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Eco-Sanitation

A method of providing the human right to dignity across the globe

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Abstract

Across the developing world, public policy has increasingly focused on sanitation to achieve the United Nation's Millennium Development Goals (MDGs). However, current misguided policies encourage the use of impractical means of sanitation, primarily the use of pit latrines and modern flush toilets. These methods combined with the current use of flying toilets are contributing to a global health epidemic and water shortage caused by fecal contamination in water. Working within a public policy framework by analyzing the current state of sanitation as well as the gaps in humanitarian sanitation policies, this paper provides a better solution for domestic and international aid organizations to move towards ecologically sound compost toilet systems. By pinpointing areas of concern and gaps in efficiency within foreign policy efforts to achieve the MDGs, nations can more effectively meet their intended humanitarian goals and provide for a better quality of life for billions of men, women, and children worldwide.

Contents

Public Policy Framework

Public policy refers to the actions of the government and the processes behind the scenes and in the public eye that determine a course of action for resolving an issue of public concern. Policy evaluation involves the examination of past, current, or proposed policies and analyzing those policies for efficiency and effectiveness (Cochran, Mayer, Carr, & Cayer, 2006). Cochran, Mayer, Carr and Cayer (2006) continue to explain that the process of policy-making revolves around three basic steps: problem identification, policy demands, and agenda formation. In the first step, the government identifies and defines a public problem. Afterwards, the policy-maker must take into consideration the policy demands from the constituency. Finally, the policy must be carefully tailored to meet and mitigate the policy demands from the public while also solving the original public issue it sought to rectify. It is important to gather all pertinent information, divide responsibility and resources, and research proper methods for effective policy goals.

Systematically targeting inefficient policies -in this case, domestic and international sanitation policies- is necessary to produce a national and international cooperative system that is more cost-efficient and more likely to solve the status quo's health-related problems caused by poor sanitation and an overuse of water.

Sanitation

Total sanitation is the management of human excreta, environmental cleanliness, and clean living (UN Water, 2008). While the health benefits of sanitation will be discussed in further detail later, it is important to understand that sanitation has broad and far-ranging effects on health, social development, and the environment. Sanitation is achievable and provides an opportunity for economic investment.

Because sanitation is inextricably linked to one's health and dignity, it can be classified as a human right. The right to sanitation has gained increased recognition globally as nations incorporate improved sanitation into their national policies. Sanitation is not just about stopping the spread of disease. Access to proper toilets also plays a critical role in human dignity-both at home and at school. Prince Willem Alexander of the Netherlands, chair of the UN Secretary Advisory Board on Water and Sanitation, advocates that all people in the world have the right to a healthy life, which in his mind, is equivalent to the right to sanitation.

Sanitation may be considered a foundational right. For purposes of this paper, a foundational right is a right that is a means to other rights. For example, in the case of sanitation, providing adequate toilet services is necessary to protect the human right to dignity, the right to a healthy life, and the right to economic development. Furthermore, sanitation is vital to the distribution of water resources and the right

to food through proper allocation of resources. Protecting the right to sanitation is a means to enhancing quality of life.

The global community is attempting to secure these rights for all human beings. Throughout the 1990s, world summits focused on the growing disparity between developed and undeveloped nations. The need for solidified action resulted in the 2002 Millennium Development Goals (MDGs), whereby the global community committed itself to respond to the development challenges of third world countries by 2015 (UNDP, 2006). Target 7.9 called for improved sanitation facilities for the world's poor, so the nations of the world began applying themselves to this goal. Yet while well-intentioned, many have pursued short-term solutions that have severe long-term ramifications in terms of environmental and physical health.

This paper attempts to identify and correct misguided foreign policy in achieving the MDGs and promote an ecological-friendly way to provide human dignity to millions of individuals living in poverty world-wide.

Problems

Human Health

General Overview

In the mid 1850s, cholera swept through London on four occasions, killing over 10,000 people in the city alone. In some areas nearly 13% of town parishes were lost (Summers, 1989, pp. 113-117). Cholera was thought to have been caused by "miasma in the atmosphere," a pseudo-theory that argued that pollution in the air was the cause of the disease. But through the work of Dr. John Snow, a surgeon, the medical community began to accept that fecal contamination could spread disease through water. Thus, the need for increased sanitation was finally recognized.

