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The Climate Change Games: Planning for Resiliency in New York City

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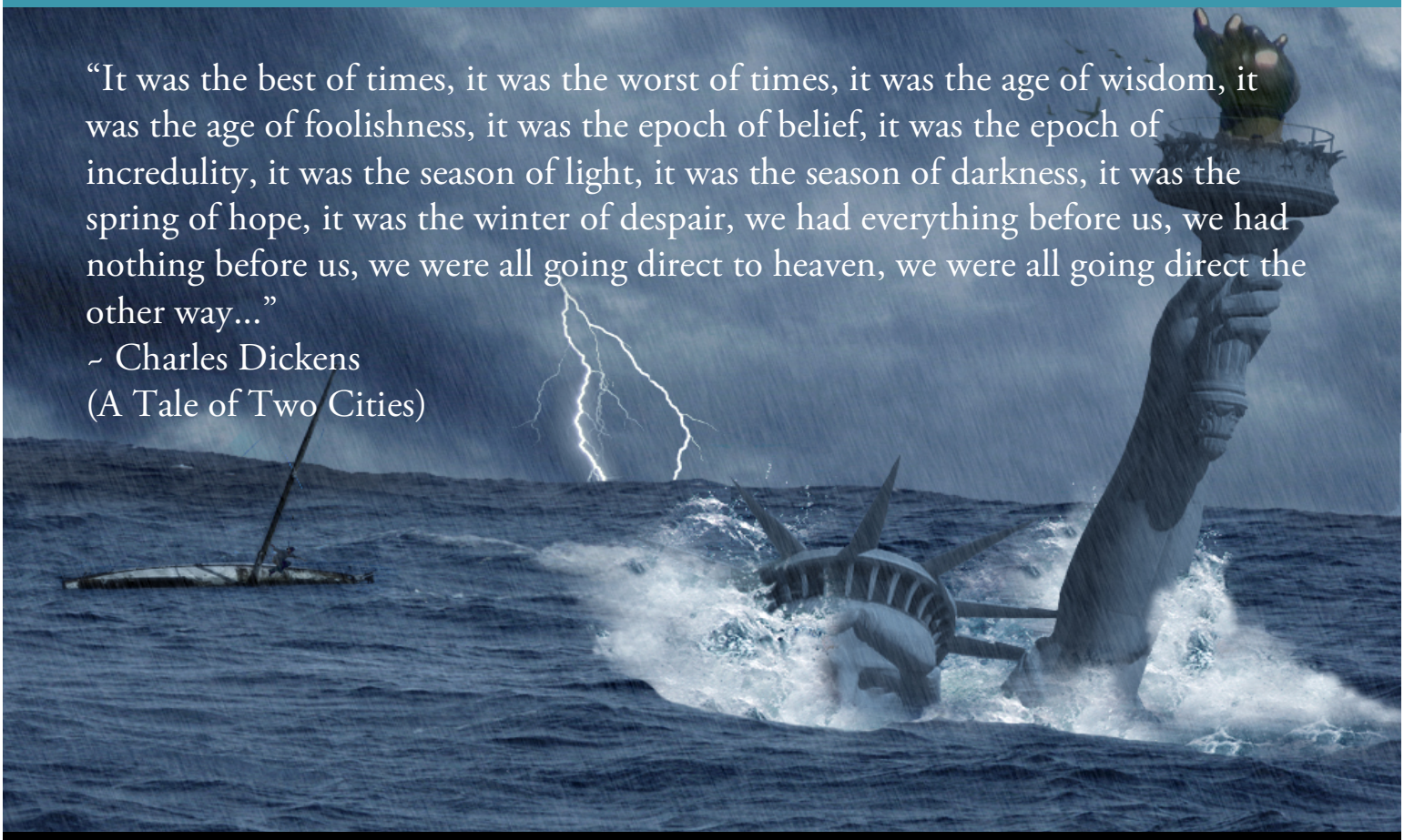

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Introduction:

As the phenomenon of global climate change, caused by anthropogenic impacts, becomes more known there is no doubt that the human population must prepare for its impacts. The question is not if or whether traumatic events will occur but of when and how they will shatter the world as we know it. Will the human race survive an apocalypse caused by climate change? Our best hope, but our greatest risk, lies in the future of our cities where the majority of the world population lives.

It is anticipated that by the year 2050 about three quarters of the world will live in cities (Pearson, 2014). Thirty-three of these cities will also have populations greater than or equal to eight million people (Klein et al., 2003). If we are to become a more sustainable society change must occur where the greatest density of people exist; this being cities and urban areas. Cities currently contribute to eighty percent of greenhouse gas emissions (Pearson, 2014). In addition, such densities of people are placed at the greatest risk of climate change events. Of the thirty-three cities discussed previously, twenty-one are located in coastal zones. These twenty-one cities of eight million people are more will be the most susceptible to disastrous weather events and rising sea levels (Klein et al, 2003).

