

Case Study on the Impact of Climate Change on Agriculture and Housing on Indigenous Communities in Suriname



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List of acronyms

BIO	Binnenland Overleg
BFN	Bureau Forum NGO
CRMI	Caribbean Risk Management Initiative
EFSA	Emergency Food Security Assessment
NGO	non-governmental organisation
PAHO	Pan American Health Organisation
UNDP	United Nations Development Programme
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNCEF	United Nations Children Fund
WFP	World Food Programme
UNDAC	United Nations Disaster Assessment and Coordination

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1. Introduction

1.1. Introduction

This case study focuses on gender, climate change and disaster risk reduction. It examines the impact of climate change on agriculture and housing in two tribal communities in Suriname: one Maroon¹ and one indigenous. The aim is to increase awareness of the differential impact of the 2006 floods on men and on women in the selected communities and specifically to assess how agriculture and housing were affected. The case studies were undertaken in June 2008, and assess differential impacts on men and women in both villages.

The decision to use these two communities as case studies was guided by several factors:

- a. the communities were representative of the two ethnic population groups which are among the country's poorest and most vulnerable;
- b. they are considered typical of similar population groups which were among the 175 villages and 101 *kampus*² affected by the floods;
- c. the size of the communities and the noticeable impact of flooding on the food security and housing in these communities.

1.2. Research methodology

A combination of research methods was used in developing the case studies. The discussions and interviews were conducted through a local guide/translator.

- Literature review: A review of relevant documents such as reports providing social and demographic data, assessment reports of the flood and reports of implemented recovery projects.
- Interviews with leaders, key stakeholders and members of households in the two communities, using a questionnaire.
- Focus group discussions with separate women's and men's groups in the target communities.

¹Maroons are the descendants of escaped slaves.

²These are small family-based camps which are also considered communities.

2. Climate of Suriname

Suriname has two basic seasons: the dry season and the wet or rainy season. A short wet season lasts from the beginning of December to the end of February. This is followed by a short dry period up to the end of April, a long rainy period up to mid-August, and a long dry season up to the end of November. There is higher rainfall in certain parts of the Interior, particularly in the mountains. Transitions in the seasons showed that major changes have taken place in the country's seasons and rainfall patterns.

People in Suriname felt they had generally been spared from disasters associated with natural hazards until the floods of early May 2006. Interestingly, most Surinamese were not aware that 50 years earlier, in 1946, parts of the Interior had experienced major floods, although these were not as severe as those in 2006. Many people and even experts believed that there were unlikely to be other major floods in the near future. However, in 2007 large urban and peri-urban areas flooded to a height of 40 cm after excessive rainfall. This caused the overflowing of canals and creeks and the veins of Suriname's urban and rural drainage system. In 2008 the Interior flooded again, affecting other parts of the country.

Since the historic floods of May 2006, people have been more conscious of the impact of climate change in Suriname. However, consultations with stakeholders revealed that sections of the government and society are cautious about blaming the flooding in the Interior on climate change alone. They noted that the exceedingly heavy rainfall that lasted for days was an important factor, but not the only one. Many believed that an increase in uncontrolled gold-mining activity was one of the causes of the severe flooding since sand from the mines washes down to the river and creeks where it accumulates and can affect the absorption capacity and free flow of the water. Such flooding had a major impact on the inhabited areas which are usually along the creeks and rivers.

2.1. Features of the District of Sipaliwini

One of the Regions that were badly affected by the 2006 flood was the District of Sipaliwini, one of the ten administrative regions of the country known as the Interior. This District is a southern region of the Interior on the border with Brazil. It stretches from east to west also sharing borders with French Guyana and Guyana, respectively. All of Sipaliwini's land is tropical rainforest, which covers about 90 percent of Suriname's total land territory of approximately 164,000 sq. kilometres.

Tepu is the furthest village in the Upper Tapanahoni River which rises somewhere close to the Eilerts de Haan Mountain, 884 metres high. Some people felt that the flooding in Tepu was the result of more frequent and higher rainfall in the mountains, which caused the water levels in the rivers to rise more quickly. There was also the view that the flooding in New Aurora which is located on the Upper Suriname River, was caused by two streams in the river coming together.

The local population in the District of Sipaliwini is familiar with high water levels after abundant rainfall in wet seasons and inhabitants of the small islands in the rivers cope with minor flooding every year. However, the 2006 floods affected the situation in the target communities and other communities in the Interior in unusual and dramatic ways. In June 2008, the eastern and southern part of Sipaliwini flooded again, with the water level reaching even higher than it did in 2006. As a result of the floods, the local population faced many challenges, particularly with respect to agricultural activities and housing.

Feedback from interviews and focus group discussions indicate that in the 2006 floods:

1. the upper Suriname River area, centred in the District of Sipaliwini, was hardest hit;
2. an estimated 26,000 people from 175 villages and a 101 camps³ were directly affected when the rivers rose to abnormal levels;
3. the flood waters affected both houses and public facilities such as health care centres, schools and churches. Buildings were damaged; some were swept away in the river together with food stocks, furniture and other precious belongings. Whatever remained was generally soaked and damaged;
4. most airstrips are grassfields and were temporarily closed because of the heavy rain.

There was also the view that the 2006 floods impacted on men and on women differently in both the Maroon and indigenous communities, as a result of their different gender roles and activities.

