The Sustainable Development Goals are more globally collaborative than the Millennium Development Goals

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I. Introduction

The global question of sustainability and environmental resilience requires a universal platform for the establishment of environmental management frameworks, as well as targets for land oceans which require protection, and a universal set of indicators for natural resources. This is encompassed by the Millennium Development Goals (MDGs) and expanded upon in the Sustainable Development Goals (SDGs), in order to create an opportunity for global collaboration.

The MDGs and SDGs are not legally binding agreements. They represent a global, moral, practical, and ethical commitment. This commitment, however, cannot be enforced, and thus requires global cooperation between the private sector, as well as governments, and local and international investors. "Sustainability requires the leadership and responsibility of the private, civil, and public sectors" (Sachs 2012:2210).

II. Contextualisation

Sachs (2012:2206) notes that the MDGs "established measurable and time-bound objectives" for the promotion of worldwide awareness and accountability, as well as the creation of improved metrics and opportunities for social feedback. The MDGs, however, could be attempted, and attained in relative isolation, with each country focusing on the targets which characterises the variability between developed and developing countries. The SDGs provide a platform for the secure progress of the achievement of the targets, with global collaboration in terms of strategy, policy, data collection and interpretation, and implementation.

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The MDGs comprise eight targets which measure the progress in the reduction of income poverty, hunger, disease, lack of adequate shelter, and the promotion of gender equality, health, education, and environmental sustainability (United Nations 2002). These goals emphasised the basic human rights of health, education, shelter, and security, and were designed to alleviate extreme poverty by the target date of 2015 (United Nations 2002).

The MDG aim to "advance human wellbeing" necessarily needs to be fulfilled within the "ecological limits of the biosphere", while avoiding damage to the biosphere (Moran *et al.* 2007:470). The overall achievements of the

MDGs and the SDGs may thus be interpreted against the matric of MDG Goal 7, ensuring environmental sustainability, because global environmental sustainability is a necessary and sufficient condition for human wellbeing.

MDG Goal 7 (ensuring environmental sustainability) comprises (Statistics South Africa 2015:xxviii):

Target 7A – Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources;

Target 7B – Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss;

Target 7C – Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation;

Target 7D – By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.

The MDG progress is variable, however. The goals were formulated without intermediate targets, which impacts on data reporting, collection, and policy creation. Sachs (2012:2210) notes that, in developing countries, "accurate published information is not

available". This is problematic in terms of the variability in MDG achievement, and requires rectification for the fulfilment of the SDGs.

Following the 2015 target of the Millennium Development Goals, the United Nations compiled a 2030 Agenda for Sustainable Development, comprising 17 Sustainable Development Goals (SDGs). The SDGs embody the MDGs, and expand upon the implementation of interventions to eradicate poverty and hunger, as well as inequality; and ensuring inter alia food security and improved nutrition, as well as health, equitable education, gender equality, availability and sustainable management of water and sanitation, access to energy, economic growth, sustainable ecosystems, and sustainable consumption (United Nations 2016).

While MDG Goal 7 focused on environmental sustainability, and yielded measurable outcomes, the SDGs comprise a more holistic sustainability approach, with seven goals pertaining to sustainability, namely:

SDG 6: Clean Water and Sanitation;
SDG 7: Affordable and Clean Energy;
SDG 11: Sustainable Cities and Communities;
SDG 12: Responsible Consumption and Production;
SDG 13: Climate Action;
SDG 14: Life below Water;
SDG 15: Life on Land.

III. Discussion

The enhancement of human wellbeing is encompassed in the aforementioned goals, inasmuch as human dignity and quality of life are dependent upon water and sanitation services, and private and economic development require affordable and safe power. Sustainable cities ensure economic development, as well as housing, and responsible production and consumption allows for the eradication of hunger, and a decrease in poverty.

Climate action ensures that global functionality can continue and progress, because in addressing the threat to the biosphere, it becomes a protected space from which resources may be extracted. Climate change is the direct consequence of "human-caused emissions of greenhouse gasses, environmental pollution, and the acidification of the oceans" (Sachs 2012:2207), and therefore, its rectification is a global, human responsibility. Life on land and life under water are enshrined within the protective ambit of the SDGs, because the earth's fauna and flora are directly affected by human consumption, production, and population growth. These seven goals affect the global population, in both developed and developing countries, and thus form a global platform for reform.

