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Flood Control and Poverty

Phillips County, AR and Guyana

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Introduction

Following Hurricane Katrina in 2005, flood protection became a major focus in public policy. Disaster management, crisis intervention and even racial biases were topics being addressed in the aftermath of one the deadliest hurricanes and floods in history. Yet, flood damage is not an uncommon world phenomenon.

The Red Cross estimates that over a twenty-five year period ending in 1995, more than 1.5 billion people worldwide have felt the impact of floods. Of that total, they estimate that more than 318,000 people were killed and more than 81 million were made homeless. In addition, over the period 1991-95, flood related damages totaled more than US\$200 billion (not inflation-adjusted) worldwide, representing close to 40 percent of all economic damages attributed to natural disasters in this five year period.¹

Each year global estimates of homelessness, deaths, economic loss and other effects can be analyzed. Throughout these analyses, it is clear that the most vulnerable populations are the world's poorest communities. Structurally unsound houses, lack of transportation, limited access to sufficient water supplies, and inadequate healthcare are immediate factors that create a dire situation for impoverished members of a community. In the case of a flood, these members are at greater risk of being stranded, contracting disease, suffering from lack of medical care, and ultimately death. Some data suggest that the number of people affected by flood since 1990 is growing due to a greater incidence of flooding.² Some claim that floods in

¹ Pielke, Jr., R. A., *Flood Impacts on Society: Damaging Floods as a Framework for Assessment* (Routledge Press: London, 2000) 133.

² Gleick, Peter H. *The World's Water*. (Pacific Institute for Studies in Development, Environment, and Security, 2006) 108.

The United States are getting worse. Others have questioned this claim, but there is no debate that the damage caused by floods is increasing. With the rising effects of flooding, it is important that flood control become a more pressing issue in our global community, and in poverty alleviation programs. Though some effects of flooding are temporary and relatively minor, there are a host of other problems to consider, with some immediate outcomes triggering greater consequences. These seemingly minor effects also play a more crucial role in impoverished communities. Hence, the epigraph does not measure all of the devastating effects of flooding on the poor. This paper identifies the effects of flooding that contribute to the cyclic and entrapping nature of poverty in Phillips County, Arkansas and Guyana, South America, and the response that is needed from the world community.

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The Communities

Phillips County

Life along the Mississippi Delta is at constant risk of flooding because of the natural tendency for the Mississippi River to flood, and Phillips County, Arkansas, is no exception. The Mississippi River periodically shifts paths and is generally very unpredictable, but the alluvial deposits from the Mississippi River make the soil in Phillips County, prime agricultural land. In addition to the fertile land, the area benefits in other ways from being along the Mississippi River. The location of one city, Helena, in particular, on the Mississippi River had the potential to be an important factor in transportation, and from 1920 to 1927, Helena was second only to

Memphis for its hardwood products. To add to the productivity of Helena's economy, a Chrysler plant was built in Helena in 1922 and continued to manufacture cars until 1956.³ Yet, the region has been battling extreme poverty for many years. In 1990, a U.S. Census ranked Phillips County as one of the sixteen poorest counties in America.⁴ Floods and poor flood management have deprived Phillips County from flourishing.

The Great Flood of 1927, one of the most well known events in U.S. history, left more than 500 people dead and over 700,000 people displaced. In Phillips County, the major levee, Laconia Circle at Snow Lake, broke in six places. Unprotected farms were under sixteen feet of water and the lumber industry failed and never recovered from the economic downturn that followed the flood. Soon after, in 1937, another devastating flood affected the cities of Phillips County. Though the Great Depression caused worldwide economic failures, flooding created a more hazardous situation for Phillips County. In spite of the agricultural potential of the county and Helena's prime location along the Mississippi River, the community battles against rural setbacks such as dependency on a major industry and steady economic fluctuation. In conjunction with these obstacles, Phillips County reaches a new level of vulnerability due to constant risk of flooding. The Great Floods destroyed lives, homes and land in that time period, but flooding in Phillips County continues to prevent the economy from rebuilding. The frequency of floods makes it difficult for the community to maintain buildings, counter the economic fluctuations and sustain population numbers. Table 1 from the National Weather Service highlights the major floods on the Mississippi River. The extreme and sudden impact of

³ Clift, Billy S. "Phillips County." Encyclopedia of Arkansas History and Culture.

