The Economics of Early Response and Resilience: Mozambique Country Study

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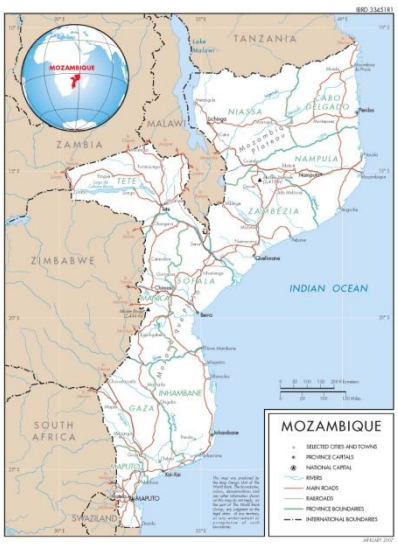
1 Country Context

1.1 Overview



Mozambique covers an area of 799.380 Km^2 and its population is around 24.5 million people. In 2012, Mozambique ranked 185 on the Human Development Index out of 187 countries. Life expectancy at birth is 50.7 years and the GNI per capita in PPP terms is 906 US$.[1] The official language is Portuguese, but 17 local languages are spoken in the country. The level of illiteracy, although it has fallen substantially, is still around 52%. The rate of unemployment among people over 15 years of age is 18.7%.[2]

Despite strong economic growth of about 7%, the rate of poverty is stagnant, if not rising with 54.7% in 2008 compared to 54.1% in 2003.[3] In fact, with a population growth of 2.4% the actual number of poor Mozambicans may be increasing.[4] The main reasons for the prevailing high poverty rates are, according to the Mozambican Government, very low or zero growth rates for agricultural productivity, together with climate shocks (floods, cyclones and droughts), large increases of international food and fuel prices, as well as the cumulative effect of the HIV/AIDS epidemic.[5] Most households depend on rain-fed agriculture, and are regularly affected by weather-related hazards. Only 6% of the population earns a living from industry, 13% from services, and 81% from agriculture.[6] The loss of harvest or income caused by drought or floods can easily push households below the poverty line. At the same time, Mozambique is a country with a high agricultural potential that is still underutilized: according to the FAO, 45% of the total land is cultivable, but only about 10% of this area is used for farming. Since an extremely limited area is irrigated (mostly for the export product sugarcane), crop production is very vulnerable to droughts.[7]

[1] http://hdrstats.undp.org/en/countries/profiles/MOZ.html; however, data from the National Institute of Statistics differs in some areas: www.ine.gov.moz/;
[2] www.ine.gov.mz;
[3] http://data.worldbank.org/country/mozambique;
[4] However, according to a recent World Bank study, the poverty rate in 2003 was 56 % and thereby higher than Government figures. In 2009 it fell to 52 % (World Bank 2012: Poverty in Mozambique: New Evidence from Recent Household Surveys).
[5] Government of Mozambique 2010: Report on the Millenium Development Goals.
[6] https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html;
[7] http://www.fao.org/nr/water/aquastat/countries_regions/mozambique/index.stm and FAO (2011): Nutrition Country Profile, Republic of Mozambique;

