Water is More Important than Gold:
Local Impacts and Perceptions of the 1995 Omai Cyanide Spill, Essequibo River, Guyana.

By

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ABSTRACT

Improved technologies, increases in global demand for metals, and lax environmental policies and regulations are causing a shift of large-scale mining activities to the tropics. This shift of mining to the tropics has the potential to modify natural ecosystems and disrupt the social structures of rural and indigenous peoples in some of the most remote areas of the planet. This thesis encompasses research done in two villages of Guyana's Essequibo River basin after the 1995 Omai cyanide spill, and illustrates the local social consequences of a large-scale gold mining operation in the tropics. It documents not only the degradation of the local river ecology, but also the changes in local people's perceptions of their environment. That environment, once viewed as pristine, is now viewed as unsafe, leading to disrupted livelihoods and lifestyles. The finding of this study points to a direct link between international economic liberalization policies (which emphasize privatization, foreign direct investment, and economic growth) and the creation of disaster circumstances in developing countries.

This thesis research is the result of a total of ten weeks of participant observer research in the area of the Essequibo River, Guyana. It utilizes the methodology of taped interviews of head-of-households. Interviews were conducted with approximately 85 percent of heads-of household of the villages of Rockstone and Riversview. Additionally, interviews were conducted with national and regional governmental officials, regional health officials, local and indigenous leaders, personnel of the Guyana Geology and

Mines Commission, and the Environmental Protection Agency in Guyana. Interviews were supplemented with archival research.

The findings of this thesis research closely mirror those of other researchers who contend that the social impacts of technological disasters are long-term and more severe than those related to natural disasters. Seven years after the cyanide spill, disruptions in livelihood activities, diet, and household behaviors continued to be evident in the two villages. There is little indication that the high negative perceptions of the villagers as a result of the disaster will change in the near future. The research found that macroeconomic policies, crafted by national governments and overseen by international financial institutions without the involvement of local citizenry, disproportionately affected the poor and rural populations through the degradation of local ecosystems. The thesis also illustrates the usefulness of ethnographic research—in particular, interviews in disaster studies of developing countries.

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Chapter I: Turning a Mud Land into a Future Gold Land

The Study

The objective of this study is to examine the social disruptions caused by the 1995 Omai Gold Mines Limited (OGML) cyanide disaster to the communities of the Essequibo River banks, Guyana. Utilizing the methodologies of personal interviews and observations, this research will identify immediate and long-term impacts on the villages, coping mechanisms, and adaptive strategies used by local residents. It will also highlight long-term social changes. Finally, the study will investigate gender differences with respect to the coping mechanisms. In a broader sense, this thesis might be interpreted as an examination of the social impacts of a major technological disaster on two local subsistence communities in a developing country.

Using field data collected in the summer of 2002, this study will illustrate the social disruptions that the 1995 OGML cyanide spill caused to the villagers' livelihoods[1] and lifescapes[2], including changes to their economic activities, diets, perceptions of the environment, and most importantly, their access to a potable water supply. It will also indicate how, in the absence of a contingency plan to deal with a disaster of this nature, official methods of informing the residents were haphazard at best and may have affected their perceptions of the contamination. In addition, the study will show that while women

[1] The term is used in the same sense as Richardson (1970), in that it notes "…not all activities concerned with getting a living in rural Guyana are about dollar and cents. Its strength is that it allows the broadest view of a community's economic activities which often overlap into kin ties, economic relationships…" (p iii)

were disproportionately affected by the disaster, coping strategies were primarily a household, rather than an individual effort.

The Problem

On August 19, 1995, at midnight, most Guyanese watched their television sets in anticipation of the return of "Iron" Mike Tyson to the boxing ring. At the OGML site on the Omai River (a tributary of the Essequibo, Guyana's largest river), another drama was unfolding (Appendix 1). A tailings dam containing several billion liters of mining effluent from the milling factory breached. Over a four-day period, the OGML tailings pond emptied its contents into the Omai and subsequently the Essequibo River, at a rate of 90,000 cubic meters per hour (Vick 1996; Guyana Chronicle August 21 1995). As the poison ceased flowing into the Omai River, a Pan American Health Organization (PAHO) expert declared it a "dead river," devoid of living organisms (PAHO Report 1995).

The effects of the OGML tailings dam failure reverberated throughout the mining industry (Vick 1996). The Omai spill was the highlight of the international media for that week and brought attention to a country often forgotten on the international scene. The *Toronto Star* financial page opened their report with:

> Shares of Cambior Inc. and Golden Star Resources Ltd. fell sharply yesterday on news of a production shutdown at the Omai gold mine in Guyana that may last several months. (*The Toronto Star* August 22, 1995).

However, putting the emphasis correctly on the human and environmental toll, The Toronto Sun editorialized:

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[2] Lifescape is used as defined by Edelstein (1988), when he writes: "At each level of social process, one can distinguish a pattern of functioning that reflects both a normal set of behaviors, the 'lifestyle' and a normal framework for understanding the environment,

> The cyanide spill into the Essequibo is major disaster. Maybe it's because it was caused in a poor Third World country by a mining company largely owned by major international corporations that the spill was downplayed. While there have been no human deaths—and Cambior insists there was no loss of marine life as well, even though several reports from Guyana dispute this—scientists argue that the Essequibo will suffer long-term effects as a result of the spill. (*The Toronto Sun*, September 18, 1995).

The then president of Guyana, Dr. Cheddi Jagan, took to the national airwaves, declaring a state of emergency and describing the situation as an environmental disaster. By an act of parliament a 51 kilometer stretch of the Essequibo River from the site of the mine to its confluence at the Atlantic Ocean was designated "an environmental disaster zone" (*Guyana Chronicle* August 21 1995). According to government estimates, approximately 23,000 persons lived within the environmental disaster zone. In contrast, OGML preferred to call the spill an "industrial accident," much to the annoyance of Guyanese officials (*Guyana Chronicle* August 22nd 1995).

The spill's impact included economic, ecological, environmental, social, and political consequences (Ramraj 2001). The spill disrupted and in some cases destroyed the social fabric of the riverain communities. Complete shifts in livelihood activities were necessary as the lifescapes of villages were altered. Residents spent hours in search of potable sources of drinking water, affecting their ability to perform other activities—such as farming. The psychological and practical fears of the river water prevented many from engaging in their established livelihood activities, which resulted in losses of incomes. The diet of villagers was also significantly altered as a result of the pollution. Their main source of protein, fish from the river, was eliminated. Residents were forced to spend extra sums on food from outside sources or shopkeepers capitalizing on the disaster

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which I term the 'lifescape' " (p.11).

situation (*Guyana Chronicle* August 30th 1995). In the Village of Fort Island, more than half of its households existed on canned food three weeks after the spill had occurred (*Guyana Chronicle* August 30th 1995). For Hindus, religious worship was interrupted since giving poisoned waters to the gods is prohibited.

Economic impacts included losses of livelihood for fishermen and others who depended on the river, losses of business for eco-tourism resorts, losses of shrimp and fish markets internationally, damaged crops, and increased expenditure to acquire drinking water and roofing for houses. Small-scale gold operations in the Essequibo region were also affected by the cyanide spill (*Stabroek News* Sept 7 1995, *Guyana Chroniclel* August 26 1995). Health impacts included skin irritations, vomiting, diarrhea, nausea, dizziness and complaints of stress. Environmental impacts of the spill included not only the kill-off of fish and wildlife but the destruction of untold species of micro-organisms. At the time of writing this thesis no complete biological inventory of the Essequibo River existed. The complete ecological impacts of the spill will never be fully known as there are no baseline studies with which to compare these impacts.

The August 19th 1995 spill was not the first occasion that OGML had emptied its wastes into the Omai River. In May 1995, the company released smaller amounts of tailings into the Omai River. The company failed to inform the government of Guyana until a week after the incident had occurred. According to company officials the May incident was not a spill but an accidental spillage of waste water containing cyanide into the Omai River. OGML claims its security guards at the time of the accident counted about 200 dead fishes in the river, which they disposed of without preserving specimens for analysis by governmental officials (*Guyana Chronicle* May 25, 1995*)*.

Background

Guyana

Guyana is located on the northeastern corner of the South American continent, bordered by Suriname on the east, Venezuela on the west and Brazil on the South and the Atlantic Ocean on the north (Appendix 2). This former British colony (and the only English speaking country in South America) has an area of 83,000 square miles or 214, 970 square kilometers (CIA Factbook 2002 a). Guyana is part of the Guiana shield—one of the oldest and richest deposits of minerals in the world. The rocks and sediments of Guyana can be divided into four groups, based on their age. These groups are the Precambrian rocks, the Upper Proterozoic, the Roraima Super group and the Cretaceous to Recent Coastal Deposits. The Roriama Plateau was geologically the estuary of a huge riverbed in the period of Pangea, when the South American continent was joined to the African continent. These areas in Africa are the locations of rich deposits of gold and diamonds as well (Energy and Mining 2001). Gold deposits in Guyana are mainly alluvial and buried under several layers of sediments.

Guyana is an Amerindian word for "Land of Many Waters," for its numerous rivers and creeks that are a part of the wider Amazon watershed. Guyana is also one of the "greenest countries" in the world with an estimated 84 percent of its 214,970 square miles still covered with forests, the majority being "pristine" forests (CIA Factbook 2002 a). Until the late 1970s and early 1980s most of Guyana's ecological resources remained unspoiled by human activities (Colchester 1997).

The concentration of settlement and development activities in Guyana is on the narrow coastal strip. While this region comprises less than 10 percent of Guyana's total

area, it is occupied by more that 90 percent of its 698,209 inhabitants (CIA Factbook 2002a). This concentration of development activities on the coast (and the existence of a large underdeveloped hinterland) is a historical legacy of Guyana's plantation colonial culture (Adamson 1972; Daly 1974; Mandle 1973).

Guyana is often described as the "Land of Six Peoples" for its six major ethnic groups. The ethnic groups are Amerindians (Amerindians is a term used in Guyana to describe the various groups of Indigenous peoples), Africans (descendants of slaves from the African Continent[3]), East Indians (referred to as such to distinguish from the Indigenous Amerindians), Chinese, Portuguese (many Portuguese were brought from Madeira as indentured laborers) and other Europeans and the mixed race comprising two or several of the above races. All of the ethnic groups with the exception of Amerindians are relative newcomers to the Guyanese human landscape. The indigenous population, whilst comprising less than nine percent of the country's population, occupies more than 70 percent of the landmass of the country, mainly the interior areas that are rich in natural resources. (United Nations Development Programme 1994). On the coast the main immigrant groups live in ethnic villages (Adamson 1972, Rodney 1981). The ethnic groups on the coast (mainly the African-Guyanese and the East Indian Guyanese) have been involved in intense ethnic rivalry and competition that has often resulted in violent attacks from the 1900s to the present (Newman 1964).

Despite its many natural resources and other potential for development, Guyana remains one of the poorest nations in South America and the second poorest in the

[3]I deliberately did not use the blanket term "Blacks" used by other historians and geographers. Many Guyanese of African descent, myself included, prefer to be called African-Guyanese.

Western Hemisphere. The World Bank classifies the country as a Heavily Indebted Poor Country (HIPC).

Guyana and Gold

Guyana is a land of water and gold. It was therefore of little surprise when the OGML began its operations on the Omai River. OGML in 1995 was a consortium consisting of Golden Star Resources of Colorado (35%), Cambior Inc of Quebec (60%) and the government of Guyana (5%). (Cambior in 2002 obtained Golden Star Resources shares.) The opening of the mine was significant not only for its scale (it was touted as South America's largest open-pit mine and second largest gold mine) but its larger importance was for the Guyanese economy. Valued at US$353 million, OGML represents the largest single foreign direct investment in the Guyanese economy. President Jagan, in declaring the mine open in 1993 stated that OGML was "…turning a mud land into a gold land" (Colchester 1997:79).

The establishment of the mine in 1993 pumped life into an economy that was in a state of decline. In 1985 under a new president Hugh Desmond Hoyte, Guyana diverged from its previous socialist leanings and began a process of economic liberalization of the economy. With an International Monetary Fund (IMF) and World Bank Economic Recovery Programme (ERP) Guyana embarked on economic reforms that stressed privatization of state institutions and promotion of new and nontraditional exports such as gold and timber. Under the ERP, state institutions were privatized and the government actively pursued foreign investment, offering lucrative concessions to foreign companies (Thomas 1998).

The process of economic liberalization in Guyana was not without its critics—especially for its emphasis of natural resource extraction projects in the lumbering and mining sector. Many felt that the concessions that were granted to the foreign companies were equivalent to giving away the country's resources (Colchester 1997). Theodore Panayotou, a fellow of the Harvard Institute for International Development, described Guyana's economic emphasis on natural resources as "destroying the country to save it." He also referred to it as an excellent example of "what a devastated economy would do for foreign investments." (*Stabroek News* September 19, 1995). In 1992, the government did recognize the challenges of natural resource extraction projects. Responding largely to critics of the new policies in the forestry sector, it invited the World Resources Institute (WRI) to recommend alternative policy development initiatives for forestry. The World Resources Institute published recommendations for sustainable forestry utilization (World Resources Institute 1995).

Decades of socialist experimentation had left the country devoid of infrastructure that could sustain large-scale industrial or manufacturing activities. Guyana possessed limited assets (outside of its natural resources) to attract foreign investment. Under the advice of the World Bank and other international and multinational donors, the country pressed on with efforts to increase its exports in the mining sector. The Guyana Natural Resource Agency (GNRA) was established in 1986 with the World Bank's assistance. Its single purpose was to facilitate private sector investment in Guyana's natural resources (Colchester 1997). The legend of El Dorado, the lost city of gold, is firmly rooted in Guyanese folklore and culture; and national planners, with the urgings of international advisers, saw Guyana's road to economic development paved in the gold of its interior.

Eul-Soo Phang's assessment of and recommendations to the mineral sector, in a study for the Guyanese government and The Carter Center, exemplified the nature of such urgings from international advisors.

> The global mining boom is on. This will accelerate over the next three years and then taper off. Guyana has no time to lose if it is to take advantage of this truly global and crossborder phenomenon. To do this the GOG must think boldly and act boldly. Botswana, Papua New Guinea, and the Chile of the 1970s all built or rebuilt their economies by reshaping their mining sector… Guyana with 750,000 people and its attractive geology can develop five to seven major gold mining projects transforming the country's economy. In Botswana, PNG and Chile, as people got richer and the countries become wealthier, the governments became more financially stable (Phang 1994:4)

The international financial institutions' further confidence in the Omai project (and in Guyana's mineral sector in general) was demonstrated by US$163 million political risk insurance from the World Bank's Multilateral Investment Guarantee Agency (MIGA) and Canada's Export Development Corporation.

Large-scale gold mining projects in Guyana, in the absence of environmental regulations and consistent government monitoring, soon led to environmental degradation. Although the actions of small-scale gold operators had earlier environmental problems, the massive scale of the new operations created the possibility for unprecedented problems. The new emphasis on large-scale exploitation of Guyana's mineral resources (as well as the new technologies employed by these large-scale operations) was a dire threat to its pristine forests, its waterways, and the thousands of (mainly) indigenous people that eked their subsistence from the natural environment. As is too often the case in developing countries, the indigenous and rural people were largely excluded from the decision-making process, yet they bore the brunt of the social and ecological consequences of the resultant environmental disaster.

Gold Mining in Guyanese History

Gold mining has a long history in Guyana. There is evidence to suggest that the Amerindians, the aboriginal peoples of Guyana, were aware of the existence of gold in Guyana's interior (Forte 1998:72). However, the Amerindians' interest in gold did not feature prominently in their socio-economic activities: they mainly used gold for personal purposes such as the decoration of their bodies. Forte (1998) contends that it was Guyana's aboriginal people's indifference to gold (specifically, their not having a treasure trove at hand when European treasure-seekers/explorers encountered them), that accounted for their survival, unlike other South American groups that were decimated by early European explorers

The Guiana coast was first sighted by Europeans in 1498 and visited by them in 1499 (Daly 1974). There was little subsequent European interest in the region since there was little evidence of massive amounts of gold or people to dominate. By 1770, the Dutch had established trading ports in Guyana in various parts of the Essequibo and Berbice regions. Gold did not feature prominently in the early activities of the Dutch in Guyana; importance was placed on trading dyes and hardwoods. In 1770 the Dutch West India Company ordered the production of gold in its colonies, including Guyana (Rodney 1981). Sugar and tobacco plantations on the coast of Guyana had replaced the trade in dyes and hardwoods as the main economic activities in Guyana. Implementing the pronouncement of its superiors in Europe, the Dutch colonial officers in Guyana began using African slaves and those of African and Amerindian ancestry in the exploration of gold. There were Dutch-led gold expeditions in Berbice, the eastern county of Guyana, in 1720. In the following 20 years the Dutch West India Company explored the Mazaruni,

Cuyuni, and Essequibo Rivers and was joined by a German expedition that covered the Groete Creek, the Essequibo Carice Island on the Mazaruni River, and the Cuyuni River. The Dutch mounted another expedition in 1743 before ceasing gold-mining activities. The gold mining industry in Guyana was closed until the early 1860s (Cantebury 1998:25). Underlying the stoppage of gold mining was the concern for competition for labor from the plantations. Cantebury (1998) declares that this fear constrained the industry even when activities recommenced in the 1860s. Increases in gold's output and values in 1860 corresponded with declines in the sugar and rum sectors (Cantebury 1998). Colchester (1997) explains that underlying this rush to exploit gold were the lucrative finds of the western Guyana region in the 1840s and eastern Venezuela in the 1860s.

Pork Knocking: Small-Scale Gold Mining in Guyana

In 1815 the various components of Guyana became unified under the British; then in 1834, by a decree of the British Parliament, slavery was abolished in all British colonies. The abolishment of slavery resulted in the genesis of "pork-knocking" (small-scale gold mining using minimal technology). In Guyana, many former slaves preferred to seek their fortunes in Guyana's interior rather than work on the plantations. There were also those who used gold mining to supplement their plantation activities. The movement of labor away from the plantations was of some concern to planters, and attempts were made to thwart it. These attempts at stopping migration to the gold fields were unsuccessful, and at the start of the twentieth century an estimated 6,000 African-Guyanese small-scale miners were mining gold in Guyana's interior (Colchester 1997). The Amerindian involvement in this activity was essential; they worked as guides,

assisted pork-knockers, supplied food products, and allowed miners access to traditional lands (Forte 1998). Indeed, Amerindians often became pork-knockers themselves.

At the turn of the century gold and diamond production peaked at 138,000 and 214,000 ounces, respectively, and made up 22 percent of the exports of the colony (Cantebury 1998: 25). In 1887, Guyana's first mining district was declared in the Northwest by British Guiana authorities. The declaration was an admission on the part of the authorities that gold mining had become an integral part of Guyana's economic activities. It was also an attempt to encourage occupation of the area in the face of territorial claims by the Venezuelans. By 1895, Guyana was ranked in the 10 largest gold-producing countries in the world (Thomas 1998).

A definite figure of the number of persons involved today in small-scale gold mining in Guyana is lacking. However, there are varying estimates. Some put it in the range of 40,000–60,000 persons (Forte 1998:75-76; Colchester 1997:71); others put it in the range of 14,000–15,000 (Thomas 1998:41). Colchester (1997) states that "…14,500 small mining claims and about 800 Medium Mining Licenses have been issued so far by the Guyana Geology and Mines Commission covering over 650 kilometers of rivers as well as one million hectares of land and are worked by approximately 1,500 licensed land and river dredges and untold illegal ones" (1997:71). In addition to Guyanese, there are a large number of Brazilians and Venezuelans involved in small-scale gold mining in Guyana.

Small-scale mining has served as the livelihood for many African-Guyanese males from the coast for almost two hundred years. The number of persons involved in this sector has been increasing due to diminishing economic opportunities on the coastal

plain. Small-scale mining requires little startup capital, and the technology used is unsophisticated: mainly adaptations of those used in the California gold rush and other areas around the world. The recovery rate of gold from the ore is very low in small-scale gold mining (Thomas 1998). This activity is strictly speaking illegal as such concessions are rarely given by the Guyana Geology and Mines Commission (GGMC), which is the agency responsible for mining in Guyana.

The environmental and social impacts of small-scale gold mining in Guyana's hinterland is well documented (Forte1998, Colchester 1997, Fox and Danns 1993). Small-scale gold mining results in deforestation, destruction and fragmentation of habitats, pollution and contamination of creeks and rivers with mercury, increased turbidity of streams and rivers, and the general modification of the landscape (Colchester 1997). The social impacts of small-scale gold mining have been overwhelming to many Amerindian communities (Danns and Fox 1993, Colchester 1997, Forte 1998). Impacts include changes in the ethnic and gender composition of the population; the introduction of new diseases by pork kockers, including AIDS and other sexually transmitted diseases; prostitution and rape of Amerindian women by mine workers; alcoholism; abandonment of farming and local foods creating a dependency on external food; and, generally, a decline in the standard of living. The Amerindian response to the onslaught of small-scale mining has been to move out of their traditional villages or become part of the mining economy themselves (Colchester 1997).

Medium-Scale Gold Mining

Thomas estimates that there are approximately 1,350 medium-scale mining outfits in Guyana (1998:42). Medium-scale miners are better equipped than their small-scale

counterparts and employ more complex technologies. Technological improvements include suction dredges with diverless missiles and lode mining with bucket line dredging and hydraulicking. Medium-scale miners have a recovery rate of gold from its ore deposits of 30 to 40 percent and operate in an average area of 150 to 200 acres. The bigger of these mines produce about 13,000 ounces of gold annually; Thomas states that the 10 largest produce about 60 percent of the declared gold in Guyana.

Medium-scale gold production increased as well in the 1980s, mainly due to the participation of foreigners. Whilst locals can only carry out small-scale mining, medium-scale mining allows the involvement of foreign partners. In the last decade there has been an increase in the number of Brazilians in this sector of the mining industry. Foreign involvement has brought superior technologies and the possibility of increased environmental impacts and degradation.

Opponents of mining in Guyana's interior are particularly critical of medium-scale miners, whom they contend are the most destructive to the environment and surrounding populations (Colchester 1997, Forte 1998). Their contamination of the environment with mercury (and, in at least one instance, cyanide) has caused immense distress. Large-scale mining was proposed as an alternative to counter medium-scale mining, which was not only environmentally destructive but also harder to regulate (Cholchester 1997). The last decade has seen the emergence of the medium-scale miner as an important player in Guyana's gold sector—and the Guyanese economy in general-through increased production and the lobbying of its representative organization, the Guyana Gold and Diamond Association.

Gold in the National Economy: The 1980s

In the period 1985–1990 Guyana experienced another boom in gold production. Forte (1998) attributes this explosion to technological innovations in the gold mining industry: namely, the development of the gravel pump in 1980. In addition, many legislative and policy reforms influenced the increased production of gold. There was an emphasis placed on private sector involvement in natural resource exploitation, particularly in the gold sector. Among fiscal reforms in 1981 were: (1) allowing mine owners to retain foreign exchange for their sales to the Guyana Gold Board (GGB); (2) pricing gold to the equivalent to the daily Cambio[4] rate; (3) buying gold from small-scale miners at the equivalent of the daily price in London; and (4) the granting of foreign exchange accounts and retroactive payments (Forte 1998). These reforms renewed gold as a major export earner in the Guyanese economy and production increased substantially from the 1980s (Table 1).