³ Camps are small family-based communities

3. Profile of the Indigenous and Maroon village communities

Amerindian and Maroon tribal communities are the main inhabitants of Suriname's Interior. Hundreds of self-supporting villages settled ages ago along the streams in Sipaliwini. Travelling from the capital, Paramaribo, to these remote villages is difficult and time consuming. By boat, a journey demands the services of experienced native boatmen because of the numerous rapids between the scattered settlements which are difficult to navigate. Several villages are only accessible by plane through small airstrips and flights are infrequent, costly and dependent on weather conditions.

Tepu and New Aurora are two of the many tribal communities scattered along the rivers in the District of Sipaliwini. The lives of men and women in these isolated and remote communities are very traditional. Today, the villages are still structured on the basis of family kinship. The high mobility of people from the Interior to the city or to bordering regions makes it difficult to collect accurate sex-disaggregated demographic data on village populations.

3.1. Profile of Tepu

Tepu is an Amerindian village of the Trio tribe established in 1966 at the Upper Tapanahony River. This village has 106 families including approximately 500 people. Indigenous people are nomads by nature. Family disputes and exhaustion of agricultural land and other food resources cause family groups to split and to form new small communities called 'kampus'.

Based on its population size, Tepu is considered a medium sized village. There are several public facilities, such as an airstrip, a Catholic church, a pre-primary and primary school, a library, a polyclinic and a clinic for traditional healing. The majority of houses are constructed from wood on high piles with thatched roofs. The major sources of income for the community include eco-tourism and selling of caught birds. There is no store but some inhabitants buy and sell goods which they bring from the city.

3.2. Profile of New Aurora

New Aurora lies beside the Upper Suriname River among tens of other Maroon villages. It was established in 1898 and is populated by Maroons from the Saramaccan tribe. The adult population of the village is 1300, the majority of whom are women. Such sex imbalance is typical of Maroon communities because of the high labour migration of men to the towns and capital city in search of employment in the city or other areas; the men work there for several months or even years before returning to the village. It is uncertain whether the existing tradition of multiple common-law relationships in Maroon communities is a result or cause of the sexual imbalance.

The greater absence of men in Maroon communities like New Aurora has increased the number of female-headed households and therefore the pressure on women in their familial responsibilities.

As a result, women take on many of the roles and responsibilities generally associated with men. Many women in New Aurora indicated that they repair houses themselves, and can be found fishing with their children.

New Aurora has a church, polyclinic, one pre-primary and one primary school, a number of small stores and an airstrip. A well-maintained forest path connects the village overland with other villages. The houses are flat and increasingly constructed from bricks with sink roofs to collect rainwater. In contrast to Tepu, the income opportunities in New Aurora are more diverse and include sales of agricultural produce and of exotic birds and crafts, small trades and diverse services such as boat transportation, furniture making and poultry rearing.

3.3. Activities of men and women in Tepu

The isolation of Tepu has preserved the traditional division of labour between women and men. Women have responsibility for the home and surrounding area, as well as for food supply and care of the family. They produce most of the food consumed in the community which includes processed bitter cassava, cooked sweet cassava and plantains and pepper water with fish or meat.

The women generally own and maintain one or more agricultural plots⁴ on which they plant a variety of crops such as: turnips, several varieties of consumable roots such as bitter and sweet cassava (yuka), plantains, bananas, maize and pineapples. They also make cassava bread and preserve fish and meat which are very time consuming activities. They grind bitter cassava, squeeze out the water, and make a large flat bread which is then baked on a large plate above an open fire. They then use the water to cook pepper water with fresh or smoked fish or meat. The cassava bread is soaked in the soup before eating. Women also use the bitter cassava to prepare *casiri*⁵, a light alcoholic drink. Both the cassava bread and *casiri* are consumed during the day, starting with breakfast. Vegetables are hardly found in the diet of the indigenous people.

In addition to cooking duties described above, indigenous women in Tepu collect fire wood, fruits, nuts, seeds and herbs from the forest. They also collect water from the river and creek for household use and take dishes and laundry to the river for washing at least twice a day. Their other work duties include spinning, weaving and colouring harvested cotton to make hammocks and clothing, some of which they sell. Women also find the time to make ornaments from collected seeds. They often work together to prepare food and the cassava based alcohol, *casiri*, for feasts. Cleaning of the village and community facilities is also done by the women. Some women have formed a group to initiate joint community projects in agriculture and cassava processing and are more active than men in voluntary services.

⁴ Cleared land used for subsistence agriculture.

⁵ Light alcoholic drink prepared by indigenous women from fermented cassava pulp and used daily, also during breakfast.

Men are generally responsible for clearing agricultural land for their wives. They also provide the protein for the family through fishing and hunting. In addition they make boats, paddles and various household utensils such as spoons, baskets, storage boxes and carriers, cassava strainers and cassava presses. Men build and repair houses, latrines and boats for their families with the help of relatives or paid workers. They generally use material collected from the forest.

Men also provide a supportive role in agriculture as they accompany their wives to the agricultural plots. There, they assist with the maintenance of the plots by digging and weeding, and also transport harvested produce to the market. Men often use the visits to agricultural plots as opportunities to hunt, since the crops attract wild animals. Among the community activities in which men are involved is the making of thatched roofs for community facilities and any construction work. Occasionally, men in Tepu also help women with cleaning around the house and public facilities. Men also have the primary responsibility for village governance.

3.4. Activities of men and women in New Aurora

Many of the activities of Maroon women at the household and community levels are similar to the work done by women in Tepu. In general, families plant and catch what they need to eat because market outlets are too far away to purchase food. However, income earning activities are more important for Maroon women such as those in New Aurora. Many are household heads, and as such they must be more financially independent than their counterparts in indigenous villages like Tepu. What they earn has to cover all household expenses. This includes paying other men where necessary for labour such as clearing land, building houses and boats and making household utensils.

