

studies and perspectives

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Suriname: the impact of the
May 2006 floods on sustainable
livelihoods

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Port of Spain, March 2007



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Abstract

This assessment of the socio-economic impact of the May 2006 floods in Suriname was carried out at the request of the Government of Suriname, through the Ministry of Regional Development, by the Economic Commission for Latin America and the Caribbean (ECLAC) Subregional Headquarters for the Caribbean with support from the United Nations Development Programme (UNDP). The Ministry organized a team of local counterparts to work with the ECLAC team which involved stakeholders from government and non-governmental organizations. The ECLAC team visited Suriname in September and November 2006.

The overall value of damage and losses caused by the floods was at least SDR\$111 million. The impact will not be perceptible in the national accounts because most of it stems from losses to self-subsistence agriculture. Nevertheless, for the severely affected population, around 30,000 people living in isolated villages deep in the rainforest, it was a devastating blow to their capacity to make a living. To bring this into perspective, the ECLAC study estimates that total damage and losses is roughly equivalent to the gross domestic product or sum total of the annual value added of all economic activities in the District of Sipaliwini, which was by far the most affected district. An impact of such a magnitude justifies external support for recovery and reconstruction to avoid a long-term depression and grave social consequences in the affected area.

The study makes use of the Sustainable Livelihoods Approach to analyze the impact of the floods on the affected households. It outlines the vulnerability context of the affected population and it maps the strategies of households to sustain a living. The vulnerability of the indigenous and Maroon communities derives from the same

condition that protected them from aggression, namely isolation and remoteness. As kinship communities, they do not have effective land rights and political participation. The internal war between 1985 and 1992 had been particularly destructive for them. Their condition is characterized by material poverty and low levels of education.

Despite being largely self-sufficient, monetary income is needed for a few critical services and supplies from outside, namely, fuel, clothing, and building materials as well as education and health services. The flood wiped out food supplies and production capacity. After the emergency relief ended, communities were forced to use scarce monetary means to purchase food. Their narrow base of monetary income-generating activities proved to be their main source of vulnerability in the short run.

The study suggests a series of priority actions to stimulate economic recovery of the indigenous and Maroon communities in the Sipaliwini District. In the short run, food security and access to monetary means is crucial. The study report makes several practical suggestions, which at the same time stimulate productive activity and improve school attendance as well as enhance the functioning of market mechanisms. In the long run, it is critical to ensure the rights and political participation of the indigenous and Maroon communities to enable them to fruitfully embark on development initiatives that would bring them greater freedom and improve their living conditions.

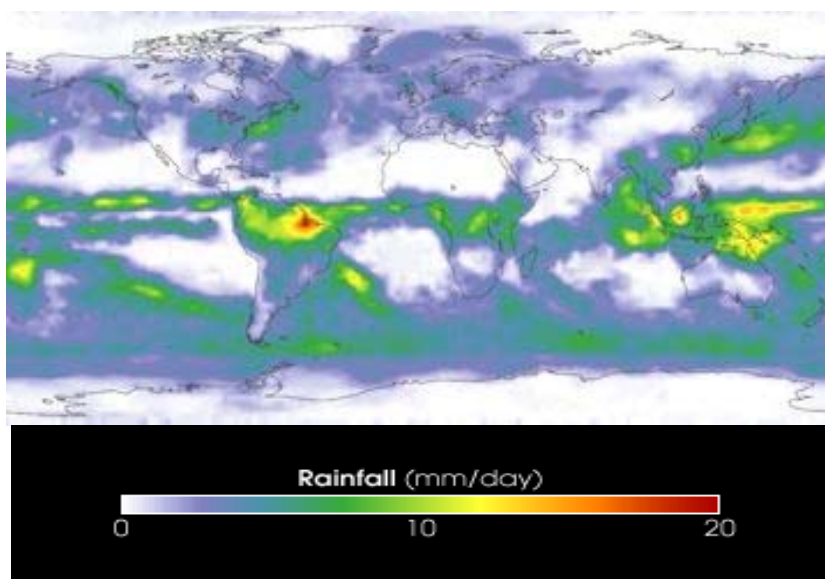
I. Background

A. Description of the event

In the last week of April and the first week of May 2006, heavy and sustained rainfall in a wide area including the central, south and south-east mountain ranges of Suriname caused water levels in the major rivers in central and east Suriname to rise extraordinarily.¹ Points of measurement are few and far between in this vast, sparsely inhabited and underdeveloped part of the country, but not one of them reported rainfall of extreme intensity: 80-120 millimeters per day is very high but not uncommon for the time of the year, which is the start of the long rainy season. Rather more exceptional is the fact that all points of measurement in the area reported heavy rainfall for several days during the period. It appears that a vast rain cell was stationary for an extended period of time covering virtually all affluents of the rivers Suriname, Sipaliwini, Saramacca, Marowijne, Tapanahoni and Lawa. It suggests that the inter-tropical convergence zone (ITCZ), an area of little wind created by the collision of currents from the south-west and the north-east, a phenomenon that is known to sailors as the doldrums, covered the entire center and south-east of Suriname, provoking heavy precipitation. Figure 1 shows the band of ITCZs around the equator in April, with heavy rainfall recorded precisely in the north-eastern part of South America.

¹ The description is based on Botterweg, J. and W. ten Brinke (2006), *Overstromingen Suriname 2006: Oorzaken, herhalingen en preventiemaatregelen*. Rijkswaterstaat/Ministerie van Verkeer en Waterstaat.

MAP 1
GLOBAL PRECIPITATION IN THE MONTH OF APRIL

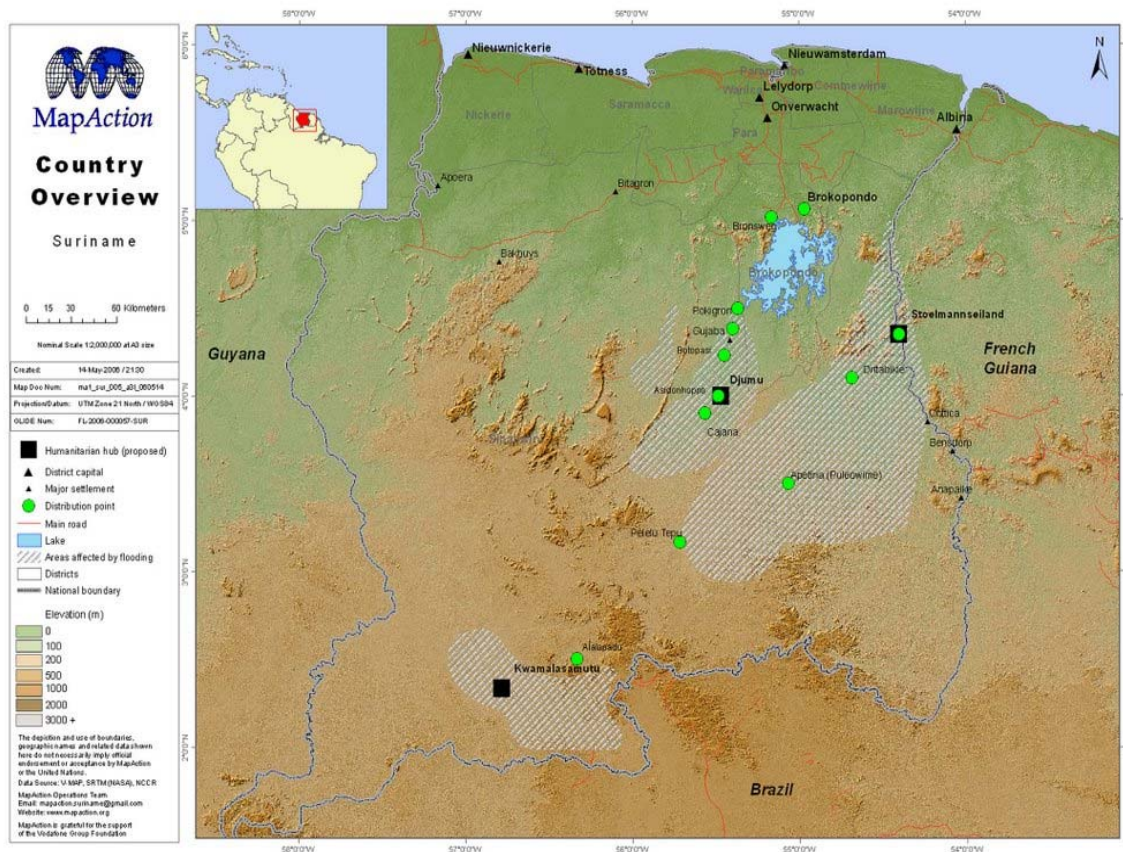


Source: Earth Observatory, NASA. (www.earthobservatory.nasa.gov)

Another possible part of the explanation is that the soil might have been soaked after higher than normal rainfall in the preceding months, provoking faster drainage. It cannot be established for certain if this was the case.

The consequence was that the rivers rose steadily to levels that had not been witnessed since 1949. In places where water in the rainy season usually rises to 5-7 meters above the base level, on this occasion it rose to 12 meters and therefore covered a wide area. The Suriname River, which feeds into the Brokopondo Lake, has registered an average flow of close to 500 m³ per second at Pokigron between 1952 and 1978. The maximum registered volume in those 25 years was 900 m³ per second. Calculations based on the water level rise in the lake suggest that in the first days of May 2006, between 3000 and 8000 m³ per second were added, most of which must have come through the Suriname River. The volume of water must have been at least three times the maximum that was on record.

**MAP 2
AFFECTED AREAS**



Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Source: www.mapaction.org

Significant is that the level of the rivers rose, according to villagers, at a not unusual speed. Water was high and rising, but people went to sleep trusting that it had reached its peak. It had not and along the Suriname River people woke up in the middle of the night with water creeping into their hut. Another significant aspect is that the water stayed three to six days at extremely high levels, implying that subsistence plots were flooded for days in a stretch. The consequences of these features will be detailed later.

B. Affected population

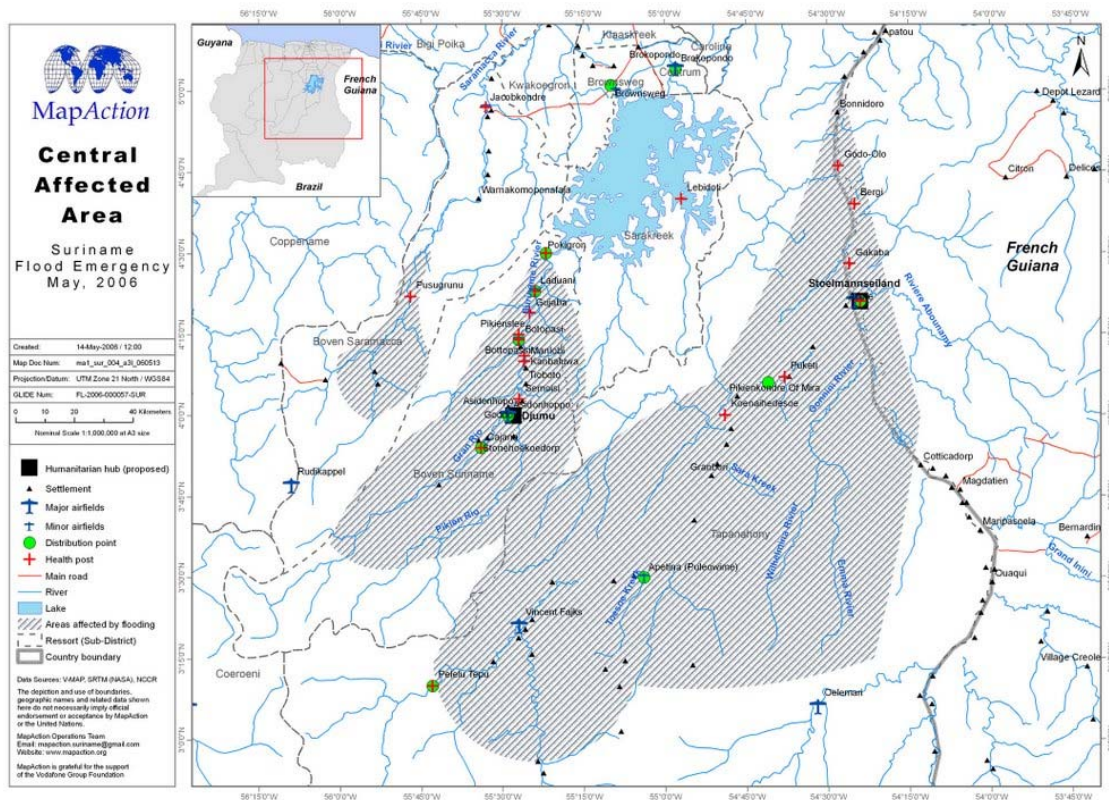
The Districts of Brokopondo and Sipaliwini were affected most heavily. Sipaliwini comprises 80 per cent of the landmass of Suriname but only 7 per cent of the population. It covers the whole central and southern part and includes mountain ranges and their piedmont that gently descends into the northern coastal lowlands. Brokopondo is the district that includes the Afobakka dam and Van Blommenstein lake, which has some inhabited islands. Data from table 1 indicates that the affected population comprises, for the two districts combined, some 48,351 persons.

TABLE 1
POPULATION OF SURINAME BY AREA AND DENSITY BY DISTRICT

District	Population	Area in km ²	Density
Paramaribo	242 946	182	1334.9
Wanica	85 986	443	194.1
Nickerie	36 639	5 353	6.8
Coronie	2 887	3 902	0.7
Saramacca	15 980	3 636	4.4
Commewijne	24 649	2 353	10.5
Marowijne	16 642	4 627	3.6
Paramaribo	18 749	5 393	3.5
Brokopondo	14 215	7 364	1.9
Sipaliwini	34 136	130 567	0.3
Total	492 829	163 820	3.0

Source: Table 3: Population, area and density, per district, General Population and Housing Census of Suriname August 2004

MAP 3
AFFECTED VILLAGES, EXCEPT KWAMALASEMUTU



Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Source: www.mapaction.org

Within these two districts some two thirds of the population was affected. They represent some 6 per cent of the total Suriname population, as detailed in table 2.