⁴ Clift

floods is counterproductive to business goals, as unforeseen costs from flood damage must be accounted for in addition to the possibility of temporary closures during floods. Hence, the economy is stifled and lack of flood control prevents the community from rising out of poverty.

Table 1. Years With Major Flooding on the Mississippi River

1700s

| | | | |
|------|------|------|------|
| 1718 | 1735 | 1770 | 1782 |
| 1785 | 1791 | 1796 | 1799 |

1800s

| | | | |
|------|------|------|------|
| 1809 | 1811 | 1813 | 1815 |
| 1816 | 1823 | 1824 | 1828 |
| 1844 | 1849 | 1850 | 1851 |
| 1858 | 1859 | 1892 | 1893 |

1900s

| | | | |
|------|------|------|------|
| 1903 | 1907 | 1908 | 1912 |
| 1913 | 1916 | 1920 | 1922 |
| 1923 | 1927 | 1929 | 1932 |
| 1936 | 1937 | 1945 | 1950 |
| 1957 | 1958 | 1973 | 1974 |

| | | | |
|-------------|-------------|-------------|-------------|
| 1975 | 1979 | 1983 | 1984 |
| 1993 | 1997 | | |

Guyana

In late December 2004, heavy rainfall caused severe flooding in the administrative regions of West Demerara/Essequibo Islands, Demerara/Mahaica, and Mahaica/West Berbice, which encompass 75 percent of Guyana's population and include the capital city, Georgetown. According to a U.N. Disaster Assessment and Coordination (UNDAC) team, rains over Georgetown in January 2005 caused additional flooding of four to five feet in some villages near the East and West Demerara conservancy dams. According to the Government of Guyana's Joint Operations Center (GOG/JOC), a total of 192,000 residents were directly affected by the flooding.⁵

The above disaster was declared on January 28, 2005. Yet, extreme flooding is quite common for Guyana, a country with an estimated 43% of the total population living below the poverty line, and about 29% can be further classified as extremely poor.⁶ It is evident that prevalent rural poverty is found along the coast, where there is access to land resources. But with these land resources comes economic devastation due to flooding. This dynamic can be traced back to 1855 when villages such as Plaisance and Friendship fought for government support, as they found it difficult to maintain roads, drainage and even plantations. Another village, Bachelor's Adventure, did not find it unusual to use boats as transportation, and in fact many residents found it easier to just relocate. In 1921, heavy rainstorms, lasting over twenty-four hours, flooded some city streets and swept away bridges. Since the 1920s, every decade

⁵ USAID

⁶ The World Bank

has seen flooding and sea breaches on a smaller scale. In 1934, major flooding devastated Georgetown and the entire East Coast. There were multiple floods in each decade since the 1930's. Serious action was finally taken in the 1950's when the seawalls were built along the coasts to protect the inland.

The declared disaster in 2005 brought Guyana's economic crisis to the forefront, and though aid was moving into the country, the people most in need were difficult to reach. The heavy rains cut off major transport points, canals burst, businesses and government buildings were forced to close. In essence, the country shut down with nowhere for the residents to turn. The impoverished communities of Guyana were beyond help. Ultimately, the U.N. started aiming to save only those that they could.

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Effects of Flooding

Major floods often result in high mortality rates, both directly and indirectly. Floods can wipe out a village due to water-pressure and high water levels. Also, "floods can destroy essential infrastructure, such as wastewater treatment and water supply systems, which increases the risk of contracting water-related and vector borne diseases."⁷ In addition to repairs of infrastructures and loss of workers, local industries suffer due to flooding. For example, agriculture, which is often a major industry for at-risk areas, can undergo major damage if protective measures are not taken. With proper flood control, though, deposits can nurture the land around the flood area and create fertile soil. Historically, many ancient

⁷ Gleick 108

civilizations depended on flood seasons to fertilize the soil and incorporated the benefits into religious or spiritual traditions. For instance, it was an Egyptian practice to throw offerings to Hapi at specific points along the river because they knew that if the floodwaters were not sufficient, famine would follow.⁸ Nevertheless, agriculture is greatly vulnerable to harm from floods. The destruction of farms, crops, machinery, and even damaging of the soil are possible effects of flooding. Water contamination can also become a major crisis during and in the aftermath of a flood. Some of the direct effects on water supply and quality are: toxic spills, leaks, exposure to buried contaminants, and salt intrusion into freshwater ecosystems. Microorganisms can also outbreak causing severe respiratory and skin detriments. As a result, human health is at great risk.