Table 1: Gold Production, 1980–2002 (ounces)

Period	Total	Omai	Other Domestic
1980–1982	13,000	NA	13,000
1983–1985	10,000	NA	10,000
1986–1988	18,161	NA	18,161
1989–1991	38,437	NA	38,437
1992	79,582	NA	79,582
1993	309,772	206,539	103,233
1994	375,618	250,642	124,976
1995	285,434	171,000	114,434
1996	365,085	254,950	110,135
1997	431,704	338,500	93,204
1998	469,554	327,000	142,554
1999	414,905	306,100	108,805
2000	435,231	330,500	104,731
2001	435,592	354,300	101,841
2002	436,240	319,000	117,240

Source: Thomas 1998; Cambior Limited 2002 , 2003; Bank of Guyana, Statistical Bulletin 1996; and IADB and IMF estimates for earlier years

[4]Cambio are licensed places in Guyana where currency are exchanged outside of the established banks. There rates usually reflect the market value of the Guyanese dollar relative to the US dollar.

Omai made its first contribution to the gold production of the country in 1993. With OGML's first contribution, gold production in that year reached second place in foreign exchange earnings in Guyana. In 1994, gold outranked the traditional exports sugar and rice to become Guyana's number one earner of foreign exchange (Thomas 1998). Small- and medium-scale mining also increased threefold during this period as a result of the new policies. The Omai cyanide spill affected gold production in 1995 and 1996. In 1995–2002 gold production remained more or less stable with record productions in 2002.

Omai Gold Mine in Guyana's Gold Production and Economy

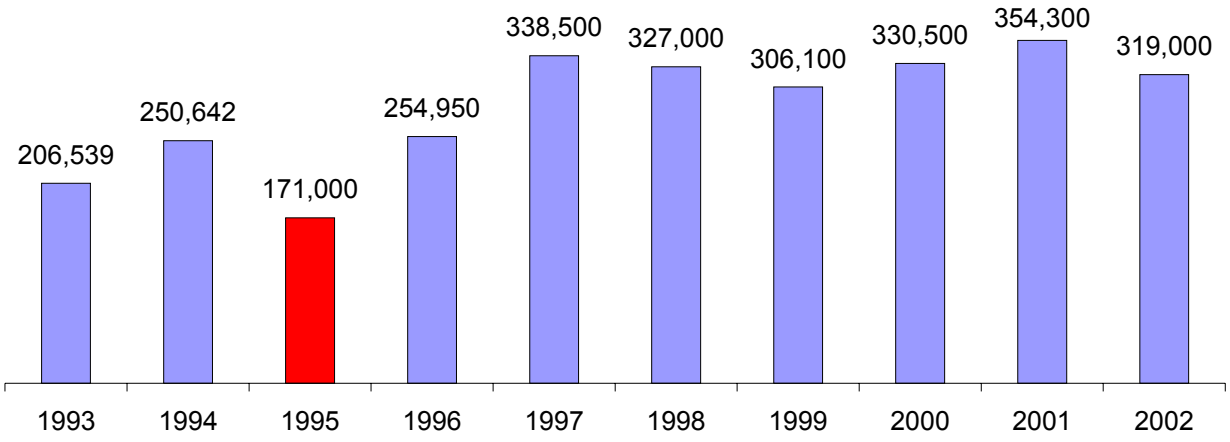
OGML came into being after approximately seven years of exploration and pre-planning by Golden Star Resources Limited of Colorado. Earlier there was much international interest in the Omai's deposits, as well as many changes of ownership prior to Golden Star Resources' acquisition. In the 1880s a German syndicate produced 40,000 ounces of gold from the Omai deposits. In 1937, Anaconda, a Canadian corporation, acquired the property from another Canadian firm. In 1985, under the Hoyte-led liberalization of the economy, Golden Star Resources obtained the property. Golden Star Resources then mined the area through commissioned consultants (Omai Gold Mines Limited 1998).

It had long been recognized by geologists that the Guiana shield of the Omai area was one of the potentially massive gold deposits of the region (Thomas 1998). Once this fact was established by Golden Star Resources, it attempted to attract partners. Several consortiums failed before Golden Star Resources was able to attract Cambior of Quebec into a consortium that also had a 5 percent Guyanese government ownership. In 2001,

Cambior increased its ownership of OGML by acquiring Golden Star Resources shareholdings in the consortium. Omai is at present Cambior's largest gold mine; in 2001 it represented 58% of the company's consolidated gold production. Cambior also owns gold mines in Canada, Mexico, and Suriname. According to the Cambior's website (www.cambior.com), Omai has mineable ore reserves of 80 million tonnes. The mine life in 1998 was projected at 12 years. However, high production recorded by OGML since 1993 may have contributed to a reduced mine life. The Prime Minister of Guyana, Sam Hinds, concedes that Omai reserves are running low and will only sustain production until 2005/2006 (*Guyana Chronicle* Jan 26th 2002). In April 2003 OGML announced it is stepping up its efforts to find new gold deposits to continue its operations beyond 2005. It has identified five remote and heavily forested areas in Guyana as possible sources (*Stabroek News* April 27, 2003).

Gold production at OGML has been consistent and met their production targets for all of its years of existence except 1995, the year of the spill (Figure 1). In 1995 production ceased for almost six months as a result of the cyanide accident.

Figure 1: Omai Gold Production 1993–2002 (ounces)



Source: www.Cambior.com, www.Guyana Chronicle.com

OGML is at present Guyana's single largest foreign exchange earner. Its contributions to the gold sector have also propelled that sector to the number one earner of foreign exchange in 1994, 1995 and 1996. However, in 2002 the gold sector ranked third behind traditional exports of rice and sugar. OGML is one of the leading employers in the Guyanese economy. In December 2002 the company had a workforce of 943 workers, of whom 85 percent are Guyanese nationals. According to OGML, over the past 10 years it paid US$ 128.9 million in wages and salaries (Stabroek News 27 April 2003). In addition to employment, Thomas (1998) identifies four other sources of local value added to the Guyanese economy by Omai: 1) revenue payments to the government of a 5 percent royalty initially, which has since declined to 1 percent, corporate taxes at 37.75 percent, and withholding taxes on dividends; 2) Omai's purchases of local supplies and services worth US$250 million (mainly food items), local transport, fuel, and equipment rentals; 3) their contribution to infrastructure development worth approximately US$ 9 million to date (infrastructure development in Guyana's context is important because the project is located in the interior, where little infrastructure exists); 4) expenditures on

training and skills enhancement in the workforce, as well as in technical institutions such as the University of Guyana and the Government Technical Institute.

However, despite these value-added economic benefits to Guyana, there are lingering questions about the contribution of Omai to the Guyanese economy. Ten years after its first gold bar and a total investment of US$253 million, Omai has produced 2.5 million ounces of gold valued at a conservative figure of US$ 916 million. Gold prices have fluctuated between annual averages of US$385 and US$271 per ounce between 1993 and now. According to OGML an ounce of gold has a production cost of US$214. Despite its high production levels for 10 years, OGML claims it has made no profits and refuses to pay corporate taxes to the Guyanese government (*Stabroek News 27 April 2003& Stabroek News April 22 2003*). The only direct monetary benefit from the company the country has seen is US$45.5 million in royalties.

In 1998, Thomas stated that OGML probably signaled the beginning of many large-scale mining projects in Guyana's interior. Fortunately, further large scale mining projects with lucrative concessions and poor environmental stewardships have not materialized. In 2002, Omai continued to be the only large-scale mining project in Guyana. Many factors have contributed to this situation, including the decline on the international markets of the price of gold. However, the OGML cyanide spill may have not only dampened Guyana's enthusiasm for large gold projects but also served as a deterrent to other investors.

Chapter II: Technological Disasters, Globalization and Developing Countries

Disaster Studies

Despite the relatively long history of disaster research, the precise meaning of the term has escaped simple definition. One of the first and most cited definitions of what a disaster is, is that of the pioneering U.S. researcher Charles Fritz: "…actual or threatened accidental or uncontrollable events that are concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of a society undergoes severe danger, and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society, or its subdivision is prevented" (Fritz 1961: 655). Other researchers that have attempted to define the phenomenon include Barton (1969), Dynes (1970), and Kreps (1986). Kreps and his colleagues, in a "modest" revision of Fritz's definition, identify four core properties associated with disaster: events, impacts, social units, and responses (Kreps 1986)

Disaster studies have increased tremendously over the last ten years with fundamental changes in the theoretical and conceptual base of the subject (Cowan 2000). Earlier studies in sociology focused on the behavioral responses of members of communities in the aftermath of the disaster (Barton 1960, Dynes 1970, Kreps 1986). Geographical studies concentrated on the geophysical and environmental elements of disaster (Hewitt 1983, White and Haas 1975). The focus of the two major groups in early

disaster studies resulted in what Hewitt (1983) termed a "technocratic approach" to the subject (1983:7). The 1970s saw a shift in the disaster paradigm by contributions from mainly social geographers and anthropologists working in developing societies (Oliver-Smith 1986, Oliver-Smith and Hoffman 1999). Disasters once thought of as completely natural phenomena under closer scrutiny revealed humans play tremendous roles in their formation (Evan and Manion 2002).

Technological Disasters

As societies become industrialized, the numbers of human-made or technological disasters increase. Evan and Manion define a technological or human-made disaster as "…one that brings on a major crisis, threatens the viability of a technological system, causes massive losses of life and property, and may even endanger the social environment in which it occurs" (Evan and Manion 2002:3). They differentiate a "technological failure" from a technological disaster. They state that a technological failure "…is brought about by an unanticipated break-down of one or more components of a technological system. It may impair the system's operation and may cause minor property damage, loss of life, or both. A technological failure, if not identified and corrected in time can lead to a technological disaster." (2002:3)

Technological disasters span the gamut of accidents and catastrophes including wars, acts of terrorism, nuclear catastrophes, dam failure, airplane crashes, pollution and toxic contamination (Evan and Manion 2002, Kreps 1986, Perrow 1984, Oliver-Smith 1986 and Oliver-Smith and Hoffman 1999). Initially most technological disasters occurred in developed countries, but the situation is changing. There are few societies that have not been touched by the technologies of modernity. For example, Hewitt (1997)

observes that of the 25 countries with nuclear reactors, eight are developing countries. There are few countries without some kind of industries, dams, and thermal generating systems. The situation becomes complicated in developing countries as modernity and traditional societies exist side by side. The technologies of modernity (as well as the wastes they produce) pose risks to the millions with traditional lifestyles through their inappropriate application and transfer (Hewitt 1997:93).

Evan and Manion (2002) identify five major causative factors of technological disasters: human errors, such as miscommunication and gross negligence; technical design factors, such as improper placement of toxic compounds and defective designs; organizational system factors (for example, refusal of management to report deficiencies); socio-cultural factors; and, lastly, technological terrorism—mainly acts of random terrorism. Evan and Manion describe socio-cultural factors as "attitudes and values that are widely accepted by people in a society and that penetrate the attitudes and values of the corporate culture in various firms" (Evan and Manion 2002:19). They concede that in reality it may be difficult to attribute one single factor to a disaster and that a combination of factors usually contributes to a disaster situation (Evan and Manion 2002:107).

Rajan (1999), in his analysis of socio-cultural factors that contribute to technological disasters, developed the concepts of "missing expertise" and "categorical politics." He defines missing expertise as "the phenomenon wherein the potential for risk is not matched by a concomitant creation of expertise and institutional wherewithal to help mitigate a crisis should one ensue." He identifies missing expertise as a major factor in the Bhopal accident, where Union Carbide, a multinational corporation (MNC) from

the US, released poisonous gasses into the Indian city of Bhopal. Rajan categorizes three types of expertise: contingent, conceptual, and ethnographic (Rajan 1999:238). Contingent expertise is the ability of local and national governments to respond "immediately and effectively" to a potential hazard (Rajan 1999:238). Conceptual expertise refers to the potential "…to devise long-term rehabilitation strategies and to troubleshoot them in practice" (Rajan 1999:241). Ethnographic expertise is the "ability to gain a contextual and grounded understanding and to act on the basis of such experience" (Rajan 1999:247). Rajan found all of these to be missing in the case of Bhopal, India, and observed that "experts played a critical role in suppressing risk. They did this by discounting the perception and concerns of 'lay' peoples, whom they characterized with terms such as "uneducated" and "irrational" (Rajan 1999:248).

Toxic Contamination as Technological Disaster

Toxic contamination is one of the many forms of technological disasters. Toxic contamination, mainly in the form of pollutants, is a byproduct of many of the technologies of modernity. In the United States recognition of the negative impacts of pollution began after World War II (Edelstein 1988). Rachel Carson (1962) in her publication "Silent Spring" brought to light the long-term impacts of chemicals on the environmental and human health of the United States and its citizens.

Edelstein (1988) found that 70,000 chemicals are in regular use in the US and 1,000 are added every year. In addition, the US generates between 255 and 275 million metric tons of hazardous waste annually, 90 percent of which is improperly disposed of (Edelstein 1988:3). The spread of agricultural and industrial methods to all corners of the globe has resulted in a pervasive threat of toxic contamination on the earth. In addition,

pollutants easily travel by water and air from one place to another. Many of the chemicals that are banned in developed countries such as DDT are still being used in developing countries. Cutter (1993) contends that in the 1980s not only were there an astonishing 11,000 chemical accidents, but that the worst of these were in developing countries. She argues that this situation is due to the fact that there are inferior safety measures and controls in place in developing countries.

The potential impacts associated with toxic contamination (in contrast to other natural and technological disasters) are longer lasting than those of other disasters because they possess the potential to remain for long periods in the environment. The associated risks can therefore threaten several generations (Hewitt 1997, Edelstein 1988). Some toxic contamination, according to Edelstein, causes an immediate and long-lasting deterioration of the relationship between humans and the ecosystem.

Social Impacts and Perceptions of Technological Disasters

Technological disasters are increasing and so are their disruptive effects on society (Baum and Davidson 1993). Cuny (1983) identifies four major impacts on society by natural disasters that are applicable to technological disasters. Technological disasters impact society in the following ways: (1) they induce social changes, (2) they result in the loss of economic opportunities, (3) they change the environment, and (4) they spur the development of leadership skills in the community as a result of advocacy activities.

Cuny (1983) identifies the poor as the group that suffers the most from natural disasters in developing countries. He states that the poor "…are more vulnerable in a complete sense because they are poor."(Cuny 1983:14). This conclusion is applicable to the impacts of technological disasters and is supported by Alexander (2000), who names

the poor and marginalized as disasters' main victims. Cuny also recognizes the household as the main social unit that disaster events impact.

The impacts of technological disasters are both similar and different from those of natural disasters (Alexander 2000, Levi et al 2001). Edelstein (1988) discusses the loss of resources, disruption to daily activities, disruption to homes, families and communities, and changes in the perceptions of the environment and risk as a result of toxic contamination. According to Edelstein, the duration of the hazard is indefinite since the pollutants (threats) remain in the environment for longer periods of time. Victims of toxic contamination often perceive their environment differently from before the disaster, undermining the fabric of individual, social, and community structures. He surmises, "Exposure to toxic materials not only changes what people do, it also profoundly affects how they think of themselves, their families and their world" (Edelstein 1988:43).

Levi et al (2001) contends that the impact of the hazard on people and communities depends on the length of the hazard (Levi et al 2001:79). The impacts of toxic exposure seemed to be prolonged while those of floods were immediate. Levi et al (2001) argue that victims of technological disasters have shown "longer lasting consequences" and more "adverse" social effects (2001:80).

Levi et al (2001) promulgated that there is a relationship between the cause of the disaster event and people's attitudes and responses to the disaster. Whilst God or nature is blamed in natural disasters, technological disasters can often be attributed to individuals and/or corporations (Evan and Manion 2002). Levi et al contend that the human element in technological disaster formation, particularly, companies and businesses, results in feelings of anger and distrust among community members, prolonging the effects of the

disaster. In addition, technological disasters often result in "chronic long-term environmental hazards." These hazards, they argue, are more difficult for people to deal with than acute problems caused by natural disasters (Levi et al 2001:80). Further, people, they contend, "…have a special relationship with natural environments that may be violated by technological contamination of nature" (Levi et al 2001:81).

Levi et al, supported by the observations of Edelstein (1988), contend that there are differences in the perceptions of risk associated with technological catastrophes. They conclude that people both overestimate and underestimate the risks of hazards. People overestimate risks when it affects something of value to them and underestimate risks when it does not directly affect them. People overestimate risks that are dramatic and sensational. Public concerns with disaster impacts include both the effects on the environment and human health, while experts are usually only focused on threats to human health. Similarly, damage to ecosystems is of importance to the public especially if their community relationships are tied to natural resources.

In an attempt to gather information on the attitudes towards technological disasters and the type of environment (built or natural); Levi et al (2001) measured the perception of coastal pollution in Avril Beach, California. They failed to observe any significant differences between the type of environment (built or natural) and perception of the pollution. Rather, awareness of the problem and higher education levels correlated with higher perceptions of the contamination. There are few studies done on the perception of pollution problems as a result of technological disasters in developing societies (Asgary and Willis 1997). Therefore, while these findings may have relevance

to developing countries there are also contrasting scenarios that may render the conclusions inapplicable.

Dyer et al (1992) attempted to provide a conceptual model for examining the social impacts of toxic contamination on communities dependent on natural resources. They proposed the natural resource community model (NRC). NRC is defined as

> … a population of individuals living within a bounded area whose primary cultural existence is based on the utilization of renewable natural resources. This concept is not restricted to subsistence hunting and gathering societies but includes agricultural-based villages… In an NRC, traditional subsistence activities represent the most persistent cultural activities (1992:19)

In applying the model to their analysis of the Exxon Oil Valdez oil spill on the Native Alaskan community of Cordova, Dyer et al discovered major social disruptions related to the disaster, in family relationships, changes in future plans, changes in workplace, and work-related disruptions, which increased over time (Dyer et al 1992:119). Long-term disruptions were reported and were attributed to the "secondary disaster effects." The authors concluded that these social relations and networks were maintained, "Through traditional patterns of resource relationships…" and that as the resource base collapsed (or was perceived by the residents to have collapsed), so did societal relations (Dyer et al 1992:119). Residents had decreased social contacts with each other. This study has obvious relevance to traditional societies in developing countries. Similarly, in their application of the "Conservation of Resource Model" Arata et al (2000) found "significant relations were obtained between resource loss and symptoms of anxiety, depression …" and decreased social contact and deterioration of physical health (Arata et al 2000:35).

There is an apparent relationship between the duration of social impacts and adequacy of aid received. Researching psychosocial recovery after technological disasters, Levi et al (2001) assert that positive psychosocial recovery is related to the victim's assessment of the adequacy of national governmental aid. Feelings of inadequacy and inappropriateness prolong the psychosocial impact (Levi et al 2001). Levi et al (2001:80) further conclude: "The effective management or containment of the chronic consequences of disaster (technological or natural) requires the development and implementation of support services that integrate economic, technological, psychological, and social strategies."

Disaster-Development and Development Disaster Theories

Developing countries are vulnerable to the risks of development if they modernize, and may be incapable of responding adequately to disasters if they do not. In 1983, Cuny proposed a revolutionary thesis in disaster research. He argued that there is a link between the impacts of a disaster and the level of development in the society in which it occurred. Using the case of an earthquake, he stated that an earthquake of less intensity causes more damage in a South American country than a higher intensity earthquake in California. The difference of impacts he attributes to the scale of development of the corresponding societies. Implicit in Cuny's thesis is the idea that increased development leads to better coping and durable mechanisms to deal with disaster impacts. Poverty, Cuny claims, is the primary cause of amplified vulnerability to disaster impacts in developing countries. Cuny therefore sees the solution to the problem of inadequate disaster preparedness (his emphasis was on natural disasters) in underdeveloped countries as increased "development."

Subsequent research since Cuny's thesis has argued that whilst increased development may reduce the impacts of disasters on communities in developing countries, the development process itself poses risks to many sectors of the population. The predominant development model is the Neo-liberal Capitalist Modernization model. Its main characteristics are economic growth, trade liberalization, urbanization, and consumerism. Multinational financial institutions such as the World Bank and IMF often force this model on developing countries (Stiglitz 2002, Karliner 1999). The development process includes activities such as infrastructure development, land-use changes, industrialization, urbanization and complex settlements (Lavell 1999). Ulrich Beck (1992) proposes that the process of modernization is strewn with risks, creating what he terms "risk societies." In Beck's view the risks posed by development and modernization activities have the potential to destroy human societies. Meshing the development/modernization process and facets of globalization, Alexander (2000) aptly concludes that, "The globalization of production has seen its regional differentiation. It is an all or nothing situation in which countries or societal groups are either fully-fledged participants or are left behind in the race for material prosperity. In all societies marginalization is a key element in vulnerability to disasters" (Alexander 2000:69).

James (1994), in an analysis of the effects of technology transfer in Africa, asserts that "Agricultural and technological developments such as dam construction, irrigation and electrification, and other industrialization efforts designed to bring about economic growth, threaten the ecological life-support systems of Africa" (James 2000: 11). Edho (1994) observed a relationship between technological transfer and diminishing resource bases of many African societies. Technology has both constructive and destructive

potentials, he argues. In their rush to industrialize, developing countries rarely consider the destructive potentials. Environmental concerns are not high on the priorities of the global economic system and transnational capitalism (Edho 1994:34). Cuny (1983) agrees that the modernization process in many developing countries is rushed, and that high technologies are often used inappropriately.

Multinational Corporations (MNCs), a major instrument of economic globalization, institutionalize the political and cultural practices and biases of governments in developing countries when such practices are in their interests. They are also a major medium for the transfer of technologies to developing societies. The transfer and introduction of new technologies, coupled with the adoption of prevailing socio-cultural biases in the host countries, lead to increases in risks and eventually disasters. In the case of the Bhopal incident in India, Evan and Manion (2002) comment:

> In designing the Union Carbide plant in Bhopal, management could not help but know of the pervasive poverty in that city of approximately 2 million people. They also likely observed in the local government the absence of concern with, and resources for, protecting the health and safety of its citizens. Hence when designing the plant, engineers and planners paid little heed to the importance of building in fail-safe devices to protect Bhopal residents against gas leaks. After all life in Bhopal was deemed not quite as valuable as in Institute, West Virginia where Union Carbide had built a comparable plant…implicitly or explicitly Union Carbide accepted the Bhopal devaluation of human life in and safety in…how to design the Bhopal plant. (Evan and Manion 2002:19).

In a study of vulnerability to hurricane Mitch in El Salvador, Wisner (2001) argues that the neo-liberal policies imposed by the international financial institutions of "free-trade, openness to foreign direct investment, privatization of government functions and dollarization of the economy" exacerbated issues such as inequitable land

distribution (Wisner 2001: 261). Liberalization of the economy resulted in less emphasis on poverty reduction, livelihood security, social development and health facilities since the focus is fiscal austerity. As Wisner states: "Run-away capitalism justified by the neo-liberal ideology in El Salvador produced vulnerabilities that affect all but the very richest" (Wisner 2001:261). He argues for human and social development with due attention to social development, livelihood security, and environmental enhancement. Wisner's findings were supported by Rocha and Christopolos (2001) in their scrutiny of the post-Mitch agenda in Nicaragua. Similarly, Blaikie et al (1994) found that debt repayment in many African countries increased risk and vulnerability by reducing spending on safety measures for the majority of the population (Blaikie et al 1994:41). In Jamaica, the same authors are convinced that there is a relationship between vulnerability to hurricanes Gilbert (in 1988) and Hugo (in 1989) and debt repayment in Jamaica (Blaike et al 1994:40).