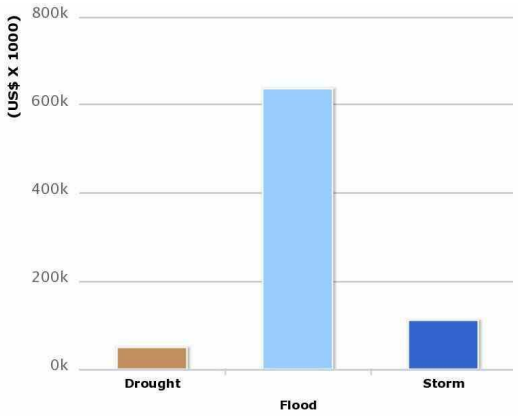
1.2 Disaster Risk Profile

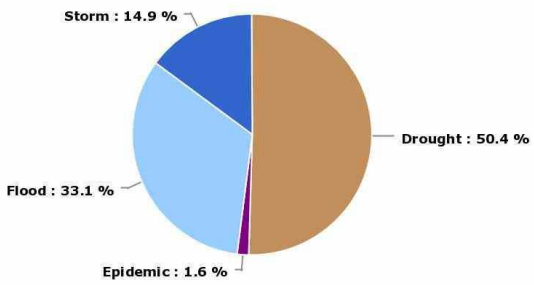
1.2.1 Overview of Disaster Risk

Mozambique ranks third amongst the African countries most exposed to risks from multiple weather-related hazards, such as floods, cyclones and droughts and related epidemics. Worldwide, Mozambique ranks 43 out of 173 countries for disaster risk.[8] The table below gives an overview of the humanitarian impact of the disasters between 1956 and 2008. Whilst droughts account for most of the affected, floods, cyclones and epidemics are more frequent.[9]

Type of disaster	No. of events	Total deaths	Total affected
Drought	10	100.200	16.444.000
Floods	20	1.921	9.039.251
Tropical cyclones	13	697	2.997.300
Epidemics	18	2.446	314.056

The figures below give an estimate of economic damages (US$ X 1.000) and percentage of reported people affected by disaster type between 1980 and 2010:[10]



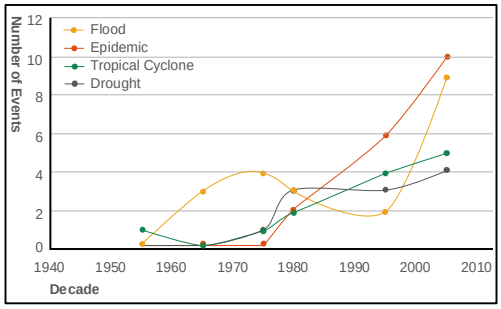


[8] Alliance Development Works (2012): World Risk Report;

[9] INGC 2009: Synthesis report. Study on the impact of climate change on disaster risk in Mozambique [van Logchem B and Brito R (ed.)]. Historical data on disasters has to be looked at critical though, as exact information on the location, extent and impact of disasters in countries like Mozambique could only be collected and properly documented since thirty years or so. In addition to that, whether a hazard is classified and hence recorded as disaster depends on the institution's criteria and definition. Other sources on frequency and impact of disasters in Mozambique are: http://www.preventionweb.net/english/countries/statistics/?cid=117. The information is based on the database of the Centre for Research on the Epidemiology of Disasters (CRED) which is maintaining an Emergency Events Database (EM-DAT): http://www.emdat.be. The database collects information on disasters which fulfill at least one of the following criteria: a) Ten or more people reported killed, b) Hundred or more people reported affected, c) Declaration of a state of emergency or c) Call for international assistance.

[10] http://www.preventionweb.net/english/countries/statistics/?cid=117;

As much as 25% of the population is at risk from droughts, floods and cyclones. Hazards have increased significantly over the past three decades. The figure to the right illustrates the increase in the number of disasters observed in Mozambique over the last fifty years. [11]



Floods occur every 2 to 3 years along major river basins, low coastal plains, and areas with drainage problems. The risk is highest in the central and southern region. Cyclones affect the entire coast, but with highest wind impact along the northern area, from October to April, with frequencies of about 1 to 2 in 4 years. Droughts occur primarily in the central and southern region of the country, with a frequency of 7 in 10 years. In some areas in the southern part of the country, they are a chronic problem. Epidemics, especially water-borne diseases and malaria, are widely spread and outbreaks peak during and after floods and cyclones.[12]

Climate models predict a 25% increase in the magnitude of large flood peaks in the Limpopo and Save Rivers and a reduction in the flow of the Zambezi River of 15%. Temperature is projected to increase between 1^{o} and 2.8^{o} C by 2060. Critical sectors that will be at higher risk include agriculture, infrastructure, power, water and sanitation, health, and nutrition.[13]