Today, the UN Water Project indicates that a lack of sanitation can decrease human health, increase child mortality, create misery for women, depress economic productivity and pollute the environment. More specifically, unimproved systems of sanitation allow contaminated water to mix with clean drinking water, which can lead to an ingestion of disease. Stoppoverty.org estimates that "just one gram of human feces can contain 10,000,000 viruses, 1,000,000 bacteria, 1000 parasite cysts, and 100 parasite eggs" (Feldman, 2007). Just a small amount of feces in drinking water can have immense ramifications on an individual's health. The following section profiles a few of the most common diseases spread by poor sanitation.

Specific Contaminates

Severe cholera is marked by watery diarrhea and vomiting, which leads to dehydration and shock, a condition which can lead to death within hours (Center for Disease Control, 2008). In 1991, cholera reached South America, infecting 400,000. Yet the contamination can be traced to outbreaks as far back at the 1500s in India (University of Pretoria, Dept. Microbiology and Plant Pathology, 2001). Poor sanitation techniques and depleted water sources keep the contamination alive today. Given the current lack of sanitation in Latin America and Africa, the CDC sees no reason for the near end of the global cholera pandemic.

Contaminated water may also carry *Salmonella* bacteria. The bacteria invades the small intestine, navigates the bloodstream to the liver, spleen, gall bladder, biliary system, lymphatic tissue of the bowel and bone marrow where they multiply, causing fever and death (Balentine & Shiel, 2008). Salmonella outbreaks occur periodically in the developed world but can be especially devastating in undeveloped countries.

In the 1920s, over 35,000 cases of typhoid were reported in the U.S. Today the numbers of cases occuring yearly are mostly due to tourists travelling to third world countries (Balentine & Shiel, 2008). This improvement is the result of improved environmental sanitation (Center for Disease Control, 2008). The disease can be spread through contaminated water in third world countries. Thus more can be done to combat typhoid through sanitation policies and procedures.

Polio, like typhoid, primarily affects poor nations. While most individuals in the United Kingdom and the United States routinely receive polio vaccines, the developing world is still at risk of developing this nerve crippling disease (Polio UK, 2005). Since the polio virus travels by water, it became virtually extinct in developed nations with improved quality of water in the 20th century (Lienhard, 2000). However, third world nations with developing water infrastructure are still at risk for transmitting the polio virus.

Bilharzias are just one of the many parasites that infest human feces. These parasitic worms enter through the feet and cause a rash accompanied by severe pain. Without quick medical attention, parasites can ultimately shut down the liver, intestines, bladder, and lungs, leading to the individual's untimely demise. This means that children can die from playing in contaminated water. Furthermore, those who survive may have an increased risk of bladder cancer. African studies revealed that the incidence of bladder cancer is 32 times higher than that of simple bladder cancer in the USA (Sudi, 2007). In three separate reports, the World Health Organization (2007) has carefully documented that up to 10% of the less industrialized world suffers from this and similar parasitic worm infections related to poor sanitation.

Illness in general decreases productivity. In addition to the above mentioned diseases, contaminated water can also cause infectious hepatitis, cryptosporidiosis, dysentery, and ascariasis, all

serious diseases that can impair a child's ability to attend school or cause death. By taking children and able-bodied adults out of school and the work force, these illnesses continue a cycle of poverty in third world nations.

Primary Victims of Water Borne Diseases

Unsafe water kills a wide variety of individuals, but the primary victims are children, the poor, and women. Due to their young age and vulnerability to disease, children are at high risk for water-borne disease. Socioeconomic status is the main determiner for the second group. Without funds to purchase the use of a toilet, the poor generally resort to 'flying toilets,' a term used to describe bags of feces thrown into streets. Furthermore, women are the primary individuals responsible for the duty of water procurement, putting them at greater risk for infection. Unsafe water kills millions, especially children, and impedes social and economic development of women. Half the hospital beds in the world serve the victims of the world's silent killer, unsafe water (Dabelkko, 2005).