The risks associated with technological transfers and the development processes of globalization and modernization inevitably led to a questioning of the established development process and its suitability to developing countries. Shrivastava (1994) places disaster in a particular development context when he states that disasters are a result of "ecologically destructive industrialization" (Shrivastava 1995:120). Rajan (2002), referring to the Bhopal disaster writes, "…the disaster served to reinforce the growing sense, among several environmental and social justice advocates, that poverty eradication and economic emancipation needed more nuanced and context-specific paradigms" (Rajan 2002:369–370). Placing the development process within the much-touted but vague concept of sustainable development, McEntire (1999) argues for a new

development paradigm that addresses disaster concerns. He points out that disaster reduction is not an explicit goal of sustainable development. Sustainable development, he states, emphasizes the environment—and the promotion of future developments. Instead, McEntire favors and proposes "invulnerable development." He describes it as "…development pursued in such a manner as to address the issue of vulnerability and thereby decrease the probability that [the] social, political and economic progress will be set back by disaster" (McEntire 1999:78).

Lavell (1999) acknowledges the attendant risks of the development processes but argues that these fail to disrupt local communities and localities, despite a break in the normal functioning. Rather, he contends, development-associated risks represent the continuity of daily life for the poor and vulnerable in society. As he puts it, "…unsafe housing, minimum incomes and livelihood insecurities" are of more concern to the vulnerable groups. Risks produced from development activities, he contends, are just another challenge (Lavell 1999:10).

Whilst the effects of modernization, globalization, and industrialization on risk and disasters are straightforward, the impacts of disasters on development are inconclusive (Lavell 1999). "Lost assets, combined with increasing investments in relief and reconstruction, are seen to erode important development benefits and opportunities…There is an urgent need for development of methodologies which allow an appraisal of the ways disasters may affect such indicators as personal and regional distribution of wealth, access to and ownership of land resources and other assets, community development and participation, improvements in infrastructure and production…" (Lavell 1999:11). However, anecdotal information suggests that investors

are highly unlikely to invest large sums of money in areas prone to disasters—natural or technological.

Coping and Coping Mechanisms

A related concept to disaster studies is that of coping. Coping is an anthropological construct, which takes into account the "Managing of resources in unusual, abnormal and adverse situations" (Hewitt 1983:62). Cuny (1983) defines coping mechanisms as "internal social structures that help societies cope" in times of extreme circumstances such as disasters (Cuny 1983: 80). Coping is essentially a community's survival strategy.

Families are the most basic coping unit and mechanism; others are the extended families, religious organizations, and kith and kin. Blaikie et al (1994) argues that the ability of social units to cope is directly related to economic status. Poor households with limited "access to resources" are impacted greater by disasters since they have limited coping ability. They define "access to resources" as the ability of individuals or groups to use the resources that are required for a secure livelihood (Blaikie et al 1994: 61).

Blaikie et al categorize coping strategies into three groups: (1) impact-minimizing strategies/mitigation, (2) preventive strategies, and (3) post-event coping strategies. Impact minimizing strategies have two objectives. First, they improve access to the basics of life, such as shelter, water, and food. Second, they attempt to tap non-traditional sources of the basics mentioned above, thereby increasing social support networks (such as extended families and/or other communities) (Blaikie et al 1994:64). According to Blaikie et al, a community's ability to secure resources in times of disaster depends on the bargaining strength of its members. Traditional communities may lack these skills

and the ability to articulate their plight—or to bargain. Blaikie et al caution that while coping mechanisms may be a good short-term solution, they can undermine the basis of livelihood in the long-term. Coping mechanisms after long periods turn into adaptive strategies. Preventive strategies are those taken to avoid the impacts of the disaster, and include such actions as migration or fortifying homes.

However, in the case of toxic contamination in particular and other technological disasters in general, there is little fore-warning, hence communities can not implement preventive methods (Edelstein 1988). Post-event coping strategies are those long-term solutions communities develop to deal with the changes in their environment. Hewitt (1997) argues that post-event coping strategies are not random but are based in the communities' knowledge of the disaster and other local knowledge.

Previous studies on the Omai Cyanide Spill

Local Communities and the Impacts of the Disaster

The government of Guyana, in an attempt to understand the causes and impacts of the OGML disaster on all sectors of the Guyanese community, established a number of committees to investigate the spill's impacts. One such committee was the Economic Audit and Social Committee, whose findings were published by the Guyana Geology and Mines Commission (1996). The report focused on the spill's impacts on local communities as well as mining and logging operations of the Essequibo River starting from its confluence with the Omai River and proceeding to Parika at its estuary. The stated objective of the survey was to "generate information on health, drinking water, fishing, logging, farming, and the social and economic well-being of the affected

communities" (1995:35). The methodology used was a household, business, and service sector questionnaire. A stratified sampling technique was used.

Table 2: Household Losses from the 1995 Omai Cyanide Spill

Name of Locations	Sample Size (%)	Average Income Loss or Costs Incurred	Estimated Loss
Butakari	9 (36%)	No Loss	-
Anarika	10 (20%)	No Loss	
Alphonso	2 (100%)	No Loss	
Bishop	1 (100%)	No Loss	
Winiperu	8 (6%)	No Loss	
St. Mary's	10 (20%)	No Loss	
Agatash	6 (16%)	$20,000 per water tank	$120,000
Bartica	75 (2%)	No Loss	
Kaow Island	5 (25%)	No Loss	
Makouria	10 (20%)	No Loss	
Shankland	2 (50)	No Loss	
Lanaballi	10 (10%)	$6,000 to obtain water	$60,000
Fort Island	6 (24%)	$3,000 farming	$18,000
Subtotal	154		$198,000

Source: Guyana Geology and Mines Commission 1996 p. 62

The government survey highlighted the immediate social, economic, and health impacts on Riverain communities because of the spill (Table 2). It further cited the spill's effects on potable water, fishing, food, and religious activity. Health impacts included vomiting, diarrhea and skin irritation. Ramraj (2001), using mainly secondary data, concurred that the spill had ecological, environmental, health, economic and social impacts on the communities downstream of the mine.

An underlying delineation in the impacts of the spill in the data of the government survey was between "natural" communities (or villages) and those that housed workers of mining and logging conglomerates. In the mining and logging communities, little subsistence farming and livestock rearing occurred. In addition, it was the responsibility of the company to provide its employees with water for domestic consumption.

Workers/residents obtained their food from the company's shops and stores. The economic and social impacts on these synthetic communities were not as severe those of the "natural" communities (Guyana Geology and Mines Commission 1996: 47). All of the identifiable impacts in the reports were more widespread in the natural communities.

The survey had some obvious limitations. In some cases the sample surveyed was less than 10 percent of the population. In Bartica, the most populous community in the disaster zone, only 2 percent of the population was surveyed. In addition, the survey concluded that in many of the communities no income was lost or costs incurred by the residents (see Table 2). In cases where there were measurable economic losses, these were only calculated for the surveyed population. It was assumed that the un-surveyed population did not suffer losses. As this research will illustrate, the use of a less structured methodology than the one used in the GGMC survey will reveal disruptions in residents' economic activities and livelihoods. In a population where the majority of the residents have only primary education it may have been difficult for them to interpret the questions. There were multiple-choice responses from which the respondents selected. There were no alternatives for cases in which the resident did not agree with any of the choices. In some cases there were vague choices such as "optimistic" and "pessimistic" with regard to how residents felt about their well-being.

Vick (1996), looking at the disaster from an industry perspective, states that the Omai tailings dam failure affected and tarnished the environmental image of the global mining industry. The recent shift of mining exploration to developing countries requires that the spill be investigated, he argues. Vick concluded that the Omai disaster "could have been prevented by applying existing design and construction technology," which in

his opinion was the primary cause of the accident (Vick 1996:34). In contrast, OGML has argued that the mining methods it employed in Guyana were the same as those utilized in North America (OGML Publication 1998). In addition Vick contends that "thorough studies have indicated no measurable effects on the downstream population or human health due to the tremendous dilution capacity of the Essequibo, the natural degradation characteristics of cyanide and its inability to bio-accumulate" (Vick 1996:35). However, Vick failed to reference the surveys to which he alludes. Vick does not mention the other heavy metal components of the tailings effluent. In contrast to Vick's views, a report by UN experts in a similar spill in Romania concluded that whilst immediate health risks were not high, chronic long-term health problems maybe be a feature of the affected region (UNEP/OCHA Report 2000). Contrasting Vick's statement of through surveys, Narayan (1998) argues, "As far as the author is aware, no routine monitoring on any environmental effects are being done either by Omai or the Guyanese government" (Narayan 1998:45). An EPA official in Guyana confirms that extensive monitoring of the Essequibo is not done and no tests of the sediments of the river are carried out (Singh 2002). This research will provide evidence that challenges both the Vick's and the governmental survey. It will show that the Omai disaster caused changes in traditional resource-use patterns and exacerbated social conflicts in two riverine communities.

In summarizing the events, Colchester (1997) situates the spill in the larger global and economic context. He argues that the spill was a consequence of the World Bank and other international advisors promoting large-scale natural resource extraction in general and gold mining in particular as a development strategy in Guyana. This was done despite Guyana's obvious lack of technical and financial ability to monitor the

activities of the new companies, and without heed to the fickle nature of the international gold market.

Chapter III: Methodology and Research Questions

Field Work

I undertook field research in Guyana in the summer of 2002 in order to gather information on the local perceptions of environmental impacts and responses to the 1995 Omai cyanide spill. My primary research tool was interviewing heads of households. My objective was to gather information on residents' perceptions of the impact of the disaster on their social activities and the environment.

Prior to actual fieldwork in the villages of study, I met with officials from several agencies in Guyana, including the Environmental Protection Agency (EPA), Guyana Geology and Mines Commission (GGMC), Environmental Studies Unit of the University of Guyana (ESU/UG), Pan-American Health Organisation (PAHO), Institute of Development Studies (IDS), Iwokrama Rainforest Project, Conservation International Guyana, World Wildlife Fund, Statistical Bureau, and Regional Officers from the three regions in which the villages are located. I did archival research in the National Library and the National Archives in Georgetown. Equipped with the background information from the numerous discussions and archival research, I commenced the design of the research instrument and the selection of my study population.

I stayed in each of the two villages in which I conducted interviews for approximately 15 days. I traveled to the villages prior to conducting the interview process to meet with village leaders and other important village figures to explain the

nature of my research as well as to arrange accommodations for the duration of my study. I received the names of the village contacts from a variety of sources, including local government officials, non-governmental organizations working in the villages, newspaper accounts of the disaster, and ministries such as the Ministry of Health.

Survey

My target population in this study was communities along the Essequibo River that were affected by the 1995 Omai cyanide spill. My focus was on heads of household who were both living in the community at the time of the survey and present during the 1995 spill. In the selection of the geographical area affected by the disaster, I used the unit already defined by the environmental officials in Guyana as the "environmental disaster zone." Two villages were selected from the designated "environmental disaster zone" based on the following factors: ease of access by road and river, similarity in ethnic composition and population size, and distance from the accident site. The villages selected, Rockstone and Riversview, were approximately 55 miles and 78 miles, respectively, downstream of the OGML (Appendix 1). In selecting these villages, I attempted to capture information about a diversity of economic and livelihood activities.

Sample Design

A random sampling design was applied to select the research population. Community maps of the villages were drawn using base maps obtained from the regional offices and the assistance of knowledgeable elders in the village. Each house in which there were occupants was assigned a number. Assigned numbers were then placed in a bag and drawn randomly. This provided each house in the sample population an equal

opportunity of having its head interviewed. In cases where occupants of the home were not present during the disaster, that number was discarded and another number was pulled. None of the heads of household selected declined to be interviewed. In a few cases I attempted to interview the household member several times before I was successful.

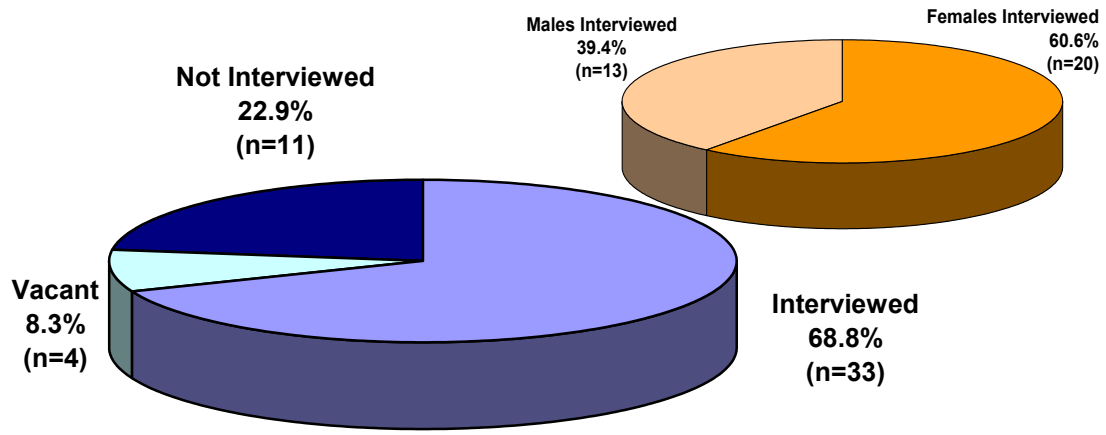
The villages, as is the case in most of rural Guyana, exhibited few intra-village economic disparities. The linear arrangement of houses in the villages ensured that the majority of the houses were the same distance from the river. There were a few houses that showed striking physical differences from the rest of the population, such as the homes of retailers or gold miners who had done well in the interior. These numbered about four per village. Little other evidence of economic differentiation of the population was noticeable.

I interviewed both male and female heads of household. In most cases, the residents decided the ideal person to be interviewed. I differed from most other studies, which automatically assumed that the male was the head of the household. In other cases, the male heads of the household were engaged in mining or forestry activities outside of the village and only the females were present. In some instances, the male or the female not being formally interviewed would provide clarification of a point that the other was making. I did not observe any differences in the responses when I interviewed females alone and when I interviewed females whose husbands were present during the interview. I did not record the names of any of the villagers whom I interviewed, in order to protect their identities.

Sample Size

In an attempt to acquire a significant sample of the population (and given my time constraints) I decided to interview a minimum of 20 heads of household per village and/or at least 20 percent of the population. In the villages of Riversview and Rockstone, the layout of the villages made the task easy.

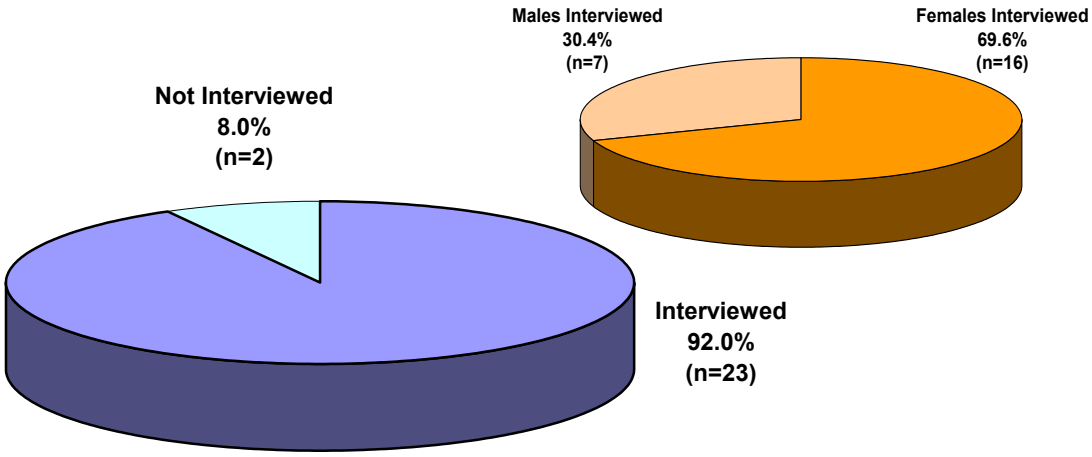
Figure 2: Riversview Survey Population



Source: Fieldwork

In Riversview (Appendix 3), the first village that I studied, there were a total of 48 houses. This number differed slightly from the 43 recorded by Forte (1998) in her study of the village. Of the 48 houses counted, four were unoccupied at the time the survey was conducted. The unoccupied homes may account for the slight differences in numbers between Forte's account and my observations. Of the 48 households in Riversview, a total of 33 or 68.8 percent were interviewed. Of the 33 persons interviewed, 13 were males and 20 were females (Figure 2).

Figure 3: Rockstone Survey Population



Source: Fieldwork

In Rockstone (Appendix 4), there were a total of 25 houses of which I interviewed 23 or 92 percent of the households (Figure 3). I interviewed 16 females and 7 males. Most of the males in Rockstone were working in the interior, and were therefore away from home at the time of the interview. This explains the male-female disparity.

Pre-Test

I conducted pre-tests in the villages of Bonaiska Creek and Aliki; these villages were not in my sample population but are in the designated "environmental disaster zone." In these two villages I interviewed a total of five persons each to gather information on how smoothly the interview would flow, as well as whether the issues I had identified as important resonated with the study population. This exercise took two days. I stayed at Bonasika Creek and traveled by boat to Aliki. This exercise proved invaluable because I discovered that the interview structure was too rigid and needed significant modifications. My apprehensions about residents not understanding some of the more technical concepts were unfounded. In some cases the interview guide came off

as condescending and some items were removed. For example, many of the persons found the question about their level of education as a measure of the accuracy of the information provided. One elder asked, "Yuh wan no hif mi bin ah skool to see if mi ah tell de truth." This question was removed and the information was extrapolated from other questions.

From the pre-tests, I was also able to gather information on the issues of importance to residents. About 60 percent of the issues I identified were also found to be of importance to the interviewees. However, it was clear that residents had their own ranking of the issues. The destruction of their water source was ranked above all other issues. I therefore modified my interview structure to reflect the ranking as identified in the pre-test.

Capturing Local Perceptions: The Interview

I conducted interviews in the field with heads of household and key informants, such as health officials, regional authorities, community leaders and Amerindian/Indigenous captains. From these interviews, I gathered information on the perceived environmental changes that had resulted from the 1995 disaster, residents' responses to these changes, their coping mechanisms, impacts on residents' livelihoods and diet, and their perception of the environment. I noted residents' observations on environmental changes they observed post 1995. To supplement and verify the resident's accounts, I interviewed community leaders and regional officials who were in office in 1995 and those in office presently. All of the interviews were structured with a combination of open-ended and closed questions.

An interview guide was used, but residents were allowed to develop topics in ways they saw fit (Appendix 5). The interviewer did not provide interpretations to the respondents, but did in some instances point out possible alternative explanations to respondents. For example, in residents' accounts of the changes in the water quality, I asked them if the changes could be attributed to the smaller mines operational in the river. I was not in anyway leading the respondents but offering an alternative explanation to theirs of the changes in water quality. In many instances, residents provided further information to substantiate their explanations.

The interview guide was divided into five sections. In the first section, my first goal was to capture local views of the use of the river, including socio-economic activity and diet pre-1995. The local history provided further insight into the regions and aided me in developing themes that further guided the rest of the interaction/interview. My other objective in this section was to reconstruct from the villagers' perspectives their lives and livelihoods prior to the 1995 cyanide spill. Furthermore, I enquired about their reactions to the opening of the mine in 1992 and their involvement in the process. Another objective was to gather information on recollections before getting their contemporary perceptions. My premise is that once one starts talking about current impacts, one will then carry current perceptions (including imported and acquired perceptions) back to the original incident. I did not wish to encourage respondents to invent or exaggerate their perceptions. Gathering recollections prior to current perceptions would, in my mind, minimize the amplification.

In the second section, I attempted to gather information on the residents' account of how they were informed of the disaster. I was interested in the time delay between the

disaster onset and the time residents were informed. In addition, I wanted to gather residents' initial response to the disaster to discern whether their initial response indicated prior knowledge of this kind of disaster or pollution. Researchers of disasters and chemical pollution contend that there is a relationship between awareness and attitudes towards the disaster (Edelstein 1988).

In the third section, I attempted to obtain detailed accounts of the social disruptions caused by the spill. I focused on the impacts of the spill on income, health, diet, and social activities such as religious worship. I placed emphasis on both the immediate losses incurred by residents and long-term disruptions and losses. Residents also identified many environmental changes that affected their activities, diet, and livelihood, which formed the basis for the next series of questions.

In the fourth section, I tried to identify local environmental changes and stresses associated with the spill from the perspective of the residents. I asked both open-ended and closed questions about environmental changes. In some cases, I made connections from the responses in section one to guide the responses.

Finally, I gathered information on the socio-economic characteristics of the household. This consisted of standard questions on the genders of the household members, their ages, and economic activities. I thought that since these questions are a bit intrusive into people's personal lives, I would ask them after establishing some rapport. Here, I diverged a bit from standard interview and questionnaire format in which questions of this nature commence the interview.

Interviews lasted between 45 and 60 minutes. The time spent on an interview varied according to my ability to guide the discussions along the interview guide.

Resident in almost all cases were willing to talk and would spend hours talking about the incident if allowed to do so.

Documenting Local Perceptions

All of the interviews were recorded with a tape-recorder and later transcribed. In accordance with Virginia Tech's guidelines, I sought residents' permission to tape the interview before commencing. Their permission was verbal and was recorded on tape. I did not request that residents' sign consent forms. I did not think that would work in the local situation where rural residents' are suspicious of affixing their signatures to papers provided by strangers. No interviewee declined to be recorded; however, some did request that I turn the recorder off at certain parts of the interview.

Chapter IV: Riverain Communities and Natural Resources of the Essequibo River

Essequibo River: Geography, Hydrology and Ecology

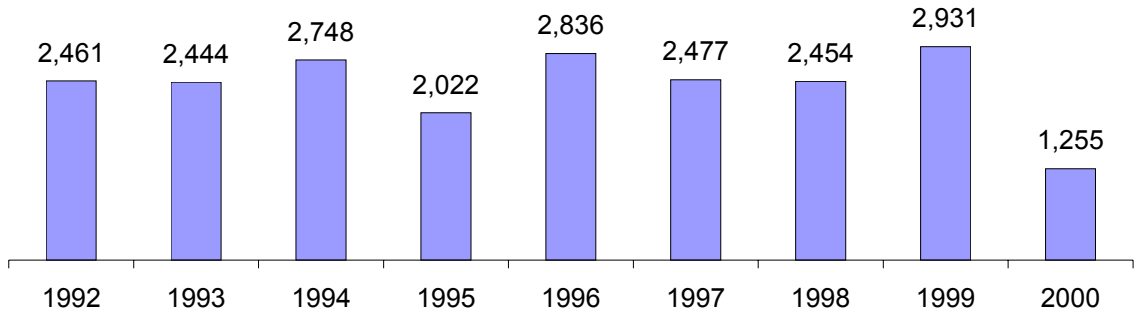
The Essequibo River is the largest river in Guyana. It is also one of the larger rivers of South America's Amazon River system. The Essequibo River stretches an estimated 600 miles from its source in the Akaria Mountains at the Guyana-Brazil border to its confluence with the Atlantic Ocean. However, despite the Essequibo River's relatively long length it is only navigable for short distances—due to its many rapids, falls, and cataracts. At the mining town of Bartica, the river is approximately four miles wide. In some upstream areas of the Essequibo River, the width is barely several yards. An interesting feature of the Essequibo River is that its major tributaries are on the west bank of the river. There is only one tributary of consequence on the east—the Bonasika Creek. The Bonasika Creek is the boundary of the Venezuelan territorial claim of the Essequibo region. Moreover, the main [western] tributaries (the Cuyuni, Mazaruni and Potaro) are all majestic rivers in their own right. The Essequibo River and its tributaries drain more than half of the landmass of Guyana.

