Local Community	• Communities, government, activists, NGOs, researchers, private/public businesses
Social Impact	• Incremental • Local	• Seeks disruption to build "new industry" at scale
Industry Impact	• Minor impact • Seldom disruptive	• Seeks disruptive innovation
Product Demand	• Known local demand • Fills market gaps and niches	• Immediate known high demand • attractive to government and business partners
Production Size	• Small, scale is not key	• Large, must affect large population groups • Manufacturing at scale
Funding Sources	• Small investments, generally $1-3 million or less • Small-scale private equity, family, friends • Limited government funding or grants	• Mostly business partner funding • Limited VC (requires key contacts with manufacturing and distribution partners) • VC may be unnecessary middlemen • Large investments $2-10 million
Financial Tranches	• Variable	• Research (self-funded) • Prototype (self-funded) • Mfg./Distribution (minimal; actual may be $100-$250M passed to partners)
Adoption Curve	• Varies depending on need and social acceptance	• Fast--government and vested partners ensure uptake with proven manufacturing/distribution
Distribution	• Self-funded or shared	• Passed to partner/government for quick and widespread distribution
Barriers to Entry	• Local acceptance • Legal barriers	• High due to research, facilities, manufacturing cost, and, distribution system

The small inroads made for water availability are admirable but are not currently scalable either at the country or regional level in most places. A new approach is required that combines both long-term comprehensive, and integrated planning with shorter-term water scarcity alleviation. The state-of-the-art science in water management is well advanced, but its applications have been sporadic, limited, often costly, or sub-optimal, and short-term. There are also vast differences in the ability of countries to fund research or build water production facilities. A new form of collaboration is needed that involves the many stakeholders, including

the layers within governments with their own interests, local communities at various stages of economic development, activists and NGOs, university researchers and partnerships, and, private firms and public enterprises. Important to this mix will be deep-skilled social entrepreneurs with the vision and energy to create large-scale change.

The model and approach presented reflects not only current problems, but current solutions as well. One effort that has chipped away at the walls between stakeholder groups is the Global Water Initiative. Founded in 2007, it is a coalition of seven international organizations that were created as a response to the disconnect between stakeholder groups and the fragmented manner in which water resources are managed (Action Against Hunger, 2007; World Economic Forum, 2020). Another organization that helps provide clean water through collaborative efforts is Living Waters for the World. Their emphasis is on water purification systems and education (Living Waters for the World, 2019). Social entrepreneurs, motivated by the opportunity to help a cause while making a profit, can follow in the footsteps of non-profit NGOs. Vivid Roots, Conscious Step, and Proper Soap are companies that fund various clean water projects (Trahant, 2019). Beyond funding, social entrepreneurs can be directly involved in providing water. Majik Water provides technology that extracts drinking water from the air (Majik Water, 2020). African Fountain has developed a business model and funded 11 companies for safe water in various African countries employing 840+ people (Swissbluetecbridge, n.d.). Entire communities can be encouraged to take a social entrepreneurship perspective. The Safe Water Network, founded in 2006 by Paul Newman, believes "that properly equipped communities can successfully operate small water enterprises that provide a reliable, affordable supply of safe water" (Acharya, 2018). Progress is being made, but more work needs to be done to bring social entrepreneurs into the arena and foster cooperation between stakeholders.

CONCLUSION

What is unique to the world water economy, and what makes it exciting is the need and potential development of an international water resource system. Although we do have some shared world interests, we are also encumbered by various national agencies with vested interests influenced by government policy, economic resources, and geopolitical differences resulting in the current fragmented approach. This often sub-optimizes opportunities for better long-term global water resource sustainability. However, the growing need for a world water economy along with the interests of large-scale entrepreneurs, ethical government intervention, and efforts to extend corporate social responsibility, offer an outlook to move forward. This, coupled with an emerging large-scale social entrepreneurship model, may provide a practical approach to advance the conversation.

ACKNOWLEDGEMENT

We acknowledge with gratitude the generous support by the William Paterson University Business Policy and Practice Research Forum Grant Program in our research, the constructive comments by anonymous reviewers of the *Global Journal of Entrepreneurship,* and for the meticulous editorial work by Dr. Victor S. Sohmen (Editor).

