

# CASE STUDY

## 2012 Floods and Landslides in Someland

### Post-Disaster Needs Assessment

**NB: This case study was adapted from the 2012 floods and landslides in Someland . It is worth noting some data was made up and added to enable participants to think about all possible effects, practice costing methodology and design a recovery strategy. Hence it does not truly reflect the reality of this specific disaster event.**

## Context

### Pre-disaster socio-economic profile of Someland

Someland is a country of highlands, mountain ranges on one side with rivers on the other. Lowland covers about 50% of the country. There are two major rivers (Pen River and Paper River) that flow through the country, the Pen River delta is fronted by hills that rise gently into the high mountains of the northwest; the Pencil Highlands cover much of the central landscape. In the southern areas, the coastal lowlands and Paper River Delta merge. Someland has an area of 574,000 sq.km with an estimated population of 20 million (2006). With a per capita income of \$800 in 2007, the 2007 Sustainable Human Development Report indicates that 71.8% of the population lives on less than \$2 a day. 46.4% live below the absolute poverty line. The population is more than 60% rural, 54.9% male and 51.6% female. Poverty is a predominantly rural phenomenon contributing 93.6% to the incidence of national poverty.

The Pen State is the capital city of Someland located in the banks of Pen River which flows through the city. It is low lying city. The total population of Pen State is 5 million. The second largest state is Pencil State with a population of 7 million. It is a highland with population scattered all over 30 small villages and towns. The River Paper originates in the hills and flows through the state and joins the Pen River Delta. The rest of the country is rural area widespread across the another state.

- Population: 20 million inhabitants (2006)
- Real GDP growth rate: 3.2% (2009)
- Per capita income: USD 800 (2005)
- Population with less than 1 USD per day: 46.4% (2006)
- Inflation: 2.8% (2009)
- Unemployment rate: 11.4%
- Agricultural sector: 35% of GDP / provides livelihoods to 80% of active pop.
- Gross enrollment ratio: 47.5% (girls: 43%)
- Literacy rate: 32.35%
- Infant and juvenile mortality: 142 ‰ in 2006.
- Underweight in under-5 years: 26%
- Maternal mortality: 307/100,000 newborns
- 35% of food insecure households
- 20% of the population have access to electricity

## Agriculture

The agriculture sector, including livestock and fisheries, accounts for 35% of GDP and employs 80% of the active population (2008). 46.7% of poor households are engaged in agriculture and livestock farming, even in urban areas.

Agriculture in Someland is essentially a subsistence type and rainfed agriculture, largely dependent on weather conditions and based on food crops (rice, sorghum, millet, maize). Most agricultural households practice polyculture, often associated with small-scale farming (67.6% of households practice livestock farming). Livestock, pastoral or agro-pastoral, is extensive and based in part on the mobility and transhumance of herds (cattle, sheep and goats); However, semi-intensive livestock farming is developing in peri-urban areas. Despite low average productivity, and despite the degradation of pasture resources in some areas, livestock remains an important area of export to neighboring countries in the sub region. In addition, livestock contributes to achieving food security.

Description	Producer price	Average yield/ha
Sorghum	12 USD/kilo	920 kilos
Millet	14 USD/kilo	850 kilos
Corn	10 USD/Kilo	1500 kilos
Rice	15 USD/kilo	2300 kilos
Sesame	30 USD/kilo	700 kilos

Furthermore, irrigated farming has developed considerably in recent years and has greatly contributed to increasing yields. The off-season vegetable growing is practiced along rivers and dams.

The fisheries sector, with an estimated production of 10,000/12,000 tons, is in the process of expansion.

Cotton and livestock are the country's two main exports.

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Description	Average price per unit	Nesting rate: 5 eggs per week (for 52 weeks from week 18) Egg producer prices: 100 Price per liter of milk: 4 USD Average farmer's income per day: 10 USD
Cattle	200 USD	
Goats	150 USD	
Sheep	150 USD	
Hen	10 USD	

### Employment and livelihoods

Unemployment in 2009 is around 11.4%, with an imbalance between men (8.2%) and women (14.2%). Unemployment is concentrated in urban areas (17.7%) rather than in rural areas (9.9%). The youth unemployment rate (15-24 years) is 16.4%. It targets 13.7% of men and 18.6% of women.