The SDGs present an opportunity for global engagement because of the potential for the "mobilisation of global knowledge" (Sachs 2012:2211). The global community of practice in terms of research and innovation may be able to collaborate in "global problem-solving networks" related to the sustainable development of energy, food, urbanisation, climate resilience, disaster management, and vulnerability mitigation.

Global collaboration in the achievement of the SDGs does not fall solely within the scope of research and development, but also in terms of public investments in infrastructure and technology, in order to empower low-income countries to "organise human activity to combine living standards and ecological imperatives" (Sachs 2012:2211). This organisation is imperative in terms of "the resource intensity in the production of goods and services, consumption of goods and services per person, and population size" (Moran *et al.* 2007:473).

When these three factors are addressed within a sustainable context, it becomes possible to investigate opportunities for the establishment of "social inclusion in the world's economies" (Sachs 2012:2207) in order to provide opportunities for the growing populations in a sustainable manner, potentially alleviating the increases in food prices and the destruction of natural habitats. Population growth projections necessitate sustainable development in order to address the global need for "food grains and feed grains" (Sachs 2012:2207). However, this development creates the risk of natural habitat destruction, water stress, increased climate change, increased fertiliser pollution, and decreased biodiversity.

This potential development therefore depends on the global collaboration of the communities of practise, to use the data gathered from the MDG initiative in order to establish a framework for global environmental resilience, which may then broken down to a community level interventions, around the world, through the implementation of municipal environmental management frameworks, as well as local, national, and international targets for land oceans which require protection, and a universal set of indicators for natural

resources.

The SDGs thus have a global effect in terms of economic development, environmental sustainability, and a different approach to governance, in order to enhance human wellbeing by 2030. Global commitment to the fulfilment of the SDGs in a collaborative manner may alleviate the man-made stress that has been placed on the global ecosystem functions in order to reduce the risk of exceeding the planetary thresholds which sustain life on earth.

IV. Collaborative Application

Sustainability and human wellbeing are not mutually exclusive, and the interdisciplinary, collaborative efforts of subject matter experts may create the foundation for the achievement of the Sustainable Development Goals. An example of collaboration in the attempt to achieve SDG 6 is evidenced by the Zambian Western Water and Sewerage Company Ltd (WWSC) commissioning a South African civil engineering form, SMEC South Africa, in order to mitigate the vulnerability of ten towns in the Western Province of Zambia with regard to water supply and sanitation services.

The subject matter expertise applied to the aforementioned project comprised a socio-spatial investigation into the water poverty of the affected area in order to contextualise the vulnerability of the inhabitants of the area, as well as the environment of the affected area. This underpinned the engineering design process with regard to the design of bulk water supply abstraction points, the water distribution network, raw water treatment, and sanitation services.

One of the ten identified towns of the Western Provinces, namely Namushakende, may be used as a case study for the identification of the vulnerability with regard to SDG 6, and the overarching issue of human wellbeing and environmental sustainability.

Namushakende falls within the Mongu District of the Western Province of Zambia. The Mongu District is predominantly rural, with commercial and subsistence activities mainly comprising “farming, fishing, timber exploitation, crafts, livestock production and trading” (Mongu Municipal Council 2013:v). As such, agriculture forms the basis of the livelihood activities of the inhabitants of the district, especially in rural communities. The Mongu Municipal Council (MMC) reports that “most people grow maize for consumption and rice to earn cash, livestock has mainly been sold when need arises. The predominant agricultural production areas are Mongu East and the Barotse plains. The district comprises a total of 45 000 farmers most of which are small scale producers” (Mongu Municipal Council 2013:v).

Namushakende falls under the influence of the Barotse Royal Establishment (BRE), because of its location in relation to the Barotse Floodplain, or the Zambezi Floodplain (Wetlands International 2007). The BRE “plays a pivotal role in the general governance of the local communities within their specific catchment areas traditionally known as ‘Silalanda’” (Mongu Municipal Council 2013:8).

The housing units available in the district are inadequate, hence the development of informal or unplanned settlements and illegal structures in formal settlements. The livestock in the Mongu District, especially cattle, are under a transhumant management system; due to the fact that they move to higher land during the flood season and move back to the plain during the dry season. Cattle are grazed on communal lands where pasture management is a collective responsibility (Mongu Municipal Council 2013:8).