REFERENCES

Abu-Saifan, S. (2012). Social entrepreneurship: Definition and boundaries. *Technology Innovation Management Review, 2*(2), 22-27.

Acharya, N. (2018). *Paul Newman's Social Enterprise now provides clean water to nearly 1 million people*. Retrieved from https://www.forbes.com/sites/nishacharya/2018/03/08/paul-newmans-social-enterprise-now-provides-clean-water-to-nearly-1-million-people/#5425ef7076ee.

Action Against Hunger (2009). Clean water breakthrough. Retrieved from https://www.actionagainsthunger.org/blog/global-water-initiative-created-response-world-water-crisis

Agafonow, A. (2014). Toward a positive theory of social entrepreneurship. On maximizing versus satisficing value capture. *Journal of Business Ethics, 125*(4), 709-713.

Barney, J. (1991). Firm Resources and sustained competitive advantage. *Journal of Management*. *17*(1), 99-120.

Baum, A., Elize, W., & Jean-Louis, F. (2017). Microfinance institutions' successful delivery of micronutrient powders: A randomized trial in rural Haiti. *Health Affairs, 36*(11), 1938-1946.

Betts, S.C., Laud, R. & Kretinin, A. (2018). Social Entrepreneurship: A contemporary approach to solving social problems. *Journal of Global Entrepreneurship, 2*(1), 31-40.

Boehm, L. (2010). How social enterprise drives healthcare innovation. *Canadian Healthcare Manager, 17*(5), 30-34.

Bragg. C. K. (2003). "Crossing a river by groping for stones": Factors reshaping the policy innovation process for Chinese water policies. *Public Administration Quarterly, 27*(3/4), 243-273.

Brown, A., & Matlock, M.D. (2011). Review of Water Scarcity Indices and Methodologies: Food, Beverage & Agriculture. University of Arkansas, *The Sustainability Consortium*, White Paper #106.

Business Wire (2014). Verb Spins Out of the University of Texas at Austin. Retrieved from https://www.businesswire.com/news/home/20140115005373/en/Verb-Spins-University-Texas-Austin#.UtabfNJdV8E.

Chidiebere, O., Iloanya, K., & Udunze, U. (2014). Youth unemployment and entrepreneurship development: Challenges and prospects in Nigeria. *Kuwait Chapter of the Arabian Journal of Business and Management Review, 4*(4), 20-35.

Christopherson, R. (2012). *Geosystems: An introduction to physical geography.* Upper Saddle River, NJ: Pearson.

Chukwuemeka, E. (2011). The challenges of government policy on entrepreneurship in Nigeria. *The Journal of Commerce, 3*(2), 11.

Conway Dato-on, M., & Kalakay, J. (2016). The winding road of social entrepreneurship definitions: A systematic literature review. *Social Enterprise Journal, 12*(2), 131-160.

Crisan, C. M. & Borza, A. (2012). Social entrepreneurship and corporate social responsibilities. *International Business Research, 5*(2), 106-113.

Das, S. K. (2015). Corporate social responsibility initiatives taken for rural development in India. *Sumedha Journal of Management, 4*(3), 4-17.

Detwiler, C. D. (1968) Institutional constraints and economic optima: A basis for management decisions in intra-regional water transfer. *Land Economics, 4*(42), 173-184.

Dixon, D. (Ed.) (2017). Clean and safe sanitation through bio-centres. *Appropriate Technology, 44*(3), 53-55.

Dobbs, R., Oppenheim, J., Thompson, F., Brinkman, M. & Zornes, M. (2012). *Resource revolution: Meeting the world's energy, materials, food, and water needs*. McKinsey Global Institute. Retrieved from https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Sustainability%20and%20Resource%20Productivity/Our%20Insights/Resource%20revolution/MGI_Resource_revolution_full_report.ashx.

Duy, N. V., & Ngoc, A. M. (2018). Does governmental microcrediting benefit child labour in the poorest regions? New evidence from a transitional economy. *Economics & Sociology, 11*(3), 333-344.

Emam, D. A. (2015, May 27). Queen Rania entrepreneurship competition honours winners. *TCA Regional News* Retrieved from https://www.jordantimes.com/news/local/queen-rania-entrepreneurship-competition-honours-winners

Entrepreneur of human waste: Ensuring a good idea didn't go down the toilet. (2015). *Strategic Direction, 31*(7), 29-31.