For these reasons it is essential that city governments consider resilience to such events in their planning and policy. One of the key components of sustainability is conserving resources for the future. In order, for a city to call itself sustainable it must demonstrate that is resilient and will stand the tests of not only climate change but also other pressures such as economic downfall, epidemic disease, and war. Without the

ability to come back from disaster a city cannot successfully provide for future generations and is therefore unsustainable.

Using New York City as an example, concepts of resilience will be explored. This global city has already begun implementing not only sustainable practices but also plans for resilience to climate change events. By acknowledging criteria from the Rockefeller foundation's "100 Resilient Cities" challenge these practices will be evaluated (Rockefeller, 2014).

Defining Resilience:

According to the Rockefeller foundation resilience is defined as "the ability of a system, entity, community or person to withstand shocks while still maintaining its essential functions and to recover quickly and effectively" (Rockefeller, 2014). The Oxford English Dictionary also defines resilience as "the act of rebounding or springing back and elasticity" (Klein et al., 2003). Both of these definitions imply that a resilient city has a capacity to handle some disturbance.

In climate change studies the concept of adaptive capacity is often used to define a country's plans and preparedness in order to be resilient. For example, industrialized nations are seen to have greater adaptive capacities compared to developing nations as they have greater infrastructure, technology, wealth, information and other resources that would allow them to rebuild. In the same respect some cities may have greater adaptive capacities than others (Klein et al., 2003).

Criteria for a Resilience City:

In terms of research, there is no agreed upon standard for what makes a city sustainable or resilient. However, notable agencies and organizations have created their own criteria and rankings that allow for some quantification of how sustainable or resilient a city maybe in compared to others. One such agency is the Rockefeller Foundation. This agency has created a program known as the "100 Resilient Cities Centennial Challenge". The initiative was launched in 2013 choosing one hundred cities from a list of four hundred applicants. The 100 cities chosen by the foundation to be involved in the challenge will receive "technical support and resources to improve their urban resiliency over the next three year" (Rockefeller, 2014). Applicants mostly involve municipalities and government agencies but there are non-profits and other institutions involved.

The Rockefeller foundation defines five pillars in which it feels create a criterion for urban resilience. The five pillars involve constant learning, rapid rebound, limited or "safe" failure, flexibility and spare capacity. The pillars are defined as follows:

Constant Learning: Constant learning means that a city will "internalize experiences". In other words, they have the ability to learn from mistakes. This can be accomplished through feedback loops where success is evaluated and new solutions can be created.

Rapid Rebound: This pillar refers to the efficiency in which a city can "re-establish function and re-organize" after a traumatic event that had the potential to cause long-term disruption. For example, when a natural disaster occurs in the United States, the Federal Emergency Management Agency (FEMA) steps in to restore order.

Limited or "Safe" Failure: The limited failure pillar involves preventing a disruption from having a "rippling" effect into other systems of the city. In other words, an economic disruption should not lead to a chain of events that cause other systems to collapse in its wake.

Flexibility: This pillar simply refers to a cities ability to "change, evolve, and adapt to alternative strategies".

Spare Capacity: Spare capacity involves having a back-up plan for when a system fails. In other words, a city has options and alternatives.

In evaluating New York City's resilience and adaptive capacity these pillars will be referenced as criteria. New York is in fact one of the cities chosen for the Rockefeller resilient cites challenge (Rockefeller, 2014).

Background New York City:

New York City is best known for it's international significance in areas of finance, arts and media. Its current population is approximately a little over eight million people. Many of these people will be at risk if sea level rise as the city has 520 miles of coastline. The current mayor of New York is Bill DeBlasio, however many of New York's sustainability initiatives were created under the former mayor, Michael Bloomberg (Rockefeller, 2014).

According to the SustainLane US City rankings New York is considered number six on the list of the United State top fifty "green" cities. Out of those fifty cities New York ranks at thirty-two in natural disaster risk and fifth in climate change policy. This shows that while the necessity of resilience and sustainability has been recognized there is stillroom for improvement. New York compared to the other cities in the rankings, also has a greater risk of sea level rise and severe weather events due to its coastal location (Karlenzing, 2007).