At the confluence of the river with the Atlantic Ocean, several large, flat sedimentary islands divide the channel of the river. Of these, Leguan is approximately 4.6 square miles, Wakenaam is 4.2 square miles, and Hogg Island has an area of about 5.4 square miles. These fertile islands are influential in Guyana's agricultural production of rice and ground provisions (such as eddoes and cassava). Anecdotal information suggests

that there are approximately 365 islands in the entire length of the Essequibo River. However, these reports are unconfirmed since the area has never been adequately surveyed.

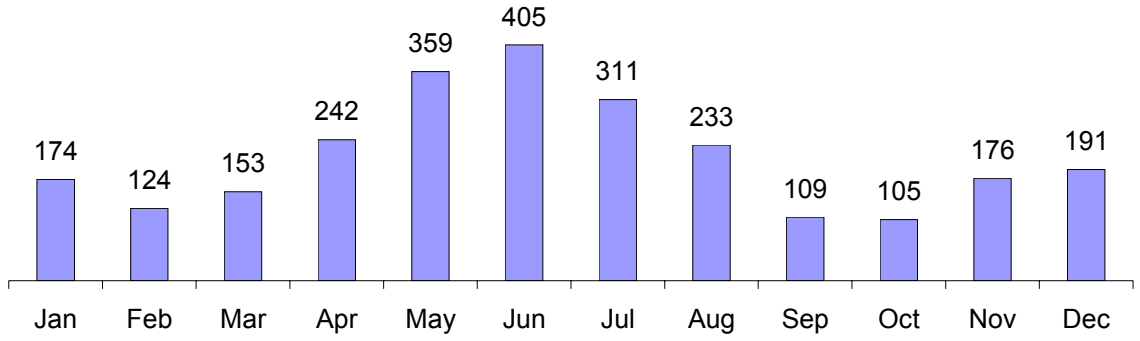
Climate

Figure 4: Annual Rainfall at Omai Station (millimeters)



Source: Omai Gold Mines Limited (2001)

Figure 5: Average Monthly Rainfall at Omai Station (millimeters)



Source: Omai Gold Mines Limited (2001)

The climate of this region is typical of tropical rainforests (Figures 4 and 5). The humidity is high and relatively constant. There are mean daily high temperatures between 26–30 degrees Celsius. Daily highs of 40 degrees and lows of 19 decrees Celsius are

customary. Annual precipitation of 2,700mm is about twice the evaporation rate. Monthly evaporation rates range from 106–185mm. Evaporation is highest in October and lowest in June (OGML 2001).

Flora and Fauna

The Essequibo River and its basin have an abundance of flora and fauna. According to Poonai (1995), the flora and fauna of the river closely resemble those of the Amazon and Orinoco Rivers. Among the many endangered species in the Essequibo River is the Arapaima (*Arapaima gigas*) the largest fresh water fish in the world. The Iwokrama International Rainforest Conservancy, whose eastern boundary is the Essequibo River, estimates that there are approximately 800 groups of birds, 220 groups of animals, 800 groups of fishes and 200 groups of reptiles and amphibians in its 3,700 square kilometers of forest (http://www.iwokrama.org). Many of the species of animals in this area are not inventoried, hence the term groups. Surveys sponsored by the OGML indicate that 20 species of fish were found in the Omai and Essequibo Rivers. Fish populations, according to the OGML-sponsored surveys, varied in accordance with seasonal fluctuations of the river (OGML Mine Closure Plan 2001). In addition to the fish populations, there are numerous animals that are found in the river and the land-water transitional area. Wildlife is generally hunted for domestic consumption as well as traded for local and international markets. For instance, the Labba (*Agouti paca*), a rodent found in the Essequibo basin, is a national delicacy in Guyana.

The flora of the Essequibo River and its basin can be categorized into three major groups: Tropical Rainforest, Swamp forests and Mangrove Vegetation. Tropical Rainforests are generally found in the high altitude areas. In the OGML concession there

are mature stands of rainforest[5]. Likewise, the Rockstone area also has mature stands of tropical rainforests. Rainforests in Guyana are structured in several layers of low shrubs and tall dominating trees. Climbers and Epiphytes are also very common. These same mature stands of rainforest are the basis of Guyana's commercial and domestic timber industry. Common species include: *Eschweilera* spp., *Licania* spp., *Swartzia* spp., *Mora gonggrijpii*, *Chlorocardium rodiei*, *Vouacapoua macropetala, Eschweilera sagotiana, Licania laxiflora, Sterculia rugosa, Poecilanthe hostmanii* and *Pentaclethra macroloba*. Low shrubs such as Myrtaceae (*Eugenia* spp., *Calycolpes, Marlierea*) and Sapotaceae (*Ecclinusa, Manilkara*) are also found (National Vegetation Map of Guyana http://www.forestry.gov.gy/projects/vegproject/natvegmap.htm).

Swamp forests are found on the banks of rivers in marshy areas. They are sometimes called swamp-marsh forest to distinguish from other swamp forests such as Mangroves. The most important species of this vegetation type is *Mora excelsa.* Mora is found and logged in Riversview. Associated species of Mora are *Carapa guianensis, Pterocarpus officinalis, Macrolobium bifolium, Eschweilera wachenheimii, E. sagotiana, Clathrotropis brachypetala, C. macrostachya, Eperua falcata, E. rubiginosa, Catostemma commune, C. fragrans, Pentaclethra macroloba, Vatairea guianensis, Symphonia globulifera, Terminalia dichotoma* and *Tabebuia insign* (National Vegetation Map of Guyana http://www.forestry.gov.gy/projects/vegproject/natvegmap.htm).

Mangrove vegetation found along the rivers in Guyana and particularly the Essequibo River is of the genus Rhizophora, mainly *Rhizophora Mangle* . In the interior

[5] Concession is the legal term for land that has been granted to a company or individual for mining or forestry purposes. The land is owned by the state and leased to the company.

Riverain areas the genus combines with other species such as *Euterpe oleracea* palms and such trees as *Pterocarpus officinalis.*

Land Use and Settlement Patterns

The Dutch established their first seat of government on Fort Island in the Essequibo River in the late 17th Century. From this location they traded with the Riverain indigenous people. Yet the Essequibo region has remained underdeveloped to present times. Several factors, historical and contemporary, have contributed to the underdeveloped state of the Essequibo area. The emphasis of the early colonial settlers on plantation agriculture resulted in predominance of development activities towards the coast and the eastern region (Berbice) of Guyana. The majority of Guyana's gold is buried under alluvial sediments making the gold inconspicuous; consequently, the colonizers lost interest in the region. The colonial emphasis on coastal development and plantation agriculture was extended into the planning and developmental focus of independent Guyana. Some attempts had been made to encourage settlements in this region but the lack of adequate infrastructure deterred possible migrants. The territorial claim of the region by Venezuela served also to dissuade foreign investors and their essential capital from projects in the region. The Essequibo region possesses one of the few remaining tracts of "pristine" rainforests in the world. In recent times, the movement to preserve the world's remaining rainforests has put the area under an international microscope. Attempts to develop the area have been met with strong resistance from locals (including indigenous groups) and prominent international non-governmental organizations. In 1997 Beal Aerospace Technologies of the United States finalized a deal with the government of Guyana to establish a spaceport in Guyana. The plans for the

spaceport were met with intense resistance by non-governmental organizations in Guyana and the Venezuelan government. Critics pointed to the Omai spill as an example of the long-term environmental damage that could result from development of the area, and cited Guyana's lack of institutional and technical capacity to manage the development activities of powerful MNCs (whose budgets were larger than that of the country).

Political Administration

For administrative purposes, Guyana is divided into 10 regions. Since the Essequibo River and its basin extend over a vast section of Guyana's landmass, it falls into several administrative regions. The villages surveyed in this research (Riversview and Rockstone) are found in Region Ten Upper Demerara-Upper Berbice. As is often the case in developing societies, regional administrative boundaries are in many cases a legacy of top-down planning and do not adequately capture local residents' economic and social spheres.

Regional boundaries in Guyana are determined by several factors, but rivers and creeks are usually the primary factors. Tellingly, these regional boundaries often seem artificial to regional inhabitants—that is, the people who make a living from the river and its environs. Riversview is an example of the arbitrariness of the regional system and its effects on local communities. Riversview is approximately five miles from the town of Bartica, the seat of the regional government of Region Seven. For Riversview, goods and services that cannot be locally produced are obtained from Bartica. It also markets its surpluses there. Riversview is more intimately connected to Bartica than it is to the other areas of Region Ten, since Bartica is more accessible to its residents. During the Omai spill the regional administration of Region Ten, which is located in Linden, did not or

possibly could not respond to the needs of Riversview (because of distance and transportation routes). This responsibility was shouldered by the administration of Region Seven (Bartica). Whilst the regional administration of Region Seven can assist in times of disaster, it cannot provide residents with other needed administrative services. For these residents must travel several miles across the intermediate savannas to the bauxite town of Linden.

Regional representatives are chosen through national and regional elections. The regional representatives choose a parliamentary representative and a Regional Chairman from their peers on the regional council. These elected officials then perform the administrative functions of the region. The Local Democratic Council is the village level council. However, in designated Amerindian areas such as Riversview, the village council is the official administrative body and the Captain or Chief is the head. Amerindian villages in Guyana are semi-autonomous in some areas. Despite their semi-autonomous state, villages and their elected representatives have nominal control over forest and mineral resources in their territory. Concerns about the limited participation of Amerindians in the pronouncements on the use of resources in their communities have been a source of advocacy by local and international indigenous organizations and environmentalists.

Ethnicity and Demography

The main ethnic group in the Essequibo Riverain communities is Guyana's indigenous peoples or Amerindians. These comprise mainly Arawaks (or Lokonos) and small groups of Caribs who have mastered the river through their excellent boat skills, settling on banks and tributaries. At the same time, the migration of pork-knockers

beginning in the mid 1880s, governmental officials who stayed on after their tenure, and general migrants from the coast, have impacted the ethnic mosaic of the region. Many Riverain villages now closely resemble the larger Guyanese society with significant numbers of persons of mixed ethnicity who are referred to locally as "Buffianos", African-Guyanese and some Indian-Guyanese.

Population statistics from the area vary with different estimates. The government survey on riverain communities affected by the spill recorded the following population figures for riverain villages (Table 3). Population along the river is generally unevenly distributed along the banks and islands of the River.

Table 3: Population of the Major Riverain Villages of the Essequibo River

Village/Area	Population (National Census)	Population (GGMC Report on Spill)	Households (GGMC Report on Spill)
Butakari	91	100	25
Anarika	NA	200	50
Alphonso (1) & Alphonso (2)	NA	32	2
Bishop Mining	NA	14	1
Winiperu	106	230	120
St. Mary's	185	200	50
Agatash	210	100	38
Bartica	7,908	8,000	504
Kaow Island	NA	50	20
Makouria	NA	100	25
Shankland	NA	20	4
Lanaballi	NA	100	25
Fort Island	533	100	25

Source: Geology and Mines Commission, 1996

The main languages spoken in the villages are English, Creolese and some Arawak languages (mainly by old individuals). The Arawaks of this region belong to the Arawakan language group, one of the three main indigenous language groups in Guyana. Cultural relations with Amerindians of the Essequibo region and the coast of Guyana are

well established and well researched (Forte 1988, Fox 1993). Most of the villages downstream of OGML are connected to the coast by river or as in the case of Rockstone, by road. Satellite towns of Linden, Bartica and Parika provide goods originating from the coast and abroad.

Formal and Informal Organizations

The colonization of Guyana, as in other places, led to the introduction of the colonizer's religions and the extinction of traditional religions and cultural practices. Today, many indigenous people are Christians. The Catholic and the Anglican churches dominated in the colonial periods, but presently many Christian denominations are in the region including various evangelical groups. Churches are very influential in the communities and provide nuclei for community organization and social interaction—especially for the very young and old.

There are a number of social organizations in the Riverain villages of the Essequibo River. In Riversview there is a women's organization involved in a number of micro-enterprise activities. The "Riverain Communities Affected by the 1995 Omai Disaster" is a group that was formed by community leaders of the areas affected by the spill. The group is mainly involved in advocacy and legal activities to address the injustices of the spill.

The major formal organization in Amerindian villages is the village council; in non-Amerindian villages, it is the Local Democratic Council. Amerindian councils are headed by a Chief, a Captain or a Touchou. Chiefs are elected every two years by village members over the age of 18.

Riversview Village

Location

Riversview is found in Region Ten—Upper Demerara/Berbice. On a map it can be found on the East Bank of the Essequibo River, approximately 24 miles from Parika (the central business district of the East Bank of the Essequibo). Riversview is adjacent to the town of Bartica.

History

The village of Riversview is in close proximity to a number of similar communities—namely Goshen, Huirushi, Falmouth and New-Found-Out. In many cases the name Riversview is often used for the amalgamation of these communities. However residents of the area define it separately from these other communities, which also have their own captains. The residents' demarcation is used in this study. The village is called Riversview for the complete panoramic view it provides of the Mazaruni and Cuyuni Rivers as they empty into the Essequibo (Stabroek News Sunday January 4th 1996).

There is very little documentation on the history of Riversview. The history of the settlement of the village is mainly oral and faces extinction with the passing of elders. The village was only added to the official Gazette of Guyana in 1991. German explorer Richard Schomburgk was contracted by the Guinaese authorities in the 1920s to conduct extensive surveys of Guyana. He described the area now referred to as Riversview as "…rich in flora and fauna; an alternating mixture of colors in which trees interfaced with thousands of bush ropes and creepers" (Stabroek News Sunday January 4, 1996). Schomburgk failed to mention any inhabitants of the area, suggesting that it was

unoccupied at that time. Other evidence suggests that the area of the village was used by first the Dutch and then the British as a trading post in the nineteen-century (Stabroek News Sunday January 4, 1996).

The most common story of the origins of the village is that Riversview began in the year 1921 with the common-law union of a Surinamese of Chinese descent, Isaac Chung, and an Amerindian woman, Maria Paul. The couple, along with a young son, settled on the site of the present Riversview Resort. Paul's relatives soon followed along with other migrants from the Essequibo Riverain areas, Demerara and the Mazaruni River. Certain of these families became associated with particular economic activities. Among those are the Frazers (logging) the Bowens (cattle-rearing) and the Pauls and Chungs (vegetable farming).

Physical Layout of Riversview

Riversview has a simple arrangement (Appendix 3). Houses and other physical structures are located in a linear fashion facing the Essequibo River. Many residents described this arrangement as having the river in their front yard. For many the river was a mere several yards away. Forty-three houses in the village were occupied. Interspersed among the houses are the three churches of the community—of which the Catholic Church is the most impressive physically. There were two other identifiable buildings that are used for worship.

Parallel to the river is the main path used by the residents for walking and bicycling. Immediately behind the houses are the gardens and farms where crops are grown mainly for domestic use. Behind the gardens and farms lie what is referred to as "backdams". The backdam in Riversview consists mainly of intermediate rainforests and

swamp vegetation, and some intermediate savannas. The intermediate rainforests are logged collectively by the village or contracted out to logging companies. Intermediate savannas are the source of hunting both for domestic consumption and trading to other parts of the region and country.

Physical Structures

The houses in Riversview are similar to those found in other rural areas and indigenous villages in Guyana. Smith (1956) and Sanders (1987) adequately describe rural dwellings and indigenous dwelling, respectively. More than 90 percent of the dwellings in the village are wooden cottages similar to those found on the coast. These houses were complete with glass windows, wooden doors, and well-defined walls. However, a marked difference between coastal cottages and those in the village was the height of buildings from the ground. Riverain dwellings were closer to the ground (approximately four or three feet) compared to coastal dwellings (usually about 10 to 12 feet). An obvious, but not necessarily correct, interpretation is that maybe coastal houses are higher because of the threat of floods. Many of the houses in Riversview were incomplete, lacking windows, doors and other physical features. Also, many of the houses were old and in need of repairs. An interesting feature of many of the houses was their new shiny roofs. Even in some of the oldest houses the roofs were distinctly new—in comparison to the rest of the structures. This new development, I was told by villagers, began in 1995 after the spill. Many residents resorted to collecting rainwater and had to add roofing and guttering systems. Only one unoccupied house in the village still had the indigenous roof of woven leaves. In addition to the wooden houses there were two concrete homes. One of these, a magnificent structure by Guyanese or international

standards, was the home of the Captain. The other was the home of a successful gold miner in the village. The physical appearance of the houses can be more often than not correlated with the economic status of its members. I also observe that the older and less maintained homes were predominantly those where a female was the only adult present. I did not observe a correlation between the size of homes and the number of occupants as noted by Smith (1965) in his study of African-Guyanese villages.

Infrastructure

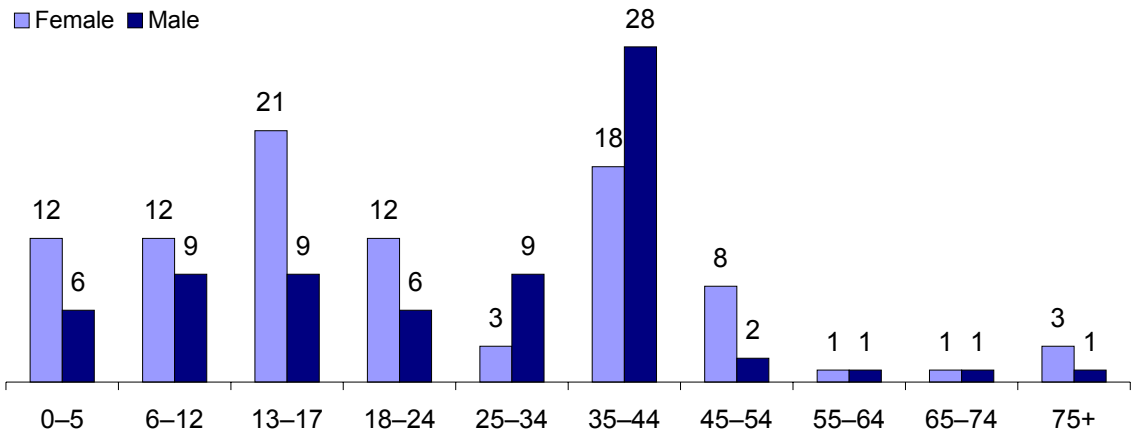
Riversview lacks any substantial form of infrastructure. The village is linked to other Riverain areas by the river. Residents refer to the river as their road. There is no electricity in the village. Many residents have car batteries, which they use to power one or two electric bulbs. Some residents have small black and white televisions as well as radios that are powered by the car batteries. There were three residents in the village with their own generators, of whom one was the Captain.

There are two shops in the village, which sell perishable goods. All other food items are obtained from Bartica or Parika. There is a community boat that goes to Bartica twice weekly, enabling residents to obtain goods.

There are two schools in the village: a nursery and a primary school. The primary school is a new building that was erected in the last year. There is also a health clinic, which, according to residents, is a white elephant. A government medical officer visits once a month. Serious health cases are referred to the Regional hospital in Bartica.

Household Characteristics

Figure 6: Riversview: Age Distribution by Sex



Source: Fieldwork

A total of 33 heads-of-household were surveyed. There was an average of 4.9 persons per household. This number varied from Forte's (1998) 6.5 persons per household. There is a concentration of both sexes in the age group 35-44 (Figure 6) The differences can be attributed to migrant workers as well as adult members of the household moving to other areas within the village and outside of the village (There were at least three households that I interviewed where residents lived with their parents in 1995). Five of the households interviewed had no adult male present. Of these, four were households belonging to or headed by widows, and the fifth was a young unmarried woman that had recently moved from her parents' home.

A typical household consists of parents, children 18 years and below as well as adult children, and in some cases daughters- or sons-in-law and grandchildren. The presence of daughters-in-law tends to be more common than sons-in-law. However, adult children tend to move as they acquire children of their own or as space becomes scarce. Approximately 70 percent of the villagers were in common-law-unions rather than formal

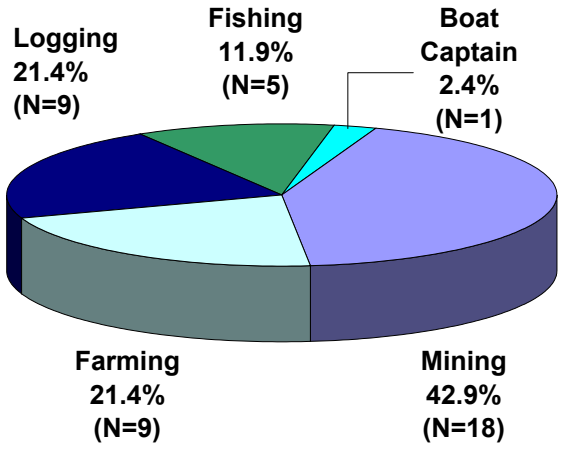
marriages. Most women in the villages tend to start having children around 17–19 years of age. (This information was extrapolated from the ages of the women and the age of their first child.) Men tend to have their first child later, around 23–25 years. Ninety percent of the households surveyed had both parents. In many instances, however, the male was away in the goldfields. The average family had lived in the community for 35 years.

Elderly villagers often lived with adult children and their families. There were two instances of elderly couples living by themselves.

Of the households surveyed, three heads-of-household, or approximately 9 percent, had a post-primary education. The majority, or 91 percent, had only a primary education.

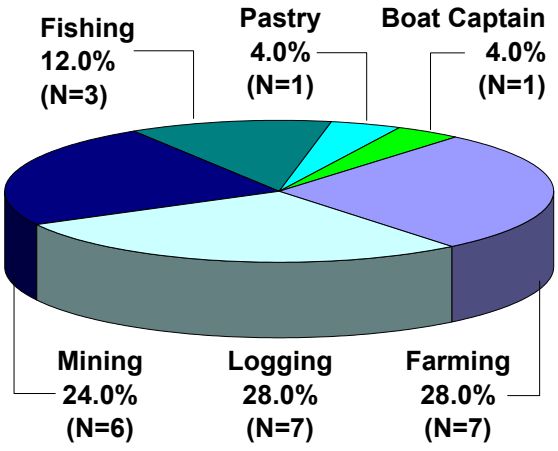
Economic Characteristics of Households

Figure 7: Riversview: Primary Livelihood Activity of Household Members



Source: Fieldwork

Figure 8: Riversview: Secondary Livelihood Activity of Household Members.