With agriculture, the informal sector is one of the key providers of employment in Someland. In Pen State, Someland's capital city, which has a population of 5 million people, the informal sector (small trade, crafts) is the largest provider of household incomes. Many small traders located along certain major arteries in flood-prone areas also depend on the sale of cell phones and accessories, hardware, small grocery stores (eg small commerce of vegetable and condiment by women), clothing effects. According to the ILO, employment by branch of economic activity is concentrated around agriculture (66.9%) followed by services (25%) and the industry contribution is only 8.1%.

### Health

In the field of health, the morbidity rate, which measures the general state of health, is 5.8%. It is mentioned that 44.5% of children in Pencil, the largest state, suffer from growth retardation. The rate of access to drinking water in urban areas is 74% and 22% for sanitation. The one in rural areas is 54% for water and 10% for sanitation. The HIV / AIDS pandemic still constitutes a major constraint to the development of the country despite an AIDS prevalence rate which decreased from 6.5% in 2001 to 4.2% in 2002.

Health structure in Pen State	Monthly average income before the disaster
1 major hospital and medical college	350 USD
10 small health centers located in different municipal wards of the city	

### Housing

In Pen State, has a total 800,000 units of houses, 20% of households live in houses without electricity and have access to drinking water from hydrants. 27% of the dwellings use a traditional latrine and 44% of the dwellings are without latrines.

Unit price of Houses	
Per square metre of of RCC house with labour costs	50 USD

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Per square metre of brick and cemented walls with corrugated roofs	30 USD
Per square metre of thatch house with no labour	10 USD

Regarding the occupancy status of the house at the city level, 61% are owners, 24% are tenants and 15% are free hostels. In the Pen state region, dwellings average 60 sq. m. The estimated price of a traditional construction is an average 100 USD per sq. m. The rent varies between 450 and 600 USD per house. The density of housing at the national level is 5.9 persons per household (census). According to household surveys, the average value of assets, food, clothing,

furniture, dishes and the like and similar items than one household can possess can be estimated at 200 USD. In the case of micro-enterprise at home, it is estimated more and more that each trader had about 300 USD value of goods.

At the national level, 50% of the buildings are concrete, RCC structures and 25 % are made of concrete or semi concrete materials with corrugated roofs and 25% houses are thatch roof with mud plastered bamboo walls. There are very few multi storey buildings, houses are mostly single or double storey units with garden space. At the rural level, 75 % of houses are corrugated roofs with mud plastered with bamboos walls and other precarious materials. The balance 25% live in houses with thatch roofs and mud walls and a collection of semi concrete materials.

The city of Pen has a Master Plan for Urban Development (SDAU) for land use and settlements and a master plan for solid waste management, but these are not generally respected, especially in the city of Pen, where unplanned habitats have developed in all the municipal wards. The national building codes is generally not followed for private houses.

At the level of training institutes and universities in Someland, there is no training for building engineers, architects and urban planners. There are a limited number of specialized technical training programs in the country. The great need for technicians and professionals is evident at the level of municipalities and public services.

People mostly construct their own houses by hiring local engineers and architects in the urban areas of Pen State. In rural areas, house owners do most of the construction themselves with the support of local masons.

#### Water and sanitation

In urban areas, the rate of access to safe drinking water was estimated to 75% in 2005. In rural areas, including small towns where the national water authorities are absent, the rate of access was estimated to 55.49% in 2008, with strong geographic access disparities. The rate of access to sanitation in urban areas was of 14% in 2005. In Pen state, it was of 55%. In rural areas, it was estimated to be of 10% in 2005.

#### Disaster profile

The country is frequently affected by different kinds of disasters, which impacts have increased over time. Several types of disasters have affected the country between 1999 and 2009, such as droughts and floods. Heavy rainfall in the hills (Pencil State) often result in landslides each year, causing the highest number of casualties, and damage to houses and public and private property. These disasters affected every year several thousands of persons. Migration, food insecurity and malnutrition were registered as secondary effects of these disasters. The populations are affected by the cumulative effects of these crises and lack time to recover from the shocks, which results in a constant level of vulnerability.