Geoffrey Dabelkko (2005), the Director of the Environmental Change and Security Program of the Woodrow Wilson Center, argues that "The vast majority of these victims are children… and virtually all live in developing countries." Diarrheal dehydration is one of the main methods of elimination of water-borne diseases. It claims the lives of nearly 2 million children every year, killing more children in the last 10 years than all the people lost to armed conflict since World War II (United Nations Childrens Fund, 2000). But additionally, the marginalized poor living in high-population city centers will be the most overlooked. In these areas, one-third of the population lacks access to sanitation (United Nations Childrens Fund, 2000). While sanitation services are often available, many are run as private businesses. In Tanzania, the numbers of privately-owned toilet businesses are increasing; forcing customers to pay for every use (Arusha Times, 2007). This limits the poor's access to sanitation services even if they are present within the city.

Areas of Concern

In November 2007, the World Health Organization declared that poor sanitation was a growing concern in the migrant laborer population in the Greater Horn of Africa:

> Absence of safe water supply, poor sanitation facilities and the communities' poor knowledge and practice in the areas of personal and environmental hygiene are the main reasons for the spread of AWD (Acute Watery Diarrhea)… [Laborers who] live and work in the AWD affected areas… add considerably to the public health risk (World Health Organization, 2007).

However, the problems are not limited to the African continent. In the developed world, sewage contamination is often a guiding factor in gastrointestinal illnesses (EMSL Analytical, Inc., 2004).

Furthermore, tourism from developing nations produces an astonishing 25,000 gallons of sewage a day (Oceana, 2008).

Human Dignity

Overview

The United Nations Declaration of Human Rights argues that all individuals deserve dignity. The status of human beings entitles them to respect. Human dignity is the fundamental value of a human being. There are several contributing factors to discrimination that takes away from this dignity: sexual bias, gender-based sanitation needs, and inadequate facilities. These three situations are barriers to eco-sanitation and the protection of human rights in third world countries.

School

The gender-based roles and needs of women and men often differ significantly when it comes to personal hygiene and sanitation. This is especially true for girls and female teachers who often must miss 4-5 days of school every four weeks for their periods, leading to a loss of basic education. Gender roles must be taken into consideration in the design phase of water projects. However, most schools are only able to afford a single toilet. With inadequate facilities present, this toilet - whether by official decree or social tendency - generally becomes marked for boys-only, forcing girls to use flying toilets. Defecating in bags is a humiliating process that leaves girls open to harassment and sexual abuse. Moreover, "children and teachers spend most of their time at their respective schools and some of them avoid using school toilets because of their unhygienic conditions which can affect their health…and affect learners' ability to concentrate in class" (Mbola, 2007). Overall, the plight of school children in developing nations is severely hindered by sexual bias, gender-based sanitation needs, and inadequate facilities. No child is saved from the spread of disease. Millions suffer the consequences of poor sanitation every year, costing millions of days in lost school education (Dabelkko, 2005).

Figure 1 School toilet in Hayanista, Armenia. Photo by Gero Fedtke.

Target 3a of the MDGs seeks to eliminate gender disparity in education at all levels by 2015. However, in order to truly meet these goals, toilet inequality must be addressed to ensure that boys and

girls both have an equal chance for dignity in an educational environment. Human dignity should be taught and practiced in schools across the globe.

Home

Figure 2 Flying toilets litter the streets in Haiti. Photo courtesy of NationMaster Encyclopedia

In the developed world, flush toilets in every building have become the norm. However, for 2.6 billion people in the developing world, a lack of even basic toilets is severely jeopardizing their health and dignity (Hearn, 2006). Forced to defecate in bags, buckets, fields, and ditches, these individuals are consistently stripped of their human dignity as they then walk around in their own excrement on a day-to-day basis.

Lack of water also impedes social and economic development. Women and girls in many parts of sub-Saharan Africa must walk an average of six kilometers to fetch water—each way—preventing them from going to school or working outside the home, stunting movements for women's equality (Dabelkko, 2005).

International Action

Specific Action

Fecal contamination presents a moral imperative to act in the face of discrimination and a lack of dignity. It's a silent emergency, so no one will stop it. In 2006, the UN Development Program argued that unclean water is an immeasurably greater threat to human security than any violent conflict. They argue that when poor sanitation claims the lives of 2 million children and 443 million lost school days every year, the international community must act. In addition:

> To add to these human costs, the crisis in water and sanitation holds back economic growth. Yet unlike wars and natural disasters, this global crisis does not galvanize concerted international action. Like hunger, it is a silent emergency experienced by the poor and tolerated by those with the resources, the technology and the political power to end it. With less than a decade left to fulfill the Millennium Development Goals, this needs to change (UNDP, 2006).