In New Aurora, women own a small bakery, a grocery shop, do fishing or catering and raise and sell poultry. Many women also cultivate rice which is a staple in the diet of people in New Aurora. These Maroon women also cultivate bitter and sweet cassava, plantain, maize, okras, some vegetables, sweet potatoes, peanuts and ginger. In addition, they process the nuts of wild fruits into cooking oil. Occasionally, some women earn a little money by selling surpluses from crops harvested. These include: rice, bananas, cassava and other root crops. Maroon women also make cassava bread and pepper water which are important in their diet. These items are then combined with proteins such as fresh, smoked or salted fish, wild meat, chicken and salted beef.

In New Aurora as in other Maroon villages, women also produce and sell traditional handicrafts such as traditional wrap skirts with embroidery or appliqué work on cloth, and they carve calabashes. These items are sold in the villages or to traders.

The activities of men in New Aurora and Tepu are different. Maroon men build and repair houses, latrines, kitchens and boats and work together to build community facilities such as the village meeting house, jetty, school and clinics. However, this work is done with the support of paid workers. It is more common in New Aurora than in Tepu to hire labourers for land clearing, house construction and thatching of roofs.

Interviews with members of the respective communities revealed that the influence of the city culture is resulting in the younger generation losing traditional skills. Other changes reported are that men's work of fishing and hunting has become less important as fish and meat are often bought from specialized hunters and fishermen, or transported from the nearby town and city.

Like most other traditional indigenous communities, the men and women of Tepu and New Aurora are among the most economically vulnerable communities in Suriname. The inhabitants are among the poorest in the country because of limited employment opportunities, among other factors.

3.5. Employment of men and women in Tepu and New Aurora

In both Tepu and New Aurora, the rate of labour force participation is higher for men than for women. Cultural traditions give men more freedom of physical mobility than women and enable them to have more access to education, as well as opportunities to enter the mainstream economy and secure paid employment. Many men work as tourist guides, drivers (boat/bus/truck), tradesmen or short-term miners. Some men are employed in the villages as local extension workers, translators or construction workers. Others work for the government or for private companies involved in logging and mining activities.

The interviews revealed that when men return to the village they often bring home goods bought with their earnings. It was also reported that men often experienced high levels of stress because of increasing costs, limited sources of income, and because they failed to meet expectations related to their role as the main family breadwinner, many feel inadequate when they are not able to fulfil their role as 'man'.

The interviews also revealed that in both Tepu and New Aurora, job opportunities are scarce. This is more acute for women who are restricted from travelling or selling their products outside the boundaries of the village if they are not accompanied by their spouses or a trusted male relative. A few women are employed as teachers and workers in schools, clinics and traditional healing activities.

As a consequence of the limited opportunities for employment, many men and women earn income through (irregular) self-employment. Some women in the villages earn a small and irregular income mainly from utilizing traditional skills such as food production, food processing, traditional healing and handicrafts. The women from Tepu use their traditional skills to make necklaces, bracelets and small purses from tiny Maramara seeds they collect. They then sell these products to tourists who visit or through non-governmental organisations (NGOs) located in the city.

Men earn income from small trading businesses or by providing boat transportation services. Many men have also transformed their traditional skills into income earning activities,

such as the production of utensils and handicrafts. The interviews showed that while men and women both face the similar challenges in finding adequate markets for their products, the income earned by men is greater. Table 1 shows the income earning disparity between women and men in New Aurora.

Table 1: Disparities in income earned by men and women

Income Source	Men	Women
Monthly income in New Aurora	Between US\$100 and US\$500	Between US\$20 and US\$100
Pricing of handicrafts	US\$5 and exceeds US\$15.	US\$3.50 and US\$10.

Data from the interviews also showed that while men and women in both villages are economically vulnerable, women are much more at risk than men because of unequal gender roles and responsibilities, as well as differing economic opportunities that exist even before a disaster.

4. Gender roles and vulnerabilities

The research revealed that households in indigenous and Maroon communities are formed along matriarchal lines and may comprise several families and generations living together. This means that the female relatives of a family remain together and form an extended family comprised of three or four generations and women comprise the majority of household members. Whereas in some cultures matriarchal families share one house, it is common in indigenous and Maroon communities for parents, who have sufficient resources, to build a house close to their own for their daughters and their new partners or husbands. Reports from the persons consulted indicated that the existence of extended families under one roof means less privacy and family harmony, and often results in families being divided and new settlements being established

4.1. Gender roles and responsibilities

As previously reported, women in the two communities studied have the main responsibility for child rearing, food production, food processing, food preservation, collecting water and firewood, taking care of the house and caring for the sick and elderly people. For many women, child rearing often includes caring for grandchildren when their daughters go to their plots or to the city to work. When comparing women's and men's unpaid labour, it is evident that female unpaid labour is more intensive.

In addition, women's social role as care takers and food providers ties them to the family and village. Women are considered virtually irreplaceable and daughters are seen as important assets and are a measure of well-being in the family. According to one of the mothers interviewed, "A girl is your old age pension, because girls attend and take care of their parents."

The main roles and responsibilities of men are not only to provide income but also to take care of shelter, to provide protein and to clear agricultural land. Men also provide social protection for the family and see to their well-being. In addition they are expected to be the main breadwinners and to earn an income; many men leave the villages to seek jobs outside. Women then have to rely on male relatives or paid labour for assistance.