Flash flooding has a host of effects greater than normal flooding because it is very difficult to prepare for. Dams, levees, and other structures may fail, causing extensive damage and disrupting human life unexpectedly. The water-pressure and speed cause more erosion, carry debris, and become a more powerful force than usual. Floods with slow rising water levels may cause less damage, but have large clean-up costs. Consequently, flooding in general has a significant impact on every-day life and the economy, extending beyond the flood area.

Another chief factor in flood management is climate change. Governments should invest in flood defense measures to buffer against the unpredictability of the environment. Investing in proper flood management is an investment to protect natural resources, the economy, and of course the people. Flooding affects communities on a multitude of levels:

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socially, economically, physically and mentally. As a result, extensive research must be done before implementing flood management plans.

A study in England to examine vulnerability to flooding: health and social dimensions, led to the development of an interesting model, shown in Figure 1.

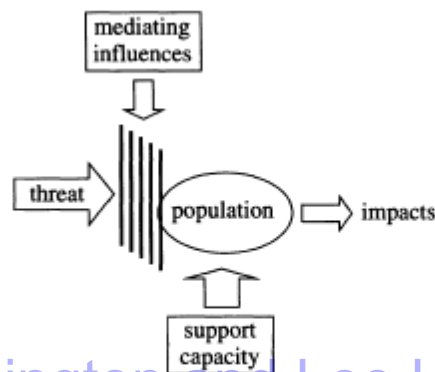


Figure 1. The process model of vulnerability to flooding: threats, impacts and mediating influences (courtesy of Colin Green).

The model shows that the impact of flooding is determined by influential factors on the population. Those factors are the mediating influences, the threat of flooding and the support capacity in households, communities, and the government. With the proper assessment of a nation's capabilities and ability to promote resilience, the population can properly gauge its capacity to recover from devastating events and plan for future threats.

Health Effects

Good health is defined by social, physical and mental well-being. Floods affect the state of health of the people within each dimension. Physical health effects after flooding may include asthma, chest infections, coughs, diarrhea, pleurisy, kidney infections, swollen glands, headaches, laryngitis, spots and skin irritations. In Tapsell's research, one community, after a flood, had concerns about lack of government action since there had been no cases of disease reported. The researchers found that people's ongoing concerns about their physical health were largely associated with the perceived health risks from streets not being cleaned following flooding, particularly where children were playing in these environments.⁹ Participants who were already sick also had increased stress levels due to worry about future health care in the aftermath of the flood. The actual and potential physical health effects directly affect the mental health of the community.

It is easy to see how impoverished communities have exaggerated effects. In the aftermath of a flood, existing health problems may snow-ball, and access to health care decreases. In addition, the incidence of flooding also increases anxiety of existing obstacles. Hence, impoverished communities such as Phillips County and Guyana face a more complicated crisis. It is for this reason that flood management is crucial in order for the needs of the communities to be met and to level the playing field for their members. Thomas Pogge's example of a soccer game being refereed by a parent in his book, *World Poverty and Human Rights*, is relevant here. In order for Phillips County and Guyana to be worthy opponents,

⁹ Tapsell et al "Vulnerability to Flooding: Health and Social Dimensions." (Philosophical Transactions: Mathematical, Physical and Engineering Sciences. Philosophical Transactions: Mathematical, Physical and Engineering Sciences, 2002.) 1517

adequate flood management must be implemented. Though the government is not causing harm and negative duties do not play a role, positive duties are in effect, counter to Pogge's argument. To protect the vulnerable population from the factors described in figure 1, the government role entails fulfillment of positive duties. The government must provide support, threat reduction, and monitor the community even though floods are not a result of government action. Ample flood control is vital to the functioning of these communities.