As Namushakende falls within the ambit of rural Mongu, the health risks to residents include malaria, HIV and AIDS, and environmental related diseases, including water borne diseases (Mongu Municipal Council 2013:37). Malnutrition is also one of the highest reported causes of morbidity. A basic standard of health is directly related to a community’s access to water and sanitation services, as the community is vulnerable in terms of hazard exposure, due to the untreated water, and lack of sufficient water supply to the town.

It is important to note that Namushakende has very limited access to treated and safe water, which is why people in the area “experience high incidences of diarrhoeal disease” (Mongu Municipal Council 2013:29):

SMEC South Africa (2016a:8) reports that the Zambezi River is more than 8km away from the Namushakende town, and consequently, in order to use surface water from the Zambezi River, a pumping main is an unavoidable requirement. Pumping from the river will prove more costly when compared to pumping from a local well field equipped with boreholes. The most feasible water source in the area is through borehole abstraction.

The Firstspace of Namushakende is thus vulnerable, due to its location in terms of accessibility because it is not feasible for the inhabitants to source water directly

from the Zambezi River. Furthermore, the lack of treated water increases the vulnerability of the inhabitants of the town, as the health risks associated with excreta-related diseases increases.

The current bulk water supply infrastructure for Namushakende was built in 1974. The system was originally designed to transport water from the plains via a canal which terminated in a channel conveying water to two wells. At the time of the wells' construction, they were equipped with diesel engine powered pumps. The system has since been abandoned because water from the plains is seasonal, and thus not reliable as a full-year supply source (SMEC 2016a:8). The seasonality of the water supply from the Flood Plain renders the Firstspace of Namushakende vulnerable to natural disasters including droughts and floods. In order to mitigate the potential effects of drought, it would be necessary to plant drought-resistant crops, in order to sustain the small-scale agriculture of the town.

Currently, water is sourced from a well field located at the old intake which is located at the western part of Namushakende, along the banks of the Barotse Flood Plain. Two boreholes are available for use, but only one borehole is equipped and in use. The well field has been encroached upon by squatters which raises concerns about the ground water quality, and reaffirms the inhabitants' vulnerability in terms of water quality, as the borehole water only undergoes rudimentary treatment, through manual chlorination (SMEC 2016a:8).

Raw water is pumped from the borehole to an elevated tank where the pump operator manually chlorinates the water. The chlorinated water is then directly distributed to the end users (Gauff Ingenieure 2015:4-8). This is a dangerous and unreliable treatment method, as the operator has to climb the tank access ladder on a daily basis. There is also no protection against water source contamination (SMEC 2016a: 10), which relates to the Firstspace vulnerability of the well field itself. Without automated chlorination, there are inconsistent levels of disinfection that could result in health risks where under-chlorination or over-chlorination is present (SMEC 2016a:10). Furthermore, the concentrated chlorine in elevated tanks may result in corrosion of the steel tank material, which creates infrastructure vulnerability, as well as environmental degradation.

In terms of environmental vulnerability and degradation, the existing water distribution system comprises old asbestos cement and galvanized iron pipes (SMEC 2016a:10) that were incorporated into the network in 1947. SMEC (2016a:10) notes that the current pipe network does not fully cover the existing inhabited areas within Namushakende, which means that Firstspace othering occurs innately due the location of the water distribution network; those who inhabit the town in a given space are favoured by having access to the water distribution system, whereas those who do not have access due to their location are othered and disadvantaged. It is necessary to note, however, that access to the water distribution network does not guarantee a safe water supply, as Gauff Ingenieure (2015:2-1) reports that the prevalence of waterborne diseases is compounded by the fact that "households do not treat the tap water as it is taken for granted that the water has been treated prior to being supplied".

Namushakende's sanitation services are predominantly comprised of on-site systems, including septic tanks or soak-aways, and pit latrines (Gauff Ingenieure 2015:4-11), and there is no wastewater treatment infrastructure in place. The lack of sanitation services in the area both creates and reinforces the community's vulnerability in terms of illness and disease related to sanitation, including, inter alia, diarrhoea and intestinal worms.