Gawell, M. (2013). Social entrepreneurship: Action grounded in needs, opportunities and/or perceived necessities? *Voluntas, 24*(4), 1071-1090.

Ghosh, S. (2014). A study of the participation of the private sector companies of India in corporate social responsibility activities through conjoint analysis. *Vision*, *18*(2), 91-108.

Gleick, P. H. (1996). Basic water requirements for human activities: Meeting basic needs. *Water International (IWRA) 21*(2): 83-92.

Goyal, S., Sergi, B. S. & Jaiswal, M. P. (2016). Understanding the challenges and strategic actions of social entrepreneurship at base of the pyramid. *Management Decision*, *54*(2), 418-440.

Goyal, S., Sergi, B. S., & Kapoor, A. (2014). Understanding the key characteristics of an embedded business model for the base of the pyramid markets. *Economics & Sociology*, *7*(4), 26-40.

Granados, M. L., Hlupic, V., Coakes, E. & Mohamed, S. (2011). Social enterprise and social entrepreneurship research and theory. *Social Enterprise Journal*, *7*(3), 198-218.

Griffiths, M. D., Gundry, L. K. & Kickul, J. R. (2013). The socio-political, economic, and cultural determinants of social entrepreneurship activity. *Journal of Small Business and Enterprise Development*, *20*(2), 341-357.

Grobmeier, D. (2012). Engineering Students Selected as Finalists in Social Innovation Challenge. *The State Press.* Retrieved from https://www.statepress.com/article/2012/06/students-win-5k-for-clean-water-solution

Gundlach, M. J. & Zivnuska, S. (2010). An experiential learning approach to teaching social entrepreneurship, triple bottom line, and sustainability: Modifying and extending practical organizational behavior education (PROBE). American Journal of Business Education, 3(1), 19-28.

Hadad, S. (2018). Analyzing corporate social entrepreneurship specific to knowledge economy with a focus on the Romanian economic context. Management Dynamics in the Knowledge Economy, *6*(2), 247-264.

Huitema, D., Lebel, L., & Meijerink, S. (2011). The strategies of policy entrepreneurs in water transitions around the world. Water Policy, *13*(5), 717-733.

Human Development Report (2006). Beyond scarcity: Power, poverty, and the global water crisis. Retrieved from https://www.undp.org/content/undp/en/home/librarypage/hdr/human-development-report-2006.html

Husser, J., Jean-Marc, A., Barbat, G., & Lespinet-Najib, V. (2012). CSR and sustainable development: Are the concepts compatible? *Management of Environmental Quality*, *23*(6), 658-672.

Huster, K., Petrillo, C., O'Malley, G., Glassman, D., Rush, J., & Wasserheit, J. (2017). Global Social Entrepreneurship Competitions: Incubators for innovations in global health? *Journal of Management Education*, *41*(2), 249-271.

Islam, S. & Susskind, L. (2015). Understanding the water crisis in Africa and the Middle East: How can science inform policy and practice? *Bulletin of the Atomic Scientists*, *71*(2), 39-49. DOI: 10.1177/0096340215571906 http://the bulletin.sagepub.com

James, I., (2015). How unchecked pumping is sucking aquifers dry in India. Retrieved from https://www.desertsun.com/story/news/environment/2015/12/10/how-unchecked-pumping-sucking-aquifers-dry-india/74634336.

Jones, J. A. & Donmoyer, R. (2015). Multiple meanings of social entrepreneurship and social enterprise and their implications for the nonprofit field. *The Journal of Nonprofit Education and Leadership*, *5*(1), 12-29.

Jung, K., Jang, H. S. & Seo, I. (2016). Government-driven social enterprises in South Korea: Lessons from the social enterprise promotion program in the Seoul metropolitan government. *International Review of Administrative Sciences*, *82*(3), 598-616.

Justicia Hídrica (2016). Water accumulation, conflicts, and civil society strategies. Retrieved from http://justiciahidrica.org/the-justicia-hidricawater-justice-alliance/?lang=en).

Karnani, A. (2014). Corporate social responsibility does not avert the tragedy of the commons. Case study: Coca-Cola India. *Economics, Management and Financial Markets*, *9*(3), 11-33.