Women's vulnerability to natural hazards is linked to their unequal gender roles and responsibilities, particularly in agriculture, housing and community decision-making. The women interviewed in New Aurora reported that because there are fewer men than women in the village there is a problem when there are floods. Before a disaster they have to prepare and may not always have access to help from men. After a flood, both women and men clean up together, but many women are forced to repair their houses by themselves if they cannot afford to pay a male labourer. Interviewees also reported that during the floods women's work burden is greater because of their role in house maintenance and because the mud and sediment remaining in their houses make it difficult to clean. This causes the houses to stink and the smell can last for several weeks.

4.2. Gender and vulnerabilities in agriculture

As previously noted, Tepu and New Aurora are typical of Amerindian and Maroon communities respectively. The two communities are largely dependent on subsistence agriculture, producing their own food and catching their own fish and meat. Agriculture has a very significant meaning for the food security and survival of both villages and women play a major role in agricultural production as well as food processing. There is a sexual division of labour as some tasks are done by women and others by men. Separate women from both communities stated “If we don’t plant or fish, we die, because we do not have money to buy food.” In the Interior, agricultural cultivation is done using the ‘slash and burn’ method where land is cleared, burnt and plots are cultivated on a rotational basis.

In both villages agricultural plots are structured through matriarchal lines, and plots belonging to families from one family line are generally clustered together. Mothers and daughters may share a large piece of land, or may each have smaller lots close together for support and mutual protection.

The agricultural plots of the women of Tepu and New Aurora are close to the river or creek. There are several reasons for the choice of these sites. The soil is richer, the location near to the river makes the plots more accessible to the women who have to travel using paddle-boats to transport tools and harvested produce, and there is less danger as the women do not like to travel alone in the forest. The downside is that these riverside locations are particularly vulnerable to flooding.

In both communities, flooding impacts women’s agricultural production at many levels. There is the direct loss of crops when there are floods, and recovery is slow. It takes at least a year before the flooded soil has recovered sufficiently to produce a good harvest. Among the adaptation strategies reported during the interviews, were that women protected their crops from high flood waters in the wet season and avoided locations where there was the danger of flooding, by moving their plots to higher locations in the forest. This however made cultivation more difficult since they had to establish new agricultural plots, which was both time consuming and arduous work. Relocating plots also increased the distance women had to walk from the village. This often took them between one to two hours, which, in addition to being more inconvenient, made them very tired. Some women, particularly those who were elderly, continued to use their old plots after flooding, either because they were unable to find new plots or because they had limited resources or support to clear new land. As a result they experienced very poor harvests.

There is a sexual division of labour in agriculture in the two communities. Men in Tepu clear land to establish agricultural plots. They also assist their spouses with planting and maintenance, and help to transport the harvested produce. In New Aurora, men also clear and prepare land for their wife, (or wives if they practice polygamy). This activity usually takes three weeks on average and the wife and children assist. However, men do not usually assist in the maintenance of the plots nor in harvesting of crops; these tasks are regarded as women’s work. These findings indicate that after floods all interventions should be gender-sensitive. This means that aid projects should ensure that women receive adequate agricultural training, equipment, tools and material so as to enable them to restart their agricultural production as soon as possible.

4.3. Gender and vulnerabilities in housing

In the indigenous and maroon cultures consulted, there are also specific gender roles and responsibilities related to the provision of housing for the family. Men are expected to build a house for their wives, while women are responsible for the maintenance of houses, except for repairs which are the responsibility of men. Another factor related to the earlier report is that many parents help to build houses for their daughters and sons-in-law and to provide for them financially and with food until they are independent. As a consequence of this traditional practice, middle-aged men and women often said they owned more than two or three houses.

Cultural traditions in building houses also influence how communities cope with flooding. In Tepu, the impact of the 2006 floods on housing was minimal, as the indigenous population in this area build houses on stilts. The kitchens and storage areas are however on the ground. When the floods re-occurred in 2008, the houses on stilts were safe but several kitchens and storage areas were destroyed because the water level around houses close to the river reached almost to the top of the stilts. The flooding also resulted in the loss of soil around the stilts of some houses which increased their risk of collapsing. Consistent with their role of building and repairing buildings, men in Tepu collected material and undertook the necessary repairs as soon as the water subsided.

The impact of the floods in New Aurora was different. As many women lived in female headed households and did not have building skills, they had to rely on and pay males to undertake house repairs. This situation made them and their families even more vulnerable after the floods and prolonged their difficult period of recovery.

Interviews in New Aurora indicated that some people had to resort to using more than one house. One female respondent reported that she had lost two houses with all her furniture, so she moved to her daughter's house. She had collected some roof material, but two years later, at the time of the interview, she was still saving to buy more materials to construct a new house. She lacked skills to repair her house and facilities because it was not her traditional gender role and responsibility.

Results of the interviews, suggest that people in both communities were more proactive in the 2008 floods than they had been in the previous disaster. They had taken precautions early to reduce the impact of the flooding. They had packed important belongings and put these in higher locations. They reported that moving all their things was a major problem because most families had no other place to take their belongings. Some men in New Aurora said they had built shelves high on the walls of their houses to store things. Females unable to afford male help would not have been able to get this done.

The persons interviewed reported that after the floods an impact assessment had been done and this included specific questions about the impact of the floods on housing. As a result both men and women reported that they had expected assistance in rebuilding but two years later the anticipated support was still not forthcoming.

4.4. Vulnerabilities resulting from gender and power relationships

The study also highlighted vulnerabilities related to unequal power relationships between women and men in the Indigenous and Maroon communities. Both have strong self-governing structures which include village councils which are hierarchical and allow the Council to maintain order and discipline in the community. The villages are governed according to traditional customs and the Council is independent with limited state interference. This leadership structure is a great asset in managing disasters and risks, and reduces potential accidents during floods. However, there is gender inequality as women do not participate at the decision-making level in these village councils.