The primary population that took the brunt of the disaster lives in the Sipaliwini District which is home to some 50 major Maroon and indigenous villages and over 100 smaller settlements for a total population of 34,136. These groups, Maroons and indigenous peoples, comprise some 15 per cent and almost 4 per cent of the national population, respectively.² In Sipaliwini District, severely affected communities could be found living along the Marowijne River from Langatabiki to Stoelmanseiland; along the Tapanahony River from Manlobi to Dribabaki; and along the Suriname River from Pokigron to Anwara Dan; the Saramacca River from Popukampu to Mofina; and in the Kwamalasemutu and Tepu areas.

TABLE 2
THE AFFECTED POPULATION BY DISTRICT AND RESORT

District	Resort	Total Population	Males	Females	Severely Affected Population	% of the Population Affected
Brokopondo		14 215	7 571	6 622		
Sipaliwini		34 136	16 131	17 981		
	Tapanahony				13 805	
	Boven Suriname				15 057	
	Boven Saramacca				1 537	
	Coeroeni				1 299	
Total		48 351	23 702	24 603	31 698	66%
Percentage						
Total Population of Suriname		492 829	247 846	244 618		6%

Source: ECLAC estimates based on Government of Suriname data

C. Reactions and emergency relief

The water must have reached many homes along the upper-Suriname river in the early morning of Saturday 6 May and in villages on other rivers a few hours later. The villages are very isolated, from the outside world and from each other. People and village communities could rely only on themselves in the first three days or so of the crisis. Amazingly, no lives seem to have been lost. People must have reacted well; self-help and organized response at the village level stood up to the test. This was confirmed by the ECLAC team during the interviews. The able-bodied immediately looked after the children and the elderly. Village captains ordered canoes to go out and check on the huts farthest away and most in danger. The very compact way that the villages are built must have contributed to the success of the initial reaction in terms of avoiding human

² The Indigenous in Suriname comprise four distinct peoples: Kalina (referred to as Caribs), Lokono (referred to as Arawaks), Trio and Wayana. There are some isolated settlements of Akurio, WaiWai and other peoples in southern Suriname. In total there are some 35 indigenous villages in Suriname, some on the coast and others deep in the interior of the country. The Maroons descend from Africans who escaped from enslavement and established free autonomous communities along the major rivers of Suriname's rainforest. They are the Saramaka, N'djuka (or Aucaner), Matawai, Kwinti, Aluku and the Paramaka. Maroons consider themselves, and are perceived to be, culturally distinct and regulate themselves according to their own laws and customs. Their freedom from enslavement and rights to lands and territory, and the autonomous administration thereof, were recognized in treaties with the Dutch colonial government as early as the 1760s. Those treaties have however not been translated into contemporary legislation and collective land rights for the Maroons and indigenous peoples remains a high-priority issue in Suriname. Both groups have been sustained by Suriname's rainforests, savannahs and coastal forests, and these remain the most important subsistence resources.

loss and major injuries. However, soon enough it became obvious to the otherwise very self-sufficient and autonomous Maroon and indigenous communities that they could not deal with the situation on their own.

Granman Aboikoni of the Saramacca Maroons might well have been the first to get the word of the disaster out, through radio contact. Reports of floods in the interior seeped through to the national disaster response coordination center (NCCR³) in the afternoon of 6 May. On the morning of 7 May, a first reconnaissance flight was undertaken. By Sunday 7 May, word had reached the Netherlands. The NCCR coordinator gave radio interviews and the Surinamese Diaspora in that country reacted instantaneously. The President declared the affected areas to be a ‘disaster area’ on Monday 8 May. The emergency coordination center had several disaster scenarios and plans ready, but not one for floods in the interior. The event took everybody virtually by surprise.

The Government established a crisis team of ministers, led by the Minister of Regional Development, as the authority for crisis control. The team was comprised furthermore of ministers of justice and police, health, defense and finance. The NCCR activated the national crisis centre and initiated operation “Falawatra” to conduct and coordinate relief efforts. Emergency assistance flowed promptly and the NCCR established 10 distribution hubs in the interior from which further assistance was provided to affected villages and communities. NCCR was supported by a network of NGOs operating in the interior, as well as by UNDP and the Pan American Health Organization/World Health Organization (PAHO/WHO). Priorities for the emergency operations were search and rescue, food security, drinking water supplies, shelter and health. Daily coordinating meetings were held with the national army, the police corps and fire brigade, all of which made emergency workers available from their organizations, the District Commissioners which are the local authorities, as well as the Red Cross and other international support organizations, including the United Nations Disaster Assessment and Coordination (UNDAC) team.

Funding for the emergency assistance came from the government, NGOs, private sector, individuals and the international community. The immediate expenses of the emergency operations are estimated at SDR 3.8 million, in addition to the support in cash and kind by the international community. Because of the logistical problems and the isolation of the affected areas, transportation costs amounted to 65 per cent of the total costs. Of this, transport by air, boat and road accounted for 50, 6 and 2 per cent, respectively, with the remainder of the transportation costs accounted for by fuel. A total of 31,078 food packages were delivered to the affected areas. Of these 18,635 had to be transported by air and the remainder by road and boat. By 19 August the state of emergency in the affected areas was formally ceased.

TABLE 3
RELIEF ASSISTANCE AS AT NOVEMBER 2006, US\$000'S

Donor	Amount
Belgium	123
Brazil	In kind
EU	892.9
France	62.1
IDB	200
IFRC	78.7
Netherlands	2758
Neth. Red Cross	283.3
OAS	10
Private	2441.8
Sweden	65.4
UN	130
USA	250
Venezuela	In kind
Govt of Suriname	1.000
Indonesia	..
China	..
Total	7271.2

Source: Relief web

³ Nationaal Coördinatie Centrum Rampenbeheersing. The present section is based on a powerpoint presentation by Overste J. Slijngard, NCCR Coordinator, August 2006.

II. Assessment of the socio-economic impact of the floods on sustainable livelihoods

A. Sustainable Livelihoods Approach (SLA)⁴

This report inserts the analytical framework of the Sustainable Livelihoods Approach (SLA) into the ECLAC disaster assessment methodology in order to focus on the vulnerability context of livelihoods as the bases for policy recommendations.

It is understood that for livelihoods to be considered sustainable, they should demonstrate:

- (a) Resilience in the face of external shocks and stresses;
- (b) Capacity to maintain the long-term productivity of natural resources; and
- (c) Ability not to undermine or compromise the livelihood options open to others.

The SLA examines the vulnerability context of the affected groups according to the human and social capital which they possess, the natural and physical capital at their disposal and the financial capital available.

⁴ The Sustainable Livelihoods Approach was developed by the Department for International Development (DFID), see www.livelihoods.org.

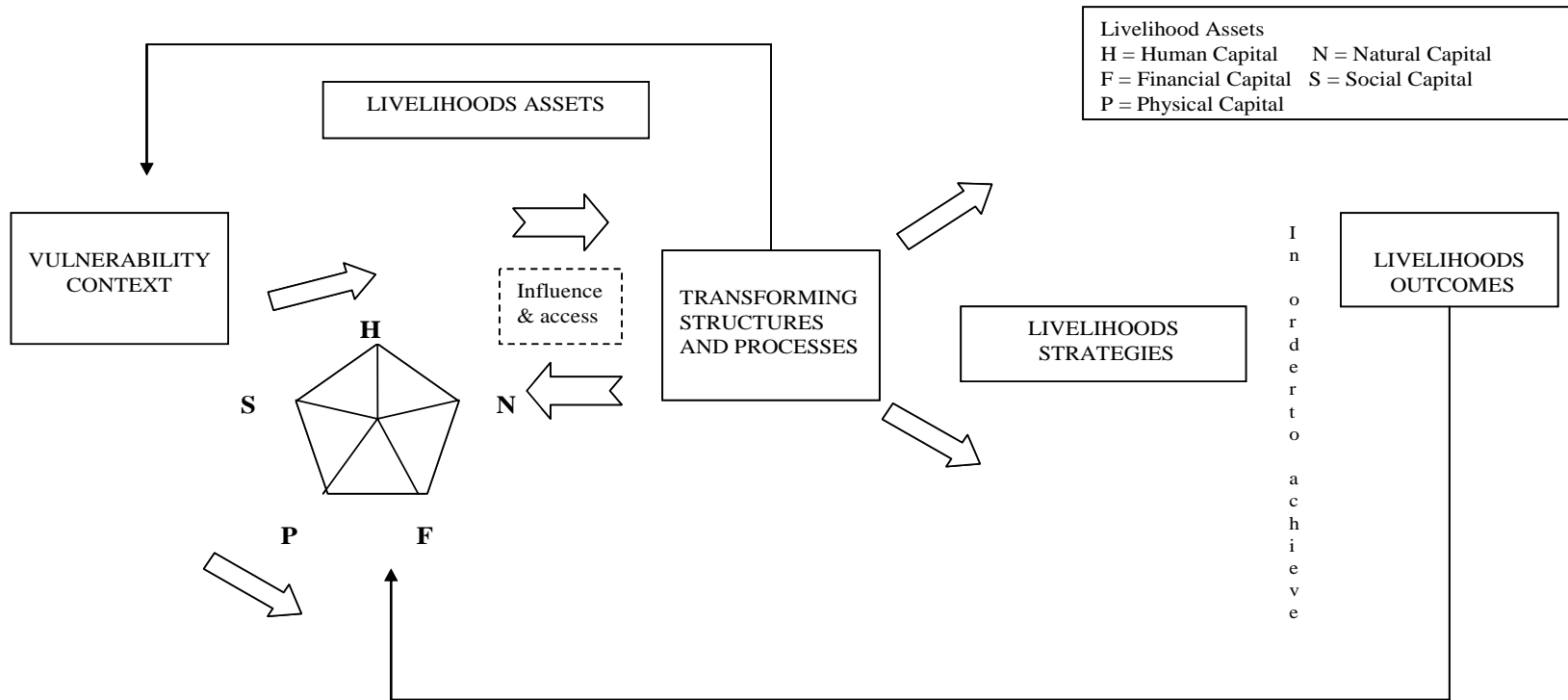
Disaster assessment using the SLA seeks to ascertain:

- (a) Where were the affected communities located?
- (b) Which households were affected (how many and to what extent);
- (c) What were the damage and losses suffered by households with regard to their assets?
- (d) How were their income-earning activities affected?
- (e) What would it take to restore the capacity to make a living?
- (f) What assistance is required to build resilience and reduce future risk; and
- (g) What will it take to make the affected households' livelihoods sustainable?

The unit of analysis for the SLA is the household. In undertaking a rapid assessment of livelihoods, as needs to be done following a natural disaster, the methodology involves key informant interviews and group interviews which seek to ascertain the processes of the primary, secondary and tertiary income-earning activities of the households in the affected areas; and the structures, contributors and beneficiaries of the households' current livelihoods. Such an assessment also seeks to understand how each activity has been affected by the recent disaster. Finally a gender analysis is applied to understand the differential impact of the disaster on the livelihoods of men and women. From such a comprehensive analysis, recommendations that will support sustainable livelihoods follow.

The Sustainable Livelihood Framework (SLF) (see figure 1 below) shows the relations between the main analytical components of the SLA. At the center are the livelihood assets: human, social, physical, financial and natural capital. In the context of the Maroons and indigenous peoples, cultural and spiritual assets would probably also be very important to mention, although ECLAC does not have the methodology to measure it. Policies, institutions, transformation structures and processes determine access conditions for households to the livelihoods assets as well as the vulnerability context in which they operate. This shapes and determines the sustainable livelihood strategies that households can pursue to achieve the desired outcomes such as income, well-being, reduced vulnerability and improved security, to enhance their freedom. The interactions between institutions, strategies, assets, vulnerability and outcomes can be described in historical perspective. In the next section, a brief overview of the history of human settlement in the Surinamese rainforest is presented with the components of the sustainable livelihoods framework in mind. Subsequently, the vulnerability context and the analysis of assets, strategies and outcomes are summarized. The impact of the natural disaster on sustainable livelihoods will be analyzed in the final chapter, after the description and assessment of damages and losses.

**FIGURE 1
THE SUSTAINABLE LIVELIHOODS FRAMEWORK**



B. Policies, institutions and processes in historical perspective

Helman, in his colossal work on the history of the Guyanas⁵, situates the earliest arrival of humans somewhere between 30,000 and 10,000 years ago, as part of paleo-asiatic immigration that populated the American continent from the north-west. He considers two main groups, the Arawaks being the earlier settlers, followed by the Caribs. The Trio and Wayana communities that were affected by the May 2006 floods are, according to Helman, contemporary and maybe related to the Caribs. Before the arrival of people from across the Atlantic, settlements had developed where some agriculture played a part, witnessed by the mounds found in coastal swamps. They mastered pottery. Other groups remained mobile hunters and gatherers and fabricated, for example, stone weapons, arrows and canoes. Elaborate signs on rocks, now petroglyphs, were probably used for purposes of orientation and rituals. Although they found gold, there are no signs of metallurgy. Communities were small, extended families of at most a couple of hundred persons. Trade existed, with some villages specializing in hammocks and textiles, others in fabricating canoes or poison for arrows, for example. They did not accumulate many possessions and property was mostly communal. The 15 indigenous villages in the area affected by the floods are the home of 2,350 people⁶ who preserve many of the cultural and organizational traits as well as livelihood strategies from those early settlers.

Spanish adventurers sighted the coast of present-day Suriname just before the year 1500 and sporadic explorations interested in gold ventured on land and upriver in the sixteenth century. Attempts of settlement failed until Lord Willoughby out of Barbados established in the mid-seventeenth century a foothold that was the start of effective colonization of the coastal plains. The early English settlers established tobacco and sugar cane plantations using enslaved laborers from African origin. After a few years the colony was overtaken by the Dutch who expanded the plantation economy and the slave trade.

Helman, who had indigenous blood himself, reports that in the beginning relations between colonists and the indigenous population were “reasonable”: there was some wood trade and the enslavement of indigenous peoples was officially discouraged. The expansion of plantations pushed indigenous settlements further inland and hostilities ensued. A peace agreement, in which the colonizing force recognized the existence and the rights of the indigenous population, was achieved as early as 1686. Many more peace agreements were to follow but to this date, land titles of the indigenous communities remain uncertain. Most indigenous communities do not accept individual titles in the form of land lease and insist on recognition of collective land titles.⁷ Lack of recognition of collective land titles is probably the single most important cause of vulnerability. Indigenous peoples were affected by the curtailing of access to their main asset: the natural capital of the territory they occupied. In exchange, through contacts with the new settlers, timber trade and migration to work for a wage became part of their livelihood options.