Source: Fieldwork

Men are generally the primary wage earners in the village. The men engage in a number of livelihood activities to acquire income (Figures 7 and 8). Women generally care for children and other members of the household (including the elderly) and assist in the farms or gardens. An indication of the intense domestic schedule of women is the fact that of those surveyed 80 percent claimed to have used the river for domestic purposes at least twelve times per day prior to 1995. The three females in the village with professional occupations were the two teachers and the headmistress of the nursery school.

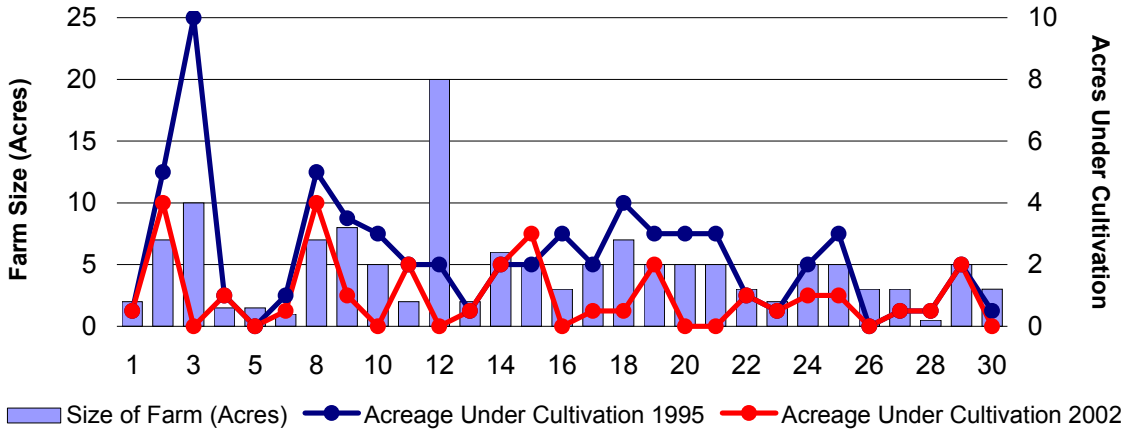
Of the males in the village surveyed, only one worked at the OGML. This corresponded with Forte's (1988) study of the village. Seven of the thirteen heads of household and a total of 18 household members worked outside the village in artisanal gold mining, mainly in the Mazaruni-Potaro area. Eighteen of the thirty-three households surveyed had members whose primary livelihood activity was mining. Of the remaining heads of household, two males, or 15 percent, claimed that they were full-time fishermen. Five household members gave fishing as their primary livelihood activity.. The remaining 31 percent were farmers and loggers. It should be noted that five of the thirteen men surveyed claimed they were fishermen or subsidized their incomes with fishing at the time of the disaster. Eighteen of the entire households surveyed, or 42.9 percent, claimed that a son or husband worked in the interior in a gold camp. Another economic feature of this population is that almost all the males have a primary occupation and several secondary occupations. All of the men surveyed expressed the desire to stay at home should opportunities to sustain their households exist in the village.

Forte (1998) found that 17 percent of the household members worked outside the village. She also contends that this phenomenon of migrant workers has social consequences for the village. Firstly, it undermines traditional activities such as farming and creates a dependency on external economies. Secondly, the transmission of malaria is intricately tied to this movement of migrant workers. Males become infected in the gold producing areas and return to the villages with the disease infecting other villagers. Many of the young-men in the village prefer to work in the gold mines of the Mazaruni-Potaro area than to do farming. Forte (1998) describes the improved social status that pork-knockers achieve after returning to their villages with their modern-day trinkets.

Archival data suggests that charcoal production was an economic activity carried out by villagers. A mosquito net production project (which was carried out by women with the assistance of Amerindian Research Unit of the University of Guyana in 1996) is no longer functioning. Many governmental and regional officials have cited the village of Riversview as a possible site for eco-tourism ventures. Its assets for this activity include its sand beach, its access to the rainforests and waterfalls of the Essequibo, Potaro and Mazaruni Rivers, its view of the Essequibo, Potaro and Mazaruni Rivers, and lastly its proximity to Bartica and the opportunities that town offers for water sports. There is at present one eco-resort at Riversview owned by a local family. It is basically a single room cabin that is not well kept. It has no area for cooking. Riversview will also have to compete with the other tourist resorts on the Essequibo River such as Shankland. Eco-tourism in Guyana has yet to take off despite its natural heritage.

Land Ownership and Cultivation

Figure 9: Riversview Farm Size and Area under Cultivation in 1995 and 2002



Note: X Axis labels represent individual respondents
Source: Fieldwork

All of the land in the village is leased from the village council. The average farm size per household was 4.74 acres (Figure 9). The largest farm was 20 acres and the smallest was 1 acre. The average cultivated farmland was 0.97 acres per household in 2002. Cultivated farm farmland in 1995 was 2.26 acres per household. The major crops grown were green vegetables such as Bora (String Beans), Ochro (Okra), Boulanger (Eggplant), and ground provisions (mainly cassava).

Rockstone Village

Location

Rockstone is also found in Region Ten-Upper Demerara/Berbice. It is located on the East Bank of the Essequibo River, downstream of the OGML and west of the town of Linden. Rockstone is almost adjacent to Gluck Island, one of the larger islands of the upper Essequibo River.

Rockstone is one of the more famous places of the Essequibo River. Numerous travelers and explorers of the Guiana landscape have described it (National Geographic 2002, Carnegie British Guiana Expedition 1908). It serves as the gateway between the mining town of Linden and the hinterland of the Essequibo rainforest. In addition to links with Linden, Rockstone is connected by trails to several hinterland locations. There are several Biological Stations in close proximity to the village, an indication of its biodiversity. Rockstone is also well known for the rapids at that section of the Essequibo River. Only skilled boatmen and women can navigate these rapids. The rapids also have hydrological significance. According to scientists, the mixing of the water at this point of the Essequibo is very pertinent to the transport of sediments and pollutants (Guyana Geology and Mines Comission 1995). The load of the river is often deposited on the rocks and riverbed, making the suspended pollutants available for a longer period of time.

Origin

There is very little archival information on the formation of the village of Rockstone. Residents have varied accounts of its origin. Village elders claim that Arawaks always inhabited the area that is now known as Rockstone as they moved via river from the upper Demerara River and other areas of the Essequibo. Most residents agree that the village became an established community as a result of mining and mineral surveys conducted in the counties of Demerara and Essequibo. In 1842, the British Guiana government assumed responsibility for the estate of some deceased former French Naval officers. Part of this estate was contracted to Sproston's, a prominent company of that period possibly of German origin. Sproston's been interested in establishing a railway to Rockstone to exploit its minerals and forests resources (Ishmael

2003). A proposed stone quarry by the Sproston's did not materialize. However, the earthen roads and trails developed for its operation remained to the present time, thereby increasing the accessibility of the village.

The 1970s saw the development of a two-lane laterite road built to connect Linden and Rockstone—and later Rockstone to Mabura and Kurukapari (the ferry crossing of the Essequibo River). During the years 1974–78 another road was built between Rockstone and Kurpung for the construction of a hydroelectric station. The Kurpung road was extended to various other hinterland areas. The construction of roads in the 1970s was an attempt by the government of Guyana to develop its hinterland. Rockstone was the center of these developments as roads and highways intersected the village. A boom in local gold production in the 1980s, according to anecdotal information, was associated with an increase in the village population and some economic prosperity.

Physical Layout of Rockstone

Rockstone (unlike Riversview) is not located on the immediate bank of the Essequibo River (Appendix 4). Houses are not located parallel to the river; rather, they are on both sides of the road that connects Linden and Rockstone. (The boundaries of the village are fuzzy at best since the area is not mapped.) Some residents have farms in their front and backyards. However, larger farms are located some distance from the houses in the forest. Most homes are etched out of forested land, and there is considerably more forest in this area compared to Riversview. The vegetation is mature tropical rainforest.

Physical Structures

Houses in Rockstone are less modern than those in Riversview. Most of the houses are simple square wooden buildings with openings for windows and traditional or zinc roofs. There were only two houses in the village with glass windows as the majority has wooden windows or empty spaces. The village possessed no concrete structures but a concrete house was under construction. The houses lacked maintenance; and in many cases, there were partially lacking roofs or had leaky roofs. Similar to Riversview, in Rockstone older buildings tend to correlate with female-headed households.

I counted a total of 25 houses and one church in the village. The Church was of the Seventh Day Adventist denomination. No grouping of houses according to social economic class was evidenced. Houses were randomly distributed in the village.

Infrastructure

The village had limited modern infrastructure. The main road was laterite and part of the recent Guyana/Brazil road. It was therefore of modern dimensions and excellent by Guyanese village standards. However, secondary roads were merely trails or earthen tracks and less easy to drive through. There was one family in the village that owned a car. There are many creeks in the areas that are used by residents to access the Essequibo River. These creeks are small and are hardly navigable by a motor engine boat. In Rockstone, residents move around by boats—mainly dugout canoes.

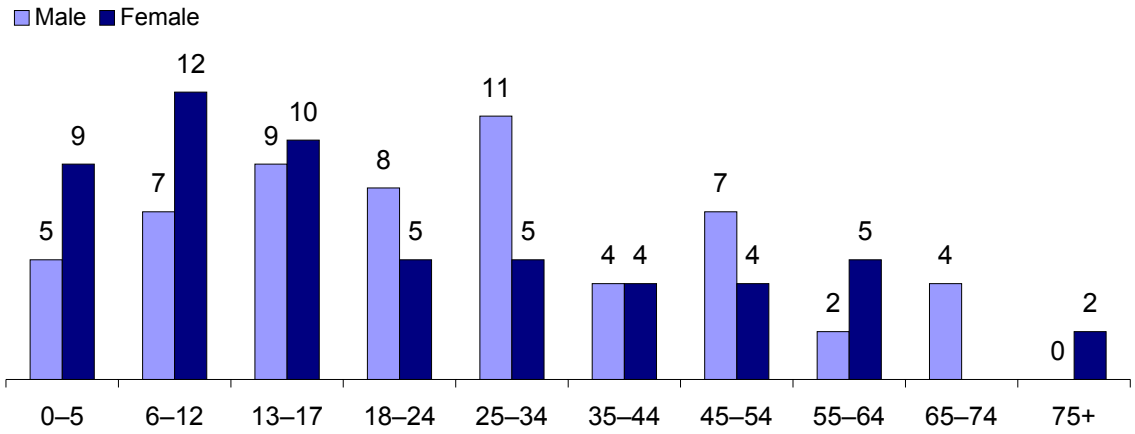
There is no school in the village. Children from the village attend school in the neighboring village of Anarika, which provides education from nursery level to the three levels of secondary education. However, I did learn from the former village councilor that plans are in place to build a secondary school. In order to attend secondary school

students of Rockstone generally move to Linden. Many students are forced to leave school, as their parents cannot afford to send them to live in Linden.

The village lacks electricity. Residents use the same methods as in Riversview to obtain power to listen to radio or television. Two families in the area had their own generator sets. There is one health center in the village. A nurse and a nurse assistant manage the health center. The health center is a donation from the OGML. Rockstone has one shop that is fairly well stocked with perishable goods from Linden and Georgetown. Most residents obtain their groceries from this shop, supplementing this source with monthly visits to Linden.

Household Characteristics

Figure 10: Rockstone: Age Distribution by Sex



Source: Fieldwork

A total of 23 households of the 25 households in the village were surveyed. There was an average of 4.47 persons per household. Similar to Riversview, households consisted of extended rather than nuclear families. Female population peaked in the age group 6-12, and males peaked in the age group 25-34 (Figure 10). There was a higher

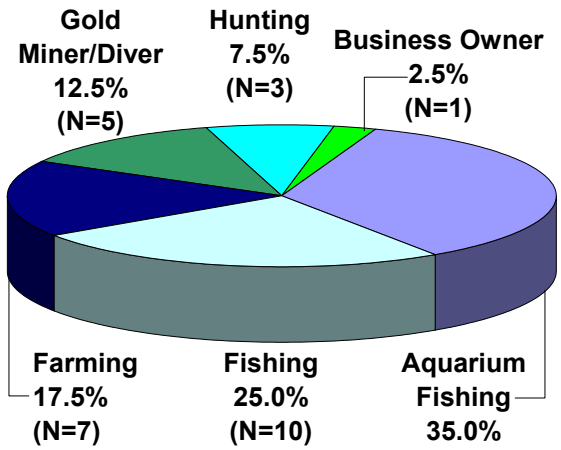
incidence of adult children living with parents in this village than in Riversview. Of the households interviewed there were at least five one-parent households headed by females. In all of these only the female adult was present. This was higher than in Riversview. Again, over 70 percent of the married villagers were in common-law unions.

An astounding fact in Rockstone was that of the 16 women interviewed 13 or 81 percent had their first child at 13–14 years old. This has obvious implications for the growth rate of the village. (This information was extrapolated from the ages of the women and the age of their first child.) Men tend to have their first child at 19 years. These figures were much lower than those in Riversview. In Rockstone, the average family had lived in the community for 29 years, a slightly lower period than that in Riversview.

Of the households surveyed three heads of household, or approximately 13 percent, had a post-primary education. The majority, or 87 percent, had only a primary education, and in some cases they had none.

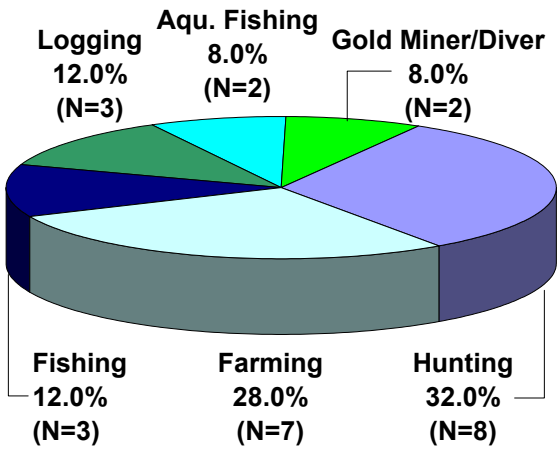
Economic Characteristic of Households

Figure 11: Rockstone Primary Livelihood Activity of Household Members



Source: Fieldwork

Figure 12: Rockstone Secondary Livelihood Activity of Household Members



Source: Fieldwork

Unlike the situation in Riversview, men were not the primary wage earners in this village. As a matter of fact, of the females surveyed over 90 percent worked for a wage at one stage or another. This can be attributed to the once flourishing aquarium fish trade that residents claimed was reduced significantly after the spill in 1995. In Rockstone 90 percent of the women in the village worked prior to 1995 in the aquarium trade or in the fishing business in general.

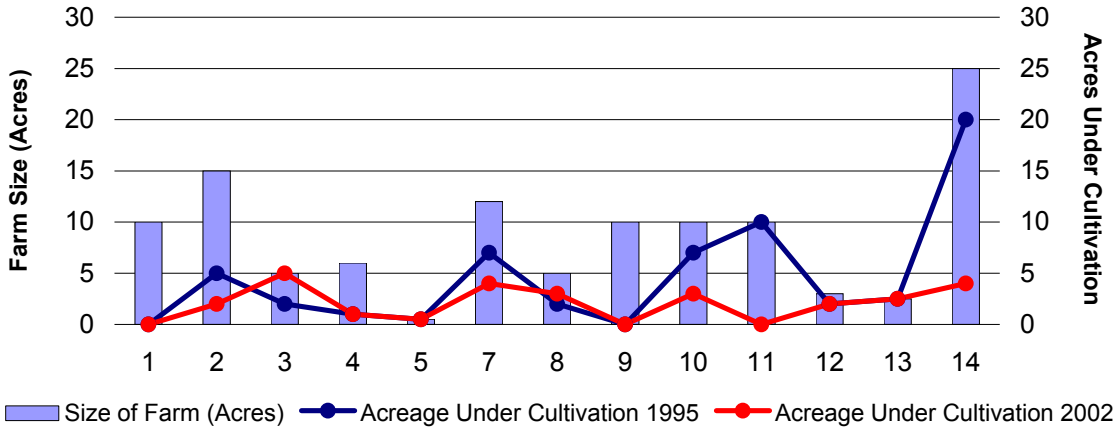
There was a lower incidence of villagers working in the gold fields or in the lumbering business than in Riversview (Figure 11 and 12). The aquarium and fishing industry in the village explains the higher numbers of women wage earners and the lower numbers of men working in the gold-fields or logging industry. Of the men interviewed, some explained that they sacrificed earning higher wages outside of the village in order to look after their wives and children. They cited many cases of unfaithfulness by the wives when men were away for long periods, resulting in broken families. (Many men are also

unfaithful to their wives whilst working in the gold fields, as prostitution is very common in gold mining areas.)

The number of villagers engaged in farming was slightly lower in number and percentage of the population than those in Riversview (only 7 families claimed farming as the primary economic activity). The main livelihood activities in the village are fishing for aquarium fishes, fishing for local and external consumption, and farming.

Residents were aware of the possibilities of using the non-traditional resources of the village. Rockstone is noted for its massive rare butterfly populations. Some residents of Rockstone were aware that the butterflies were being marketed for several hundred United States dollars on the Internet. They remarked that this would not only be a good source of income, but a task in which almost all household members could be engaged.

Figure 13: Rockstone Farm Size and Area under Cultivation in 1995 and 2002



Note: X Axis labels represent individual respondents
Source: Fieldwork

Approximately 60 percent of the villagers claimed ownership of farms (Figure 13). The largest farm is 25 acres, and the smallest is half of an acre. The largest tract of land owned was several hundred acres; the smallest was 2 acres. Average farm size is

8.77 acres. The average cultivated farm in 1995 was 4.54 acres and was reduced to 2.08 in 2002. Land is leased from the government for 99-year duration for farming.

Chapter V: "De Wata Spoil and de Fishes Dead"

Impacts and Perceptions of the Omai Cyanide Spill

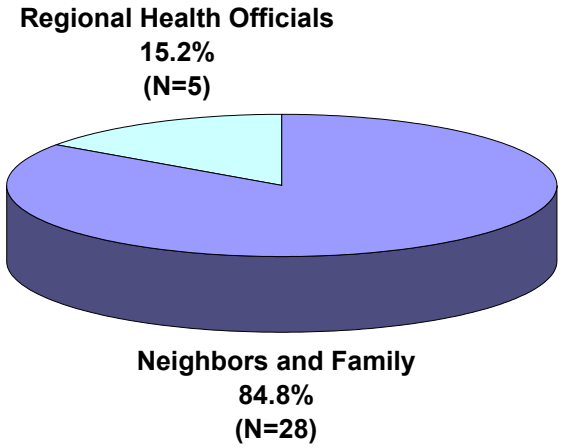
This chapter examines the local perceptions, impacts, and ensuing responses in relation to the 1995 Omai cyanide spill in Rockstone and Riversview. It is a micro-examination of how indigenous rural populations cope with a resource base that has changed or has been perceived to have changed as a result of pollution from a technological disaster.

The August 19th 1995 cyanide spill was a watershed moment in the history of the Essequibo River and Guyana. The lives of the inhabitants of the Essequibo River banks changed significantly in the disaster's aftermath. Prior to August 19,1995, village life was drastically different on the Essequibo River banks. Residents lived in an environment that provided for all of their basic needs, and which allowed them to sell produce, which generated income for those necessities that could not be produced in the villages. Many of the residents had lived in the community for several decades and knew the rivers, forests, and savannas as well as they knew themselves. These are not romanticized views of the villages. The villages were not idyllic paradises—far from it. The residents had and still have many problems. Yet, despite the problems, the environment provided access to quality resources, especially a potable and consistent source of water and opportunities for reliable livelihoods.

On the surface, it may appear as though little has changed. However, upon delving further one discovers many changes—particularly in the residents' perceptions of their environment. These have resulted in changes in their daily activities, livelihoods and diets. Some of the changes (especially in livelihood activities) resulted not only from the residents' perception that their environment was unsafe but also from outsiders' perceptions, especially those on whom they depended to purchase their produce.

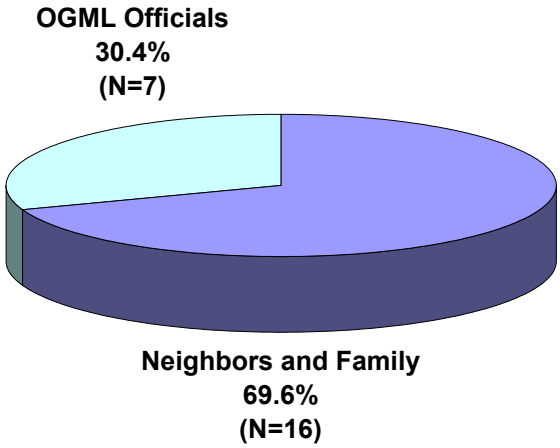
Source of Information on the Spill

Figure 14: Riversview: Initial Source of Information on Spill



Source: Fieldwork

Figure 15: Rockstone: Initial Source of Information on Spill



Source: Fieldwork

An important contribution to residents' perceptions of the pollution is the manner in which they first encountered or were informed of the pollution (Figures 14 &15). The first contact many residents had with the pollution was dead fishes floating in the river or the water becoming a whitish color in the case of Rockstone, and reddish-pink in color in the case of Riversview. In addition to changes in the water color most villagers were

informed by their neighbors and friends that a spill had occurred. An 85-year-old villager of Riversview described the situation:

> When meh come home meh wife tell meh seh how de wata get spoil and de fish dead. Mi look and meh see the whole river red. It red like meh wife blouse. Normally the wata use to be black. We did confuse we nah know wha fuh do, so we tell the other people in the village nah use de wata. (When my wife came home, she told me that the water was spoiled and the fish were dead. I looked and saw the entire river was red. It was red like my wife's blouse. Usually the water used to be a black color. We were confused, we did not know what to do, and so we told the other residents not to use the water.)

A 40-year-old fisherman in the village described his first encounter with the polluted river as follows:

> I de go out to fish, and I fishing. All of a sudden I see this massive set of fish coming towards the boat. I put out me line, but I did not even need the line, I never see so much fish. The fish appear stupid, when you put you hand in the river the fish just staying deh. I full up de boat and I said something nuh right hey. (I went to fish and I saw a large number of fish coming towards my boat. I put out my line but I did not need it. I had never seen so much fish. The fish appeared stupid. When I put my hand in the river they did not move but stayed there. I filled my boat with fish and said to myself something is not right with the river.)

Villagers later learned from regional health officials traveling in a boat that they should not use the water in Riversview. In Rockstone villagers near the river were informed by representatives from OGML (Rockstone is closer to OGML) and these individuals later disseminated the message to other residents.