Despite strong matriarchal traditions, men possess decision-making power at different levels in the community:

- i. men are perceived as heads of the families and the main income providers;
- ii. the mothers' uncles are the most influential persons in the family. They make the decisions and inherit tribal functions or delegate these to nephews;
- iii. land use for agriculture and housing is subject to permission being granted by the Tribe Chief or Chief Captain who are male;
- iv. whereas both men and women have practical community duties, the management of the village community is men's domain only;
- v. decisions at the community level are made through the participation of men in village meetings because, traditionally, women do not speak publicly. However, women confirm that they have some indirect advisory influence on decisions through their partners or male relatives;
- vi. aside from male dominance in making decision, at the community level, male power is also witnessed in social control of women at family level. Opinions about male protection of women are strong and require women to ask permission of their spouses to travel outside the village, even when travelling to surrounding villages. A significant exception is women's almost daily routine to visit their agricultural plots.

Overall, women's minimal power and decision-making are linked to their low social status in their respective communities. As a result they have less power and capacity to manage risks related to their roles and areas of responsibility. Since they are not allowed to speak in public meetings, their problems and needs are often not heard, and may even be misinterpreted by men. The women interviewed said that they would prefer their voices to be heard directly. They wanted to be able to share their personal opinions, experiences, preferences and proposed solutions relevant to disaster risk management. They would like to be able to identify what they required after a disaster, particularly as it related to the distribution of aid.

Some examples were cited of how the poorest women in the two villages were adversely impacted by unequal access to power. Since powerful families tended to dominate local community

organisations, external aid resources were not shared equally in the villages. Interviewees reported that, when one of the women's groups received a cassava machine to restore food security after the floods, this was placed in the Captain's⁶ home and not in the centre of the village where all the women would have easy access.

In another village, women reported that they had received a small engine-driven rice mill, an engine-driven cassava mill, tools and seed from the "Recovery of Food Security" project. The equipment was however accessible and brought them tremendous relief from their labour intensive work.

The study demonstrated that men's participation in decision-making structures had enabled them to be better organised than women. They were better able than women to express their needs and to propose solutions for their problems. For example, in discussions about housing and relocation men were able to state clearly their need for heavy building equipment, such as chain saws and other construction material.

Unequal access of women also placed them at a disadvantage in having their needs addressed. For example, the Captain in one of the villages requested agricultural extension services for men after the floods. When the consultant pointed out that the women would need this more than men because they have the main responsibility for food security, the Captain was adamant. He argued that men should be skilled in improved agricultural techniques because they are the bread-winners. In his opinion, women were already receiving a lot of attention and economic support from NGOs and therefore did not need agricultural support services. Since women had no opportunity to make their voices heard at the highest levels of decision-making in the communities, there was risk that they would not receive the aid and assistance they urgently needed. The danger was even greater if persons responsible for the aid programmes were gender-blind or were not sensitive to gender dynamics and roles in the community among women and men.

4.5. Vulnerabilities resulting from the structure of male/female relationships

The structure of male-female partner relationships also exposes gender vulnerabilities in natural hazards. The very traditional gender division of labour in village communities results in partnership relationships that are very complex. The activities of men and women are so complementary that there is a major problem when a partner falls away. In this respect, divorced people, widows and widowers are very vulnerable. Women who are solely responsible for their family have to pay for land clearing and for all the other labour a man is supposed to do for his wife. Lack of money therefore becomes a major problem for these women. However both sexes consulted believe that a single male headed household has bigger problems than a single female headed household as the man has no one to provide food, care for the children and perform household duties.

Traditional views on household headship may also cause vulnerabilities to natural hazards. For example, both women and men interviewed agreed that the man is the breadwinner and the one with most

⁶The Captain is the village headman and head of the Council

power in the household. The interviews also confirmed that there is a difference in women's access to the income they earn in the two communities. In New Aurora, the income earned by women is controlled by them. However, in Tepu the use of the income earned by women is controlled by men since it is they who travel to the city to buy goods.

Polygamy also plays a factor in gender and vulnerability to natural hazards. The interviews showed that women from New Aurora are very dissatisfied with the polygamy tradition because they do not want to share their partner and the income he earns with other women. Apart from jealousy, women also argue that their extreme poverty is due to the fact that their male partner financially supports more than one family.

Men generally agree with the women on this point, but pointed out the peer pressure on men to be polygamous. A man with more than one wife has a higher status in Maroon society because he is considered wealthy and potent. A few men argue that polygamy helps to bring balance so that a man is never without a wife and a woman always has a man to take care of her. It was also reported that women without a male partner virtually 'stalk' men. It was interesting to note that almost all the older men consulted said that they used to have more wives when they were younger, but kept only one wife as they grew older.

The study also showed that the pre-existing vulnerability caused by domestic violence which was prevalent in both villages also increased women's risk factor when there is a natural disaster. Both women and men testified to the existence of all forms of violence in their villages including physical, psychological (cursing, threatening) and financial violence, which involved men refusing to give financial support to their households. While there were also reported incidents of women abusing men, this was less frequent and was usually psychological violence.