#### Disaster Risk Management/Reduction (existing capacities at the time of the disaster)

Among the national institutions in charge of disaster risk management and reduction (DRM/DRR), the National Council for Emergency Relief has a central role. It was created in 2009 to manage all phases of disasters (pre-disaster, during the disaster, and post disaster situations). It is presided by the Minister of Relief and Disaster Management (MRDM) with separate divisions for Relief and Disaster Preparedness. It is represented throughout the country at the regional, provincial levels. At the village level there are personnel from the relief department. There are village committees for development which are often engaged in relief activities.

Additionally there is a National Directorate for Civil Protection (DGPC), created in 1978, has an institutional role and responsibilities for civil protection, fire and disaster response. It is placed under the Ministry of Settlement and Decentralization (MATD). In addition, the DGPC defines and oversees the necessary measures to protect goods and

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persons in the event of a major disaster. It works closely with the National Fire Brigade, which makes up its operational arm, despite its lack of human and material resources.

On policy, strategy and planning, the Government of Someland adopted in 2007 the National Social Action Policy, which is the point of reference for any action regarding disaster risk management and prevention in the country. The government adopted in 2008 an emergency plan to ensure food security and nutrition in Someland. Finally, with the help of the United Nations, a Contingency Plan was adopted in 2008, but it was imperfectly implemented during the recent flood events. The Government reports regularly on their targets for the Sendai Framework for DRR. It has not made much progress in terms of achieving the target.

The disaster has affected the Pen State and Pencil State fire services and emergency operation centres run by the department of Relief. 10 emergency operation centers with equipment in Pencil state were affected and 5 fire service units were flooded and lost some equipment. The Pen state 5 emergency operations centers were flooded for over 10 days with all equipment lost but the building was not damaged.

#### Environment

The Directorate of Meteorology placed under the Ministry of Environment and oversees the forecast, detection and monitoring of climatic events. The Ministry of Environment has drafted Nationally Determined Contributions (NDC) to meet their national targets for climate change. Additionally they have climate action plans and a Green Climate Fund project which is just being initiated in the Pencil State for protection of highlands and Forests.

The floods have caused many environmental impacts. Most of the environmental impacts are due to landslides and trees and soil that washed down Paper and Pen rivers. The flood waters also contain household materials and hospital waste. The floods have eroded all river bank and several plantations projects planned around the river banks. The damage to the beach caused by the floods has also affected the tourism sector in the area. About 150 hectares of thick forests in Someland were also destroyed due to the floods, impacting the ecological benefits provided by them.

An enormous amount of disaster waste has been generated due to the floods, which includes silt, mud, municipal solid waste as well as materials, which are not normally considered as waste but have suddenly turned into waste streams such as house hold articles, automobiles, vegetation, trees, mud etc. There are also hazardous wastes from industries, hospitals, animal carcasses etc. The waterways (natural and manmade) in the area have been blocked with silt, mud, and other disaster wastes. Municipal solid waste management facilities have been adversely impacted, including damage to equipment and infrastructure and have resulted in reduced capacity to treat normal amount of waste not to mention the enormous volume of disaster waste. There are stagnant pools of floodwater trapped locally have increased the water pollution and risk of diseases in the area.

The Ministry of Environment, which looks after the environmental governance and common property resources, has been affected due to low numbers of staff. The Ministry of Environment and Ministry of Disaster Management and Relief work separately without any coordination.

## II. The current floods and landslides

On September 1st, 2012, 263.4 mm of rain fell in less than 12 hours. In comparison to the average rain quantity, which is of 800 to 900 mm a year, the rainfall that day represented approximatively one third of the cumulative seasonal rainfall. The quantity of rain recorded in Pen and Pencil States reached a national record compared to the last 105 years. It is mostly an urban flood with Pen State affected fully and only one province of Pencil State affected.