This call echoes the imperative to act found in the UN Declaration of Human Rights. Article 22 argues that as members of society, all individuals both have rights and duties to protect those rights. Each

individual is “entitled to realization, through national effort and international cooperation” for the social and cultural rights necessary for his or her dignity. From a public policy mindset, the question becomes: how should the international community act in terms of sanitation to provide that dignity? The answer seems clear: efforts to fix sanitation should provide a long term solution for sustainability. Unfortunately, many programs have become misguided as discussed later in this paper.

Aside from the aforementioned MDG Target 3a, there are a few other targets related to sanitation. Target 7a seeks to integrate the principles of sustainable development into country policies and programs, reversing the loss of environmental resources. Target 7c aims to reduce the population of people without sustainable access to safe drinking water by half. Targets 7.8 and 7.9 aim to increase the proportion of individuals with available water sources and improved sanitation facilities.

Aside from the effort by UN partners and their subsidiaries, there have been other non-governmental organizations who seek to improve sanitation. In their attempts to alleviate the suffering of drought victims in the Greater Horn of Africa, the International Rescue Committee built 45 refuse pits and over 2,000 latrines for refugees in Ethiopia (International Rescue Committee, 2007). Aiding over 4,200 refugees of the Eritrean-Ethiopian conflict, the IRC maintains the camp water supply systems, building new structures including the construction of toilets.

Unintended Consequences

Even with the UN’s new “sanitation ladder,” the focus of sanitation programs has been on installing pit latrines or flush toilet systems. Both alternatives have grave consequences. Pit latrines, a favorite of aid programs for their low cost and easy construction, result in the same health implications of flying toilets. During the rainy season, pit latrines overflow, spreading fecal contamination because the toilets lack the portability and environmental safeguards to prevent contamination (Rashid, 2008). The sewage systems that accompany flush toilets are similarly affected. However, instead of the toilet itself overflowing, the sewage systems themselves may back up, causing the pollution.

Figure 3 Nairobi, Kenya still suffers from overflowing pit latrines. Photo by Sarah Simpson.

But flush toilets, the pinnacle of Western sanitation, are both expensive and large water consumers. New U.S. decrees mandate that toilets may not use more than 1.6 gallons per flush (Jay Keating & Associates , 2008). Traditional toilets in the Western world can often use up to 5 gallons each use.

In the developing world and the developed world alike, this waste should not be tolerated as it directly trades off with our limited drinking water. Aside from being a public trust and a basic human right, water has been defined as the oil of the future, and some argue that it should never be considered a good to be traded and sold on the world market (Bennett, 2002). Conflict over water has been empirically seen in both the Middle East and Africa. As resources become strained, countries, tribes, and villages will often use water basins at a critical point of conflict, because without essential water, they know they will die (Murray-Rust, Alpaslan, & Harmancioglu, 2003).

Yet despite these serious and obvious downsides to both pit latrines and flush toilets, they continue to be the focal point of foreign policy and humanitarian initiatives. A new solution is needed, and a change in policy must be implemented to right these inefficiencies.

Solution of Eco-Sanitation

Eco-Sanitation goes by many names: eco-san, compost toilet, bio-latrines, bio-let, eco-toilet, dignity toilet, and portable toilet among others. The basic premise of these toilets is to provide a low-cost alternative to flush toilets that are more effective than pit latrines and create a sustainable system of decomposition and agriculture. This creates the most efficient sanitation system for developing countries at the lowest cost. These toilets have the potential to dramatically change the way Western nations re-conceptualize human dignity through toilet construction.

Structures

Eco-sanitation takes on many forms and structures. To purchase a pre-made loo would cost the purchaser $180. However, these same toilets can be built for just $25 (Joseph Jenkins Publishing, 2008). There are three basic components to a compost toilet system: the toilet receptacle, cover material, and a compost bin. After every use, the toilet must be covered with clean, organic matter. Rotted sawdust, peat moss, leaf mould, rice hulls, and grass clipping make excellent cover material by absorbing urine and eliminating odor that attracts flies. (Jenkins, 2005) The final component of the compost toilet system is a compost bin. Once full, the toilet receptacle should be deposited in a temperature-monitored compost pile. The compost pile allows the organic matter to decompose into fertile top soil.