What flooding means to Phillips County

Rural poverty contains distinctions from the urban poverty that tend to be publicized more often. These distinctions make programs difficult to implement and people are less accessible than in urban areas. When the levees broke in 1927, Phillips County was thriving, but the people who were suffering had no help, and the people who were at risk, fell into poverty. In 1937, as the towns of Phillips County struggled to recover, the now larger population in poverty, suffered greatly, and again those at risk fell. Phillips County's economy and vulnerability will always be dictated by the Mississippi River until sufficient resources are available to counter the unpredictability of the river. Agriculture may flourish due to flow of the river, but all the more swiftly that sector is destroyed. Factories and businesses could enter Phillips County, but with the possibility of being swept away, establishment becomes unappealing. Poverty in Phillips County, Arkansas is rooted in a system where the poor are deprived of assets and simply do not have enough employment opportunities. The county battles against greater divides, such as racial segregation, lack of education, lack of healthcare

and lack of public transportation. Thus flooding diminishes human capability of an already struggling community.

Since 1927 there have been 16 years with major flooding on the Mississippi River (Table 1). Phillips County consistently battles against the cost of property damage and emergency response services provided during floods. There is residential loss, drainage structure damage, levee repair, and land restoration to be accounted for. Another economic detriment that the county faces is the cost of the high sediment and contaminant load carried in the river. Drainage ditches and storm drains trigger rapid movement of water off the land and into the rivers. The levees focus the energy of the flood on a narrow section of the river system, which accelerates the waters and prevents slow transport through vegetated landscapes where sediments and contaminants would filter. The result is poor water quality for humans who use the rivers as a source of their drinking water and for all the flora and fauna dependent on riverine habitats. The continental shelf of the Gulf of Mexico, the ultimate disposal site for the Mississippi River watershed, now has a growing Dead Zone, an area of low dissolved oxygen (<2.0 mg/L) created by the abundance of nutrients carried downstream by the river. It is estimated that approximately 50 to 75 percent of the nitrogen delivered to the Gulf by the Mississippi River is from agricultural sources upstream of the Gulf.¹⁰

The housing in the area is aged with 51.4% of the occupied housing units built between 1960 and 1979, 18.0% between 1940 and 1959, and 7.8% built in 1939 or earlier.¹¹ Hence, these units are more likely to be structurally incapable of withstanding high water pressure,

¹⁰ The Wetlands Initiative

¹¹ U.S. Census Bureau

suffer from internal flooding due to lack of adequate sealing, and are prone to molding and rotting. In addition to the structural and economic vulnerability, Phillips County provides insufficient medical care. With about 20.4%¹² of the residents above the age of 65, the poor quality of the health care system is amplified. The major health unit is Helena Regional Medical Center, a 155-bed facility with 24 active physicians to serve a population of 15,323.¹³ The 155 licensed beds include critical care and maternity wards. As a result, in the incidence of flooding, medical care will be limited for these residents during and after the event.

One assessment by the Department of Agricultural Economics at the University of Mississippi in 2005 estimates the cost of noncrop agricultural damage in the Mississippi Delta. The researchers developed the calculations documented in the following tables.

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**TABLE 2. ESTIMATED EQUIPMENT INVESTMENT
 COSTS BY CROP, MISSISSIPPI DELTA, 2005**

| Crop | New Cost (\$/acre) | Average Investment (\$/acre) |
|----------|-----------------------|---------------------------------|
| Cotton | 1,181 | 590 |
| Rice | 688 | 344 |
| Soybeans | 426 | 213 |
| Wheat | 352 | 176 |
| Corn | 713 | 357 |

¹² U.S. Census Bureau

¹³ Helena Regional Medical Center

| | | |
|---------------|-----|-----|
| Grain Sorghum | 448 | 224 |
|---------------|-----|-----|

TABLE 3 ESTIMATED DEBRIS REMOVAL COSTS PER HOUR, 2005

| Item | Direct Cost Per Hour | Fixed Cost Per Hour | Total Cost Per Hour |
|-----------------------------|-------------------------|------------------------|------------------------|
| Tractor (60-89 horsepower) | 18.8 | 4.37 | 23.25 |
| Tractor (90-119 horsepower) | 22.32 | 6.75 | 29.07 |
| Front-end Loader | 2.41 | 5.74 | 8.15 |
| Trailer | 0.75 | 0.07 | 0.82 |
| Labor (four men) | 25.76 | 0 | 25.76 |
| Total | 70.12 | 16.93 | 87.05 |

Table 2 and Table 3 identify the unique dynamic agriculture along the Mississippi River faces due to flooding. With agriculture being the main industry in Phillips County, the community is severely disadvantaged when the primary source of income is affected in any way.