Enslaved persons from African origin who were put to work on the plantations soon revolted and escaped. There are reports of such events in Suriname from the mid-seventeenth to the late nineteenth century, when slavery was abolished. They fled, sometimes with help from indigenous people who considered them possible allies against the white intruders. Based on African traditions, the Maroons set up communities that were mainly self-sufficient although the occasional raid on plantations and colonial settlements provided necessary weapons and means of subsistence. For most of the eighteenth century, the colonial power fought the Maroon communities but at the same time commercial contacts also developed, especially through timber trade. A peace treaty was

⁵ Helman, A. (1995) *Kroniek van Eldorado*, Globe Pocket 32, Amsterdam.

⁶ Kambel, E. (2006) Policy Note on Indigenous Peoples and Maroons in Suriname, Economic and Sector Studies Series, IDB

⁷ Kambel, op.cit.

signed with the major groups in 1760, recognizing their existence and their freedom to settle in the interior with autonomous socio-cultural and political entities.⁸ As is the case with the indigenous communities, more peace treaties were to follow but so far none has given the Maroon communities effective land titles. The livelihood strategies they developed mirrored those of West Africa, complemented by elements from the indigenous communities such as the use of the canoe, a means of transport the Maroons subsequently adapted to specific circumstances (particularly for passing over rapids in the large rivers). Subsistence agriculture, hunting and fishing, as well as the sporadic timber trade and migration for paid work, increasingly also to French Guyana, made up the essence of their sustainable livelihoods until the close of the nineteenth century, not unlike the situation in the indigenous communities.

Suriname underwent radical transformations in the second half of the nineteenth century. Slavery was at long last abolished (1863) and contract laborers were brought in from different parts in Asia, adding to the ethnic diversity of the population. The decline of the plantation economy could not be stopped, however. The discovery of large deposits of gold in the 1870s created a rush that provided some peoples of the forest with additional opportunities to earn a monetary income, through the provision of transport services and labor to the gold miners. Missionaries from the Moravian and Roman Catholic churches ventured into the Maroon and indigenous communities to provide, for the first time in-situ, western-type education and medical services together with the spread of their faiths.⁹ A short-lived balata or rubber-boom around 1900 also created some economic opportunities for people of the interior. Gold production declined steadily after 1908 and bauxite mining from the 1920s onward took the place of plantation products and gold as the driver of the Surinamese economy. Bauxite mining would also offer employment opportunities for Maroons on the coastal plains.

Livelihoods and the vulnerability context of the peoples of the forest would undergo significant additional transformations starting from the 1940s, when the introduction of the outboard motors signified a technological revolution for the interior. Travel times were reduced from two to three weeks paddling to two to three days in a korjaal with outboard motor. Fuel became a crucial monetary outlay for the Maroons and indigenous communities. Operation Grasshopper, a project to map the country's mineral deposits from the air, established in the 1960s landing strips that reduced travel time to two to three hours for the relatively few who could afford the cost. From the 1950s, the appointed State authorities in charge of the interior, District Commissioners and local administrators called Bestuurs Opzichers (overseers), stepped up the formal contacts with traditional authorities of the forest peoples. The interior became relatively less isolated and the peoples of the forest enhanced their integration in the Surinamese nation.

Despite formal recognition in peace accords, the participation of Indigenous and Maroon communities in the political organization of the country had been nonexistent up to the elections of 1963, when a registration campaign in the interior allowed them for the first time to vote. The problem of the lack of political representation and the undefined nature of property rights had become evident in the course of the construction of the Brokopondo Dam, created to provide energy to Suralco's aluminium smelter and, by extension, the coastal plains, including the capital city. The agreement to create the lake was signed in 1958. Around 6000 Maroons living in the area that was about to inundate were relocated by the aluminum company. It is ironic that despite this sacrifice, to date the forest peoples upstream still do not benefit from the energy of the dam. Another irony of history is that the village of Nieuw Koffiekamp, named after the old Maroon village of Koffiekamp that lies now at the bottom of the lake, was established precisely in an area where a Canadian gold

⁸ Organization of American States (2001), *Peace and Democracy in Suriname, Final Report of the Special Mission to Suriname (1992-2000)*, Washington.

⁹ In 1874, primary education was declared mandatory and African ("heathen") rites outlawed, in a policy of "assimilation" that lasted until the 1930s, when Asian marriage law and traditional forms of community organization were legalized (OAS, op.cit).

mining company would soon discover an important gold deposit. The insufficiency of political participation and hence the lack of legal procedures for meaningful participation in decision-making about resource exploitation is probably the second most important cause for vulnerability. This includes decisions about the establishment of areas to protect nature. The Nature Protection Act of 1954 forbids hunting, fishing or practicing agriculture, and denying indigenous and Maroon communities access to vital livelihood assets¹⁰.

It should have been evident that the insertion of the traditional leadership of forest peoples in the nation's governance structures was an important topic. Nevertheless, the Constitution of 1975 with which independent Suriname was born, does not mention the political organization of traditional village communities at all.

This state of affairs took a tragic toll when the democratically elected government was overthrown in a military coup in 1980. The background to this coup was a growing popular frustration with "old-style" politics and their failure to deliver on promises of development after independence, despite the availability of an unprecedented amount of financial resources from the Netherlands. A labor dispute in the military triggered a coup that at first had significant popular sympathy. The new military leaders however showed little interest to restore democracy quickly, spawning increasing opposition. After the execution of 15 opposition leaders in December 1982, a more radical authoritarian socialist approach prevailed.

Dutch development aid was frozen as a reaction to this violation of human rights. Also, world prices of alumina plummeted. The economy got into a tailspin and Suralco was forced to lay off hundreds of Maroons employed in the bauxite mining. The socialist authorities established so-called people's committees and people's militia designed to enhance local participation in the revolutionary process and in so doing, created a novel form of political control at the community level that seriously threatened traditional village leadership. By late 1984 disenchanted young Maroons from the Marowijne area had formed an armed resistance cell. Inflation was rampant in 1985 and especially damaging to the economy of the forest peoples. The recall of paper money and their replacement with new bills of another denomination in late 1985 was devastating for the interior. The army clamped down hard-handedly on so-called smugglers in Albina. In February 1986, traditional village leaders met with government representatives to express their grievances, to no avail. They were henceforth unable to stem the movement to violent resistance. In July 1986 a group of young Aucaner Maroons, known as the Jungle Commando, launched their first attack on military posts. As it goes, the soldiers in the army, victims of these attacks, also included people from indigenous and Maroon descent.

The bloody "interior war" that ensued would last six years before a peace accord was reached in 1992. The development of the interior suffered tremendously. Communication and civilian transport was virtually impossible. Health and education services were abandoned. Businesses closed down, including the first ecotourism resort that was established in the early 1980s in the upper Suriname River. Inflation had made work for wages rather pointless and many inhabitants of the forest resorted to gold mining and migration to French Guyana and beyond. Several parties in the conflict seem to have collaborated with international drug traffickers.

By 1991 the military grip on power had waned and the democratic government of President Venetiaan was successful in placing the military under civilian control and brokering a peace accord with the guerrilla groups of the interior. The accord once again recognized the right of development of the indigenous and Maroon communities of the interior with preservation of their traditional cultures and forms of organization. Implementing this accord was going to require a protracted effort.

¹⁰ Kambel, op.cit

The Organization of American States (OAS) report reads: “The physical destruction of infrastructure and fighting during the interior conflict led to a collapse of the governmental service delivery system and left the interior isolated and dangerously lacking in routine services”. An Evaluation Commission of the Peace Accord was created in 1994 to oversee and monitor the rebuilding, development and improvement of the interior, necessary for a durable peace. A Council for the Development of the Interior, envisaged in the Peace Accord, was to be established and the thorny issue of land rights was to be settled. It was not before the year 2000 that a Framework resolution on Land Rights was signed.

The issue is far from resolved, however. In 2005, the United Nations Committee on Elimination of Racial Discrimination had to express “deep concern about authorizing additional resource exploitation and infrastructure projects that pose substantial threats of irreparable harm to indigenous and tribal peoples, without notification or seeking prior agreement or informed consent”.

The proposed policy for the period 2006-2007¹¹ sets out, among others, to “clarify the legal position of traditional authorities” and to “support and facilitate the dialogue among stakeholders about solution models for the question of land rights”. On this hinges the improvement of access to livelihoods assets of the communities, because 60 per cent are currently located within a logging concession and 40 per cent are in or directly affected by mining concessions.¹²

C. Livelihoods assets and the vulnerability context: a summary

The settlement patterns, policies and institutions described above, particularly as they relate to access to natural capital, social services and economic opportunity, show the process of isolation and marginalization which characterizes the vulnerability context for the communities. Following the flooding, this proved to be at the core of both their susceptibility and resilience.

These communities contain peoples with many similarities yet differing social structures and cultural patterns of livelihoods. Among them are livelihood groups as diverse as subsistence and commercial farmers; miners and small-scale commercial traders; skilled artisans and day laborers or hired hands, thus making each group’s susceptibilities distinctly different. Indigenous communities in the southern part of Sipaliwini are less integrated in the cash economy than some of the larger Maroon communities. In addition, the cultural patterns of women’s and men’s work in the two ethnic groups can increase the susceptibility of one gender group over another.

This section of the report seeks to explore the differences in household susceptibility found within the communities that may have resulted in various levels of increased vulnerability. Exploring these susceptibilities and making them clear improves the chances of developing programmes and projects that can lead specifically to the reduction of risk and the increase of resilience to future hazards.

Vulnerability has been defined by the Kobe World Conference on Disaster Reduction as the “conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards”. In the 2006-2011 Multi-Annual Development Plan (MOP) the government acknowledges the vulnerability of Suriname to various external and internal shocks both of an economic, environmental and social nature. The vulnerability of the people that reside in the areas affected by the May 2006 floods can be attributed to a multi-dimensional set of factors, including physical, social, economic and environmental conditions, which increased their susceptibility. Table 4 below summarizes the main characteristics of vulnerability of access to livelihoods assets.

¹¹ Ministerie van Regionale Ontwikkeling (2006), Beleidsnota 2006-2007

¹² IDB, Suriname Country Environmental Assessment

TABLE 4
VULNERABILITY OF ACCESS TO LIVELIHOOD ASSETS IN SURINAME'S SIPALIWINI DISTRICT

Components	Main characteristics
Human	Low levels of education make interior villages and their inhabitants vulnerable because it limits access to information and knowledge about dangers and threats. Public health issues related to limited primary health care facilities, consistent access to safe water resources, burial traditions, solid waste management and other sanitary concerns are a case in point. Another example is the threat of HIV/AIDS and other diseases.
Social	Low school attendance and lack of primary and secondary schools and access to information in the interior also limit the opportunities to expand the set of sustainable livelihoods open to communities. Especially the female population has a skill set that is not easily transferable to other forms of livelihood.
Financial	Monetary poverty affects virtually all inhabitants of the Sipaliwini District. Their asset base is very narrow and their insertion in the monetary economy is very weak. Poverty enhances vulnerability and reduces resilience in many ways.
Natural	Its remoteness characterizes the Sipaliwini District. As is the case with independence and autonomy, remoteness has both positive and negative consequences in the vulnerability and resilience context. Threats and dangers from outside are mitigated by remoteness; alternative livelihood options and outside support are limited and costly. The natural habitat has its dangers for human life, such as malaria and mercury poisoning of water resources by artisanal gold miners. It also offers opportunities for sustainable livelihoods that require adequate management. Cases in point are logging and mining. Shifting cultivation systems and hunting and fishing, on which food security rests, are low-productivity activities that in some cases are approaching the limits of sustainability.
Physical	Human settlements have been built on islands and riverbanks, sometimes too close to high water levels. Infrastructure for land transport, energy and communication is virtually absent. This enhances vulnerability in situations of both extremely high and low water levels.

Source: Based on the Economic Commission for Latin America and the Caribbean (ECLAC) Subregional Headquarters for the Caribbean field work.

1. Human and social capital

Human capital represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies; and the term social capital has been used to refer to the social resources upon which people draw in pursuit of their livelihood objectives.¹³

The most affected population shows the paradox of having strong social capital coupled with weaknesses in human capital due to the absence of a supporting environment. Because of the deeply rooted nature of such rural and isolated communities, strong bonds and trust among household members and among households develop. This was repeatedly demonstrated among the Maroon communities and was best exemplified by a partially disabled woman, aged 75, who reported to the ECLAC team that she managed to withstand the floods and its hungry aftermath, through the support she received from her sister's son and other children of the village. Another example of the support which the social capital provided to people was apparent in the response mechanisms to the disaster provided by the traditional Granman or paramount chief. It was reported that immediately upon notification of the rising waters, under his authority boats were sent out to low lying islands to assist in the removal of people, thus ensuring everyone's safety.

Weak human capital may mean that persons possess a narrow skill base that is not easily mobile. It could also mean low levels of educational attainment, making it difficult to take advantage of economic and social opportunities if and when they become available. Such uneven combinations of social and human capital may challenge the best capacities for resilience of a people.

¹³ DFID Sustainable Livelihoods Guidance Sheets 1999

The achievement of livelihood objectives is dependent on the quality of human capital available within those communities. Male members of the Maroon and indigenous communities possess skills which are easily transferable from one type of activity, such as agriculture or construction, to others where opportunities may arise, such as mining. Men are traditionally engaged in hunting activities, which enables them to be mobile. The informal sector in Suriname is relatively large. Logging and gold mining form the backbone of the informal economy, generating significant income and employment for many of the otherwise economically deprived. It is estimated that there are currently about 15,000 - 25,000 people engaged in small-scale gold mining, about half of whom are Brazilian *garimpeiros*¹⁴. Male members of the Maroon community are considered to form a substantial part of this informal sector both contributing to their resilience and susceptibility at one and the same time. In the short to medium run, such involvement may provide much needed income to the Maroon households and communities but in the long run, ill managed mining may increase the susceptibility of nearby communities through the degradation of forest ecosystems which are ultimately necessary for sustenance. It may also result in deteriorating health conditions of the community due to poorly managed mining processes with the use of mercury and potential spread of Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) due to the mobility of male miners.¹⁵ Less easy to transfer are the boat production and woodcarving skills as well as spiritual healing practices. Female heads of household, on the other hand, have important skills such as language and other cultural heritage related skills such as the production of handicraft and food products, and traditional knowledge (including on traditional healing and medicinal plants, agricultural practices) but those are also not easily transferable. In addition, their reproductive roles and responsibilities reduce their mobility.