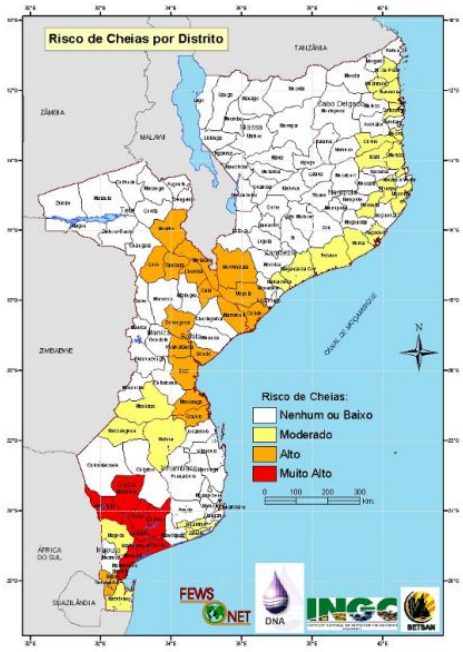
More than 60% of Mozambique's population lives in coastal areas, and is therefore highly vulnerable to cyclones and storms along its 2.700 km coastline.[14] Many of the river mouths are affected by saline intrusion with consequences for agriculture, animal husbandry, fisheries and access to safe water.

The Centre is most affected by floods, tropical cyclones and epidemics, followed by the South and the North. The South is more prone to droughts than the Centre and the North.

Earthquakes have also occurred in the past thirty years, but caused little damage. Another hazard, though with very limited humanitarian impact, are wildfires. Often underestimated, but posing a serious threat to civilians are munitions sites dating from the civil war. Industrial accidents are still rare, but pose an increasing risk with the exploitation of natural resources, which has started on a large scale.

[11] INGC (2009): Synthesis report. Study on the impact of climate change on disaster risk in Mozambique. [van Logchem B and Brito R (ed.)];
[12] ibid;
[13] INGC (2009); see also „Mozambique Dashboard" at http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=MOZ
[14] World Bank, GFDRR, ISDR (2011): Disaster Risk Management Programmes for Priority Countries, p. 97;

1.2.2 Flood



Flooding destroys homesteads, agricultural land, household items, infrastructure and crops. Floods render thousands of Mozambicans temporarily homeless every year. Daily productive activities in general are severely disrupted. Epidemics, such as cholera and malaria, are strongly linked to floods.

Historical analyses show that many of the approximately 100 rivers of Mozambique are exceeding the danger level every two to three years.[15] However, due to an increase of population density along the rivers and potential impact of climate change, they are likely to affect more and more people. The map shows the districts most affected by floods.

Heavy rains are responsible for the floods both in Mozambique as well as upstream in neighbouring countries. They can also be aggravated by water discharge from dams within Mozambique, such as the Cahora Bassa, or in neighbouring countries, such as the Kariba in Zambia.

The river basins at greatest risk of flooding, with serious social and economic impacts, are the Limpopo, Incomáti and Save (in the south) and the Búzi, Pungue, Zambezi and Licungo (in the centre). Apart from these basins, some Mozambican cities, such as Beira, have been exposed to regular flooding, due to the lack of adequate drainage systems or settlement in low lying areas.

The most likely time for floods to occur is from November to March in the southern region of the country and from January to April in the central and northern regions. There is also a high probability of flooding following tropical storms or cyclones.[16] They can aggravate already on-going river floods, as they bring extremely strong and heavy rainfall within a short period and their occurrence coincides with the rainy (flood) season – from October to April. Their biggest impact is the destruction of crops and fruit trees (such as cashew and coconut), the destruction of homesteads and infrastructure. They also lead to injuries and fatalities.

[15] INGC (2009).
[16] A tropical storm is called a cyclone when the wind speed exceeds 118 km/h (see http://www.tropicalstormrisk.com/).

Major floods hit Mozambique in 2000, 2001, 2007 and 2013. The table below gives a timeline for the 2013 floods, to give a sense for how the response unfolds.