Kinsella, S. & Wood, N. (2014). University/Community partnerships: Engaging business students in leadership and solution-based approaches. *Journal of Management Policy and Practice*, *15*(3), 36-41.

Korsgaard, S. (2011). Opportunity formation in social entrepreneurship. *Journal of Enterprising Communities, 5*(4), 265-285.

Lan, H., Zhu, Y., Ness, D., Xing, K. & Schneider, K. (2014). The role and characteristics of social entrepreneurs in contemporary rural cooperative development in China: Case studies of rural social entrepreneurship. *Asia Pacific Business Review*, *20*(3), 379-400.

Lauesen, L. M. (2014). How well are water companies engaged in CSR? A critical cross-geographical discourse analysis. *Social Responsibility Journal*, *10*(1), 115-136.

Lauesen, L. M. (2016). CSR maturity and motivation in the water sector. *Social Responsibility Journal*, *12*(3), 506-522.

Lawrence, A., & Weber, J. (2017). *Business and society: Stakeholders, ethics, public policy*. New York, NY: McGraw Hill.

Living Waters for the World (2019). Clean water for communities, by communities. Retrieved from https://www.livingwatersfortheworld.org

Longuevergne, L., Scanlon, B. R., & Wilson, C. R. (2010). GRACE hydrological estimates for small basins: Evaluating processing approaches on the high plains aquifer, USA. *Water Resources Research, 46*(11).

Maddocks, A., Young, R.S. & Reig, P. (2015). Ranking the world's most water-stressed countries in 2040. Retrieved from http://www.wri.org/blog/2015/08/ranking-world%E2%80%99s-most-water-stressed-countries-2040.

Massetti, B. L. (2008). The social entrepreneurship matrix as a "tipping point" for economic change. *Emergence: Complexity and Organization, 10*(3), 1-8.

Majik Water (2020). Harvesting drinking water from air. Retrieved from http://www.majikwater.co.

Mekonnen, M. M., & Hoekstra, A. (2016). Four billion people facing severe water scarcity. *Science Advances 2*(2), e1500323. DOI: 10.1126/sciadv.1500323.

Mititelu, C., Fiorani, G. & Litardi, I. (2017). Fostering sustainable development and entrepreneurship: The new role of university. *Management Dynamics in the Knowledge Economy, 5*(3), 395-414.

Mondal, W. I. (2012). Microcredit as a tool for rural development: A case study of Malaysia. *Journal of Business Case Studies, 8*(1), 87.

Nelson, T., Ingols, C., Christian-Murtie, J. & Myers, P. (2013). Susan Murcott and Pure Home Water: Building a sustainable mission-driven enterprise in northern Ghana. *Entrepreneurship Theory and Practice, (37)*4, 961-979. DOI: 10.1111/j.1540-6520.2011.00448.x.

Nierenberg, D. (2018). The water economy: How much do we have? In D. Nierenberg (Ed.), Nourished planet: Sustainability in the global food system (pp. 70-72). Washington, DC: Island Press.

O'Connor, R. (2017). Water scarcity: Preventing future conflicts. *Case Western Reserve Journal of International Law. 49,* 331-335.

OECD (2009). Managing water for all: An OECD perspective on pricing and financing. Retrieved from https://www.oecd.org/env/resources/managingwaterforallanoecdperspectiveonpricingandfinancing.htm.

Peric, J. & Delic, A. (2016). Developing social responsibility in Croatian universities: A benchmarking approach and an overview of current situation. *International Review on Public and Non-Profit Marketing, 13*(1), 69-80.

Pless, N. M., & Appel, J. (2012). In pursuit of dignity and social justice: Changing lives through 100 % inclusion--how Gram Vikas fosters sustainable rural development. *Journal of Business Ethics, 111*(3), 389-411.

Prahalad, D. (2018). How can business increase its social impact? *The Journal for Quality and Participation, 41*(3), 4-11.

Prakash, V., & Marndi, M. N. (2015). Corporate social responsibility in ACC jhinkpani, jharkhand. *Anusandhanika, 7*(1), 116-121.

Santos, F. M. (2012). A positive theory of social entrepreneurship. *Journal of Business Ethics, 111*(3), 335-351.

Satpathy, C. R., & Singh, L. R. (2013). Corporate social responsibility: A study in national aluminium company limited. *Srusti Management Review, 6*(2), 40-48.