Some residents claimed that they had serious apprehensions about the operations and its use of cyanide before the spill. A male resident of Rockstone explained:

> I always knew it was gross disrespect to us that Omai could build up the river. Even without the spill that operation was a threat to our health and our children's health. The use of cyanide to extract gold on

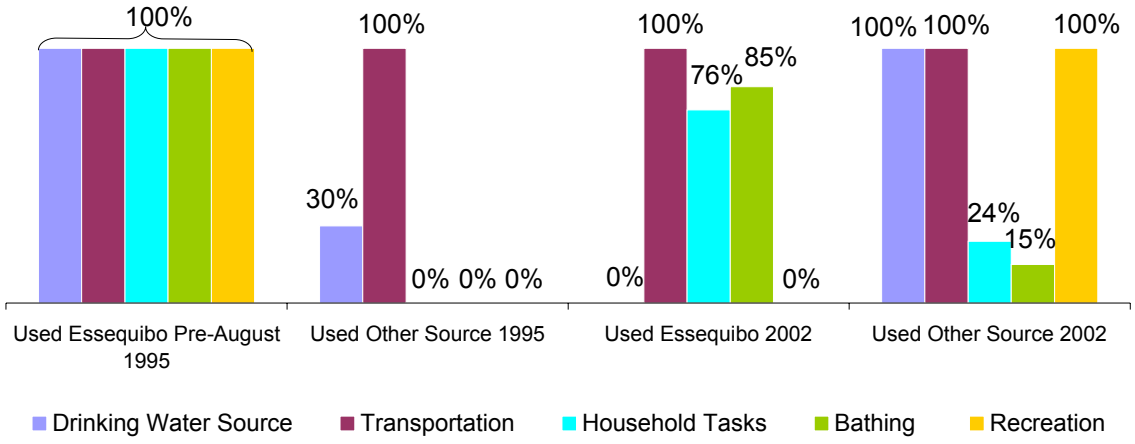
> the banks of an a main river in Guyana, in people drinking water, a river where we existence depend pun, is playing Russian roulette with our lives. How can you put waste in people drinking water? The whole operation was a threat to our lives from the start but they don't care 'bout we and water all they care about is gold. (I always thought it was disrespectful to us that OGML was allowed to build the mine on the river. Even without a spill that operation was a threat to our health and our children's health. The use of cyanide to extract gold in one of Guyana's main rivers, a river that people use as a source of drinking water, a river that our existence depends upon, is playing Russian roulette with our lives. How can waste be put in people's drinking water? The entire operation was a threat to our lives from the beginning. But they do not care about our lives and the river; they are only concerned with gold.)

Another articulate male put it this way: "The river is a main part of our life in this area, they poison the river with cyanide and is like the tek we life." (The river is a main part of our lives. They poisoned the river and it is almost like taking our lives.)

Household Use of the Essequibo River

Impacts of this disaster have been severest on household domestic activities. A housewife from Riversview complained: "It hampered our whole domestic life." In 1995, 100 percent of those surveyed in both Riversview and Rockstone described the Essequibo River as their primary source of water for domestic use (Figure 16). Since women are primarily engaged in non-wage-earning domestic tasks they were adversely affected by the disaster impacts on household tasks.

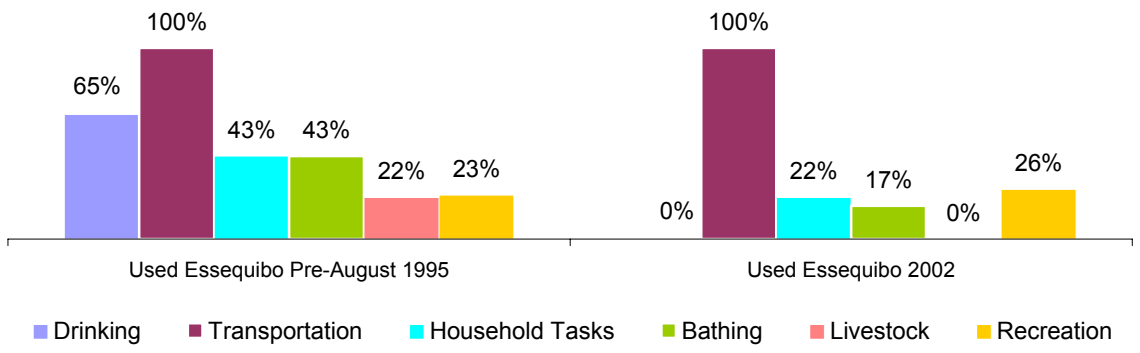
Figure 16: Riversview: Changes in Household Use of the Essequibo River in 1995 and 2002



Source: Fieldwork

In Riversview 100 percent of the residents claimed that the Essequibo River was their only supply of water for bathing, domestic tasks, and recreation before the spill (Figure 16). One hundred percent of the residents used the river as a source of drinking water, and for 70 percent of this number it was their only source. In Rockstone the presence of numerous creeks and streams, some in close proximity to houses, resulted in less reliance on the Essequibo River (Figure 17).

Figure 17: Rockstone: Changes in Household Use of the Essequibo River in 1995 and 2002

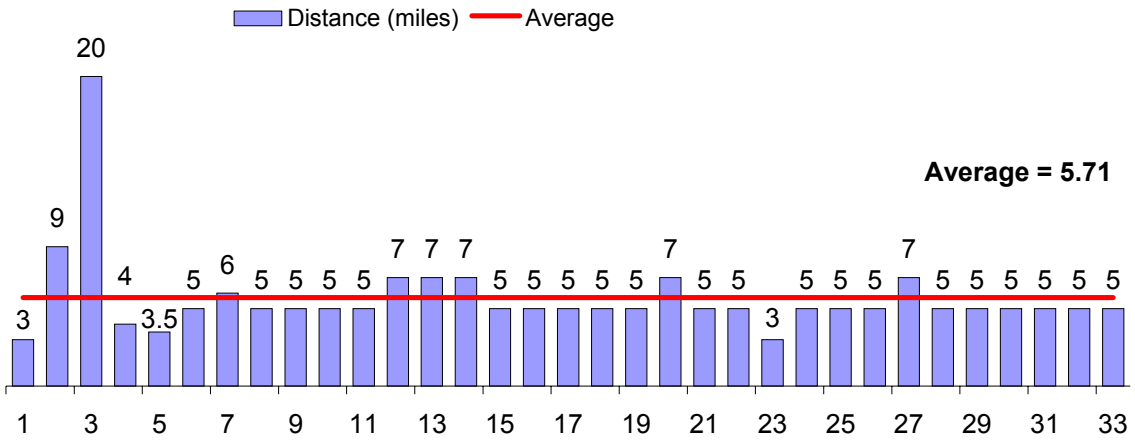


Source: Fieldwork

The eleven-day ban (the spill was flowing for four of the eleven days) on the use of the river water after the accident forced residents to seek alterative sources of water and food. Of those surveyed 100 percent in both villages reported that they stopped having any contact with the water for an average of four months after the spill. During the ban on the use of the water, and for several months afterwards, villagers were forced to seek other sources of water. In the immediate aftermath of the spill (the first four days) water was provided by the Regional authorities in Region Seven to some families in Riversview. In Rockstone no such assistance was provided. This was primarily because residents relied less on the river for drinking and household use. (This was also the reason the villagers contended that OGML refused to compensate them for damages resulting from the disaster.)

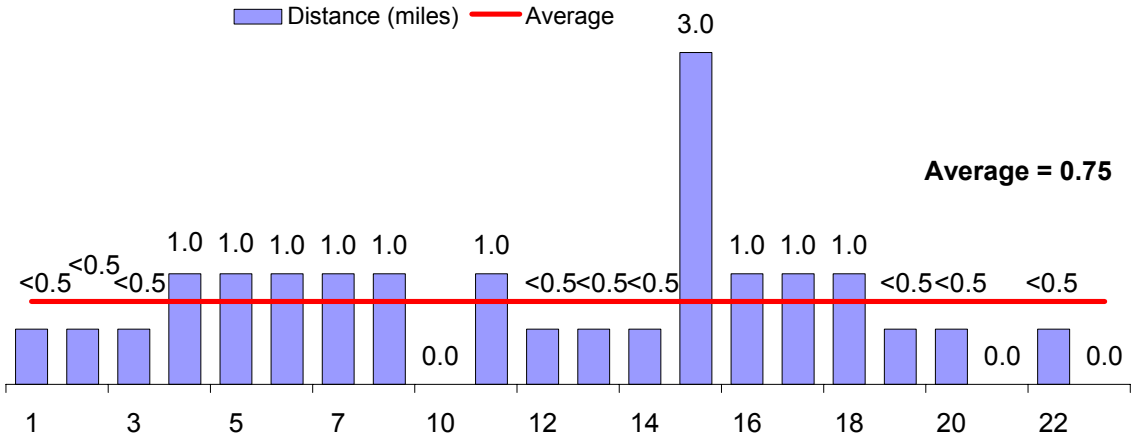
In Riverview residents turned to the creek in the village for water. In Rockstone, the villagers' sources of water were split between the numerous creeks in the village and springs behind their houses.

Figure 18: Riversview: Distance from the House to get Water (miles) four months after the disaster.



Note: X Axis labels represent individual respondents
Source: Fieldwork

Figure 19: Rockstone: Distance from the Household to obtain Water (miles) four months after disaster.

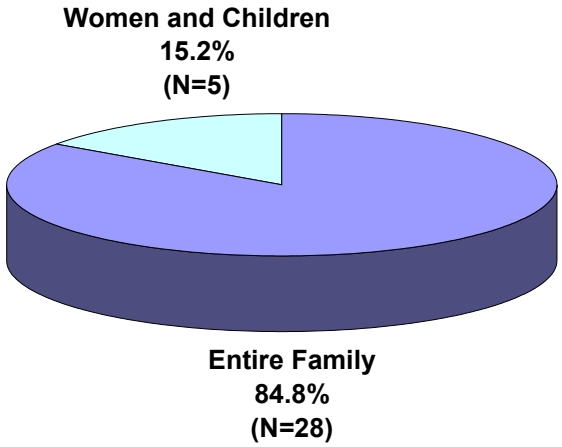


Note: X Axis labels represent individual respondents
Source: Fieldwork

Another impact was the increased distances villagers had to travel to obtain water. Villagers traveled several miles to obtain water for domestic use. In the immediate aftermath of the spill residents traveled an average of 5.7 miles in Riversview and 0.75 miles in Rockstone in search of water (Figures 18 &19). The longest distance traveled to

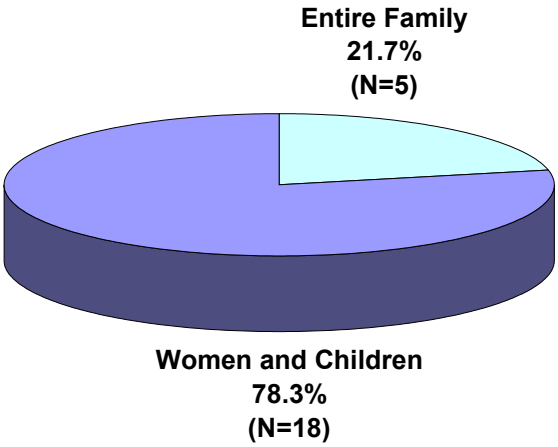
obtain clean water was in Riversview where a family traveled 20 miles to the Mazaruni River. The enormous amounts of time spent obtaining water prevented the villagers from engaging in other essential tasks such as farming. In addition, villagers were forced to purchase containers to store water, a new practice in the villages. The ability to purchase water containers bears a direct relationship to the availability of disposable income. Poor families therefore could not purchase water containers and walked several times daily to a creek to obtain water.

Figure 20: Riversview: Family members engaged in collecting water.



Source: Fieldwork

Figure 21: Rockstone: Family members engaged in collecting water.



Source: Fieldwork

In response to questions regarding which family members obtained water during the spill's aftermath, the responses of the residents of the two villages varied greatly (Figures 20 & 21). In Riversview 84.8 percent of the villagers said that their entire family obtained the water. Collecting water was a family-oriented task for many reasons such as safety and the long distance for family members, especially children, to carry water. A resident of Riversview explains:

> We had to walk through the bush. The trail neva use to be use a lot so it did rough. It had nuff insect and reptile, it din safe for one-person

> fuh guh so de whole family used to guh. The only person that did not guh was granny and she did sick. (We had to walk through the forest to get water. The trail was not used a lot so it was difficult. There were many insects and reptiles present, so it was not safe for one person to walk alone therefore the entire family went. The only person in the family who did not go was granny and that was because she was ill.)

Another interviewee remarked:

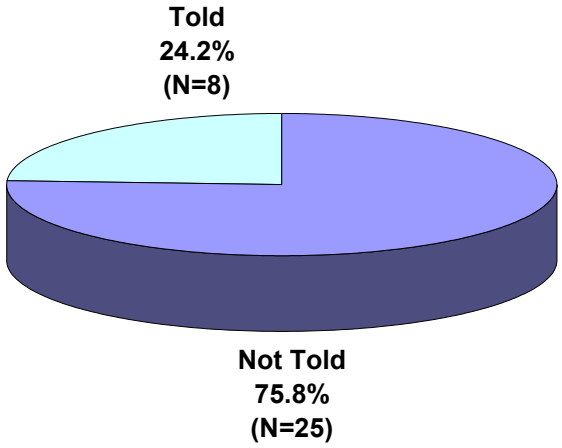
> Oh it was terrible for those who had children. We had to leave the village at five-thirty in the morning to go and bathe. When we come back the children tired. The trail was not safe fuh one person alone fuh go. You had to go as a team, walking through the bush alone it aint safe. (It was terrible for those families with children. We usually left home at five-thirty in the morning to take a bath. When we return the children are usually tired. The trail was un-safe for one person to go to the creek alone. It was better to go as a team, walking through the forest alone is not safe.)

Many males from the villages who were working in the goldfields at the time of the spill returned home to assist with the water fetching. A gold miner from the village reported:

> When I hear wha happen I seh I got fuh go home and help de wife. I know she and them children couldna manage. I tell de bossman I gonna go home and I lass three week pay. (When I heard what had happened (the spill) I said I would have to go home to assist my wife. I knew that she and the children would not be able to manage. I told my boss I was going home and I lost three weeks salary.)

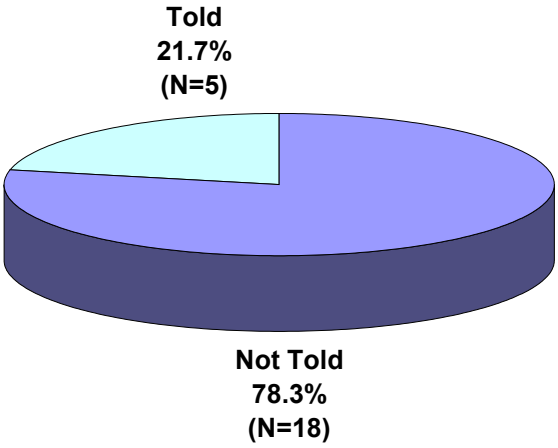
In Rockstone creeks and streams were closer to homes, and women and children were primarily responsible for obtaining water for household use, as is usually the case. The gender roles of water fetching in Rockstone did not change much. Rather, it created an increased burden on women and children to fetch more water for tasks that were usually performed using the Essequibo River.

Figure 22: Riversview: Told Water Good to Use, Two Weeks after Spill.



Source: Fieldwork

Figure 23: Rockstone: Told Water Good to Use, Two Weeks after Spill.



Source: Fieldwork

One week after the spill, governmental officials declared the river safe for use. However, this declaration was never made formally in the villages. Of those surveyed, 75.8 and 78.3 percent in Riversview and Rockstone, respectively, said that they did not receive any communication that the water was safe for use again two weeks after the spill had occurred (Figures 22 and 23). Residents who were aware that a governmental declaration was made mostly heard so from the radio and televisions. Televisions can be afforded by the more prosperous villagers. When asked how they knew it was safe to use the water again, a resident stated:

> I see seh the wata color change back a little like afta two months or so and I see meh next door neighbour a wash she clothes so I seh I gun tek a chance with it. Because I kant do betta. So I start fuh use it and little by little I see other people using it. (I saw a little change in the color of the water after about two months or so and I saw my neighbor washing her clothes, so I decided to take a chance and use it, because I could not do any better. Therefore, I started to use it and little by little, other people began to use it.)

Not being told officially that the water was safe did not help in the reduction of villagers' fear of the water. Residents claimed that the reason the officials did not return

and inform them that the river was safe was because they knew it was not. Months after the disaster when governmental and company officials did visit, villagers were skeptical. A Riversview woman explained:

> They come and tell we seh the wata good for drink and they walk with Tropical Mist in bottles. Me nuh seh nothing but in me mind I seh if the wata good fuh drink why they aint drinking it. And I seh is because we is Buck people deh think we stupid and them nah care nothing bout we. (They came and told us that the water was good for drinking but they brought bottled water. I did not comment but in my mind I said if the water is good for drinking purposes, why are they not drinking it. I said to myself the reason is that we are Buck people and they think we are stupid and they do not care about us.)

Villagers saw obvious contradictions between officials armed with bottled-water on their visits to the villages and their declarations that the river was safe for use. Residents were of the opinion that because they were rural people, and indigenous in particular, officials did not care much about their health and well-being. There is a view among non-Amerindians and Amerindians that they are inferior and less intelligent than other races in Guyana. In the eyes of Amerindians this mindset is present in both lay-persons and governmental officials and guides their treatment of issues affecting Amerindians (Sanders 1987).

One hundred percent of those interviewed felt that the aid and assistance that they received from the regional and governmental authorities and OGML (both in the immediate aftermath of the spill and long-term) was insufficient. The water and food distributed to the villages (in the first four days of the spill) were inadequate, and there was no systematic distribution system. Many residents were of the opinion that favoritism played a role in who received aid and who did not. Again, they perceived the adequacy of the aid received as a measure of their importance in the eyes of regional and national officials.

Despite the public assurances one week after the spill that the water was safe for drinking and fishing, many residents continued to avoid the water. Residents in the two villages, especially Riversview, continued to travel long distances in search of potable water for an average of 4 months. The source of water for household use (especially for drinking) has completely shifted in both villages (Figure 16 and Figure 17). Tellingly, for Riversview in July 1995, 100 percent of the villagers depended on the Essequibo River for drinking water. In 2002, none of the residents drank the water. When asked the question "do you drink the water from the Essequibo River", residents simply responded: "Me nah drink the Omai water (I do not drink Omai water)." Residents of the villages, especially, Riversview distinguish between the Essequibo River before and after the disaster by referring to the River now as the "Omai water".

The use of the Essequibo for other domestic purposes also declined drastically. In Riversview the issue of fewer alternative sources of water and more reliance on the Essequibo resulted in greater impacts on domestic tasks. Residents expressed many fears of the water and about the continued presence of heavy metals in the aquatic environment. A 69-year-old villager, who had lived all his life in the village, details:

> Some people come and took some water and they seh how them send it to the US for testing. They said how the water is good but we know that is not so. We live here all our life and we know this river. The cyanide and other things they put in the water is at the bottom of the river in the riverbed. Moreover, it will come up slowly and as it come slowly, it killing us slowly as well. (Some people came and took some water samples for testing in the US. They said that the water is good but we know that is not so. We live here all of our lives and we know this river. The cyanide and other things they put in the water is at the bottom of the river, in the riverbed. The cyanide at the bottom of the river will surface slowly and as it surfaces slowly, it is killing us slowly.)

Many villagers of Rockstone also expressed such a concern. In Rockstone, villagers contended that the heavy metals were deposited on the rocks and that this caused the algae that grows on the rock to disappear, which caused the fishes that feed on the algae to be scarce. Residents were very distrustful of the readings of cyanide content in the water from OGML and governmental monitoring agencies. A village official described it as follows:

> They seh that they ain't got to no poison in the water. They come and they read something that say 0.0000 or something like that. Me nah know wha da mean and de people heh nah no seh wha da mean. We does live hey and we know the water change. They can send the water to the US, Europe or Heaven and tell me it good but I know it aint suh. I does see it every day. I duh see fish dead in the water. If yuh wake up and yuh see dead fish floating on the river yuh no seh the water nah safe or the fish wouldna dead. Once fish dying you know seh something wrong. (They (referring to company officials) told us that the water does not have any poison. They came and read something to us that said 0.0000 cyanide readings or something like that. I do not know what the readings mean and the people here do not know what it means. We live here and we know the water has changed. They can send the water to the US, Europe or heaven for testing and tell me that it is good, but I know that it is not good. I see the water everyday. I see dead fish floating in the water. If dead fish are floating in the water, the water cannot be safe or the fish would not die. Once fish are dying something is wrong with the water.)

In explaining what might be perceived as a contradiction between using the water for household tasks even though they think it is unsafe, a resident explained:

> The people try to avoid using the water and using the river as before the spill happened. Even though we use the water for washing, we do not cook with it. The water is not good and it is bad for us to use it even for washing, but what are we to do? When the rain does not fall, we cannot walk seven miles for a bath everyday. So we use the water but deep down inside of us, we know it is not for us to use.

The opinions of the majority of the residents regarding the water and their use of it at present was summed up by a 28 year old as: "De cyanide deh in de wata, we can't do

betta so we have to use it." (The cyanide is in the water, we do not have any other alternatives so we have to use it.)

The differing opinions concerning the safety of the water between local people and governmental officials can be explained by the difference in perspectives of those analyzing the situation. For governmental officials, scientific readings are all that they need to validate that the water is suitable for human consumption. These scientific readings are taken at specific times and places. Residents' evaluations of the water arise out of a more intimate contact with the river. Residents are in a position to observe almost moment to moment changes in the river's conditions. The difference in perspective between the "experts" and local knowledge advances the argument of Levi et al (2001) that damage to the ecosystem is of more importance to the public than is the narrow focus of possible harm to human health based on the scientific readings of experts.

In Riversview, more than 90 percent of the households were compensated by the OGML for losses incurred as a result of the spill. Each adult villager (including fishermen) was given 40,000 Guyana dollars or approximately US$210, some in the immediate aftermath of the spill and some as late as 2001. Of the 40,000 dollars received 20 percent of it was paid in legal fees. With the remaining compensation money, the majority of the residents bought water tanks and put new roofs on their houses to catch rainwater. A 38-year-old logger explained:

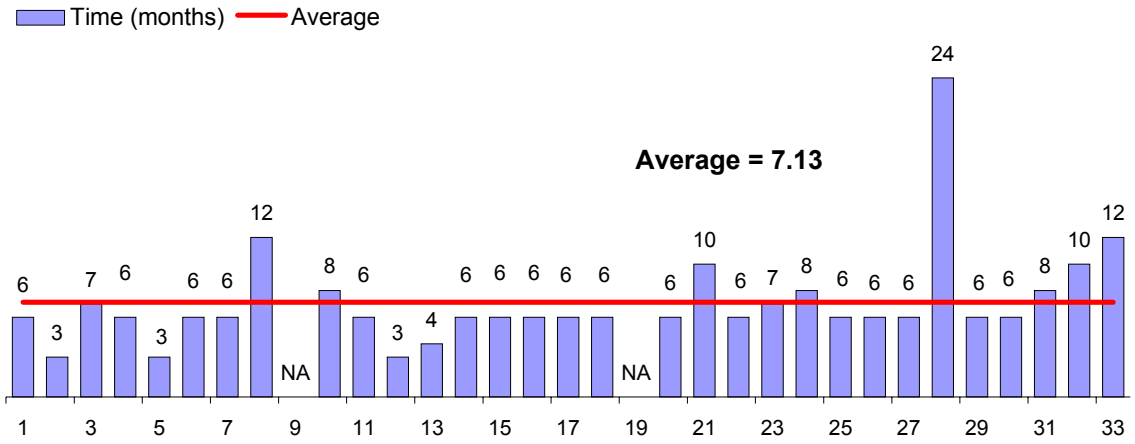
> Right now in Guyana 40,000 Guyana dollars is a joke. They destroy the river for life and give we 40,000 dollars. That can never compensate for taking away the water. But most of the people poor and so they were forced to take the 40,000 dollars. A tank cost 20,000 dollars and by the time you pay for bringing it to the village and put on gutter on your house so you could get water de money done. It still

> ain't easy for us without the river, we got to live with the poison in the water and we children and grandchildren and their children and grand-children. (Presently in Guyana 40,000 Guyanese dollars is a joke. They have destroyed the river for a life-time and they gave us 40,000 dollars. The money can never compensate for taking away the water from us. Most people in the village are poor and were therefore forced to take the 40,000 dollars. A water tank cost 20,000 dollars and the rest of the money was spent on transporting the tank to the village and guttering of the house. It is still difficult for us not being able to use the river. We have to live with the poison in the water and so does our children and their children and grandchildren.)