Date	Event
12.1.2013	Orange alert by Government following heavy rains for consecutive days
by 20.1.2013	150,000 affected, 55 dead, out of which 140.591 and 38 respectively in Gaza Province; rains continue;
22.1.2013	Red alert by the Government
24.-31.1.2013	Field assessments, mobilization of stocks, initial response, Cluster planning;
30.1.2013	Government of Mozambique asked for national and international assistance
31.1.2013	Humanitarian Country Team launches "Response and Recovery Proposal" for 150.000 people; 30.6 million US$ for 6 months (34 US$/beneficiary/month); relief operation on-going;
21.2.2013	175.693 people displaced, from which 137.858 are in camps; relief operation on-going;

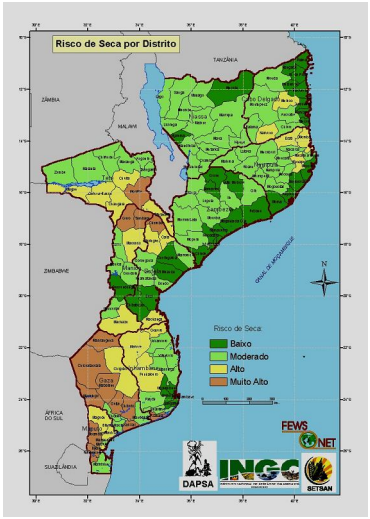
The table below gives an overview on the impact of the 2013 floods on core areas:[17]

Core elements	Effects on humanitarian needs and operations	Population most affected
• High water levels and damaged infrastructure continue to obstruct relief from reaching isolated flood-affected populations;	• Reduced coping strategies for vulnerable and poorest segment of population • Prolonged disruption of critical services (power, water and sanitation, health and education) • An increase in food insecurity	• 150,000 temporary displaced people
• Floods destroyed agriculture crops in affected areas (110,000 ha)	• Increase in protection concerns and reported cases of SGBV • Food insecurity • Negative effects on nutrition	• 150,000 people • 20,000 under-5 aged children
• Serious damage on telecommunication equipment and electricity power network	• Lack of communication	• 150,000 people
• Floods destroyed and / or damaged houses and social basic service facilities	• Protection concern (GBV, unaccompanied minor, separation of families) • Lack of access to basic services (shelter, health, education, water) • Risk of outbreak of water-related diseases and protection regarding sanitation facilities in displacement sites	• 150,000 temporary displaced people
• Floods leaves school premises unusable or inaccessible	• Increase of absenteeism of children to school, especially girls	• 180 schools, 1,500 teachers and 73,000 children.
• Damage and / or destruction of health facilities and pollution of water sources	• Further exposure of diseases such as malaria, pneumonia and diarrhea, as well as other communicable and water-related diseases.	• 150,000 people
• Damage and /or destruction of infrastructures	• Lack of communication • Isolation from basic services and humanitarian assistance	• 150,000 people

[17] Source: Humanitarian Country Team, Mozambique Floods 2013 Response and Recovery Proposal, January 31, 2013;

1.2.3 Drought

As mentioned above, land in Mozambique is underutilized. With around 30 people per km^2, population density is low and sufficient land for agriculture is available: 45% of the total land is considered as cultivable, but only about 10% of it is used for farming. Since an extremely limited area is irrigated (mostly for the export product sugarcane), crop production is very vulnerable to droughts. Prolonged dry spells can easily lead to severe problems, because over 95% of the food crops in Mozambique are produced under rain-fed conditions and 81% of the population relies on agriculture.[18]



Droughts are affecting more Mozambicans than floods and tropical storms. In some regions in the southern and central part of the country they are a chronic problem (see map). The Government's Contingency Plan for 2012-2013 anticipated 175.000 people affected by drought and only 43.563 by floods.

Droughts can last for one or two years or for a much longer period and result from a combination of low levels of precipitation, its spatial and temporal distribution and the overgrazing and overuse of agricultural lands.[19] Yet, they do not only affect agricultural production, but also sanitation and hygiene of people and animal husbandry, as water holes dry up. During and after droughts communities not only experience food shortages and hence malnutrition, but also restricted access to water and outbreak of communicable diseases. In the longer-term, droughts lead to the increase of prices of food and agricultural products.