#### Human toll:

- Number of affected persons: 5,000,000 (of which 45% work in the agriculture sector, 27% work in the informal business sector, 20 % in the housing sector, 0.02 % in the health sector, and the rest in other sectors or not working).
- Affected households: 800,000
- Deaths: 125 (missing 14) 100 deaths due to landslides in Pencil State in Simba Province
- Injured: 63

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#### Affected areas:

- 11 municipal wards out of 15 in Pen State
- 3,000,000 people affected in Pen State
- 2,000,000 people affected in Pencil State
- Most affected regions: The Capital city Pen State with 11 municipal wards inundated by floods for 15 days. A total of 100,000 housing units were damaged of which 30,000 were fully damaged and 70,000 were partially damaged. The adjacent Pencil State has only one sub region **Simba** on the hills which was affected by landslides. A total of 2 million people affected. Landslides has destroyed 50,000 units of houses of which 25,000 are fully damaged and 25,000 are partially damaged . The houses still stand but are in danger of being sliding down as some are precariously perched on the hills.

The affected households' characteristics provided by the National Institute of Statistics (INSD) show that 94,8% of these are headed by men and 5,2% by women, with variations in urban areas, which have a higher number of women-headed households (12,4% against 3,2% in rural areas). A study on employment and the informal sector shows that 50% of the affected households undertake income generating activities, mostly women. The daily income is estimated to be of 10 USD.

#### **Response of the government and development partners**

To address the crisis, the State and the humanitarian partners have set up emergency response mechanisms. 24 schools have temporarily housed about 2 million affected persons in Pen State. The rest of the affected people are living in families. In Pencil State, all the landslide affected population have moved temporarily to a nearby town Rumba and are housed in 20 schools. The immediate priorities of the government were: (1) the restoration of the transportation network (roads and bridges), (2) the delivery of food to the affected persons on the 24 sites, (3) the delivery of safe drinking water and sanitation on the 24 sites, (4) the restoration of water and electricity services in the city of Pen , and (5) the immediate health care to injured families.

A specific organization was set up to ensure the monitoring of the situation, via:

- The cabinet council presided by the Prime Minister;
- A crisis committee headed by the mayor of the city of Pen State;
- An ad hoc committee in charge of humanitarian issues.

A similar set up was adopted at the regional and municipality levels to take care of the affected persons. The government estimated that the immediate humanitarian emergency and relief needs summed up to USD 50 million , and that the medium-term needs summed up to approximately USD 800 million.

In addition, the development partners set up an intersectoral coordination framework, and preliminary assessments were conducted by the Relief Departments together with Red Cross , FAO, EC/ECHO, and UNDAC, in relation with the different ministerial structures in charge of the affected sectors. A Flash Appeal was issued by the United Nations to address the most urgent needs.

In this context, the government, via the Ministry of Economy and Finance, has invited the World Bank, the United Nations System and the European Union to prepare a joint post-disaster needs assessment (PDNA).

#### **III. Effects and impacts of the disaster**

##### **Agriculture**

The agriculture sector (including livestock and fishery) is without a doubt the most affected sector, having the most severe consequences on the populations.

22,200 ha were extensively flooded throughout the national territory, leading to major losses on the current output, and on some of the future output. Approximately 15,800 ha of the total flooded areas were used for cereal production (sorghum, maize, millet and rice). An analysis on the type of crops affected showed that the sorghum production was the most affected (around 4,400 ha), followed by maize (3,330 ha), mil (6438 ha) and rice (1665 ha).



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The disaster took place just before the harvest, of which 100% crops was lost. In addition to the losses on the cereal production, 1032 ha of sesame production and 500 ha of cotton production were affected.

In Pen State and the surrounding areas of Pen State, 330 ha of vegetables production were lost. Before the disaster, the production over this area was estimated to reach 6,500 tons of vegetables twice a year.

23.5 ha of banana trees were destroyed by the rain. The production value of these was estimated at USD 1 million per ha. It is estimated that 3 years will be needed to go back to the pre-disaster yield level.

The sub-sectors of livestock and fishery have also been affected with the total or partial destruction of infrastructures or means of production. For livestock, 100 cowsheds, 200 pigsties, 50 sheep pens, 6 poultry farms, and 2 warehouses were fully destroyed. The livestock facilities were all located in flooded areas. The loss of animals amounted to 3000 bovine heads, 5,800 pigs, 4,200 sheep, 6,300 goats, and 20,000 laying hens.