Presently, 18 of the Riversview households interviewed, or 52 percent, have water collection devices. Water collection containers range from plastic water tanks used on the coast, used oil drums, and oil bottles. The remaining 42 percent of the villagers claim that they still depend on the creek for water. In Rockstone, 7, or 30.4 percent, of the households interviewed had water collection device. Seventy percent of Rockstone residents continue to use the creek and other streams in the area as their primary source of water.

The changes in the household use of the Essequibo River water are not the only way residents illustrate a total lack of confidence in the safety of river. Changes in the consumption of fish demonstrate strong perceptions among villagers that the river is still polluted and unsafe for use. For several months after the spill, residents ignored governmental declarations that the water was safe and refused to eat fish or wildlife from the river.

Figure 24: Riversview: Elapsed Time Before Started to Eat Fish Again (months)



Note: X Axis labels represent individual respondents
Source: Fieldwork

In Riversview residents did not eat fish for an average of 7.13 months after the disaster (Figure 24). There were three residents in the village who after the spill refused to eat fish again. One villager only started to eat fish again two years after the spill. A resident explained why she stopped eating the fish:

> Up to now I don't eat the fish. One night meh daughter ketch fish and we steam it and it eat it and meh daughter get sick bad. Since then I wring meh ears and seh me nah eat fish no more. (Presently I do not eat fish. One night my daughter caught fish and we steamed it and ate it. My daughter got very ill after eating the fish. Since that incident, I do not eat fish anymore.)

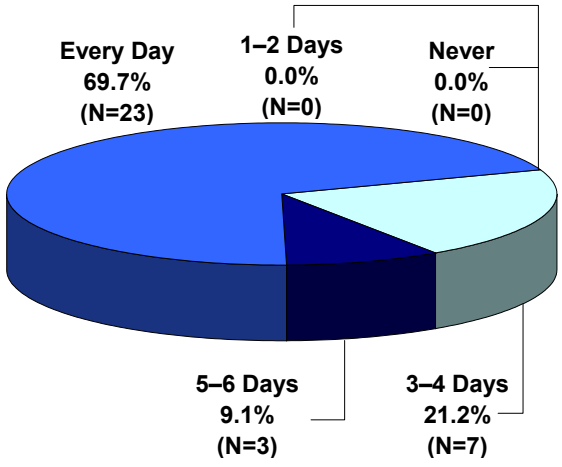
In Rockstone, residents began to eat fish from the Essequibo River on average 10 months after the disaster. The longer period in Rockstone can be attributed to the availability of other food sources, such as nearby shops belonging to logging and quarry companies along the Essequibo River. Some villagers began to fish above the OGML site in the Essequibo River. They argue that the fishes from the Essequibo River above OGML looked better than those below the mine site. A 65 year-old fishermen described

the prevailing perception among residents of the fish originating from the Essequibo River:

> If yuh want fish yuh have to go have to go pass Omai. We nuh trust fuh eat de fish from the Essequibo below Omai. So I used to guh above Omai and fish in the falls. When yuh guh above the fall the fish fresh and healthy and yuh dus see nuff fish. In addition, sometimes I used to go in the creeks. I feel more confident eating the fish up the falls and creek. (If you would like to have fish, you have to go past the falls. We are not confident in the fish in the Essequibo River below Omai. I used to go above Omai and fish in the falls. There is more fish above the falls and they are fresh and healthy. In addition, sometimes I fished in the creeks. I feel more confident eating the fish from the falls and creek.)

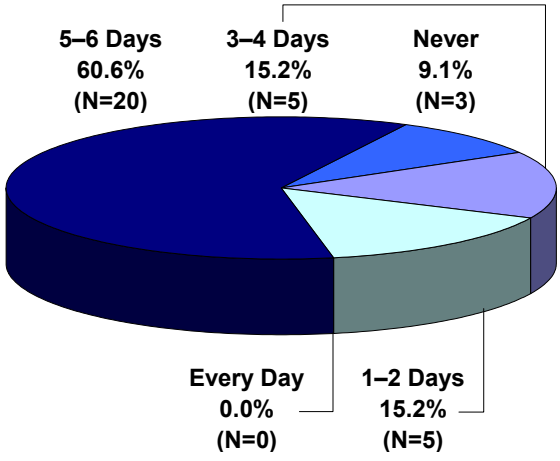
Going to fish above the OGML mine site and to the falls and creeks meant villagers not only spent longer times in search of fish but more on gas (for those with outboard engines), making fishing more expensive. Residents made a distinction between fishes and the water that originated in the creeks and tributaries of the river and the river, itself. However, whilst in Riversview creeks and other rivers are clearly delineated from the Essequibo, this was not the case in Rockstone. In Rockstone residents described many inlets of the Essequibo as creeks being distinct from the Essequibo River, but, in fact such waters were not. In many instances, it was the same water from the Essequibo River flowing in these "creeks."

Figure 25: Riversview: Household Consumption of Fish per week in 1995



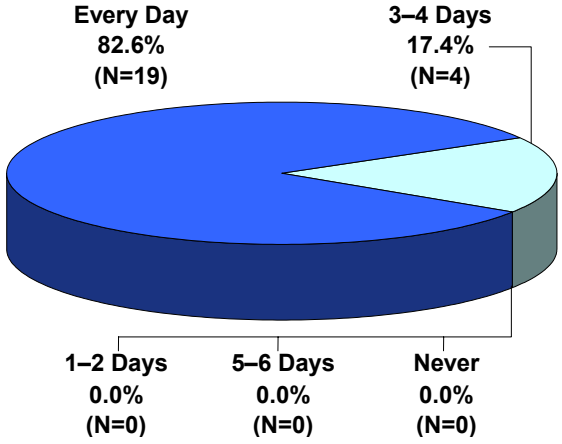
Source: Fieldwork

Figure 26: Riversview: Household Consumption of Fish per week in 2002



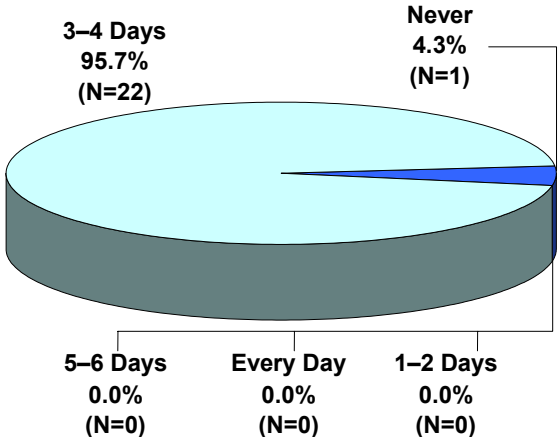
Source: Fieldwork

Figure 27: Rockstone: Household Consumption of Fish per week in 1995



Source: Fieldwork

Figure 28: Rockstone: Household Consumption of Fish per week in 2002



Source: Fieldwork

In 2002 residents continued to have apprehensions about eating the fish (Figures 25, 26, 27 & 28). The use of fish declined significantly in both villages. In Rockstone many villagers have resorted to eating dried fish originating from the Atlantic Ocean. Presently, the majority of the villagers eat fish approximately three days a week

compared to eating fish everyday in 1995 (Figures 27 & 28). As is the case with the water, residents contend that eating of fish is not an indication of their confidence in the river water but rather an indication of their poverty. They simply cannot afford to purchase chicken and beef from outside the village for extended periods.

In Riversview, 10 of the households surveyed claimed that all of their livestock were killed during the spill after drinking the river water. Residents claim to have lost cows, chickens and ducks. Residents had used these livestock to supplement their fish consumption. In 2002, only five villagers had a small number of livestock. In Rockstone, 3 of the 23 households surveyed had livestock. Residents claimed to lack confidence in the non-recurrence of other spills and consequently were not willing to risk investments in livestock.

The decline in fish consumption has obvious implications for the health of the villagers, whose traditional main source of protein was fish from the river. Eating less fish adds additional financial burdens on families to supplement their incomes with food from external sources. Decreased fish consumption and increased reliance on external food sources as a result of the spill demonstrates how short-term coping mechanisms can undermine the long-term health and sustainability of societies in disaster situations (Blaikie et al 1994). The majority of villagers surveyed in both villages substituted vegetables, beef, and chicken purchased from Linden and Bartica for the decline in fish consumption. A small number of families (four in Riversview and three in Rockstone) claimed to have reduced the number of meals as a way of conserving resources. These households were the poorest in the villages and female-headed. The extent of coping with the impact of the disaster by altering fish usage was related to the economic status of

the household. Households with disposable income could easily purchase goods from Linden and Bartica. Poor families spent longer periods of time searching for fish or ate more vegetables or lesser number of meals. This correlates closely to contentions in the literature that disasters disproportionately impact the poor, whose limited resources affect their ability to successfully cope with such impacts (Blaikie et al 1994).

Impact on Livelihood Activities

The spill severely impacted and disrupted the livelihood activities of the villages. Livelihood activities in the village are interdependent with the ecosystems and natural resources of the region. In 1995, prior to the spill, males in both villages were involved mainly in fishing and farming for local consumption (selling the excess to the towns of Bartica and Linden). Women in Rockstone were mainly involved in fishing for exotic species, which they sold to dealers of aquarium fishes in Timheri and Georgetown as well as assisting in the work on farms. The aquarium fishes' final destinations were the US and Europe. According to residents, the fish trade decreased significantly after the spill, due to the unavailability of fish and the loss of markets. Almost two years after the spill, aquarium fish dealers refused to purchase fish from Rockstone residents. A woman from the village puts it this way:

> The buyers seh dem nuh want the fish no mo. Dem seh by the time dem get to Georgetown the fish dead. The fishes nuh strong no mo. Also when we catch the fish we notice them got a kind of fungus growing on the eye and the tails look a little deform. So we used to try and go into the creeks and fish. The fish from the creeks was better. (The buyers said they did not want the fish anymore. They said on the journey to Georgetown that the fish died. The fish are not as healthy as they used to be. There is usually a fungus growing on the fish eyes and the tails look a bit deformed. So we tried fishing in the creeks; the fish from the creeks were better.)

Of the households interviewed in Rockstone, 10, or 60 percent, of the households reported that at the time of the spill their primary livelihood activity was aquarium fishing; this figure has been reduced to 35 percent (Figure 11).

Losses of markets in the towns of Linden and Bartica resulted from a lack of confidence in the wholesomeness of the fishes originating from the Essequibo River after the disaster.

A villager from Rockstone gives his experiences:

> There is a stain that is left on Rockstone in particular. When people hear the fish come from Rockstone they don't want to eat it or buy it. We suffered the stigma for two years, up to now people still would not buy the fish. They ask where the fish originates and if you answer Essequibo, they do not want it.

A villager leader confirmed the loss of markets by adding:

> When the fishermen catch the fish and carry it to the market people refusing to buy the fish. So men in the village stopped fishing and looked for other jobs.

In Rockstone after the spill, fishermen could not or did not fish for approximately fourteen months—and in Riversview for twelve months. When asked how they supported their families during these periods, the majority reported that they switched to logging or gold mining activities. Forte (1988) in her study of Riversview reported that 17 percent of the households were involved in gold mining. In 2002 the figure had risen to 42 percent.

Social problems also resulted from males being forced to leave the village and find work elsewhere. An altercation in Rockstone between two males illustrates the social issues surrounding out migration. Two men were involved in a conflict over a

woman resulting in the police being called into the village to settle the matter. In an interview, the man whose wife abandoned him explained his predicament:

> I used to fish, ask anybody I was a good fisherman. Now the fish is not plentiful so I left the village to logging work. I was away from home sometimes for as long as six or seven months. The wife was left alone at home to struggle with the children. She has to farm and find food for them to eat every day. Therefore, I do not blame her. But what can I do? I cannot stay here and punish as well.

The migration of males to find work outside of the village has health consequences as well. Women are left behind with increased workloads and numerous roles to perform. Forte (1998) contends that a higher incidence of malaria in the village of Riversview is related to migrant workers. The migration of males to seek work outside of the village did not commence after the OGML cyanide spill. However, the spill pushed even the remaining males in the village in search of other opportunities because of the displacement of their regular livelihood activities. The majority of males interviewed reported that they found it extremely difficult to return to farming and fishing after experiencing life as a gold miner or logger.

Changing livelihood activities by residents of both villagers was a major means of coping with the disaster. Changing livelihood activity with some degree of ease is a result of lack of over-specialization of livelihood activities in the village (or non-dependency on one single resource). One hundred percent of the households interviewed had primary and several secondary livelihood activities both in July 1995 and 2002. Low population pressure in the area and an abundance of natural resources allowed residents to occupy several livelihood niches (and diversified livelihood activities). This diversification of livelihood activities in the villages was a survival mechanism the pre-disaster environment and served as an important tool in coping with post-disaster changes.

However, the social coherence of the two villages as social units was intimately tied to the resources of the river and the river ecosystem. The secondary livelihood activities that residents resorted to had many negative social consequences (possibly explaining why they were not primary livelihood activities in the first instance). In the two villages fishing and farming were the basis of the social organization of the villages as communities. The pollution of the river disrupted that foundation of social organization and resulted in long-term social disruptions.

Reduced availability of fish in the river has impacted the livelihood of residents of both villages. Fish, which prior to the spill, according to residents, were in abundance, are now scarce. A former fisherman comments:

> Everyday we used to fish. That was our main source of protein. We cannot fish as we used to before. The fish is just not around. We now have to go into the creeks; we cannot depend on the river anymore. There is no fish in the river.

Another resident adds:

> I live in this river all my life. I never knew a time when we could not see fish, nowadays you fish for days and you aint get nothing. I never hear me parents who live here as well say that there was a time fish scarce, now there is no fish.

When asked if there were particular species of fish that were scarce or missing most residents responded that they do not see many of the fish that lived in the rocks and mud of the river. Almost all the residents identified Low Low and Lukanee as species that were severely scarce and missing. Residents pointed to the absence of bottom feeders as evidence that the pollutants have settled at the bottom of the river. A fisherman in Rockstone observed:

> Low Low (*Brachyplatystoma filamentosum)* and Lukanee *(Cichla ocellaris)* yuh nah see them two at all. Whatever cyanide deh down deh it ah affect them. The Low Low and Lukanee does deh in the rock, deh is weh dem does live. We nah see them two no mo either. (Low Low and Lukanee, we do not see those two. The cyanide at the bottom of the river is affecting them. They live in the rocks and mud, so we do not see them anymore.)

Neither the governmental monitoring agency (the EPA) nor the OGML conducts tests of the heavy metal content of the sediments of the Essequibo River (Singh 2002). This is despite claims by some researchers that significant deposition of metals may occur in the bed of river in pollution of this nature (UNEP/OCHA 2000, Mineral Policy Center 2001).

There are no written records of fish catches in both of the villages. In Riversview the fishermen's cooperative was disbanded after the spill. Fishermen in both villages, independently, stated that fish catches have decreased from 150 pounds per night to 10–15 pounds per night. In 1995 fish were sold from 40 Guyanese dollars per pound and in 2002 the price of a pound of fish was 70 dollars. The increase in the price of fish reflects the inflation in the wider Guyanese economy. Despite the increase in the price of a pound of fish, the reduction in amount of fish in the river meant a reduction in the income of families that depended on the river for their sustenance.

Farming in the villages also decreased after the spill (Figure 9 and Figure 13). The decrease in farming is in part a result of out-migration of males from the villages and less time being available for farming as a result of increased time spent collecting water and catching fish. Women left behind due to the migration of males have increased roles to perform and less time available for farming. Additionally, in Riversview, many residents claimed to have lost several acres of crops during the spill. Agricultural produce that was irrigated with water from the river subsequently died. Residents were apprehensive about

loosing farm produce again after their losses due to the spill and cited this as another reason for decreased farming. A former farmer, turned gold miner, explained the dilemma:

> Me nah farm nuh mo. The spill come and kill out all the crops I had. Since then me mind nah give me for farm. Is better if I go work gold cause I know nothing can't affect that. When you farm also sometimes the people want buy for nothing. Me aint able, I gun do pork-knocking for now. (I do not farm anymore. The spill killed all my crops I had at that time. Since the spill, I do not feel like farming. I prefer to work gold because I know nothing affects that. Also, when you farm, sometimes buyers pay very little for produce. I prefer to avoid the problems with farming and do pork-knocking for now.)

Health Impacts

Of the households surveyed surveyed, 86.9 percent and 90.9 percent in Rockstone and Riversview, respectively, said that they experienced some health problems related to the water from 1995 to 2002. The main problems residents experienced were intense itching, sores on the skin, gastroenteritis, vomiting, and diarrhea. Residents claim that children experienced these problems more frequently than adults. The greater frequency of health effects in children is as a result of children playing for long hours in the water despite their parents' best attempts at preventing them from doing so. A villager described the health situation of the village before and after the spill:

> I born and grow in the river here. I am 53 years old. I grow almost in this Essequibo River. That was the main source of water that we used to cook, bathe, wash, and drink. Everything was the Essequibo River and right now that have been taken away from me and the entire community. All the people in my age and who come after me it bothers me a whole lot. I grow up here and I never know what is gastro and vomiting from using the water. In my days I never get gastro and skin problems. I have eight children. I bring them up in this river they

> never sick, now all the children in the village sick when they use the river water. (I was born and I grew up in the Essequibo River. I am 53 years old. I grew up almost in the Essequibo River. That was our main source of water for cooking, bathing, washing, and drinking. We used the river for everything and presently the use of the river has been taken from me and the entire community. It bothers those of my age a whole lot. I never saw gastro and vomiting complaints growing up. In my days I never got gastro and vomiting. My eight children were brought up here and they were never ill. Now, all the children in the village are ill when they use the river water.)

Another resident explained the effects of using the river water as:

> Even now when you bathe you have to rinse your skin with rain or creek water, you cannot come in from the river just like that or else you skin itch you.

When asked if they treated the water to reduce its negative effects, 60 percent of the households in Riversview responded that they either put bleach in the water or boiled it for domestic purposes such as drinking and washing. When asked why they boiled the water or added bleach, residents responded that boiling and adding bleach would get rid of bacteria. They did not think that adding bleach or boiling would get rid of the pollutants from the mine; they think those are still in the river. Many residents reported not liking the effects of bleach on the water. A housewife in Riversview explains:

> Well sometimes I put bleach in the water and like I put too much. So the water does smell funny and also it does burn your skin. So I seh I do not know what to do. I can die from bleach or die from the Omai water.

In Rockstone residents use the streams and creeks in the area, avoiding the river water. They reported only using the river water when fishing on the river for days and in those instances they did not treat the water in anyway.

Residents' testimonies indicated that there are some health-related problems from eating the fish of the river. A Riversview villager describes it as such:

> I don't eat the fish anymore. Every time I eat the fish I get sick. I get diarrhea and vomiting. So I stop eating it all together.

Hospital records at the Bartica and Linden Regional hospitals could not verify these accounts of increased health problems. Both institutions did not compile information based on areas of origin. Interviews of regional medical officers confirmed that there were indeed increased incidents of vomiting, diarrhea, and gastroenteritis in the two villages, yet health officials were cautious in declaring the river as the source of these health problems.

Chapter VI: Conclusion

This research sought to investigate and document the social impacts and disruptions caused by a technological disaster in two subsistence, natural resource-dependent communities in a developing country. It documents and presents empirically evaluated selected social impacts and disruptions caused by the 1995 Omai cyanide spill. The research found that there were both immediate and long-term social impacts and disruptions as a consequence of the disaster. The spill interrupted and in some cases eliminated residents' access to quality resources, especially potable water supplies. The impacts or perceived impacts of the disaster on the natural resources of the villages caused disruptions in livelihood activities, diet, and domestic chores. The social impacts of the disaster do not appear to be diminishing over time. Changes in the use of fish and the river water, reduced livelihood activities, and migration in search of jobs (*six years after the disaster*), reinforce assumptions in the literature that the effects of technological disasters are long-lasting and socially disruptive (Dyer et al 1992, Edelstein 1988, Levi et al 2001).

The findings of long-term social impacts contradicts the statements of Vick (1996), who contends that there was no "measurable impacts on the downstream population" of the Omai mines (1996:35) and that of the government survey that found the residents were optimistic about their well-being. The differences in results between the two studies and this research finding may be a consequence of the different methodologies utilized. In the case of the governmental survey, the questionnaire may

have failed to adequately capture the effects of the disaster on the local residents. The interview method used in this research allowed residents to give detailed, authentic testimonies about the disaster from their perspective, leading to a better understanding of its human impacts. Thus, this study highlights the importance of an ethnographic approach, particularly interviews, in the study of disasters in general but more specifically in developing societies.

The limited assistance given to the affected villages by those in authority gives credence to Rajan's (1999) theory of the role of socio-cultural factors in not only the creation of disaster situations but also the response to disaster victims. In this case, the residents of the two villages are insignificant rural indigenous minorities that have limited influence on national and regional elections in Guyana. They were therefore treated with scant regard by both officials of the Guyana government and the mining company in the planning stages of the project and in the disaster's aftermath.

This study provides evidence that the ability to cope with the social effects of disaster is a function of the economic status of the household members. However, in the case of the Essequibo River, limited pressure on resources as a result of low population densities and an abundance of natural resources allowed villagers to switch to other livelihood activities—even though many were less rewarding than the previous activities and had attendant social problems. This finding differs slightly from those in the literature that contends that the poor have limited capacity to cope with the changes in their resource base (Blaikie et al 1994). This research indicates that in the absence of high population pressure and lack of overspecialization of livelihood activities on one resource the effects of disaster maybe less devastating to communities.

The research also illustrates the role of political ecology in the formation of disasters. In a broad sense it can be viewed as the dilemma of governments of developing countries in their pursuit of development and economic growth. The Omai cyanide spill exemplifies the frequent results of this predicament. Guyana's focus on non-traditional exports resulted in a large-scale gold mining project and a major technological disaster. "Missing expertise" and categorical politics identified by Rajan (1999) were found to be significant contributors to the Omai disaster. Large-scale gold mining was promoted as a major economic activity in Guyana despite the country's inability to monitor such projects and the lack of any land-use planning. The local, regional, and national governments in Guyana lacked the ability to respond adequately to the disaster. The Guyana review sums up the situation: "The Omai incident has bared the paucity of Guyana's preparedness to cope with the possible human and ecological consequences of large scale exploitation of its natural resources." (Guyana Review September 1995).