1.2.4 Vulnerabilities to Flood and Drought

According to the World Risk Index, Mozambique ranks 43 out 173 countries. According to Maplecroft's Climate Change Vulnerability Index, Mozambique is considered an 'extreme risk' country, ranked 7 out of 197 countries. A combination of several factors is responsible for the high vulnerability of Mozambique and its people:

- Geographical and climatic conditions;
- High level of poverty;
- Heavy dependence on rain-fed agriculture;
- Dependence on natural resources, lack of income sources;
- Endemic diseases such as malaria, cholera, HIV/AIDS; and

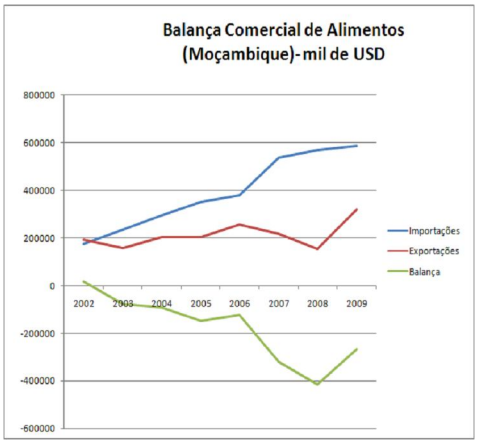
[18] http://www.fao.org/nr/water/aquastat/countries_regions/mozambique/index.stm and FAO (2011): Nutrition Country Profile, Republic of Mozambique;
[19] Ministry for the Coordination of Environmental Affairs (MICOA) (2007): National Adaptation Programme for Action (NAPA);

- Weak or almost non-existent infrastructure.

The exposure to floods and droughts has been described in the previous section. Poverty minimises the capacity to prepare for, respond to and to recover from shocks. Data from the Government's Household Budget Survey 2008/09 shows that poorer households are relatively more affected than richer households by agricultural pests, drought, cyclones, floods and low producer prices.[20]

The high dependence on subsistence farming and lack of other income sources, which people could switch to in case of a loss of harvest due to a climatic shock, is another factor for high vulnerability. As mentioned above, more than 80% depend economically on agriculture. The loss of harvest or income caused by cyclones, droughts or floods can easily push a household below the poverty line.[21]

According to FAO estimates, the major food and agricultural commodities produced in Mozambique in 2011 were cassava, sugarcane, maize, sweet potato, sorghum and pulses. Cassava, maize, sorghum and pulses are mainly for local human consumption.[22] Crop yields are stagnant. According to WFP, Mozambique's annual food deficit in the past four years has averaged 500.000 Meticais in cereal equivalent. Surplus food production in the central and northern provinces is offset by a vast deficit in the south.[23]



Most of the population are smallholder farmers (cultivating no more than three hectares) and suffer from low productivity. Apart from weather-related hazards, several other factors contribute to the stagnant production and in general low productivity: less fertile soils, low yielding traditional varieties, use of untreated seeds, unsophisticated tools, limited use and lack of access to fertilizers, herbicides and pesticides. Limited access to adequate storage facilities and poor farm level post harvest handling practices results in high post-harvest losses - up to 30% as estimated by WFP. Furthermore, lack of public sector rural extension services and poor agricultural infrastructure connecting farmers to suppliers of inputs and product markets are also responsible for low agricultural productivity. Most of the farmers have little or no access to formal markets for inputs as a result of poor transportation infrastructure and consequent high costs. Finally, access to credit is a

[20] Ministry of Planning and Development (2010): Poverty and Wellbeing in Mozambique: Third National Poverty Assessment;
[21] For a deeper analysis on the sector of agriculture in relation to climate related hazards and food security see: INGC (2012): Responding to Climate Change in Mozambique, Theme 6, Agriculture; The World Bank Group (2010): Economics of Adaptation to Climate Change, Country Case Study Mozambique; FAO (2011): Nutrition Country Profile, Republic of Mozambique;
[22] http://countrystat.org/home.aspx?c=MOZ&tr=7
[23] WFP 2011: Country Programme Mozambique 200286 (2012-2015): http://documents.wfp.org/stellent/groups/public/documents/eb/wfpdoc061726.pdf

major challenge in the purchase of inputs, equipment and other farming requirements in Mozambique.[24]

Crop failure increases food insecurity and can lead to malnutrition. According to WFP, around 25% of the population suffers from acute food insecurity at some point in the year and approximately 34% remains chronically food-insecure and lacks an adequate diet. The majority of food-insecure households is located in the arid and flood-prone areas of the south and centre. Food insecurity is higher in rural (47,2%) than in urban areas (34,8%). Chronic malnutrition in children under 5 remains alarmingly high at 44% and is one of the highest in Africa.[25]

Nutritional deficiencies are exacerbating the effects of HIV/AIDS. 11.5% of Mozambicans between 15 and 49 years old are infected - the most productive segment of the population.[26] The epidemic leads to declines in productivity and the loss of skilled workers. It has also increased the numbers of orphans and vulnerable children. Outbreaks of other epidemics such as cholera and malaria are common and compound peoples' already precarious living conditions.