Some women also confirmed being raped by their male partner when they refused sexual intercourse or when the man was drunk from drinking too much *casiri* or used herbs to increase his sexual potency. The interviews also confirmed that cases of rape of young girls are generally not reported out of fear of retaliatory violence. *Basiyas*⁷ and Captains in the village council mediate in quarrels and cases of domestic abuse. Within these, sexual offences of men or women against men and boys are not permitted. Serious offences are reported to the police. While acknowledging that there was pre-existing gender based violence, none of the persons interviewed expressed the view that the floods had caused any increase in domestic violence.

⁷ *Basiyas* are assistants to the Captain

5. Risk, adaptation strategies and recovery

The results of the study show that living in the forest for many generations has enabled the people in both villages to develop various strategies to cope with their specific vulnerabilities and circumstances. However, the severe flooding that occurred was clearly outside their normal experience and they had limited capacity to deal with the resultant risks. However, they relied on some traditional approaches and developed new strategies to deal with and adapt to the risks associated with the flooding.

5.1. Cultivation and drainage

Even before 2006, some communities had noticed that the density of the forest combined with the absence of proper drainage systems had resulted in the soil being saturated by water. Some people said that water was literally coming from the soil. The survival strategy used by families was to clear new land and plant crops⁸, but it took more than six months before the crops were ready to be harvested. Flooded agricultural plots ruined 70% of people's crops, and the ground needed almost a year to recover. Cassava, the main food staple of these communities, and turnips, were particularly hard hit because they are extremely sensitive to water.

In order to protect their crops from high water in the wet season, and also from the danger of flooding, many women reported that they had moved their plots to higher locations in the forest. But, as indicated earlier, this move had created additional problems of access and security for the women.

5.2. Lack of firewood for cooking

The floods also had an adverse effect on the fuel for cooking. Women in the villages collect and use firewood for cooking. They reported that during the floods the stored firewood was washed away. High water levels also hindered the women from collecting new firewood which was in any event also wet and unusable.

5.3. Dependence and interdependence

The floods also had an impact on family relations. As previously indicated, families are traditionally independent and self-sufficient for food because this is the work of women. The groups reported that part of a women's self esteem in these communities is linked to their ability to provide food for their families. However, because of the floods many women had to survive by depending on relatives for food as well as on food relief assistance. Many of the women reported that they felt ashamed to do so, especially since everyone was facing food insecurity in one way or another.

⁸Flooding in Suriname, Picture Report, PAHO May 17, 2006.

On the other hand, many traditional support systems functioned well after the flooding. The matriarchal structure provided important forms of support for women. These included joint food production and preparation, sharing of shelter and access to services. Female relatives gave each other support with planting and harvesting. They also shared planting material and food. Elderly women played a key role in child care, freeing younger women to undertake their productive work.

They also reported that the community spirit was stronger as men helped each other to rebuild homes, while the women prepared food for everyone which is a system that is sometimes applied to land clearing and building community facilities.

However the floods had a negative impact on the men who had the important role and major responsibility for providing protein for their families. During the 2006 floods, they came under severe pressure because fishing and hunting were impossible. Men also had to clear new plots for and with their wife or wives. This was a major challenge since many men lost the tools they required to fulfil these manual tasks.

5.4. Geographic isolation and food security

Poor transportation and communication links between the capital and hinterland increases economic risks and makes both women and men more vulnerable to natural hazards, particularly with regard to food security. The men and women consulted were also of the view that although the food situation was precarious, it was not taken seriously by the authorities in Suriname. Persons from the indigenous communities in the South compared their situation with those of their counterparts in Brazil, where they perceived the government as being more sensitive to the needs of the indigenous population. This was especially relevant in the provision of adequate agricultural extension services. The lack of women's voices in decision-making in these communities may also have contributed to lack of priority given to the communities' needs.

It was important that the Government, NGOs, Red Cross and other institutions working in Suriname, started a relief assistance programme which continued to take place throughout the affected villages, and which addressed immediate food consumption as well as non-food needs.

5.5. Lack of access to water

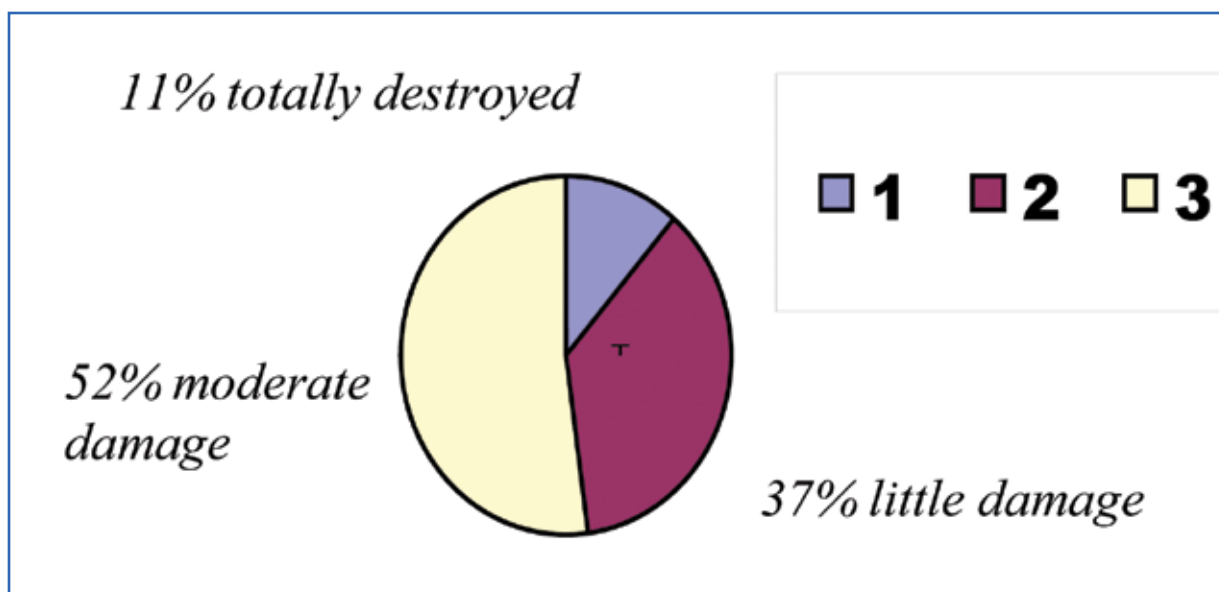
During the 2006 floods the natural sources of available safe, fresh drinking water were contaminated. Villagers reported that they survived by collecting rainwater for cooking, washing and bathing. However, water collection systems were inadequate and only a few people had water tanks so there was a shortage of water. Persons with tanks reported that during the floods, the tanks could not be used if the water level reached the level of the water tap. Some people lost their water containers and tanks because they floated away with the flood waters. This made it more difficult to catch available water.