It is estimated that the milk production of the 14,000 cows in the affected areas will decrease by 35% over the next 4 months, due to the lack of fodder and the bad quality of the pasture resulting from the floods. The poultry farms need to be reconstructed and repopulated.

Regarding fishing, the public infrastructures were the most affected, i.e. the fish farms. The disaster led to the damage of 68 pond embankments, of an average of 10m long. The fishing stock was completely lost, representing an estimated value of USD 5 million. In addition, 300 fishing boats, 5000 nets, and other hand-crafted fishing material were damaged or lost but no statistics were established on those amounts.

The floods also lead to the total or partial destruction of hydraulic infrastructures. 15 hydraulic agriculture dams and 25 km of irrigation canals were damaged or destroyed. Those were used to irrigate an area of 3820 ha.

Torrential rains also destroyed several technical services of the Ministry of Agriculture. One agricultural research center located in flood risk areas, as well as the National Center for Forest seedlings were also damaged,

The flood, by affecting two key sources of employment and income (agriculture and the informal sector) deprived thousands of families- the poorest in particular from their livelihoods means. For example, in the city of Pen alone, more than 5000 families of vegetable producers were affected. This had very negative impacts on food security and access to healthcare. Vulnerable social groups such as women, young people, adolescents, women heads of households and persons with disabilities were the most affected.

#### Housing

Housing was one of the most affected sectors. A total of 150,000 units of houses were fully or partially damaged. 100,000 unit of houses in Pen State and 50,000 in Pencil State. 55, 000 houses totally collapsed in the two states. In addition, sanitation of at least 60 per cent of the 150,000 affected homes in Pen and Pencil states were destroyed (latrines, septic tanks and showers), resulting in a contamination of water sources and a worrying deterioration in hygiene conditions. Drinking water and wastewater systems were also severely affected.

Shelters and dwellings generally located near river beds and swampy areas were the most severely hit. The majority of the houses destroyed by floods in Pen State (about 30,000 houses ) were located in informal settlements. In all flooded areas, there were no drainage system.

Initial precariousness of the habitat was an aggravating factor. In affected areas, 99% constructions built in non masonry structures collapsed and were completely washed away whereas stronger structures resisted. Each affected household lost the entirety of its assets, including those required for their micro-activity; 20,000 people with a micro activity at home lost their equipment, their stock and some cash. According to household surveys, it is estimated that the daily income earned by people with a home-based informal activity was approximately 10 USD daily.

A significant proportion of those affected also lost important administrative documents such as identity cards, death and birth certificates, or property deeds.

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24 temporary housing sites hosting approximately 20,000 displaced people were set up and provided with water and sanitation; 2,114 prefabricated houses were provided by the State. The Ministry of Housing and Urban Development identified two sites to permanently relocate disaster affected populations who previously lived in unsafe areas of Simba. The Ministry has identified 400 ha in Rumba for relocation of households who lost their land and houses in Simba. To make the relocation sites viable, some work was required, roadworks (50 km), installation of drinking water distribution system (one fountain in radius 300 meters radius), electrification works (50 km).

The quantity construction material needed for reconstruction was estimated at more than 36,000 tons of cement) and seemed to exceed the production capacity of the domestic industry (about 20,000 tons per month, factory output cost = 10,000 USD per ton). Cement imports will therefore be necessary. It is estimated that works on these permanent relocation sites will last 6 months. For other households who lived in affected areas (formal settlements but without drainage channels), experts estimate that the time needed for reconstruction on site will be 120 days.

#### Water and sanitation

Flooding caused partial demolition of the drinking water treatment plant. Paspanga station in Pencil State shut down for 10 days. Sewage infrastructures and solid waste management infrastructures were destroyed. Landfill sites were washed away by rainwater and litter was scattered on the streets. Sanitation facilities were destroyed in at least 60% of the 23,222 dwellings affected in Pen State (latrines, septic tanks and showers).

Losses are mainly due to the drop in production due to the interruption of the drinking water supply service, the installation of temporary sanitation and drinking water supplies (fountains, Water tanks, latrines, showers, laundry areas, hand washes), the collection and transport of solid waste, the cost of installing solid waste management equipment and the roll out of awareness campaigns and hygiene kits.