Saverimuttu, V., & Cochran, A. K. (2018). Addressing rural-urban disparities: A case of government service delivery in Papua New Guinea. *International Journal of Business and Economic Development (IJBED), 6*(2).

Sepúlveda, J., & Mendizabal, M. (2011). Business in climate or climate in business? *Management of Environmental Quality, 22*(5), 632-651.

Sepúlveda, L. (2015). Social Enterprise: A new phenomenon in the field of economic and social welfare? *Social Policy & Administration 49*(7), 842-861.

Shamsudduha, M., Taylor, R. G., & Longuevergne, L. (2012). Monitoring groundwater storage changes in the highly seasonal humid tropics: Validation of GRACE measurements in the Bengal basin. *Water Resources Research*, 48(2), 1-12.

Shaw, E. & Carter, S. (2007). Social entrepreneurship. *Journal of Small Business and Enterprise Development, 14*(3), 418-434.

Stephenson, H. & Mace, D. L. (2009). Partnering with an NGO to start a microloan program in a Ghanaian village: A global organic triple-bottom-line social enterprise in the making. *Journal of the International Academy for Case Studies, 15*(7), 119-127.

Sullivan, C. (2002). Calculating a Water Poverty Index. *World Development, 30*(7), 1195-1210.

Sullivan, D. M. (2007). Stimulating social entrepreneurship: Can support from cities make a difference? *The Academy of Management Perspectives, 21*(1), 77-78.

Swissbluetecbridge (n.d.) Financing Swiss innovation in water, sanitation & hygiene for one million+ people in low-income markets. Retrieved from https://swissbluetecbridge.ch.

Tan, J. (2015). Water privatization, ethnicity and rent-seeking: Preliminary evidence from Malaysia. *Journal of Southeast Asian Economies*, 32(3), 297-318.

Tankha, S., & Fuller, B. (2010). Getting things done: Bureaucratic and entrepreneurial approaches to the practice of participatory water management reforms in Brazil and India. *Water Policy, 12*(S1), 84-103.

Trahant, G. (2019). 8 social enterprise products that are impacting the world through clean water ventures. Retrieved from https://www.causeartist.com/8-social-enterprise-products-that-are-impacting-the-world-through-clean-water-ventures.

UN Water (n.d.). About United Nations Water. Retrieved from http://www.unwater.org/about-unwater/

UNESCO World Water Assessment Program (2012). The United Nations Development Report 4: Managing water under uncertainty and risk. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000217175

United Nations (2016). The human rights to safe drinking water and sanitation: Resolution adopted by the Human Rights Council on 29 September 2016. United Nations General Assembly and Human Rights Council, Geneva. Retrieved from https://digitallibrary.un.org/record/850266?ln=en

United Nations (2017). World Population Prospects. Retrieved from https://esa.un.org/unpd/wpp.

Weismann, M. F. (2017). The missing metrics of sustainability: Just how beneficial are benefit corporations? *Delaware Journal of Corporate Law, 42*(1), 1-50.

Wendling, Z.A., Emerson, J.W., Esty, D.C., Levy, M.A., & de Sherbinin, A. (2018). Environmental Performance Index. New Haven, CT: Yale Center for Environmental Law & Policy.

White, C. (2012). Understanding water scarcity: definitions and measurements. *Global Water Forum, Australian National University*, 1-7. Retrieved from http://www.iwmi.cgiar.org/News_Room/pdf/Understanding_water_scarcity.pdf.

Wolman, A. (1961) Impact of desalinization on the water economy. Journal AWWA, 53(2), 119-124.

World Economic Forum (2020). Global water initiative. Retrieved from https://www.weforum.org/projects/global-water-initiative.

World Water Development Report: Wastewater an untapped resource (2017, March 22). United Nations. Retrieved from http://unwater.org/publications/world-warer-development-report-2017.

Zahra, S.A., Gedajlovic, E., Neubaum, D.O., & Shulman, J.M. (2009). A typology of social entrepreneurs: Motives, search processes and ethical challenges. *Journal of Business Venturing 24*(5), 519–532

Zanakis, S. H., Theofanides, S., Kontaratos, A. N., & Tassios, T. P. (2003). Ancient Greeks' practices and contributions in public and entrepreneurship decision making. *Interfaces*, *33*(6), 72-88.