Rural communities are regularly cut off from markets and services, with the associated harmful effects on their livelihoods. According to World Bank statistics, 80% of the 30.000 km road network is unpaved.[27] These roads are particularly susceptible to damage from heavy rains and floods. In addition to this network, there exist about 50.000 km of unclassified tracks that are only usable in the dry season. With regards to basic sanitation, according to a recent survey by the Ministry for Water Supply, only 12% of people in rural areas have access to these services and 44% to safe water.[28]

The impact of climate change on agriculture in Mozambique has been studied and analysed thoroughly. Overall crop yields may be reduced by up to 30% of the current production in the most affected areas.[29] Climate change effects on yields differ from crop to crop, maize being the most affected with an average projected reduction of 11,1%, followed by soya with a projected reduction of 6.4%, groundnut with 4,6%, cassava with 4,2%, sorghum with 3,5% and cotton as the least affected crop on the order of 2,9% of current yields.

According to the World Bank, the impact of climate change over the next 40 years would lead to a 2 to 4 % decrease in yields of the major crops, especially in the

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24 Mozambique P4P Country Profile 2010: http://documents.wfp.org/stellent/groups/procuweb_content/documents/reports/wfp226780.pdf ; and Nkala, Peter (2012): Assessing the impacts of conservation agriculture on farmer livelihoods in three selected communities in central Mozambique, Doctoral Thesis, University of Natural Resources and Life Sciences, Vienna, Austria;

25 WFP (2010): Comprehensive Food Security and Vulnerability Assessment; see also SETSAN (2009): Relatório da Monitoria da Situação de Segurança Alimentar e Nutricional em Moçambique;

26 http://www.misau.gov.mz/pt/hiv_sida/insida;

27 The World Bank (2010): Mozambique at a glance;

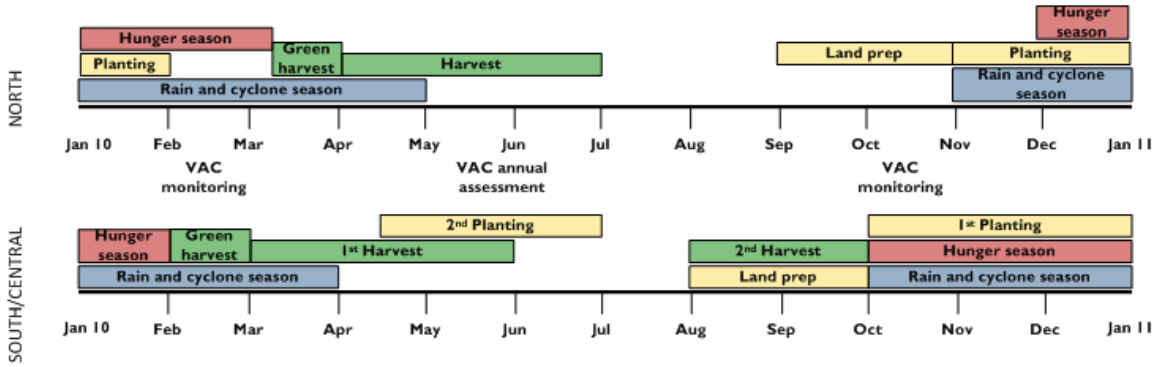
28 Direcçao Nacional das Aguas (DNA): Review of the rural supply of water and sanitation services in Mozambique for 2012;

29 INGC 2012: Responding to Climate Change in Mozambique, Theme 6, Agriculture: http://ingc.dirisa.org/repository/phase-2-theme-reports/theme-reports-final/Theme%206_Edwin%20final%20Report%20-1.pdf and World Bank et al. 2010: Economics to Adaptation, Country Case Study Mozambique.

central region.[30] Presently, Mozambique's major cash crops are sugar cane, cotton, coconuts, sesame, tobacco, and cashews; its major food crops are maize, sorghum, millet, rice, beans, groundnuts, vegetables, and cassava. The amount of irrigated cropland is estimated to be less than 0,5% of the total cropland, almost all of which is used for sugar cane production and a small portion for rice and vegetables.