2. Poverty

Among the indicators most often correlated with vulnerability is that of poverty. Examining poverty can often lead to an analysis of the strength or weakness of the assets and resources in a household or a community. The poorest have been found to be the least able to rebound from the effects of a natural disaster as they possess the least assets. Very often the assets which they possess are not of a diverse enough nature that would allow them to spread the risk during difficult times.

Many households in Suriname are considered to be poor. The national average falls somewhere between 62 and 74 per cent.¹⁶ It must be noted that this is a national poverty line, employed by the General Bureau of Statistics of Suriname, which is not readily comparable to internationally used poverty lines. In the interior, most households depend on subsistence farming rather than a money income for food intake and therefore a monetary measure of poverty is not necessarily accurate. However, subsistence farming is of the slash-and-burn type and exhibits very low levels of productivity. It is therefore safe to assume that most households in the area affected by the floods are poor by any monetary standard. The May floods exposed the narrow livelihoods base which supports most families. The flooding not only deprived people of their stocks of food supplies which they had already reaped and processed (cassava into quack), but destroyed crops in

¹⁴ Marieke Heemskerk in "Gender and Gold Mining: The Case of the Maroons of Suriname", suggests that three quarters of the small-scale gold miners in Suriname are believed to be Brazilian gold miners. Similar information is presented in the "Issues Paper: Information Issues in the Suriname Forest Sector", Tropenbos International Suriname Programme, Version 16, March 2004.

¹⁵ Marcello M. Viego, Ph.D., "Artisanal Gold Mining Activities in Surinam" a UNIDO report December 1997

¹⁶ Official estimates of the proportion of the population living below the poverty line (defined as meeting a minimum subsistence level of US\$50 per adult per month) in the year 2000 range from 63 per cent - 74 per cent (ABS 2001). In a paper by Dr. Bintiawatie Soedhwa, of the General Bureau of Statistics in Suriname, entitled "Longitudinal analysis of possible links between poverty and mortality in Suriname, January 2005" it is noted that Suriname moved from between 13 and 30 per cent poor households in 1968/69 to between 57 to 71 per cent in the last quarter of 2000. See also Suriname: MDG baseline report (UNDP, 2005)

the ground and made the agricultural plots unusable for immediate replanting.¹⁷ Without a doubt, this is an impoverishing cycle for subsistence farmers, thus increasing their overall vulnerability.

Another aspect of poverty relates to income distribution. Income inequality is reported to have worsened over a 30-year span. It is reported that from the 1968/1969 Household Budget Survey, a Gini –coefficient of 0.2522 was obtained, the figure for the 1999/2000 survey turned out 0.4552¹⁸, suggesting a trend towards deepening inequality.

Over the years Suriname has seen a high level of out-migration, particularly during the periods of economic crisis. However, these migrants maintain a steady stream of support to their relatives who remained behind and their remittances in cash or in kind help keep a number of families from sinking into absolute poverty.

3. Education

“Education is a vital prerequisite for combating poverty, empowering women, protecting children from hazardous and exploitative labour and sexual exploitation, promoting human rights and democracy, protecting the environment and influencing population growth”¹⁹

The Ministry of Education and Public Development (MINOV) Draft Sector Plan on Education 2004-2008, views its mission as among other things, “developing a more effective and efficient education system; and a just education system which provides equal chances for everyone”. It notes that the education sector had clearly suffered over recent years with the result that it has not been able to contribute optimally to national development. Among the problems and bottlenecks which the Plan highlighted were the high percentages of failure and drop outs among children; and the outdated and underdeveloped curricula and teaching methods still in use. The Plan spoke to the lack of maintenance and surveillance of school buildings and the shortage of furniture. It also noted the dilapidated state of many school buildings. The May floods made plain the vulnerability of the sector in the interior.

There would be little disagreement that the education sector in the interior was already in a fragile state. Data from the MICS 2000 suggests levels of school attendance at 61.2 per cent in comparison to 81.6 per cent in the urban areas, and high drop out rates. Table 1 presents the percentage of children who enter first grade and reach grade five for the Districts of Paramaribo (92.6 per cent), Brokopondo (80 per cent) and Sipaliwini (45.9 per cent). According to these data, children in the interior are in all instances faring much worse than their urban counterparts. Literacy levels in the interior are reportedly lower, than those in other areas of the country with only 51 per cent per cent of the population 15 years and older being able to achieve a basic or functional literacy level, that of reading a newspaper easily.

¹⁷ The World Food Programme suggested in their May 2006 report that it could take, after replanting eight to twelve months to harvest.

¹⁸ Suriname Multiple Indicator Cluster Survey 2000, March 2001p.13

¹⁹ Suriname Multiple Indicator Cluster Survey 2000, March 2001 p.22

TABLE 5
SCHOOL ATTENDANCE AND DROP OUT BY DISTRICT

District	% of children of school age Attending School			% of children who enter first grade and reach grade five
	Males	Females	Total	Total
Paramaribo	80.9	80.9	80.9	92.6
Brokopondo	69.2	82.2	76.2	80.0
Sipalwini	49.3	54.5	51.7	45.9

Source: Table 10 and 11 MICS 2000

In regard to the quality of education received in the interior, it has been suggested that the lack of bilingual and bi-cultural education provided for the Maroon and indigenous communities in the Sipaliwini District, undermines their cultural identity and continuity. It has been further suggested that such a state of affairs is in contravention of the International Covenant on Civil and Political Rights to which the Government of Suriname is a signatory. The lack of secondary schools in the interior also increases the burden of Maroon and Indigenous children, as they must leave their families and communities in order to continue their education.

The language of instruction (LOI) in schools in the Maroon and Amerindian villages is Dutch (the national language), which acts as inhibitor to students' adjustment to the education processes. A report of the Working Group on Educational Research and Policy Analysis of the International Development Research Centre (IDRC), (1997) indicates that the language of instruction is of extreme significance in the education process. Their report suggests that policies which favour instruction in the mother tongues in the early years of basic education result in: (a) improved and faster acquisition of knowledge by pupils; (b) promotes the acquisition of second-language competencies; and (c) use of mother tongues as languages of instruction instead of proving to be ethnically divisive, actually results in students' developing integrative attitudes across ethnic groups.²⁰

Fees for attendance at primary school also increase the vulnerability of children in the interior. It has been reported that the SRD\$35.00 per child required also increases the likelihood that in large families there is not sufficient cash to cover the cost for all children. The end result is that one or two children from a family are able to attend.

The above is compounded by the general problems of the education sector, such as lack of transport facilities, inadequate school buildings, weak educational tools and materials, lack of qualified teachers and teachers' accommodation. All these factors contribute to making the education sector unable to provide the children of the interior with a stake in their country's future and increases their vulnerability.²¹

4. Health

Through a combination of the resilience of the people, who are riverine and have a wealth of knowledge with and about the waterways, and the health care providers, the Medical Missions (MZ) who serve them, no lives were lost and no serious injury incurred by the affected population during the period of the disaster.

²⁰ Languages of Instruction: Policy Implications for Education in Africa. Working Group on Educational Research and Policy Analysis, ADEA IDRC 1997 ISBN 0-88936-829-5 http://www.idrc.ca/en/ev-9304-201-1-DO_TOPIC.html 11/22/2006

²¹ MDG Baseline Report 2004

The Millennium Development Goals (MDGs) Baseline Report indicated that the most prevailing health problems in the hinterland are: malaria, anemia, pregnancy-related problems, sexually communicable diseases, problems regarding hygiene, restricted access to sanitary facilities (no latrines in most villages) and safe drinking water (villages obtain their drinking water from creeks and rivers).

It was noted that there was hardly any preventative health care in the villages.

The susceptibility of the population in the interior becomes sharper when the needs of these populations are matched against the steady departure of qualified personnel in the health field. Over the period 1996-2001, an estimated 33 per cent of health care professionals either left the field or emigrated. It has been suggested that with the exception of general practitioners, a shortage exists in almost every other capacity in the health profession.²²

5. Vulnerability of women and children

Custom and tradition allows men and women in the interior districts a large degree of autonomous action.

Men are responsible for clearing the land, providing game, bringing cash income into the household and products which are available mainly in the city; while women are responsible for the nurturing of their offspring, domestic tasks, and agricultural production. Women, by and large, control the management of the households and agricultural plots. Men, on the other hand, are engaged in seeking family income outside of the household. Women therefore have a dominant presence in the villages.

Women are dependent on men for the clearing of their agricultural plots and provision of boats and paddles.

Mobility of the male is an important expression of masculinity in the Maroon community and this has proved to be an asset as the communities move ever closer to the cash-based mainstream economy. In times of disaster, such as the May floods, the capacity to transfer skills from one form of labour to another allows the male to move rapidly into another sector to earn an income. Among females, both her narrow skill base and her reproductive and productive roles and responsibilities, make her less resilient.

Elderly women and men have become dependent on the social security benefits paid by the State to assist them in meeting their sustainable livelihood needs. A widowed woman may have to pay for labour to assist in the clearing of land or the repair of a boat or to purchase much needed dry goods from the city. Her male counterpart may need such income to purchase material required for the repair of a home or for gasoline to run his boat engine. Many elderly complained of the smallness of the sum which could vary from SRD135.00 to 185.00 and its tardy delivery, as increasing their hardships.

6. Physical capital - Housing

The term physical capital is used to describe the infrastructure and producer goods needed to support livelihoods. For the purposes of this vulnerability assessment, the focus was to ascertain to what extent households had secure shelter and an adequate water supply and sanitation.

²² Christine Laptiste (2004), "Estimating the economic impact of HIV/AIDS to Suriname", Department of Economics, The University of the West Indies, St Augustine

Near 14,000 households live in the affected districts of Brokopondo and Sipaliwini (see table 3). For the most part these households depend on the river and the forests for their livelihoods, water supply and sanitation. Although the table presents data for male- and female-headed households this may obscure the reality on the ground. Women predominate in the villages due to the absence of males who make their livelihoods outside of the village compounds, but who return regularly, to fulfil their prescribed family roles.

TABLE 6
HOUSEHOLDS AFFECTED BY THE FLOODING BY DISTRICT

District	Total No. of Households Affected	Severely Affected households	HH Male	HH Female	% of FHH Severely affected	%MHH Severely affected	% of HH Affected
Brokopondo	3 749		2 121	1 628			
Sipaliwini	9 915	9 915	4 607	5 308			
Total	13 664	9 915			54%	46%	73%
Total Suriname	126 366						

Source: ECLAC estimates based on Government of Suriname data

Their shelters consist, in the main, of wooden structures, with thatch or zinc sheeting for roof material. Most floors are earthen. Very few dwellings consist of cement and wood, with cement floors. Social custom allows for use of the house mainly for storage of family possessions and for sleep, with most other household activities occurring outside of the dwelling. Some villages had piped water running through the village, with a number of stand pipes. This water was pumped from the river directly into the villages, without purification processes.

The shelters are built with what appears to be inadequate setback from the rivers edge. This may not have been their original location, but with erosion occurring over time, the water's edge has climbed closer and closer to housing. Some villages are located on low lying islands that are susceptible to flooding. Attempts at moving households to higher ground on a permanent basis to date have not been very successful.

Not all villages received electricity. Those that did had electricity generated for a period of about three hours in the evening. Sanitary disposal of human waste is an issue of usual concern, as poor methods of disposal threatens the health and well-being of the entire community. Under conditions of flooding these conditions are exacerbated.

BOX 1 LIVELIHOOD STRATEGIES

With the assets and within the vulnerability context thus described, the Maroon and indigenous communities in the affected areas have developed a set of livelihood strategies that comprise the following activities and components:

Self-subsistence agriculture of the slash-and burn type and their support activities, together with hunting and fishing, with little use of modern techniques and very low productivity.

Limited work for wages in the interior at schools, medical missions, government centers, airstrips.

Modern, commercial but small-scale agriculture and fishing.

Small-scale services such as construction, repair and maintenance, retail trade.

Temporary migration to work for wages, such as in gold mining and logging, and also migration to Paramaribo and neighboring French Guyana for the provision of services occurs frequently. Risks involved are exposure to mercury in gold mining; sexually transmitted diseases in the cities.

Small-scale industries such as poultry, bakeries and other food products, furniture, wood carving and embroidery.

Eco-tourism services through specially developed resorts in or close by the villages.

In addition to the livelihood strategies above, it is important to mention that transfers, both in kind and in cash, from community members living permanently abroad as well as transfers from the Government to the 900 local authorities in the interior, have become important income streams.

Source: Based on the Economic Commission for Latin America and the Caribbean (ECLAC) Subregional Headquarters for the Caribbean field work.

7. Livelihood strategies: Agriculture

The interior of Suriname is essentially a subsistence agricultural economy. Agricultural production and income is supplemented by other sources of income, where possible, including working in gold mining and harvesting of forestry products, nonetheless, agriculture remains the overwhelming mainstay of this rural sub-economy. Typical of traditional subsistence farming systems, agricultural production is undertaken mainly for own consumption, with any surplus production sold in local markets, when there is sufficient demand. However, resulting in part from rudimentary systems of production and husbandry based on very basic technology, the shifting cultivation systems lead to low yields, which are insufficient to fully meet the food needs of the population. Consequently, the basic food equilibrium is maintained by supplies that are purchased from Paramaribo.

Farming is so entrenched in the Maroon community, that if a person of farming age does not farm, he or she is not deemed productive in the community. Crop production is supplemented by some rearing of small ruminants and poultry. However, these are insufficient to meet the protein needs of the population. Artisan fishing is also done on a subsistence basis to provide other sources of protein, but the use of very basic techniques mean that the full potential of fishing is probably not being exploited. In any event, there is a need for sustainable fishing practices that factor in the potential impact of contamination from gold mining on fishing stocks.