During the wet season and especially during flooding, rivers and creeks are muddy and carry dirt and debris from the forest such as tree branches and grass. Since they cannot be used as sources of water for washing, cooking and cleaning, this negatively impacts women's ability to carry out their traditional roles.

5.6. Impact on housing of land erosion

The men and women reported that during the 2006 floods, there had also been loss of land due to soil erosion. This had posed a particular risk for housing as well as for agriculture as most villages are built near the riverside on land that has been cleared of trees and weeds. As a result the area was prone to soil erosion. Villagers noted that the unusual increases in the water levels made the situation more serious since the erosion of soil weakened the foundations of houses. During the floods of 2006 the fronts and lower sections of some houses had actually been washed away

Chart 1: Damage to houses



The impact of the floods on housing is presented in Chart 1 which includes data from the post-disaster assessment conducted in 2006 by NGOs working in the Interior. The results revealed that 44 percent of houses were affected by the floods, and of these over 60 percent were destroyed or moderately damaged.

In addition to family homes, there was significant damage to community properties such as schools, churches, clinics and other public facilities built over years with scarce resources obtained with great difficulty through fundraising, and these were difficult to replace.

The location of villages on high ground and the building of houses on stilts in Tepu are obviously part of traditional adaptation strategies to cope with high water levels. A number of affected families who lived at the riverside in the villages reported that they had recently moved to even higher locations further inland. In fact they all said that they should each have a small house further away from the water to which they can retreat during a flood.

5.7. Increased health risks related to natural hazards

Sanitation was also affected by the floods. The interviews revealed that the 2006 floods exacerbated the lack of proper sanitation. Few people had latrines and most used the river and bush to relieve themselves. As a result, cases of diarrhoea and in one village an increase in malaria were reported⁹. In both the villages, people complained about an unbearable stench caused by flooded latrines. This situation combined with mud and dirt from the river, increased health risks and placed a greater burden on women who were responsible for the clean up and caring for sick children and other relatives.

5.8. Interruption of economic earnings

Another significant impact of the 2006 floods was their effect on the economic activities of persons in the communities. As expected, eco-tourism and related activities which are one of the few income sources for villagers were adversely affected. Men lost their income as owners of small eco-lodges or as boatmen, fishermen, hunters, traders of birds and animals and their building materials. However, many were able to benefit immediately after the flood from higher prices charged for transportation and labour services to aid providers.

Women were the double losers. In addition to losing agricultural produce because of flooding, women also lost income because they had to pay more for transportation when it was available. One approach some women took when their crops were destroyed by the floods was to look after animals.

People in both villages reported that the assistance of NGOs contributed significantly to restoring food security after floods. NGOs undertook specific activities to promote women's empowerment. In addition, many government and NGO agricultural extension services and projects focused primarily on women, and assisted them in restoring their food production for family consumption and sale.

5.9. Vulnerability of poor people

The vulnerability of poor people, both men and women, was also increased in the 2006 floods. This was because many of the affected persons did not have the cash to replace or repair basic possessions and/or household items such as: houses, water tanks, mattresses, pots and pans, fridges, and stoves or personal items such as clothing and footwear.

5.10. Fear of cycles of droughts and floods

Discussions with the villagers also revealed that they feared the possibility of cycles of droughts and floods. They also noted that after the 2006 floods they had feared that there would be droughts.

⁹Flooding in Suriname, Picture Report, PAHO May 17, 2006.

The Chief Captain of Tepu recalled stories told by his parents that there was a drought that had affected the community severely some decades ago. He noted that this type of drought had not been experienced for a long time but felt that it could happen again and so could the floods.

In the discussions it was also noted that when the indigenous population from Guyana had suffered from drought about a decade ago, the Guyanese government had imported food for them from Brazil and that the Canada Fund had introduced drip irrigation for their agricultural sector. During the same period, the Canada Fund had also supported a demonstration project for the indigenous village of Matta in Suriname. At that time there had been no visible effects in Suriname, but they felt that drought remains a serious threat.

5.11. Mobility

Movement was also restricted by the 2006 floods. People had to seek refuge in higher locations and in many cases could only move between communities by boat. Fortunately most families owned at least one boat, often with an outboard engine. This enabled them to move and increased their chances of survival during the floods. During the flood of 2008, when the local airstrip of Tepu was closed, the Village Council played an important role in the local coordination of boat transportation to pick up emergency food packages delivered to a nearby village.