Brands

While home-made systems can be built to owner specifications, there are a number of commercially sold models that fit into a modern lifestyle. In order to make an easy policy transition from flush-toilets to compost toilets in the developed world, eco-toilets must meet the same aesthetic standards.

Figure 5 Envirolet's FlushSmart VF

Figure 4 Waste Treatment Center

Models range from simple and functional to more elaborate and complex. For example, Envirolet's FlushSmart VF is one of the first vacuum flush/composting toilet system combos. It maintains a simplistic, yet modern appearance and can be installed in nearly any home. More advanced models simulate flush toilets and fit into a more expensive taste. Envirolet's Waterless Remote System uses a remote waste treatment center installed below the floor, directly under the toilet. In this case, a composting bin is not needed (Envirolet, 2008). The Afrisan toilet has been specifically designed for projects in India and Africa. It features a solar powered option to increase the rate of decomposition (South African Toilet Organization, 2008).

Results

Eco-Sanitation provides many benefits for society, including increases in agricultural productivity, a decrease in disease, a better environment, and better water conservation. All of these represent a net benefit to status quo policies and add efficiency to sanitation.

Disease Reduction

Compost toilets kill many disease-causing pathogens, and the resulting matter is clean enough to swim in:

> In the course of the composting process, feces are reduced in volume by more than 90%. Potential pathogens die off or are consumed by predatory organisms. Regular testing of both compost end products for potential pathogens shows levels of fecal coliform that meet the USEPA standard for swimming water (Clivus Mulstrum, 2007).

The terrible costs of disease are also significantly reduced in the process. By killing off disease-causing bacteria, compost toilets reduce the spread of diarrhea, tuberculosis, and other deadly ailments. This is a direct result of properly disposing of human waste. A survey by the Kampala Ecological Sanitation Project found that the use of pit latrines in Uganda negatively impacted cleanliness and hygiene. However, the study went on to conclude that using Eco-Sanitation measures would increase this cleanliness and positively impact sanitation goals (Businge, 2007). Thus the millions a year that die

because of water-borne diseases and the billions that are forced to openly defecate in bushes can be saved from this devastating lifestyle through the use of Eco-Sanitation.

Agricultural Benefit

The potential for compost toilets to stop the spread of disease is clear. With its unique composting element, feces and urine can be become a benefit to society through agriculture instead of a source of human and environmental harm. A Calvin College Case study continues to point out that human excrement naturally contains nutrients that are necessary for the creation of food. And through an eco-sanitation toilet, humans can capture those nutrients. In commercial models, solid and liquid waste is separated into two compartments, allowing each to process on its own. The study explains:

> As urine passes through the composting medium, it is chemically transformed, by a process called nitrification, into a stable, nearly odorless, high-nitrate solution. In addition to nitrate, the "compost liquid" also contains potassium and phosphorous, making it an excellent fertilizer... Feces are also converted by aerobic decomposition into a stable end product that closely resembles topsoil and is useful as a soil conditioner (Clivus Mulstrum, 2005).

This recycling of nutrients has the potential to produce a significant amount of food, without wasting precious water resources on toilet activities. Over the course of a year, the excrement of one person will contain almost enough nutrients to grow the amount of grain needed for that person to survive (250 kg) (World Health Organization, 2007). Through the use of compost toilets and ecological sanitation, the international community can ensure that hunger does not become systemic. By developing small scale water infrastructure and reducing the use of water through compost toilets, the global community can create 1 trillion dollars in productivity by fighting malnourishment, a condition that kills more than AIDs, malaria, and tuberculosis combined (Kielburger & Kielburger, 2006). The sheer number of deaths associated with malnourishment is of greater magnitude than many of these infectious diseases. And yet, the global community can stop both malnutrition and diseases as a result of fecal contamination with a single policy.