(a) Agricultural outlook in the interior prior to the flood

The government has recognized the importance of agricultural development to sustainable livelihoods in the interior. Therefore the government has prioritized a number of areas for agriculture in the interior. These include a guaranteed food supply to ensure food security, a reduction in the degradation of forest lands and deforestation and liberation of private entrepreneurship and initiatives that could foster sustainable agriculture and the development of a long-term strategy that entails balanced structural transformation and some modernization of the sector in the interior. Crucially, even as some modernization is undertaken, every effort should be made to preserve the many positive aspects of the traditional way of life of communities in the interior. Modernization must neither be scorned nor worshipped but, like fire, must be treated as a good servant, but a bad master.

Although there seems to be a prevailing view that agriculture in the interior is more or less unimportant relative to total agricultural output in Suriname, the interior might be more important than assumed. Although hard data is not available, indications are that agriculture in the interior accounts for much more than the received view.

A critical constraint in the traditional agricultural systems in the interior is the small farm size. The average farm size in the affected areas was quite small at around 0.6 hectares. This presents an absolute limit to production and productivity as farmers cannot reap economies of scale from the use of improved techniques such as use of tractors, even if these were available. Further, with respect to the use of even fairly basic technology, production systems remain rudimentary. For example, although chainsaws are essential for speeding up land clearing and preparation for planting, only around 20 per cent of farmers own chainsaws. This means that the other farmers have to rent or borrow this vital equipment and this incurs a cost, which is a constraint in a weakly monetized economy and also slows down the farming process.

(b) Food security risks in the aftermath of the flood

The theory and literature on vulnerable agricultural production systems, such as those found in the interior, usually assess them in terms of their capacity to sustain the livelihoods and ensure the food security for the population. Food security is defined as “secure access by all people at all times to enough food for a healthy active life” (World Bank 1986)²³. Therefore, food insecurity is the opposite of food security and a major development challenge in many subsistence farming systems. With regard to the duration of food insecurity, a useful distinction is that between transitory and chronic food insecurity. Transitory food insecurity refers to sudden drop in the ability to grow or purchase enough food to meet basic health and activity needs. Chronic food insecurity, on the other hand, is the inability to meet minimum food needs over a sustained period of time. Importantly, chronic food insecurity often stems from structural bottlenecks in food production and purchasing ability and can lead to vicious cycles that end in poverty traps.

Apart from the duration of food insecurity, the severity (see table 7 below) of the shortages is critical. Transitory food insecurity is moderate where emergency relief is not required, but severe where emergency relief is required because food stocks have been wiped out. Chronic food insecurity²⁴ is moderate where hunger persists at a somewhat low level over time. However, severe chronic food insecurity is often characterized by high levels of mortality.

TABLE 7
DURATION AND SEVERITY DIMENSIONS OF FOOD INSECURITY

	Moderate	Severe
Chronic	Moderate chronic food insecurity (chronic hunger)	Severe chronic food insecurity (high mortality rates, esp. for infants)
Transitory	Moderate transitory food insecurity (e.g. seasonality)	Severe transitory food insecurity (emergencies)

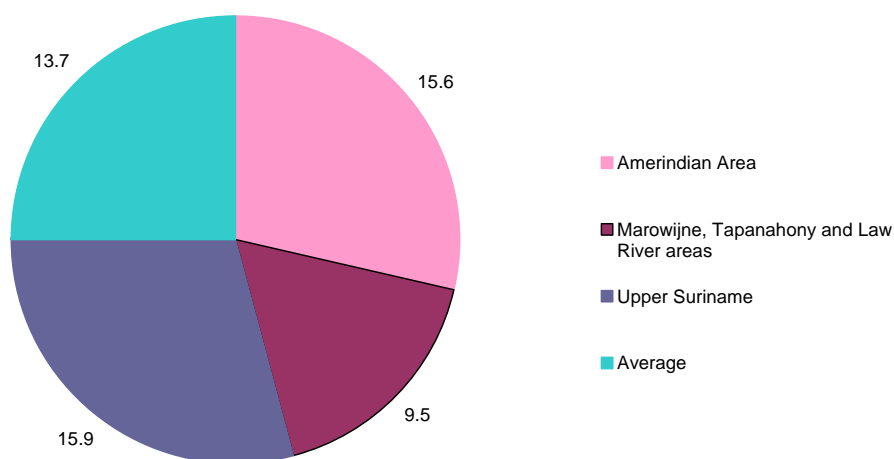
Source: Food and Agriculture Organization (FAO) of the United Nations.

²³ See World Bank (1986), “Poverty and Hunger: Issues and Options for Food Security in Developing Countries, Washington, DC.”

²⁴ See World Food Programme (January 2006), “Identification of Methods and Tools for Emergency Assessments to Distinguish Between Chronic and Transitory Food Insecurity and to Evaluate the Effects of Various Types and Combination of Shocks on these Different Livelihood Groups”.

In the specific case of the flood in the interior, although hard quantitative data is inadequate, indications pointed to some moderate chronic food insecurity, without any real hunger in the population. Baseline survey data indicates that on average just over 13 per cent of the population in the affected areas (Upper Suriname River area, Marowijne, Tapanahony and Lawa Rivers and the Amerindian area) had acceptable levels of food consumption in terms of quantity and nutrition (see figure 5 below).

FIGURE 2
PERCENTAGE OF HOUSEHOLDS WITH ACCEPTABLE LEVELS OF CONSUMPTION IN THE INTERIOR OF SURINAME BY AREAS



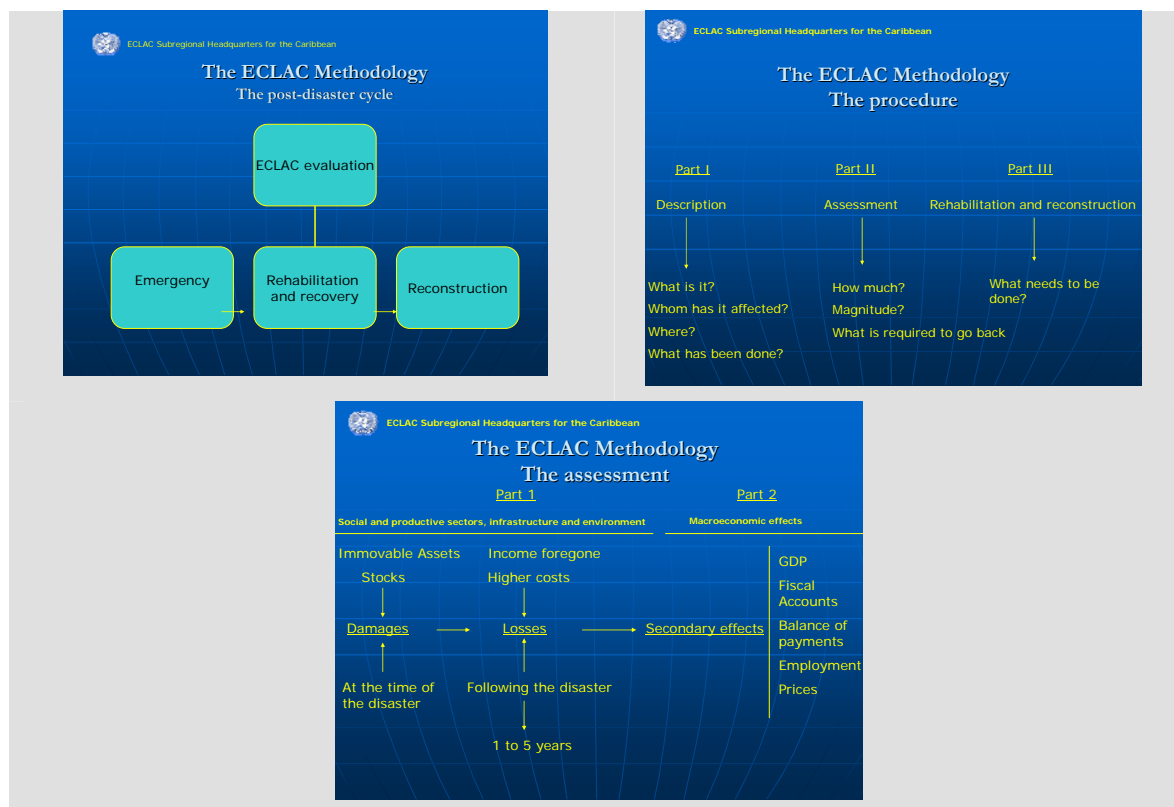
Source: FSNMS Baseline Survey: Comprehensive Food Security Analysis in the Interior: Preliminary Results, 14 November 2006.

Before the flood, the interior was already relatively food insecure. This was evidenced as, when measured by calorie intake and nutrition balance, over 80 per cent of households fell below the threshold for adequate food consumption. Although there is indication of a chronic food production imbalance, there was no evidence of open malnutrition as local output is supplemented by purchases from Paramaribo. However, the flood has posed a serious threat to this delicate food balance, with the risks that these communities could suffer food shortages in the short to medium term.

Even though the flood might seem to be a transitory shock to the agricultural production system in the interior, it could easily have more medium-term effects if remedial measures are not put in place. The reality is that this shock to these vulnerable communities could lead to food insecurity 'ratchet effects', where households are forced to use up the planting stocks and to sell their productive assets such as agricultural tools in order to survive. This severely reduces their capacity to recover from the disaster and makes their livelihood situation quite unsustainable.

D. Description of damage and losses by sector

BOX 2 DAMAGE ASSESSMENT: THE ECLAC METHODOLOGY



The ultimate goal of the ECLAC assessment methodology is to measure in monetary terms the impact of disasters on the society, economy and environment of the affected country or region. National accounts are used as a means of valuation, supplemented with procedures for specific estimates such as environmental damages and the differential impact on women.

Application of this methodology provides affected countries or regions with the means to determine the value of lost assets and define reconstruction requirements. It enables the identification of the most affected geographical areas and sectors, together with corresponding reconstruction priorities. In addition, it provides a way to estimate effects on economic flows, the affected country's capacity to undertake reconstruction on its own and the extent to which international financial and technical cooperation are needed. Moreover, it can be used to identify the changes to public policy and development programmes/plans needed to deal with needs arising from the disaster and to avoid undesirable effects in economic performance and public well-being.

Assessment activities described in this Handbook should be carried out when the emergency stage has been completed or is nearing conclusion, so as not to interfere with those actions and to ensure the availability of the necessary personnel and basic information. They are intended to facilitate the identification of needs and priorities for the reconstruction stage.

Sourec: Economic Commission for Latin America and the Caribbean (ECLAC) Handbook for estimating the socio-economic and environmental effects of disasters; diagrams: ECLAC Subregional Headquarters for the Caribbean.

1. Social sectors

(a) Housing

Damage to the housing sector was relatively small. It amounts to SRD\$12.4 million, as detailed in table 8, which represents estimates of damages to approximately 5137 dwellings, or 4 per cent of the national housing stock.

A contributing factor to the low level of damage to the housing stock caused by the May flood waters was the very low density of the population in the Sipaliwini District of 0.3 persons per square kilometer, in comparison to the capital of Paramaribo and the District of Wanica which in 2004 had a population density of 1334.9 and 194.1 per square kilometer, respectively.²⁵ The other contributing factor is the sturdy wood with which most houses were constructed and the low cost of the flooring materials used, which were, in the main, produced from dirt.

TABLE 8
DISTRIBUTION OF AFFECTED HOUSEHOLDS BY DISTRICT

District	Total No. of Households Affected	Primarily Affected households	HH Male	HH Female	% of FHH affected	%MHH affected	% of HH Primarily Affected
Brokopondo	3 749		2 121	1 628			
Sipaliwini	9 915	9 915	4 607	5 308			
Total	13 664	9 915			54%	46%	73%
Total Suriname	126 366						

Source: ECLAC estimates based on Government of Suriname data

Based on the assessment of the affected districts it could be estimated that some 13,664 dwellings were affected, as detailed in table 8. Of these 9,915, or 73 per cent of households in the combined districts, were primarily affected.

Of those, as can be seen in table 9, some 75 (0.6 per cent) were totally destroyed and required reconstruction. Another 1,983 (20 per cent) suffered structural damage and required major repairs and yet another 3,079 (31 per cent) required light repairs. The remainder, some 49 per cent, required cleaning. All households suffered the loss of stored food and belongings.

TABLE 9
HOUSES DESTROYED AND DAMAGED BY DISTRICT

District	Total No. of Households Affected	Households Severely affected	Dwellings totally destroyed/ requiring replacement	Dwellings Structurally Damaged requiring major repairs	Dwellings damaged requiring light repair	Total number requiring repair and replacement
Brokopondo	3 749					
Sipaliwini	9 915	9 915	75	1 983	3 079	5 137
Total	13 664	9 915	75	1 983	3 079	5 137
Percentages		73%	0.55%	20%	31%	52%
Total Suriname	126 366					4%

Source: ECLAC estimate based on Government of Suriname data

²⁵ See table 1 in the Vulnerability context taken from the General Population and Housing Census of Suriname August 2004, table 3.

As can be seen in table 10, the total impact on the housing sector is SRD\$12.4 million. Losses incurred from the cleaning operations could not be ascertained.

TABLE 10
SUMMARY OF DAMAGE AND LOSSES TO THE HOUSING SECTOR

Total Impact	12 430 782.52
Damage to Dwellings	10 106 327.25
Losses	
Import component	2 324 455.27

Source: ECLAC estimates based on Government of Suriname data

(b) Health

Damage to the health sector amounted to SRD\$0.2 million, as detailed in summary table 12. Among the reasons why the damages were so low is the location of the health facilities which were always placed well back from the water's edge and on stilts or high ground.