What flooding means to Guyana

Compared with other neighboring countries, Guyana ranks poorly with regard to basic health care. Guyana ranks lower than most of these communities in life expectancy, and higher in infant mortality rates. A large portion of the population lives in very poor health conditions.

Basic health services in the interior range from primitive to non-existent and some procedures are not available. In the aftermath of flooding in Guyana, the spread of disease increases drastically. In The United States Agency for International Development (USAID) report on Guyana in 2005, the Pan American Health Organization (PAHO) warned that leptospirosis, a bacterial disease caused by exposure to contaminated water, is a health concern in flood-affected areas. According to USAID/Guyana, the Georgetown Public Hospital has admitted approximately 112 people with suspected cases of leptospirosis, including an estimated 12 people who have died from the disease. In addition, the dramatic rise in suspected cases of leptospirosis has resulted in overcrowding at the Georgetown Hospital, the only public hospital operating in flood-affected areas. The Ministry of Health (MOH) continues to distribute prophylaxis at mobile clinics to patients exhibiting leptospirosis symptoms.¹⁴

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The most recent floods have affected nearly 40 percent of Guyana's population, in 113 villages. Women make up about half of the affected population, and children under the age of nine comprise one-third.¹⁵ The poor drainage system in the country complicates the flooding situation, as the water level remains high for longer periods, and the country remains susceptible to the flood waters for an exaggerated amount of time. In February 2005, agencies reported that floodwaters could be removed from most areas in 10 to 14 days, but in other areas, such as Mahaica Creek, floodwaters would remain for two to three weeks. As a result, businesses (along with normal activities) were forced to shut down for long periods of time.

¹⁴ USAID

¹⁵ USAID

When hit with the aftermath of clean-up costs, businesses once again suffered since most of their customers were rebuilding and unable to frequent their stores.

During the time of standing floodwaters, the Red Cross received many reports of diarrhea, insect bites, skin ailments, and a few reports of death. There were also reports of dead animals and a concern about an increased number of vector populations, such as insects and rats. In each flood situation, severe or relatively minor, residents have decreased access to food, increased exposure to contaminants, and intensified disease exposure. Since many of the poor living in the interior are dependent on agriculture, frequent flooding directly breaks down the community as it does Phillips County. Others depend on small businesses and small-scale crop production, which immediately fails in the case of a flood.

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What to do?

Although Phillips County, Arkansas is a part of one of the leading world powers, the hopelessness, isolation and lack of response from surrounding communities make the county extremely similar to Guyana. Both countries are losing members of the population due to consistently high rates of emigration, while facing regular economic crises with a large group of their populations in poverty. The current failures of their communities, some unrelated to flooding, are creating vulnerable populations. There is a need for industry expansion, increased healthcare and increased transportation. Phillips County and Guyana cannot battle against

poverty without the buffers against flooding. Both the United States Government and the Guyanese government have failed their people.

In 1928, the U.S. government developed the comprehensive "Jadwin Plan" for the lower Mississippi River, named for Major General Edgar Jadwin, the then Chief of Engineers, and was adopted by the Act of May 15, 1928.

Under this basic plan and subsequent modifications and extensions, approximately \$900,000,000 have been expended to construct levees, channel improvements, floodways, emergency spillways, and reservoirs for the protection of more than two million people living in a hundred urban areas or on 200,000 farm units involving nearly twenty million acres. This great project is technically about two-thirds complete, but it has been advanced to the point where it affords substantial protection to this tremendously valuable alluvial valley. It is estimated that these works have prevented over five billion dollars in damage since 1928 on the basis of the state of development and price levels prevailing at the time the potentially damaging floods occurred. This is a significant accomplishment in an area which only thirty years ago suffered a disastrous flood costing 313 lives and affecting 18,000,000 acres of land with 300 million dollars in damage. Larger flows have since been experienced without significant damage¹⁶

Another effort to address the flood problem in the Mississippi Delta areas began in 1936. By the Flood Control Act of June 22, 1936, Congress declared that flood control on navigable waters or their tributaries is a proper activity of the Federal Government in cooperation with States, their political subdivisions and localities; and that the Federal Government should improve or participate in the improvement of navigable waters or their tributaries, including watersheds, for flood-control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of

¹⁶ Sturgis, S.D. "Floods." (The ANNALS of the American Academy of Political and Social Science, 1957) 20.

people are otherwise adversely affected.¹⁷ This was the first general federal flood-control legislation.