Nutrient Pollution

This paper has already briefly discussed the immense usage of water that flush toilets employ. However, the impact on the environment is just as disturbing. Typical sewage systems cause severe harm to the oceans. Arno Rossmarim, communications director of the Stockholm Environment Institute, believes that ecological sanitation is the only way to avert a global crisis (Conant, 2007). Jeff Conant explains:

> In nature, nitrogen, potassium and phosphate are all returned to soil in animal wastes. But a century of sewage has diverted vast amounts of these essential elements to the bottom of the oceans, from where they can never be recovered. While phosphorous is essential for agriculture, its build-up in aquatic ecosystems causes eutrophication (the elimination of oxygen from the marine environment). Meanwhile, the world's known reserves of mined phosphorous are growing dangerously scarce (Conant, 2007).

This environmental damage can occur indirectly through city sewer leakage or through the cruise ship industry. A 2007 study revealed that the cruise ship industry has increased in volume by 107% in the past decade (Environmental News Service, 2007). The study further points out that in a typical one-week cruise accommodating just 3,000 people, produces over 210,000 gallons of sewage. Compost toilets reduce this conventional waste pollution. Clivus Mulstrum toilets have earned the U.S. Green Building Council's Leadership in Energy and Environmental Design (Clivus Mulstrum, 2007). Because composting systems eliminate nutrient pollution caused by sewage and septic systems, they make an ideal alternative to conventional systems. A reduction in freshwater ecosystems would cause the extinction of fish and marine species (Jackson, et al., 2007). The authors of *Ecological Sanitation* argue that "Unless the efficiency of water use rises, this imbalance will reduce freshwater ecosystem services, increase the number of aquatic species facing extinction, and further fragment wetlands, rivers, deltas, and estuaries" (Jackson, et al., 2007). Thus compost toilets could be instrumental in the protection of a variety of marine species.

Community Dignity

The process of building a compost toilet in a community ensures that cooperative measures produce a greater degree of human dignity. The mere building of a compost toilet guarantees that the community increases their awareness of proper hygiene. Moreover, projects like these sponsored by the UK-based program *Wherever the Need* have reported a major impact on the general health of these participant communities (Crosweller, updated daily). Additionally, Crosweller argues that the facilities "provide security for women, whose only option was open defecation, putting them at risk of attack or rape, or even scorpion, snake and spider bite/sting." *Wherever the Need* reports that eco-toilets can provide functionality and privacy in an efficient manner for more than twenty-five years. The sustainable nature of the eco-toilet makes it ideal for communities. Dignity extends beyond the individual. These toilets allow communities to be self-sufficient in nature, which allows individuals within the community to avoid the humiliating effects of constant and intergenerational dependence on developed nations. The

creation of self-help groups surrounding these new eco-toilets has also been influential in breaking this cycle. Crosweller explains:

> New complexes are built after consultation with the local community and the creation of or involvement by community self help groups. These self help groups then become the focal point for site identification, construction, maintenance and general running of the complex (Crosweller, updated daily).

These projects have been successful in completing small-scale initiatives in three areas of India near Cuddalore, Pune and Rajkot. However, an expansion of these programs should become the focus of international policy because they are proven to be more efficient, self-sufficient, and effective in fighting disease.

Conclusion

In order to produce substantial changes in public policy, national and international organizations must identify the problems, assess policy demands from the population, and then formulate an efficient agenda. In the world of sanitation, the problem is two-fold: (1) most of the developing world lacks adequate access to toilets and (2) sanitation programs focus on inefficient means of providing sanitation through pit latrines or flush toilets. The need to change these problems is compounded by demands for women's equality and dignity for developing countries. Thus the final step to produce an efficient public policy is to formulate an agenda aimed at Eco-Sanitation.

International aid organizations and national programs should focus on transitioning foreign assistance to fund compost toilets instead of pit latrines and flush toilets. While more expensive than pit latrines and less costly than their flush counterparts, they are a better alternative because they reduce water costs in the long term, decrease the spread of disease, and mitigate conflict. Additionally, the agricultural benefits and decrease in environmental pollution could go a long way towards providing developing nations with sustainable development and means of income. However changing foreign policy is not enough. Domestic measures must change as well. The effects of environmental pollution caused by domestic sewage systems and cruise ships every year do not remain confined to national waters. Illnesses through these means are not easily measured; however they are of equal concern. In both situations, Eco-Sanitation promises to provide both increased savings and healthier results. Thus, the only rational public policy decision would be to transition global focus towards compost toilet systems.

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