TABLE 11
DAMAGE TO THE HEALTH SECTOR BY ITEMS DESTROYED OR DAMAGED

Item	Damage	Losses	Total Impact
Assessing extent of damage		13 440.00	13 440.00
Public Health Education		31 477.00	31 477.00
Emergency supplies for medical personnel		20 890.00	20 890.00
Extra medicine		10 000.00	10 000.00
Food packages for medical personnel		7 500.00	7 500.00
Building damage	65 000.00		65 000.00
Solar panels, regulators, batteries	15 300.00		15 300.00
Communications		8 180.00	8 180.00
Totals	80 300.00	91 487.00	171 787.00

Source: ECLAC estimates based on the Official data of Medical missions (MZ)

As can be seen in table 11, the main damage to the sector arose from the losses incurred through the provision of increased drugs and medical supplies, provision of increased public health services, and losses due to increased use of water and air transportation.

TABLE 12
SUMMARY TABLE OF IMPACT TO THE HEALTH SECTOR

Total Impact	211 298.01
Total Damage	80 300.00
Damage to Health Facilities	65 000.00
Damage to solar panels, regulators and batteries	15 300.00
Losses	91 487.00
Import component	39 511.01

Source: ECLAC estimates based on official Government of Suriname data

c) Education

Damage to the education sector amounted to SDR\$51.4 million. The estimate represents data collected from the Moravian Community and the government education sector. As can be seen in table 13, some 30 schools were reported damaged, four of which were totally destroyed. At the time of the assessment, the extent of damage to schools managed by the Roman Catholic community, was not yet available.

TABLE 13
DAMAGE TO THE EDUCATION SECTOR BY ITEMS DESTROYED AND DAMAGED

Total Number of educational institutions affected	Number of Students Affected	Number of institutions Destroyed	Number of institutions Damaged
30	7500	4	26

Source: ECLAC estimates based on official Government of Suriname data

Contributing factors to the devastation to the education sector caused by the floods were the age, condition and structure of the school buildings. Buildings were in the main flat and built on flat ground. Flood waters rose as high as eight and 10 feet in some villages, in the area where schools were located. The government's draft Education Sector Plan noted that many school buildings were old and already in a dilapidated condition. The flood waters made the situation worse and resulted in concern for many buildings which although appearing to be in tact could be considered structurally unsound.

Table 14 presents the extent of damage to the education sector by items destroyed and damaged. The cost of damage to books and furniture is approximately 10 per cent of the total cost. It should be noted that estimates of damage to religious, cultural and heritage sites were not included.

TABLE 14
VALUE OF DAMAGE TO THE EDUCATION SECTOR BY ITEMS DESTROYED AND DAMAGED

Item	Number	Unit Cost \$	Total \$
Schools Destroyed	4	1 837 500.00	7 350 000.00
Schools Damaged	26	1 164 333.00	30 272 658.00
Cleaning of schools			9 705.00
Furniture			1 725 000.00
Books, Maps and materials	7 500	16 628	2 454 260.69
Sub total			41 811 623.69

Source: ECLAC estimates based on official Government of Suriname data

Table 15 details the summary of damage to the education sector, for the May 2006 flooding. Damage includes losses incurred by the additional cost of cleaning schools which amounted to a small sum of SDR\$9,705.00 representing mainly the cost of labour.

TABLE 15
SUMMARY OF IMPACT ON THE EDUCATION SECTOR

Total Impact	\$51 428 297.14
Damage	\$41 801 918.69
Losses	\$9 705.00
Import component	\$9 616 673.45

Source: ECLAC estimates based on official Government of Suriname data

2. Economic sectors

(a) Agriculture

High water levels on the land for a protracted period of time destroyed and damaged a significant proportion of the crops, much of which was ready for harvest.

TABLE 16
TOTAL IMPACT OF FLOOD ON THE AGRICULTURAL SECTOR BY SUB-SECTORS
(Suriname dollars)

	Damage	Losses	
	Sub-total	Sub-total	Total Impact
Cassava	20 292 910	405 858	20 698 768
Peanuts	15 254 699	152 547	15 407 246
Napi	1 124 007	28 100	1 152 107
Plantains	1 269 807	165 075	1 434 882
Rice	793 590	79 359	872 949
Other	2 414 948	195 992	2 610 940
Livestock	50 000	...	50 000
Machine & equipment	11 812	...	11 812
Total	41 211 772	1 026 931	42 238 703

Source: ECLAC estimates based on official Government of Suriname data

The effect on Brokopondo, Marowijne and Coeroeni was less severe. The total impact of the disaster on the agricultural sector was estimated at SRD \$42,238,703. This represented 37.9 per cent of the total impact of the flood on the interior. Also this amount was equivalent to about 17 per cent of the GDP of agriculture, hunting, forestry and fishing for Suriname. The brunt of the impact of the flood was on traditional agricultural production systems, thereby posing an important threat to livelihood systems. Although this amount is small, relative to the total agricultural GDP of Suriname, it represented a substantial portion of the agricultural GDP of the interior. This underscores the differential and sometimes localized impact of disasters that can lead to severe hardship for vulnerable segments of the population, even as the population at large remains little affected.

A good example is the loss of the cassava crop, the main staple in the diet of the people of the forest and the single most important item in the damages and losses. To estimate the impact in volume terms depends on a series of assumptions but is relatively straightforward and the consistency can be checked in different ways. Annual production per household was estimated at around 810 kilos. The damage to the crop for the most affected households was estimated at 69 per cent of total production; in other households it was estimated at 20 per cent and 10 per cent. The real impact can be 10 or 20 per cent higher or lower.

Cassava, the food staple of the majority of the communities in the interior, suffered the brunt of the disaster, with estimated damage of \$20,698,768. Cassava and other root crops suffered root rot and high levels of spoilage as a result of the water remaining on the land for a fairly long period. Moreover, the length of the flood would have affected the availability and quality of planting materials (cuttings), thereby adversely affecting output from the next crop. Peanuts, an important cash crop, suffered damage and losses of over \$15 million. The loss of cash crops is also quite important, since it reduces household incomes, which could be used to purchase food or supplies to restore production. This has the potential to create somewhat of a vicious cycle, as more than 55 per cent of the population in the affected areas depends on food purchases to supply their needs. Cash earnings are particularly important for enabling households to purchase protein supplies to have a balanced diet. Moreover, increased food insecurity has led to some households consuming the store of planting material for the peanut crop, which could jeopardize production from the next crop.

The rice crop was also relatively badly damaged, although the value of the impact was not as high as for more widely grown crops. Moreover, rice production in the interior is affected by low productivity, stemming from the use of very old, low quality and low yielding seed varieties and the adverse impact of climate change. Nevertheless, in areas that are heavily dependent on rice as a staple, such as the upper Suriname River area, the adverse fall-out on the food situation of households could be severe.

The flood also resulted in important damage and losses to other subsistence crops. The total cost of the impact on the napi was estimated at \$1,152,107. Meanwhile, plantains suffered losses of \$1,434,882, stemming from waterlogged conditions. The losses to other crops, including Pom tayer, Chinese tayer, maize, sugar cane and vegetables were put at \$2,610,940.

Although livestock rearing is not a major part of agricultural systems in the interior, households do keep some small ruminants (goats and sheep), cattle, pigs and poultry to supplement their protein sources. The total impact of the flood on the livestock subsector was estimated at around \$50,000, representing mainly loss of poultry, small ruminants and pigs.

Farmers also suffered loss of farm tools and equipment that were swept away by the flood waters. Information available did not allow a fair assessment of these losses, but they were expected to be important. Further this would adversely affect future productive capacity as most farmers do not have the financial means to readily replace lost tools and equipment.

Apart from the damage and loss to crops and livestock, the flood would have led to the silting up of some farm land and also deterioration in soil fertility and quality in some areas, stemming from the leaching of nutrients. This is particularly important, as the laterite soils in the interior are not particularly fertile.

Table 17 shows wood production in Sipaliwini over the period 2000 to 2005.

TABLE 17
ROUND WOOD PRODUCTION CUBIC METERS IN SIPALAWINI

	Industrial	Non industrial	Total
2000	18 989	125	19 114
2001	35 787		35 787
2002	36 345		36 345
2003	17 889		17 889
2004	24 333		24 333
2005	21 131		

Source: Planbureau, CELOS

The round wood production was not affected by the floods. However the subsistence cutting of wood was affected by the loss of chainsaws (and possibly small saw mills). A total of 47 chainsaws in 24 villages were destroyed and 83 chainsaws damaged for a total of SRD\$228,113.

(b) Tourism

Tourist arrivals in 2005 showed robust growth over 2004 arrivals as the number of tourist arrivals jumped from 137,808 to 159,669. Suriname could not maintain this level of growth in the first four months of 2006 as arrivals from January to April stood at 48,469 or slightly below the 49,285 arrivals in the same period of 2005. Using the 2004 estimate of average expenditure per person per visit of US\$937 tourism earnings were estimated at US\$149.6 million in 2005 and at US\$45.4 million for the first four months in 2006.

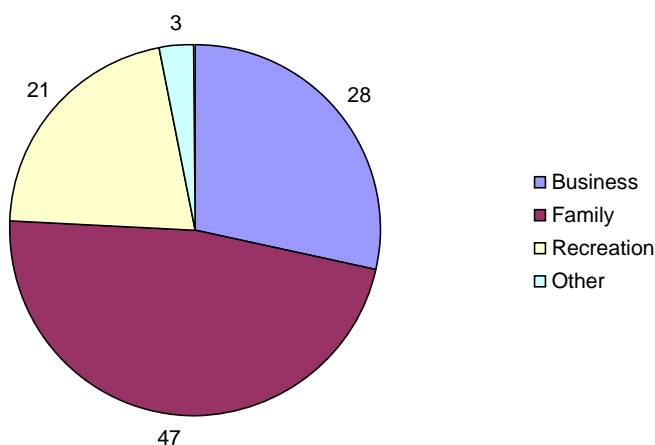
Although seasonality in Suriname is not as pronounced as in the insular Caribbean, the high season months are July and August reflecting the dependence of Suriname on the Dutch market.

In the MOP (Meerjarenontwikkelingsplan) 2006 – 2011 tourism is considered as one of the priority sectors with the potential to actively involve the people from the interior in the economy of Suriname.

The tourism sector was impacted in two ways. The first stemmed from the damages of the eco lodges in the flooded areas and the consequent inability to host tourists. By the end of June to early July many lodges had repaired damages and were ready to receive visitors.

The second factor stemmed from a drop in demand following negative publicity and travel advisory and the subsequent cancellation of travel plans and the negative travel advisory was not lifted until after the end of the state of emergency.

FIGURE 3
DESCRIPTION OF TOURISM BY REASON TO VISIT



Source: FSNMS Baseline Survey: Comprehensive Food Security Analysis in the Interior: Preliminary Results, 14 November 2006.

As the graph shows, most tourists to Suriname are visiting friends and relatives, a group which generally is less vulnerable to the influences of the negative publicity. Similarly those who travel for business are less likely to be influenced by negative travel advisories. However those traveling on vacation comprise 21 per cent. It is this very group that supplies most of the tourists that visit the lodges in the affected areas. Notwithstanding the above, the 2004 VEMS indicates that 31 per cent of all visitors engage in a trip to the interior. This visitation rate increases to 61 per cent of those who travel for pleasure and, not surprisingly, drops to 15 per cent for those traveling on business.

The flood affected lodges and their damages were estimated by tourism authorities at €655,000. Loss of business by the lodges was estimated at €375,000, while tour operators were affected to the extent of €200,000, resulting in a total of €1, 23 million or SDR\$4.4 million.

This may very well be an underestimate as the data does not include other expenditures made by tourists on items other than organized transport and accommodation. Nor do the estimates include a drop in tourist arrivals induced by the negative travel advisory.

Regrettably tourist arrival data from May onwards are not available at the time of writing which means that there is as yet no firm indication of the effects of the floods. Following the 2005 flood in Guyana, when the United States and the United Kingdom issued negative travel advisories, tourist arrivals dropped and estimated losses in tourism earnings amounted to over US\$5 million. Suriname has more visitors and higher per visit tourist expenditures.

With a 10 per cent drop in tourist arrivals over the period May – August 2006 losses in tourism earnings would amount to SDR 15.4 million and even a 5 per cent drop would cause losses of SDR\$7.7 million.

TABLE 18
SUMMARY OF IMPACT ON TOURISM

	SDR 000
Total impact	4 403.4
Damages to lodges	2 344.9
Losses	2 058.5
Lodges	1 342.5
Tour operators	716.0

Source: ECLAC based on STF data

In terms of recovery the Nationale Ontwikkelings Bank (NOB) is making soft loans available at an interest of 6 per cent, a grace period of one year and a repayment period of up to seven years. To overcome the pervasive land title issue and the consequent lack of collateral, the Government of Suriname is guaranteeing 50 per cent of the loan.

(c) Commerce

Although limited, the affected region has a nucleus of small commerce and manufacturing throughout the region. The BIO report identified bakeries, handicrafts, shops, fuel depots, saw mills, transportation and furniture manufacturing among the activities within the commerce and small manufacturing sector. In addition there are traders for resale of produce in Atjoni and other central villages and a number of outboard engine and electrical equipment repair shops along the river banks.

Damages included the loss of stocks, equipment such as freezers, ice boxes, generators and tools as well as damages to or destruction of the premises.

Of more concern is the significant drop in turnover which is continuing. Interviews with shops and small-scale manufacturers along the Suriname River indicate that the fall in turnover ranges from 40 to 70 per cent, depending on the village and nature of the activity. The sole exception to this pattern is the outboard engine and electrical repair shops which are still busy with the repair or revision of outboard engines and electrical appliances.

The drop in turnover may be an indicator of the current lack of income and a harbinger of future distress of the villages. The situation is aggravated by the delay or non payment of social security because this worsens an already dire income situation.

An assessment of the damages and losses of the commercial and micro-enterprise sector was not carried out. Losses were estimated at a drop of turnover of SDR 50 per day for bakeries and shops. No data was available for other economic activities.

TABLE 19
SUMMARY OF IMPACT ON COMMERCE AND SMALL ENTERPRISES
SDR

Total Impact	2 860 370
Damages	352 370
Destroyed shops and bakeries	31 422
Damaged shops and bakeries	320 948
Losses	2 508 000

Source: ECLAC based on BIO data

Recovery of small manufacturing and trading is impaired by the virtual absence of micro finance and other soft loan credit systems. Where there is significant loss of tools and equipment, recovery will be difficult as the drop in turnover and limited cash flow do not allow for the purchase of expensive items.