Guyana's government response, beyond the previously discussed construction of a seawall, has been relatively non-existent. After the 2005 disaster, Guyana received international aid. However, this aid is limited to emergency supplies and general help in the aftermath. There is not much being done to address the actual flooding problem, thus leaving Guyana vulnerable.

The natural resources of Phillips County and Guyana are precious, and both areas have a lot of potential. We need to create irrigation systems that use the likelihood of flooding as a benefit, while protecting the community from harm. These irrigation systems need to be structurally sound and precisely direct the water system. This will allow the agricultural sector to expand and reduce the risk factors that exist for other businesses in the areas. Since these areas are extremely vulnerable due to their locations, one may consider a mass migration as the U.N considered for Guyana in 2005. However, these are people's homes and history. The cost of flood management is trivial in a cost-benefit analysis because the preservation of humanity outweighs economic factors.

The efforts in the Mississippi Delta on a federal level reflect the ability of the government to protect the communities from extensive damage. Legislation should now incorporate new studies and technology to reduce the effects of flooding. Research can be done to analyze the soil makeup, levee systems, and housing locations to predict the paths of

¹⁷ Sturgis 20

the existing water bodies in order to ensure preparation for massive levels of water. This knowledge can then assist in creating a collection mechanism and/or interim drainage system to prevent mass accumulation. However, the focus will need to be on utilizing the natural resources as opposed to controlling the steady flow of nature. Destroying the natural layout may trigger further environmental hazards and may also decrease the agricultural potential of these areas. This kind of information is relayed through hydro meteorological services set up by the National Meteorological Station Network (NMSN) and the National Hydrological Station Network (NHSN).¹⁸ Only with this kind of technology and action will Phillips County be able to start progressing. Only then will Guyana have a more steady foundation to face the remaining challenges of the country. Flooding currently traps these communities in poverty and makes the populations extremely vulnerable, by stifling human capability beyond the economic industrial potential.

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The healthcare systems and housing makeup must be addressed in reducing the vulnerability of these communities. There must be a better line of defense at the coastal areas to create safer housing zones for residents. Guyana's seawalls must extend and must be resistant to wave action. Similarly, the levees protecting Phillips County should adhere to these rules. Both defense mechanisms must account for erosion, where the structures must be anchored below instances of erosion. In conjunction with these structures, soil erosion, creating a more susceptible path to flooding, must be repaired. Adequate disease control must be available to prevent disease spread in the event of a flood. Medication, emergency services, water filter systems along with water reservoirs and food dispensation services must be

¹⁸ Guyana's National Development Strategy

present, especially in higher risk areas. When there is a flood, human life must be protected and all measures have to be taken to ensure the survival of residents. As Phillips County has a significant number of elder residents, medical services are crucial for these residents whose defenses are already weakened.

Finally, housing guidelines must be utilized. All housing structures must have adequate sealing, have a safe haven above the potential flood waters, and pass health regulations to avoid mold concerns, rotting, and air contamination within the home. Even with the availability of emergency services, residents must be protected in their homes. Also, proper housing reduces the expenses spent on house repair and structural flood damage, thus creating more stable communities. For any efforts to be successful, constant maintenance and public attention is required. Sufficient flood control allows Phillips County to utilize opportunities currently nonexistent, expanding the business arena creating a ladder for the community to be removed from the cycle of poverty they are trapped in. Efficient flood control in Guyana will stabilize the country as frequent flooding exasperates the existing setbacks. As Figure 1 suggests, the current impact of floods is connected to the available support and the possibility of flooding. Thus, national governmental action is part of the battle in decreasing the effects of flooding. Furthermore, decreasing the threat of flooding reduces the necessity for assistance as residents are mentally stronger and structures have less wear and tear. Though the magnitude of flooding constantly varies for Phillips County and Guyana, the effects on the cycle of poverty is consistently pressing, much like other communities vulnerable to flooding. Thus, increased flood control is an important foundation to poverty reduction.

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