Resilience in New York City:

New York City's policy and plans for resilience began with Mayor Bloomberg's initiative known as "PlaNYC". PlaNYC began in 2007 with goals to strengthen the city's economy, combat climate change and create a better quality of life for New Yorker's. Bringing together twenty-five different city agencies, the most significant impacts the program has had include improved transit, creation of green space, and reductions in greenhouse gas emissions. The plan has been deemed successful in many lights and is seen as model for other coastal cities to follow. Since its start in 2007 it has create over one hundred initiatives with goals of sustainability and resilience. Ninety-seven percent of those initiatives reached goals or were completed by 2009 (City of New York, 2014).

While many improvements and changes have been made to resilience and sustainability in New York three will be discussed further including green space, transportation and energy.

Green Space:

While New York City is threatened by sea level rise and weather events it does not struggle as much as other cities do with air and water quality. This is primarily due to the city's dedication to parkland and to its protected watershed in the Catskills. The city is also known for having the largest urban gardening program with seven hundred community gardens. The city also has seventy-two active farmers markets offering locally grown products (Karenzing, 2007). These initiatives show the city has spare capacity; the city is not primarily dependent on importing its food supply.

Transportation:

Since hurricane Sandy, New York has installed many limited failure technologies to the subway so that if flooding occurs again it does not impact the system. While the new technology has been extremely expensive it has made transportation a more resilient system for future storms. Upgrades to the subway system include pumps that are able to push four thousand five hundred gallons of water out per minute. The metropolitan transportation authority (MTA) has also input tunnel plugs that are able to seal off corridors as necessary. Removable subway stair covers have also been put in place as to create watertight passages until the passages can be drained for safe passage. The estimated costs of such improvements that are currently going on and in the future is calculated to be around four billon dollars. The MTA believes the new technology is a long-term solution in providing transportation through (Beck, 2013). Changes in New York's transportation show the city's internalization of experience and use of constant learning to improve its systems.

Energy:

One of the most aggressive systems New York City has put in place is its goal to reduce greenhouse gas emissions and dependency on fossil fuels. Under PlaNYC the city has decided to invest in a "diverse portfolio" of energies specifically in the private sector. A program known as the NYC Carbon Challenge has been put in place to encourage private institutions to reduce their footprint. Currently there are seventeen universities, eleven hospitals and twelve global companies involved in the challenge. The goal of the challenge is reduce greenhouse gas emissions by thirty percent. So far at least six of these

institutions have already completed the goal. PlaNYC has also invested in small-scale clean energy projects as well as incentives for green building practices (City of New York, 2014). New York's energy goals have allowed the city have the "best per capital fuel use in the US" at three hundred and twenty-six gallons of oil per person. While this may seem like a lot this may actually leave New York City as the most prepared for an oil crisis (Newman et al., 2009). New York's investment in clean energy shows its ability to be flexible as well as spare capacity is access to fossil fuels fails.

Surviving Climate Change:

While New York City has become a model of resilience for other coastal cities there is stillroom for improvement before the impacts of climate change become detrimental to the future of the city. The president of the Rockefeller Foundation, Judith Rodin, offers the following recommendations for continuous improvements to the city. First, Rodin believes that the public and private sector should work together therefore a deputy mayor of economic development and resilience should be created to manage this connection. Second, while improvements to the subway are being made a safe failure should be in place by improving the bus transportation to a rapid transit system. Improving the subway is costly and rising sea levels will make it difficult to keep water out of the underground tunnels. Third, the city should continue its investments in cutting edge resilience ideas and technology as to allow for flexibility and spare capacity. Fourth, investments and money should also be placed in grassroots sustainability efforts. Finally, the city should place investments in infrastructure that is not only resilient but will also attract the private sector to the city. By bringing the private sector to the city it remains

economically viable and the city will have a greater financial base to continue its efforts in resilience and sustainability (Rodin, 2014).

Conclusion:

There is five pillars that the Rockefeller Foundation recognizes in order for a city to be resilient: Constant Learning, Rapid Rebound, Limited or "Safe" Failure, Flexibility and Spare Capacity. New York City has demonstrated some of these pillars through its efforts in areas such as green space, transportation, and energy. President of the Rockefeller Foundation, Judith Rodin, also addressed improvements to where the city could advance or include pillars of resilience.

There are many reasons a society or city may fail. A group may not anticipate a problem or when they do come across a problem they do not see it as a problem. Even when a group recognizes a problem they may not take action to solve it. Actions to solve problems may not always succeed (Diamond, 2005). Resilience in a city requires recognition of the problem as well as efforts to eliminate the problem. It has yet to be determined if efforts to lessen the impacts of climate change will be successful.

As climate change advances New York City must make efforts in resilience or one of the world's greatest cities will fall. As a coastal city New York is also a model that will be looked upon by other nations in creating plans and policy in resilience. The concept of resilience is still recent and needs to be explored in order to gain more clarity before its fate is left in the hands of global climate change.

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