Conditions that impact on a community's level of access to water relate to developmental concepts and is a primary driver for development planning. By informing the development process of the nature of hazards, avoidance and mitigation strategies can be incorporated in strategic planning and in the design of infrastructure, for example by avoiding hazard zones such as floodplains and constructing earthquake-resistant housing (Oliver-Smith 1994; Lewis 1999; Fordham 2006).

The lack of access to a clean and safe water supply increases vulnerability. In this context the Water Poverty Index provides a means of vulnerability assessment.

The WPI is a "holistic tool" which is used to "measure water stress at the household and community levels, designed to aid national decision-makers, at community and central government level, as well as donor agencies, to determine priority needs for interventions in the water sector" (Sullivan *et al.* 2003:189). This index comprises the measures of:

- Access to water;
- Water quantity, quality, and variability;
- Water uses (domestic, food, productive purposes);

- Capacity for water management;
- Environmental aspects.

The WPI was developed upon the understanding that "access to safe water is a necessary condition for an adequate quality of life" (Sullivan *et al.* 2003:189). For Sullivan *et al*. (2003:190), "water is a fundamental basis of all life, and nobody can be lifted out of extreme poverty without adequate access to water". Fewtrell and Bartram (2001) note that an "improved" water supply encompasses a "Household connection, public standpipe, borehole, protected dug well, protected spring or rainwater collection".

There are five key components to the WPI (Sullivan *et al*. 2003:191-192):

1. Resources: Physical availability of both surface and groundwater, taking into account variability and quality, as well as the total amount of water;
2. Access: Access to water for human use, including distance to a safe source, time needed for collection per household and other significant factors, including water for crop irrigation and industrial uses;
3. Capacity: Effectiveness of people's ability to manage water. Capacity is interpreted in the sense of income to allow purchase of improved water, and education and health, which interact with income and indicate a capacity to lobby for and manage a water supply;
4. Use: Different uses of water, including domestic, agricultural, and industrial;
5. Environment: Evaluation of the environmental integrity related to water and of ecosystem goods and services from aquatic habitats in the area.

In order to mitigate the vulnerability of the area, SMEC South Africa implemented the following design recommendations for the WWSC (SMEC 2016b):

1. The construction of new and additional boreholes will improve access to improved water through improving both the quantity of the available water, as well as the quality;
2. The implementation of automatic chlorination will ensure the improved quality of the water;
3. The rehabilitation of the water storage systems in the identified districts, sub-districts, and zones will ensure equitable access to improved water to all of the residents of the towns;
4. Through construction of new boreholes and reservoirs, it is estimated that all residents will be able to reach an improved water source in 30 minutes or less. This would allow individuals to utilise the time which would have been spent travelling to the water source more productively in terms of domestic and agricultural purposes;
5. Through improving the amount of accessible water, as well as the quality thereof, there will be enough water for the residents to use for domestic, purposes, agricultural purposes, and sanitation and hygiene purposes. This means that the incidences of water borne diseases and diseases related to exposure to sewage will begin to be mitigated;
6. Through the sustainable development of the water supply, there will be enough water for the sustained development of improved agriculture and productive purposes, leading to the improved socio-economic status of the residents;
7. Consistent water treatment and improved infrastructure will improve the iron content of the water supply;
8. The protection and supervision of the well field will prevent water source contamination and limit environmental damage at the water source;
9. The provision of VIPs, Pour Flush Systems, Aqua Privy Systems, septic tanks, and soak-aways will improve on-site sanitation from the basic level to the highest level of service.

V. Conclusion

Water quality and availability have a direct impact on the health of the individuals to whom that water is available, and "studies indicate that clean water within a distance of 1km from the house tends to lead to improved health status, since people start to use substantially more water for cleaning and washing" (Sullivan *et al*. 2003: 190).

The pervading issues of water supply and sanitation services as applied to SDG 6, as well as the potential environmental impact of this lack of access requires collaborative interventions in order to address the wellbeing of communities in areas where the lack of access to resources threatens their quality of life and the environment in which they live. Sustainable development of resources is attainable through interdisciplinary approaches, as exemplified by the collaboration of SMEC SA and the WWSC where social sciences and engineering were used in conjunction in order to identify the vulnerability of a community and to mitigate that vulnerability.

This example shows that regardless of the legal status of the SDGs, the goal to provide the sustainable access to resources in order to improve the quality of life in an

impoverished area is possible, and that the SDGs create a platform for collaboration, because they are not considered in the relative isolation of individual countries.

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