The NOB has a loan facility for micro enterprises, such as bakeries and furniture manufacturing, but not for trade. Conditions are similar to those for tourism and a typical disaster recovery loan for small manufacturing and micro enterprises may range from 10 to 15,000 SDR, at a 6 per cent interest with a one year grace period and a five to seven year repayment period. Also, like tourism, the Government will guarantee 50 per cent of the loan.

The location of the NOB in Paramaribo may make accessing the funds difficult and very expensive for small and micro enterprises, especially when the businesses need assistance with the preparation of a business plan. Perhaps within the framework of the recovery window within the bank, the NOB can initiate an outreach programme.

In terms of recovery, the damages and losses by the trading sectors (shops as well as traders) which sell produce from village to village is of concern because on many occasions the business will have lost its already limited savings, assets and working capital and the rebuilding of stocks will be delayed.

(d) Energy

The energy supply in the interior relies on diesel generators that have a capacity between 10 and 60 kiloWatt. There are also a few villages that have benefited from solar energy projects. The Rural Electrification Department of the Ministry of Natural Resources is responsible for electricity supply to these villages. In the affected resorts, only 47 out of 158 villages identified by name had received generators from the ministry. These generators work only a few hours per day and frequently break down. Problems are lack of maintenance, spare parts and fuel. In many villages some inhabitants, for example shopkeepers, vacation resort owners and other businessmen, have generators on private property. Schools and clinics run by NGOs may also have their own generators. One village reported the existence of a mini-power plant or Combined Heat and Power system.

In the BIO questionnaire, 84 out of a total of 276 villages answered the question about private generators damaged. One third (28) reported that private generators had been damaged. The number of damaged private generators reported (446) is not very credible because it cites one village with 300 generators damaged. Fifty-four villages answered the question about damages to public generators; 24 villages confirmed that there were a total of at least 26 damaged generators.

Only 54 villages responded to the question about private generators destroyed and 22 confirmed that there were. The total count must be at least 42 private generators destroyed. Nineteen villages confirmed the destruction of a total of at least 24 public property generators.

Six villages reported damages to or destruction of solar panels in private property; two villages reported destruction of panels in village property. The total number of damaged and destroyed solar panels per village is questionable as all villages report one or two panels affected except one that reports 200 panels destroyed. Not considering this outlier, there must be at least 14 solar panels destroyed.

One village reported the destruction of two mini-CHP plants (Combined Heat and Power plants).

Table 20 below summarizes the damages to the energy infrastructure. Only destroyed units were taken into consideration, as it was not possible to obtain a reliable estimate for the repair costs of damaged units.

TABLE 20
NUMBER OF PUBLIC GENERATORS PER RESORT

	Number of named villages	Villages with public generators
Tapanahony	68	13
Paramacca	14	4
Boven-Suriname	57	24
Boven-Saramacca	17	5
Curuni	2	1
Total	158	47

Source: Structuuranalyse van de Districten (1999-2003), Stichting Planburo Suriname (October 2005)

TABLE 21
SUMMARY OF IMPACT ON ENERGY INFRASTRUCTURE

Item	Units	Damage per unit	Total damage
Generators	66	4 950	326 700
Solar panels	14	3 666	51 321
Mini-chp plants	2	192 500	385 000
Total			763 021

Source: ECLAC estimates based on Government of Suriname data

(e) Transport and communication

Transport to and in the interior depends on the canoes (korjalen): long, shallow, wooden constructions designed to negotiate the many rapids that make the rivers unsuitable for boats with keels. Even so, in the dry season the water level is sometimes too low even for korjalen. This particular means of transport was developed by indigenous communities; indeed, the term korjaal seems to stem from the word koeliala which appears in both the Carib and Arawak languages.²⁶ The construction technology was improved by the Maroons, who started to burn the wood in order to bend it into shape. Traditionally, the korjaal was moved with wooden oars called pagaai; in shallow water it is pushed with a stick called koela. A major technological change in Maroon life was the introduction of the outboard engine, in the 1950s. Nowadays, hundreds of canoes, equipped with engines up to 75 hp provide long-distance transport services for cargo and passenger transport.

At the river port of Atjoni, the road to Afobaka commences which connects the upper-Suriname area with the capital. The road between Afobaka and Atjoni was damaged by the heavy rains and needed to be repaired. From the Tapanahony area, river transport is used all the way to Albina near the coast where it connects with the road. The upper-Saramacca area connects at Kwakoe Gron with the road, which is at that point not suitable for normal passenger vehicles. At some points in the river, constructions have been placed to help korjalen pass the rapids. All villages would have jetties, natural or man-made, of wood or concrete. The jetties are not frequently maintained and many were partially collapsed already before the floods. It was reported that 32 jetties suffered damages and 21 were destroyed.

The other means of transport in the interior is by air. In the 1960s, with the objective of mapping Suriname's mineral deposits from the air, Operation Grasshopper built about a dozen

²⁶ Suriname 1599-1975, Library of the University of Amsterdam

airstrips in the interior. Others were built with foreign support. Several private companies serve the interior from Zorg en Hoop airport in Paramaribo. Fourteen airstrips in the affected area were considered during the floods and 10 were found to be temporarily unusable.

Telecommunications improved in 2003 with six telecenters that allow telephone services in a radio of 60 kilometers. The Telecenter project grew out of the cooperation of the International Telecommunications Union with Suriname in 1996 following the Buenos Aires Action Plan²⁷. In a first phase, 19 Telecenters were built and technical assistance and training delivered, with a total project budget of US\$1.6 million. Telecenters are connected to the Telesur telephone network with fixed cellular telephones at a transmission speed of 9600 bps. Some of the telecenters are equipped with computers and fax machines. Broadcasting equipment such as a modulator, a transmitter, audio equipment and microphones are in place. Total cost of a basic telecenter was US\$ 4000 in 1996.

Three telecenters were damaged by the floods. It is not clear what the material damage of the centers was.

In 2002 Telesur established the first V-SAT communication link with the interior, in particular in Djoemoe on the upper-Suriname river and in Dritabiki in the Tapanahony area. In 2005, equipment was bought to strengthen the television signal to reach the interior; the effective transmission of national television to the interior of the country was envisaged for 2006.

TABLE 22
SUMMARY OF IMPACT ON TRANSPORT AND COMMUNICATIONS INFRASTRUCTURE

Item	Number of items	Damage per item	Total damage
Reparation road Afobaka-Atjoni			335 000
Outboard engines destroyed	34	10 106	343 600
Telecenters damaged	3	...	
Jetties damaged and destroyed	53	...	
Total			678 600

Source: ECLAC estimates based on Government of Suriname data

(f) Environment

Much of the interior is characterized by high dry land forests and with marsh and creek forests along the creeks. Around the villages provision grounds and secondary forests dominate as a result of agricultural practices. The Forest Sector Environmental Assessment and Action Plan estimates the number of species at 670,000, including 5,800 plants, 600 trees at least 185 mammals, 668 species of birds, 152 reptiles, 95 amphibians and 790 marine and fresh water fishes. The dry land forests have a high and dense canopy with high levels of tree species diversity²⁸.

There were no major ecological damages to the affected area, although wildlife may have been temporarily scarce.

The 2004 population census indicates that the large majority of the households and people in Sipaliwini use the bush or rivers and creek as their main means of toilet facilities as is shown in the table below.

²⁷ Pansa, R. (2001) A case study of Suriname, International Seminar: Integrating Modern and Traditional Information and Communication Technologies for Development, mimeo

²⁸ NIMOS, 2003. Forest Sector Environmental Assessment and Action Plan.

TABLE 23
NUMBER OF HOUSEHOLDS BY TOILET FACILITY

Facility	Number of Hh	Facility	Number of Hh
Toilet	561	Open pit	664
Pit latrine	2 256	Bush	3 909
River	1 871	Unknown	614

Source: Population census 2004

With the increased volume of water, bacteriological contamination of the main bodies of water, apart from increased sedimentation and siltation, was reduced. However, there was pollution of the flooded areas, mostly by sewage from overflowing pit latrines. After the waters receded pollutants remained until these were eventually destroyed by sunlight.

Initially there were fears that flooding of the artisanal gold mines would have caused contamination due to increased mercury, and possibly cyanide, levels in the rivers and creeks. However indications are any additional contamination was more than compensated for by the increased water volume and that actually contamination levels, which are high for mercury, may have actually dropped.

An unexpected impact was the deposition of garbage and plastic on the turtle beaches of Galibi. Garbage and plastic floating along the Marowijne River was caught in the cross current between the Marowijne River and the Guyana Current and deposited along the beaches around Galibi. While the turtle nesting season has been finished, cleaning of the beaches may be required before the next turtle nesting season. Reports indicate that several villages suffer from rat infestation

E. Summary of findings

1. Summary of damages and losses

The floods caused damages and losses that can be valued at approximately SRD\$111 million or slightly over US\$41 million, according to the summary table below. It is important to underscore once more that the valuation of damages and losses in a largely self-subsistence economy with few markets is fraught with difficulties as prices do not exist. This is especially problematic for the damages and losses to agriculture. Market prices were used to attach a monetary value to the loss of self-subsistence crops ready for harvest. In other sectors, prices were relatively easy to obtain and an effort was made to estimate replacement value of the damaged assets and goods.

TABLE 24
SUMMARY OF DAMAGES AND LOSSES

	Total	Damage	Loss
Housing	12 432 000	12 432 000	
Health	171 787	80 300	91 487
Education	48 090 500	48 081 425	9 075
Energy	580 421	580 421	
Transport and communication	678 600	678 600	
Agriculture	42 238 703	41 211 772	1 026 931
Tourism	4 403 400	2 344 900	2 058 500
Commerce and trades	2 860 370	352 370	2 508 000
Total	111 455 781	105 761 788	5 693 993

Source: ECLAC estimates based on Government of Suriname data.

To describe the magnitude of the impact, it is necessary to establish some kind of comparison to put these numbers in perspective. What is quite clear is that the disaster will not have a noticeable impact on the formal GDP of Suriname. The total estimated damages and losses amount to approximately 2.3 per cent of GDP, which could be visible in the macroeconomic numbers except for the fact that the economy of the Sipaliwini District is virtually not recorded for purposes of estimating formal GDP. The economy of Suriname is expected to register a growth of 6.4 per cent of GDP in 2006 and the May floods will not have a significant impact on that growth figure. It may have a noticeable impact on the nascent tourism industry, however.

The economic and social impact of the disaster on the economy and livelihoods of the people living in the affected areas is much greater. By way of illustration, table 26 presents a back-of-the-envelope approach to measure the GDP of the Sipaliwini District.

TABLE 25
MAGNITUDE OF THE DISASTER IN PERSPECTIVE

	Suriname	Sipaliwini	Sipaliwini in percentage of Suriname
Population	492 838	34 1366.9%	
GDP	SRD 4.8 billion	<i>Approx. SRD 100 million</i>	2%
GDP per capita	SRD 9 852	<i>SRD 3 000</i>	30%

Source: ECLAC estimates based on Government of Suriname data.
Numbers in italics are for illustration only

If GDP per capita in the Sipaliwini District is estimated at one third of national average or around US\$1,000, the product of the District would approach SRD\$100 million. No such data exist and these calculations should be considered for illustration only. It would place the Sipaliwini District on par with Guyana and Bolivia in terms of GDP per capita, which is probably an overestimate of economic activity in Sipaliwini.

It can therefore safely be concluded that the amount of damages and losses is equal to or greater than the annual value of production of the Sipaliwini District. This is a significant conclusion because international experience indicates that disasters with an estimated impact of the order of magnitude of GDP or higher may cause long-run economic recession and a protracted recovery period, in the absence of external support and specific intervention. Table 27 below gives a comparison of the impact of natural disasters, according to the disaster assessments that ECLAC has carried out in these events.

Table 26
International comparison of impact of natural disasters

Name	Place and year	Impact as % of GDP
Hurricane Michelle	Jamaica 2001	1.0
Hurricane Ivan	Dominican Republic 2004	1.9
Hurricane Frances and Jeanne	Bahamas 2004	7.0
Earthquake	Dominica 2004	12.0
Hurricane Ivan	Cayman Islands 2004	138.0
Hurricane Hugo	Montserrat 1989	200.0
Hurricane Ivan	Grenada 2004	200.0

Source: ECLAC estimates based on Government of Suriname data

If the May 2006 floods in Suriname were included in this list, it would probably be similar to the impact of Hurricane Ivan on the Dominican Republic in 2004. That was a significant event that caused sizeable damage to specific places, industries and households. It did not constitute, however, a major shock to the economy. If the May 2006 floods in the Sipaliwini District could be included on the list, it would probably be listed close to Hurricane Ivan in the Cayman Islands, which was a major shock to its economy.

III. Findings and recommendations

It rained heavily for several days in most of central, south and south-east Suriname at the end of April and early May 2006. The rivers Suriname, Saramacca, Tapanahony, Lawa and Marowijne carried at least three times more water than the maximum volume recorded in 25 years. Water levels in some places of the Brokopondo and Sipaliwini Districts rose five to seven meters above normal high levels and around 12 meters above standard. Around 200 villages of indigenous and Maroon communities and their agricultural lands were partially flooded.

Personal resilience and adequate collective response at the village level prevented serious injury and loss of life during the disaster. A strong emergency relief effort by the Government of Suriname with important support from abroad was able to prevent widespread hunger and disease by delivering food aid and restoring basic services.

Over 30,000 inhabitants were severely affected by the floods. From the set of livelihood strategies contained in text box 1, in the short run very few escaped the impact of the floods. Agriculture, both the self-subsistence and the commercial type, was affected in major ways: crops on the fields could not be harvested, planting materials were lost, the plots could not be prepared in time for the next cycle, tools and equipment was damaged. In addition, food reserves were lost. Hunting and fishing remained available, except in the cases where water damage rendered rifles and ammunition unusable.

Small scale services and industries, such as retail trade and bakeries, were heavily affected, sometimes directly because inventories were lost, in other cases because of the interruption of transport services, the loss of power generators and the cash crunch of consumers in general. Most small-scale entrepreneurs reported a drop in turnover of around 50 per cent.

Other services had to become very active, such as repair and maintenance of motors and equipment and also construction services. Even these were affected by the loss of power generating capacity, interruption of supplies and the scarcity of money.