5.12. Access to education and information

Most people in the villages are poorly informed and believe that the flooding they experienced was accidental. However, women generally had less access to important information due to their lower level of education and limited travel opportunities. People travelling to the city, mostly men, have a greater chance to garner information. They could learn about the impacts of climate change including flooding, droughts and earthquakes in other parts of the world, and how other people cope with such disasters.

6. Lessons learned

The effects of climate change which were demonstrated in the floods of 2006 and 2008 were new to Suriname although some Caribbean countries have been coping with the devastating effects of natural hazards for a long time. There are many lessons to be learnt from the experiences of the target communities which may be applicable to communities across the Caribbean.

1. Women's vulnerability to natural hazards is linked to the traditional roles, responsibilities and activities in which they are involved in both the household and the community. Data from the interviews and focus group discussions show a clear sexual division of labour in the household based on cultural traditions which result in women doing most of the non-paid work activities in the household.
2. Multiple factors expose men and women to risks before, during and after disasters. Some may make women more vulnerable than men to natural hazards. Among these factors are: the imbalance between the numbers of women and men and polygamy in Maroon communities; higher rates of unemployment and lack of paid employment opportunities and collateral particularly for women; male dominance in leadership at all levels of the community; unequal access to education and information; women's increased risk from domestic violence as well as the geographic isolation which impacts women more because of cultural practices which place restrictions on their movement.

Factors affecting men include decreased opportunities for hunting and fishing and the shortage of house construction material and tools. Lack of opportunities for employment also affects men's ability to fulfil their roles as providers for the family.

3. While men and women in both villages are economically vulnerable, the interviews from both villages showed that women are much more at risk than men because of unequal gender relations that exist even before a disaster. Families at high risk need assistance in relocating their houses and plots to safer places in order to protect lives and their food security, while preventing loss of their possessions, which could increase their poverty.
4. Living in the forest for many generations has enabled the people in both villages to develop various strategies to deal with their specific circumstances. However, extreme flooding or drought is not part of their regular experience and specific measures or coping strategies are limited. However, after the 2006 floods they were able to survive by depending on traditional social networks and support services, as well as using small savings to cope with the situation.
5. Many traditional community support systems functioned well for both women and men. These systems for sharing labour can be utilised during natural hazards and during the recovery / restoration phase.

6. Indigenous and Maroon communities have a strong self-governing ability through the village council, and the existing hierarchical structure maintains good order and discipline in the community. Such leadership is a great asset in managing crises and risks and has helped to reduce incidents and accidents during floods. However, since women do not participate in the decision-making structures of the village councils, they are less likely to have their concerns and needs heard or addressed. They are also less likely to be involved in risk management, and have little control over emergency recovery aid that would maximise benefits to them and their families.
7. Special precautions and measures need to be taken for elderly people who are less mobile and less flexible to adaptation. The older people face many difficulties such as walking to the river and maintaining their houses and plots; this threatens their food security. While they may receive help from others, they are especially vulnerable when they do not have daughters to take care of them.
8. Women and families need the assistance of government and NGOs in the communities to identify suitable locations for new agricultural plots, and to gain appropriate agricultural skills and techniques so that these plots and the newly exposed soil are not washed away.
9. It has become more relevant and necessary to monitor unusual increases in water levels of the rivers, so that early warning can be given to get families and their possessions to safety. Tepu was the first village that flooded in both 2006 and in 2008. The water level rises quickly and fluctuates, while it subsides gradually. The villagers believe it is important to have a water watch to observe any unusual rising. Families living directly on the waterfront are usually the first to notice problems and they can then alert the rest of the community.

Another lesson from the 2006 floods is that people have to seek refuge in geographically higher locations and in many communities, they can only move around in boats. The Government, NGOs, Red Cross and other institutions working in Suriname, started a relief assistance programme which continued to take place throughout the affected villages. It addressed immediate food consumption as well as non-food needs.

7. Conclusions and recommendations

7.1. Conclusions

The study shows that women and men are vulnerable in different ways and, women more so than men. The case studies on Tepu and New Aurora describe the factors which impact the conditions of women and men in communities and ascribe different roles, activities, attitudes, customs and responsibilities to them. These factors shape imbalances not only in the sexual division of unpaid labour, where women bear the greatest burden, but also in the opportunities to earn incomes and enjoy autonomy.

Women and men of the villages are both vulnerable in different ways because of severe poverty which is caused by lack of education and limited employment opportunities. Because of their different gender roles, women and men also experience the impacts of natural hazards differently. However, the case studies show that women are more vulnerable than men in handling the impacts of flooding on their families and their areas of responsibility in agriculture and housing.

7.2. Recommendations

1. Ensure that disaster risk assessments are designed in gender sensitive ways to look at different risks and vulnerabilities for women and for men and to ensure that women are consulted in ways that encourage their full participation and input;
2. Assign clear roles and activities to women and to men in risk management plans which demonstrate gender equality and strengthen women's capacity to increase their power and control over their situations;
3. Assist women from the villages in identifying and clearing more suitable agricultural land that is less prone or not prone to flooding and empower them to negotiate with village leaders for permission to use such lands;
4. Ensure that women gain skills and more effective agricultural techniques so they can manage and mitigate the risks of excessive rainfall or drought;
5. Assist in relocating families that live closest to the river or that are at greatest risk from flooding. Special needs of female headed households and elderly people must be taken into consideration with respect to assistance with construction and repairs to housing;
6. Involve NGOs which know the communities, are sensitive to gender differences, and have gained trust from the villagers. Use them as partners in the process of disaster planning and reconstruction to identify and implement risk reduction and management strategies in collaboration with the community and to integrate such strategies into their regular activities.

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