The location of the OGML mine illustrates bad land-use planning in Guyana. The use of cyanide in the mine and the storage of large amounts of tailings close to a main river on which 23,000 persons depended for drinking water illustrate the high risk of the operations. In addition, this study shows how local environments and populations are made vulnerable in the interest of larger national goals, such as economic growth. The research highlights the risks identified by the development-disaster school of thought. The operations show how development activities create risks and result in vulnerable and degraded environments that threaten the survival of traditional and subsistence societies (Wisner 2001, Lavell 1999).

Many Guyanese above the age of 30 are aware of the Jim Jones tragedy, in which approximately 900 people perished after ingesting cyanide-laced solutions. A national psychological fear of cyanide is present throughout the Guyanese population (Guyana Geology and Mines Commission 1996). National and regional planners, OGML officials, and international sponsors of this project should have been aware of this fear of cyanide and created contingency plans in the design of the operations to address this fear and possible accidents. The lack of contingency plans is attributable to several deficiencies. The Guyanese government lacked the technical and scientific capacity and expertise to monitor the project and develop emergency plans. The OGML and its international sponsors adopted the prevalent socio-cultural practices in Guyana of lax environmental safeguards and scant regard for local and rural peoples, especially Amerindians. This was done despite OGML's claims of operating at environmental standards similar to those in Canada and the US. The failure of both the company and government officials to inform the populations downstream of the mine about two earlier spillages is further evidence of this mindset. Rajan's (1999) "missing expertise" and "categorical politics," identified as factors in the Bhopal incident, were also significant contributors to the OGML spill.

This disaster most seriously impacted the poorest of the Guyanese population—namely, the indigenous people and other rural peoples who eke their subsistence from the forest and river resources. The OMGL cyanide spill is the result of neo-liberalization policies that stresses economic growth above the human and social development of all the country's citizens. This study confirms the assertions of other disaster researchers that development policies, particularly neo-liberal economic policies and pressures of national debts, exacerbate environmental degradation and create immense risks and disasters for

the poorest in the society (Rajan 1999, Shrivastava 1994, Wisner 2001). Several researchers have identified the role of the state in environmental degradation in developing countries. However, in the era of globalization the role of the state is being continuously eroded by multinational corporations and international financial institutions; as a result, states are increasingly becoming marginal actors in the exploitation of their countries' natural resources. The Omai disaster resulted from macro-economic policies crafted in the boardrooms of Washington DC and imposed on Guyana by international financial institutions and the urgent need in Guyana to grow economically. It is unlikely that either of these two scenarios will change in the foreseeable future. Since the disaster, OGML has not only expanded by purchasing the bauxite mine in Guyana but has since opened a large gold mine in neighboring Suriname. Omai has also begun exploration of other remote areas in Guyana to extend its operations.

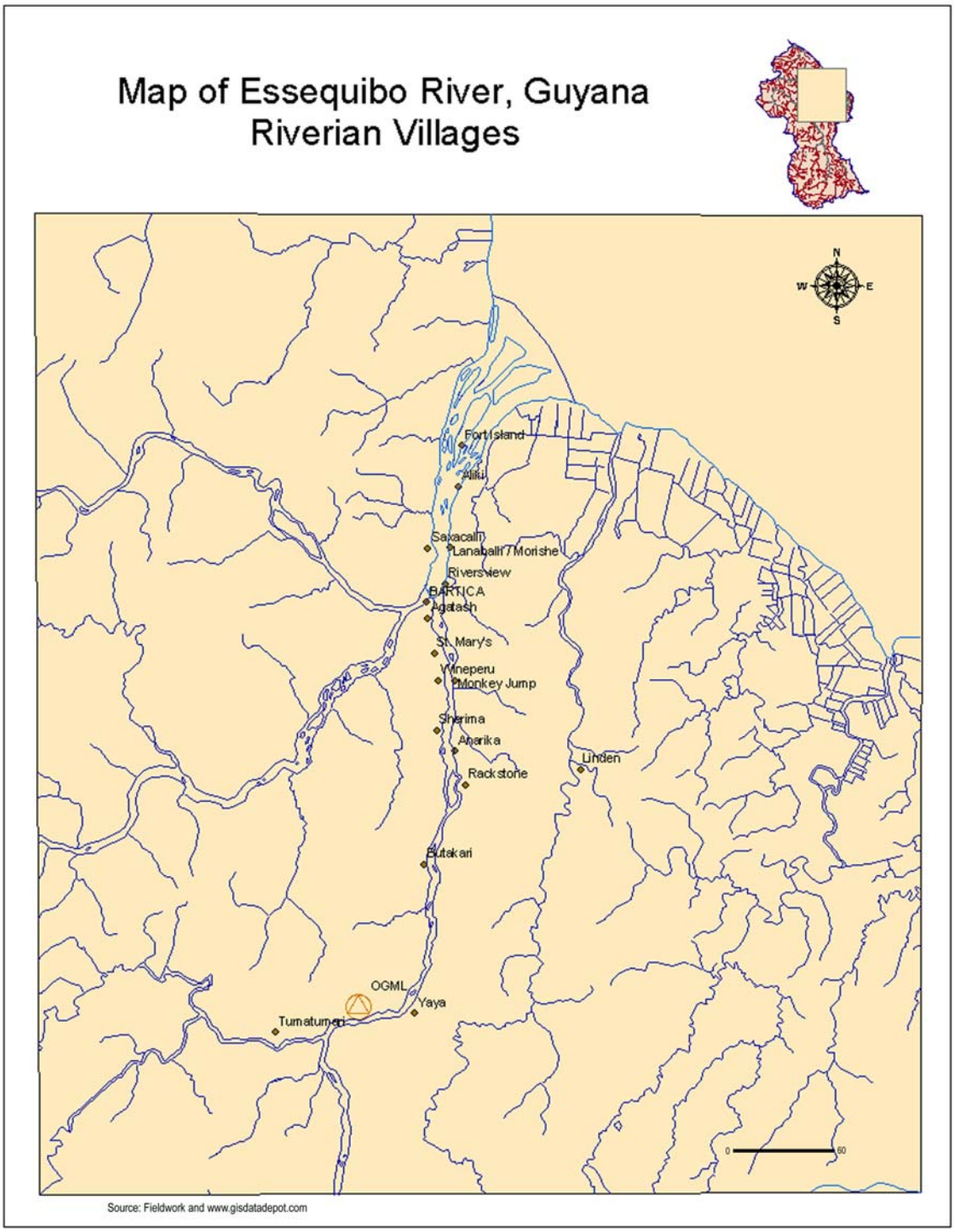
This research was conducted in two villages of the Essequibo River. These villages are not meant to be representative of the entire riverian communities of the Essequibo River. Therefore, additional research needs to be done in other villages to investigate whether the findings of this study are applicable to other areas. Distance from the mine site, for example, may have possible effects on residents' perceptions of the disaster and responses to it.

In addition, consistent long-term monitoring of the social impacts and disruptions of the spill on several villages will be required for a complete understanding of the social changes in the area. It will also provide evidence as to whether the impacts of the disaster are diminishing or increasing over time.

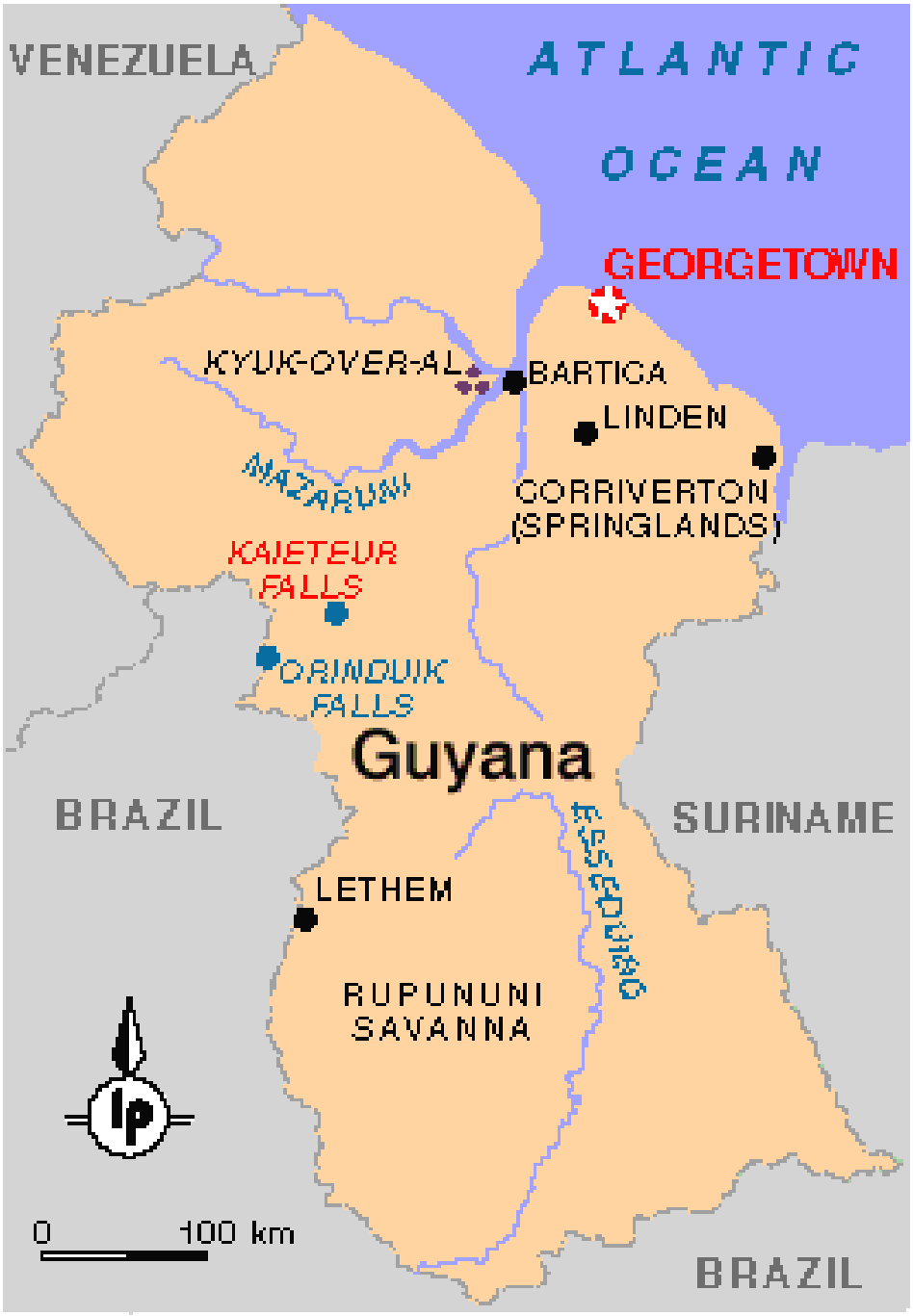
The environmental observations of residents of the villages need to be further documented. In the absence of baseline biological data on the Essequibo River and surrounding areas, residents' observations can serve as an important source of information on stresses and changes in the environment.

This study is an important first step in the direction of improving disaster studies in developing societies. It demonstrates the links between disaster and the long-term environmental and social impacts of international economic agendas that propose industrial developments that are inadequately planned, monitored, and regulated.

Appendix 1: Map of Essequibo River showing OGML and downstream villages

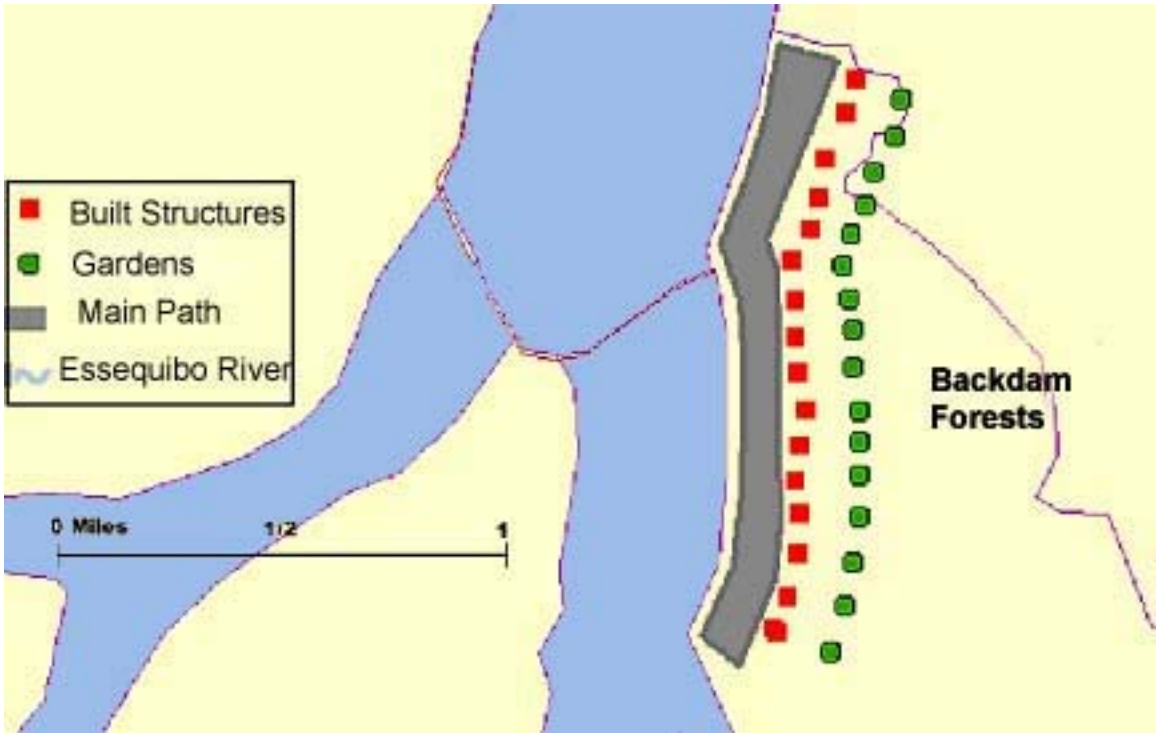


Appendix 2: Map of Guyana



Source: www.bio.uu.nl/tropenbos/ map.htm

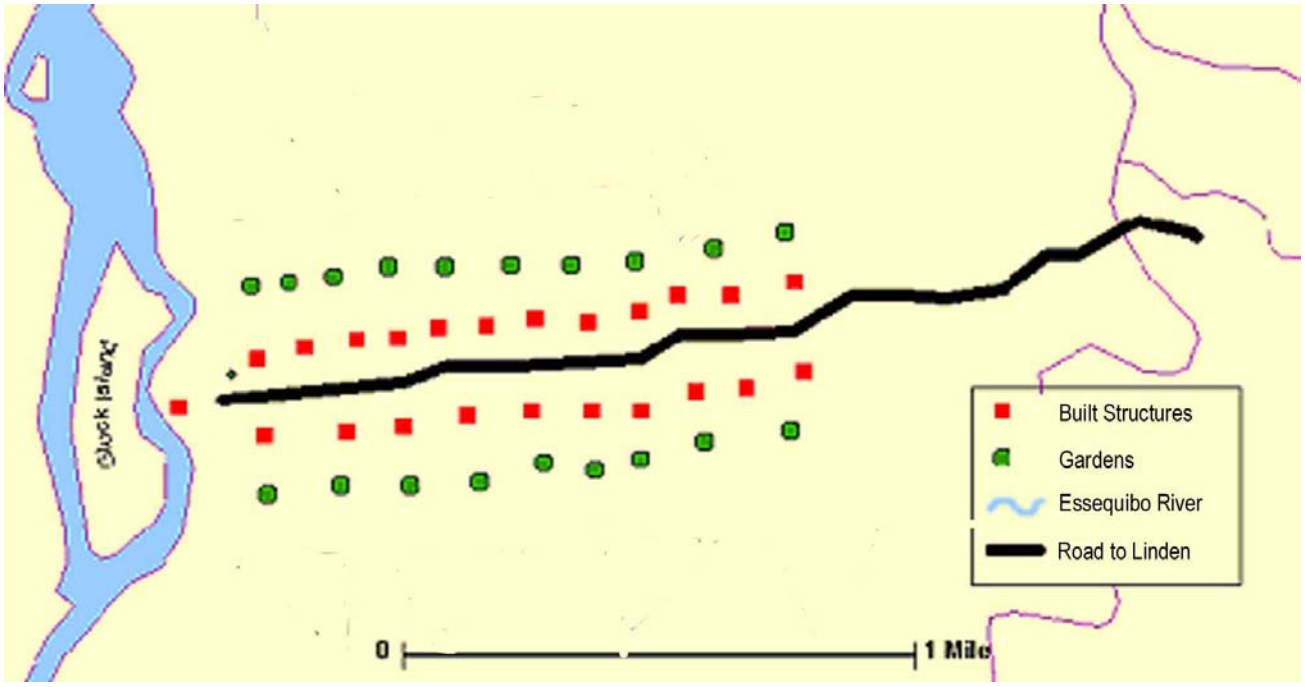
Appendix 3: Sketch Map of Riversview Village



Source: Fieldwork

Note: Built Structures refer to houses, churches, schools, and other structures.

Appendix 4: Sketch Map of Rockstone Village



Source: Fieldwork. Note: Built Structures refer to both residential and commercial buildings.

Appendix 5: Interview Guide

I am a Guyanese graduate student of Geography at Virginia Tech in the United States. I am collecting information on the 1995 Omai cyanide spill in the Essequibo River for my research project. I would be grateful for your help in obtaining information on the spill and how it affected you and your family. Any information that you give will only be used for this research project. I will not give that information to any other persons or agency. Your participation is crucial to the success of this project and in me obtaining accurate information. Your identity will not be traceable to the information you give. Thank you for taking time off your activities to talk to me.

I would like to begin by asking some questions about where you get water from for domestic uses.

1. What is your household primary source of water for the following?
    - Drinking
    - Cooking
    - Bathing
    - Feeding Livestock
    - Recreation
    - Household Tasks
    - Transportation
    - Irrigation for Agriculture
2. What are your household other sources of water presently for the above activities?
    - Does your household use the Essequibo River more or less than you did before the 1995 Spill? Why?
    - Are there any purposes for which your household use the river more than you did in 1994, if so what?
    - Are there purposes that your household uses the river for in 1995 that you use it less in 2002. If so why.
    - Are there any purposes that your household uses the river for in 1995, that you do not use it for now.

Now I am going to ask you some questions specifically on the period when the spill occurred? I am going to ask you how your household members were notified that a spill had occurred and how it affected you. I will then ask about the changes you have made in your activities since the spill.

- How did you know that a spill had occurred at the Omai Gold Mines Upstream of your village?
- Were you notified by any "officials" of the spill, if so who? By official I mean anyone from the mine, community leader, local government persons, community health officer or government officials.
- Were you given any instruction regarding the use of the river water at the time of the spill?

- How did you receive instructions regarding the use of the river water?
- Were you visited by or aware of any local/ national/ or regional officials visiting your village during the spill.
- Can you recall the date the officials visited?
- What advice did the officials give regarding the use of the Essequibo River?
- Were you given any instructions that the Essequibo River was safe to use again?
- Where or from whom did you get information that the river was safe to use again?
- Did you stop using the Essequibo River water during the spill?
- How did your household obtain water during the spill?
- Who in your household obtained the water?
- Where did the person or persons get the water from?
- Did OGML or the regional officials provide you or your community with water or containers to collect water?
- If you stopped using the Essequibo River water as a result of the spill, did you reuse the water after? If you did reuse the water when did you start to do so?
- How did you know it was safe to use the river water again?
- Did you do anything to the water before using it during the spill and after? If so what did you do to it?
- Why did you treat the water the way you described? Did anyone tell you to or did you get the information from some other source?
- Did you eat fish or any other animals from the river during the time of the spill?
- If you stopped eating fish when did you resume eating fish?
- What did you substitute for fish during the period you stopped eating fish?
- Where did you get the food that you substituted for fish from?
- How often did you eat fish before August 19th 1995, how many days a week?
- How often do you eat fish now?
- What else do you eat now in addition to fish?
- What did you loose, if anything, as a result of the spill?
- What additional expenses did you incur because of the spill?

I am now going to ask you some questions on your observations of changes in your environment since the spill.

- Have you noticed any changes in the Essequibo River since the spill? If so what are these changes?
- Did you notice these changes any other time before the spill in 1995?
- Do you have any concerns about using the Essequibo River at present, if so what are these?

I will now ask about your household member health and the impact of the spill on their health.

- Did you or your family members suffer any health problems on the day of the spill? If so what kind?
- Did you suffer from these health problems after eating the fish or coming in contact with the water?

- Do you suffer from any health ailments now after eating the fish or using the water?
- Did you have these complaints before the spill, after using the water or eating the fish?
- Are there any particular times when your ailments from using the water were greater or more intense? If so when?
- Were any particular members of your households afflicted greater by these health problems? If so what is the age and gender of the persons?
- Did you consult any health personnel/person regarding your health problems?

I am going to ask you some questions about your movements during the spill.

- Did you or your family members move from the village during the spill in 1995?
- If you did move where did you go?
- Do you know of other community members that moved out temporality during the spill? If so do you know where they went?
- Do you know of anyone who moved out permanently after the spill? If so do you know where they moved to?

I would like to conclude by asking you some questions about the make-up of your household.

- How many persons live in your house presently?
- What are their ages and sex?
- What are your household members' primary and secondary occupations?
- Are there members from your household that are away presently?

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Aug 2001 to May 2003 — ***Graduate Teaching Assistant, Department of Geography, Virginia Tech***
Prepared lecture materials for professors; graded assignments; gave periodic lectures; assisted students with labs and assignments

Apr 2000 to Jul 2001 — ***Civil Society Program Officer, National Democratic Institute for International Affairs/The Carter Center***
Formulated and implemented a one year civil society program to strengthen youth's, women's and indigenous people's organizations in Guyana through training, financing and technical assistance; consulted with such organizations around the country and identified priority issues; reviewed and implemented projects for the target groups; procured consultants and technical experts nationally, regionally and internationally to work on specific areas of the projects; assembled data on Guyanese civil society

Jan 1998 to Jul 2001 — ***Guyana Regional Director, Guyana Research Environmental Education Network (GREEN)***
Coordinated and managed all of GREEN's activities in Guyana; researched and documented background materials and information for the technical staff working on GREEN's projects as well as procured international and local consultants; disseminated information to affected Essequibo riverain communities,conducted and coordinated a health survey of Essequibo residents affected by the 1995 Cyanide spill in the Essequibo watershed; fundraising: wrote project and grant proposals, including via the Internet;

Aug 1997 to Jan 1998 — ***Researcher/Project Officer Global Institute for Sustainable Forest Management***
Developed small projects for women groups in the hinterland; created a plan for Mangrove and Courida vegetation in Guyana; facilitated consultations with local communities engaged in logging activities.

Feb 1997 to Mar 1997 — ***Cross-Cultural Facilitator, Peace Corps, Guyana***
Worked as part of a team that assisted volunteers from the U.S. to become familiar with Guyanese society; led group discussions and made presentations on various topics, African-Guyanese culture, geography of Guyana, youth and gender issues

Jan 1997 to Jan 1996 — ***Technical Assistant to the Minister, Ministry of Labor Human Services and Social Security***
Developed, implemented and reviewed projects for women's groups and organizations across the country including monitoring and evaluation activities; managed five agricultural projects in Region 10; coordinated workshops, seminars and consultations with international organizations and local NGOs on women's issues; assisted in press releases and press packages as well as other public relations activities; represented the Minister in meetings and other public engagements

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