Eco-tourism closed down for at least three months, causing losses to resort owners as well as their staff. Furthermore, some of the small-scale activities to produce sellable products to tourists also suffered. Cases in point are food industries, wood carvings and embroidery.

Migration was an option for those who were able to leave, and remittances from community members and other people who expressed their solidarity provided crucial means to survive in the early weeks after the disaster. It should be mentioned that the people who depend on transfers from the government, in the form of social security or stipends for village dignitaries, did not benefit from this income source in the weeks or months after the disaster, because the ministry did not have the capacity to effect the payments in the interior with short time intervals.

The disaster may also have deleterious impacts in the long run on the access to livelihoods assets and the capacity of the people to adopt sustainable livelihoods strategies. Schools had to close down and some could not be reopened at the start of the new school year. The cash crunch prevented the poorest households with many children from enrolling them for the new school year, because schools request a monetary enrolment fee.

This damage assessment report prepared by ECLAC, in collaboration with UNDP and on the request of the Ministry of Regional Development of the Government of Suriname, estimates total damages and losses at around 111 million Surinamese dollars, using estimated producer prices and replacement costs. This is surely higher than the value of annual production of the Sipaliwini District, although statistics are unavailable and market value is a strange concept to what is largely a self-subsistence economy. The point is that the ECLAC estimate suggests that the disaster to the Sipaliwini District is of the same order of magnitude as that of Hurricane Ivan to the Cayman Islands in 2004.

This comparison is intended to indicate that the economy of the Sipaliwini District, without special measures and outside support, would need between five and ten years to recover from the impact. Why were the population so vulnerable; what is needed to restore sustainable livelihoods and what should be done to reduce vulnerability and increase resilience? To answer those questions is the ulterior motive of performing a disaster assessment such as this. The analysis uses the sustainable livelihoods approach and comes up with the following conclusions and recommendations.

The vulnerability of the indigenous and Maroon communities that inhabit the Sipaliwini District derives from the same condition that protected them from aggression, namely isolation and remoteness. The colonization of Suriname and the introduction and growth of the plantation economy based on labor of enslaved persons confined indigenous communities to ever smaller and more difficult living environments and the same is true for those that escaped enslavement and formed autonomous communities in the forest. Several peace accords, spanning more than three centuries between the first in 1686 and the last in 1992, have recognized the legitimate existence and autonomy of those communities. Nevertheless effective land rights and political participation as kinship communities are still only promises. In many ways, as individuals and as communities, the Maroon and indigenous groups that live in the interior are only recently, slowly and, in the margin, being incorporated in Surinamese society. Related to this condition and enhancing the vulnerability of the villagers is their material poverty, low levels of education, lack of access to energy and information.

Productivity growth and economic and social progress is very slow in a small, almost completely isolated village. Low-productivity, self-subsistence slash and burn-agriculture has remained the mainstay of their livelihoods for many centuries. Timber trade and wage labor to the

service of loggers and gold miners, or temporarily in marginal activities in Paramaribo and French Guyana, became important sources of monetary income, necessary to buy essential products and services, such as fuel, clothing and building materials, health, education and transport. In the last few decades, Government transfers in the form of social subsidies and a stipend for traditional authorities complemented the monetary income, as well as work in ecotourism villages and commissions received from companies with logging and mining rights. In sum, self-subsistence agriculture, hunting and fishing is the mainstay of their livelihood strategy, complemented with a very limited set of money-earning activities necessary to obtain indispensable products and services.

The floods wiped out existing food supplies and curtailed the production capacity for at least two harvests. It also affected some of the money-generating activities such as commercial agriculture and ecotourism. Even with food aid and reconstruction support from outside, the available money and income was reoriented to the purchase of food; more so after the aid stopped, three months later. The disaster that affected the indigenous and Maroon communities of the Sipaliwini District now expresses itself in the acute lack of purchasing power, the scarcity of food and the high cost of procuring indispensable products and services from afar. Their vulnerability now stems from an extremely narrow and fragile set of monetary-income generating activities, the inaccessibility of education and public sanitation as well as the distance, difficulty and cost of transport.

What is necessary to restore livelihoods, to reduce vulnerability and to increase resilience of Maroon and indigenous communities in the face of a natural disaster such as the flooding of their villages and lands? This report suggests that the answers to this question should be separated: measures for the short term and solutions for the medium and long term.

In the short run, after the emergency relief aid has stopped and eight months after the event, it is still necessary to bridge the gap to the next harvest, which hopefully comes in early 2007 but maybe even the one after that. It would be of utmost importance to make available seeds and planting material as well as tools to work the land, through the women's associations in the villages. It is recommendable, in any case, to monitor the situation with respect to nutrition because any type of additional setback now may cause an acute food shortage, with deleterious consequences for the population of these areas.

Other short-term measures should be geared in most cases, except maybe in some of the most remote indigenous villages, to provide a monetary injection in such a way that school attendance, productive labor and the functioning of markets are stimulated. Possible precise measures include the speeding-up of social security and stipend payments as well as the elimination of backlogs in these payments; reimbursement of school fees and the financing of school fees for those mothers that were financially unable to register their children; a subsidy for reparation of houses and credit to jumpstart micro-enterprises. All this should be implemented through local organizations and traditional leadership structures.

Also in the short run, an interesting idea is to involve the traditional community authorities in the channeling of resources to stimulate reconstruction and reactivation. They could be given a budget to hire local organizations, such as women's organizations, to perform tasks such as the preparation of school meals, the management of public lodging facilities, the reparation of cultural heritage items and sites, and so forth. It would give the traditional authorities a development role and it would be a clear learning experience in terms of money management and accounting. The short-term measures to bridge the gap to the next harvest cycles should fall under the responsibility of a National Reconstruction Team, similar in structure to the National Crisis Team.

BOX 3 STRATEGIC APPROACHES TO ADDRESS SUSTAINABLE LIVELIHOODS

Recommendations for the social sector:

1. Housing Grant: Replacement of houses destroyed and grant for repair.
2. Education:
 - (a) Teachers – provide incentives to encourage young Surinamese (both at home and abroad) to teach in the interior (additional cash/ Land incentives and housing);
 - (b) Allow for a different age structure for children attending school in the interior to make allowance for disruption caused by late starts, stops to assist in family agricultural processes and/or other natural events;
 - (c) Lengthen the years of schooling provided for primary school children in the interior;
 - (d) Make possible a school meal plan for children in the interior (community integrated approach – women growing, selling, preparing lunches) to increase the nutritional status of the children which will be threatened in the coming months due to the loss of agricultural production;
 - (e) Subsidize the school fee for each child in the interior for a school year and refund those parents who have already paid fees; and
 - (f) Allow for education, or language of instruction (LOI) to be conducted in the mother tongue of the student, in order to provide an opportunity to leap frog the communities to the education status of the rest of the country, and reap the benefits of improved education outcomes among the communities of Maroons and indigenous persons.
3. Health: Strengthen and mount Public Health Education Programmes in the interior.
4. Engage women in the productive processes:
 - (a) Expansion of skills - oil, soap, crafts (weaving);
 - (b) Establishment of Women's Co-operatives in Maroon communities to manage productive processes. (Marketing to be managed in the City); and
 - (c) Strengthen women's agricultural capacity through training.

Source: Based on the ECLAC Subregional Headquarters for the Caribbean field work.

In the medium and long run, economic and social progress according to the objectives and strategies that the Maroons and indigenous peoples set out for themselves and in line with their cultural, organizational and political aspirations; will require in the first place the legal recognition of their effective right to be part of Surinamese society as kinship-based communities. Land titles and effective participation in national decision-making are crucial components thereof. Time is not on the side of the communities, however, because corporate interests in the logging, gold, bauxite and hydro-energy potential of the region is increasing fast. This report does not argue that such interests are necessarily incompatible with those of the communities or of the sustainable development of Suriname in general. On the contrary, we argue that these commercial interests create opportunities for the development of Indigenous and Maroon communities, provided that their cultural, social and economic rights are protected, their participation in decision-making processes is effective and the health and well-being of the nearby communities are safeguarded.

The 2006 flood dramatizes the entrenched vulnerability of traditional agricultural systems in the interior. Although the region has been buffeted by floods fairly regularly, large scale events hold the potential to significantly disrupt food production and trading systems, leading to food insecurity and malnourishment. Clearly, food production and distribution need to become more productive and sustainable in the interior. In this respect, there is need for a well thought out and multifaceted strategy to guarantee the food security of the area. There are several key planks that should be included in such a strategy and these must seek to improve on existing food systems not simply replace them.

A critical component of the revitalization of production systems in the interior is raising the productivity of traditional farming and fishing. Shifting cultivation farming systems need to be upgraded and modernized to realize higher yields. A farmer-friendly, participatory system of extension services that would incorporate balanced use of agro-chemicals for improving soil fertility, pest control and irrigation and water management, especially to mitigate the adverse effects of floods is required. Extension should also include research into the optimal mix of crops, ideal fallow periods and amount of soil enrichment inputs to foster sustainable improvements in farm productivity.

Indeed, as Mertz and Magid²⁹ noted, low productivity of shifting cultivation systems is not more inherent to these systems than any other farming system and the lack of productivity improvements is the result of a consequent neglect of this system in agronomic research and extension. Rice production, for instance, could benefit from the use of new improved varieties that have been developed in neighboring Brazil that could double the yield.

Apart from productivity measures, there is a clear need for a strategic agricultural diversification programme to increase the range of crops grown in areas that rely heavily on one or two main crops. There is also scope for increased rearing of small ruminants and pigs and poultry.

In addition, land tenure systems in the interior must be improved to provide greater incentive for investment in improved farming systems. For instance, currently only about three persons per thousand possess any kind of rent or lease title in Sipalwini and Brokopondo districts and is similar for other districts. Government should move quickly to implement a system of land entitlement that balances the need for some private ownership to provide collateral for loans and other market transactions, while at the same time, leaving adequate 'space' for traditional collective ownership systems.

Plans for the development of agro-forestry need to be fine-tuned and implemented to diversify food and income earning sources. Agro-forestry entails both the cultivation of wooden tree species along with farm crops and rearing of animals and the extraction of food and non-food forest products. Forest food products such as nuts and fruits add important variety and nutritional content to the diet of persons in the interior. Also, research could be done into the medicinal properties of a number of plant species to develop medicines to provide another source of income.

There is a clear need for a proper baseline stock-taking of food supplies and average requirements for basic calorie intake and nutrition in the interior. This should provide the foundation for an early warning system to warn of threats to food production and trade from natural disasters and other shocks.

Generally, although the flood disrupted farm production in the interior and led to food insecurity in the short to medium term, it opens a window of opportunity to rethink the restructuring of these agricultural systems. The authorities should move speedily to implement basic measures pertaining to improved farm husbandry and techniques, use of new crop varieties and improved transport systems to facilitate the marketing of surplus produce to increase cash earnings. Complemented by improved diversification, crop rotation and productivity enhancement measures, the interior could become more self-sufficient, thereby providing a more sustainable and higher living standard for the people who reside there.

This report suggests that if the communities have effective rights and participation in decision-making processes, they could fruitfully embark on development initiatives that would need to include first and foremost improving education and skills to make participation in a broader set of

²⁹ See Mertz, Ole and Magid, Jakob, "Shifting Cultivation as Conservation Farming for humid Tropical Areas, University of Copenhagen."

monetary income-earning activities worthwhile and to improve the productivity of agriculture, small-scale manufacturing and tourism. For this to be possible, however, infrastructure and connectivity need to improve drastically, starting with energy supply and improved transport facilities. The life of Maroons and indigenous inhabitants of the Sipaliwini District would change drastically, no doubt, but if they are able to influence such a development it should be to their benefit as well as to the benefit of Suriname as a whole. If, in the future, the water level in the rivers were to reach new heights, damages might not be avoidable in spite of improvements in settlement design. Strong communities, however, would be better prepared to resist such a disaster, reduce damages and recover faster.

Developing a reconstruction strategy for the interior requires vision by the communities and the central government, focus on the task ahead, involvement of the communities that were affected, effective implementation and monitoring systems. At the same time a reconstruction strategy has to go beyond the confines of a simple return to the situation before the floods.

The sustainable livelihood approach of reconstruction has to go beyond the restoration of housing and shelter and the rebuilding of agriculture and other traditional livelihoods. It should also create a climate of generating enterprise, commerce and income generation beyond the very limited that are now available.

A regional reconstruction strategy needs to focus on income generation and the promotion of small and micro enterprises. It also means providing public services, in particular education and energy.

During the reconstruction, many examples of innovative means to generate an income have been seen. Such emerging entrepreneurs need stimulation and access to technical know how and, above all, micro finance that is in line with the existing forms of land ownership and traditional customs.

TABLE 27
MATRIX OF STRATEGIC APPROACHES TO ADDRESS SUSTAINABLE LIVELIHOODS

Level	Immediate	Short to medium term		
District	<p>Address food shortages of isolated Maroon and Amerindian Villages;</p> <p>Provide replacement seeds, seedlings and tools for subsistence and commercial farmers;</p> <p>Refurbish schools and restock with books and furniture as appropriate;</p> <p>Provide a one off grant for small businesses (including commercial farmers) who suffered losses in the interior</p>	<p>Embark on Public Health Education in the Maroon and Amerindian Villages;</p> <p>Improve remuneration of traditional leaders to include budgets for social sector improvements in the interior i.e. local school feeding programmes; management of lodgings, etc. ;</p>	<p>Pay and refund school fees for primary school children attending school in the interior;</p> <p>Provide special allowances to teachers to encourage teaching in the interior;</p>	<p>Provide a special grant for house repairs; and establish a micro credit facility for small commercial farmers and micro enterprises; pay special attention to micro enterprises which women's groups in the interior can embark such as soap making; palm oil and coconut oil production;</p>
National	<p>Develop a comprehensive disaster risk management strategy;</p> <p>Pay social security benefits on time and avoid backlog</p>	<p>Provide support for the institutionalization of Maroon and Indigenous forms of early warning systems and relief efforts</p>		<p>Regularize, monitor economic activities in the forest to ensure allowance for sustainable livelihoods of forest dwellers.</p>

Source: ECLAC estimates based on Government of Suriname data



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