The impact of weather-related hazards, applied and potential coping strategies and resilience measures depends on the main livelihood of the respective population. The livelihood depends largely on the physical and economic conditions in the regions.

Most of agricultural production takes place in the northern and central provinces, which are the most fertile. The southern region is drier with sandy soils and a higher risk of losses due to droughts and floods. Most of the families live from subsistence farming of small areas. Use of improved technologies, such as fertilizer, improved seeds, drought-resistant varieties and small-scale irrigation remain limited. Food shortages can occur between December and March in the North and between October and February in the Centre and the South. Below are the seasonal calendars for the north and the southern and central part of the country:[31]



Marine and freshwater fishery resources are fairly rich in Mozambique. Fishery plays an important role in the economy, contributing 13% of the export income, but only 2% of the population are directly or indirectly economically dependent on the sector.

Livestock, mainly chicken, pigs and goats, contribute significantly to the livelihood of rural families. Countrywide only 4% of the population possesses cattle, which are used mainly for animal traction, as a status symbol and are rarely sold. The situation is different in the arid and semi-arid districts of Gaza Province, where about 80% of

[30] World Bank et al. (2010): Economics of Adaptation to Climate Change, Country Case Study Mozambique;
[31] http://www.fews.net/pages/timelineview.aspx?loc=1&gb=mz&l=en;

the households raise cattle extensively. The majority of households are agro-pastoralists.

1.2.5 Disaster Risk in the Limpopo and Zambezi River Valleys

The people who live along the Limpopo river in Gaza Province and the Zambezi river in the Provinces of Tete, Manica, Sofala and Zambézia are largely subsistence farmers who rely on rain-fed agriculture. Irregular weather patterns challenge their ability to produce food and generate income. They are regularly affected by floods and in some parts of the Provinces also by droughts.

Gaza Province has a long dry season and its population, with 62,5% below the poverty line, is the second poorest in the country. The main problems are access to water, heavy reliance on subsistence farming and little other livelihood opportunities, high temperatures, droughts, floods and cyclones. The nutritional and health status of communities is fragile and their HIV prevalence is around 25%, the highest in the country.[32]

The natural resource base is under significant pressure from localized overgrazing, wildfires and rapid deforestation. Livelihoods are based on crop and livestock farming, harvesting and processing of forest resources for own use and sale, and occasional labour. Insufficient rains in recent years have resulted in reduced crop production and availability of water for humans and livestock.

Many of the current coping strategies relate to rainfall variability and drought and include consumption of wild tubers and fruit, sale of timber, charcoal, livestock and alcoholic drinks and other small business for an alternative income. Sometimes, manure is spread on fields to retain soil moisture. In many cases farmers turn to seek employment in towns or even migrate to South Africa. For example in Chicualacuala District of Gaza Province, 50% or more of the interviewed families are female headed households at least for part of the year.

Crop and livelihood diversification is an integral part of coping strategies. In the Chicualacuala District all families have access to land in one form or the other. However, the average size of agricultural fields per family is small: in the lowlands 69% of families have less than or equal to two hectares and in the uplands this figure is 81%.[33]

Some households that live close to the Limpopo River own two agricultural fields - one in the uplands and one in the lowlands close to the river. However, the majority of households who live in the uplands do not have this option, although they usually own more than one field. From a food security point of view, coping mechanisms

[32] Government of Mozambique 2010: Report on the Millenium Development Goals; FAO (2012): Adaptation to Climate Change in Semi-Arid Environments: Experience and Lessons from Mozambique;
[33] FAO (2012): Adaptation to Climate Change in Semi-Arid Environments: Experience and Lessons from Mozambique;

also include reducing the number of daily meals, eating less expensive or desirable food, and serving smaller portions.

Also, along the Zambezi River, some families own two fields. In total, more than 930.000 people live in the Zambezi Valley. There has always been drought and flooding in this area, but in the last 10 years weather patterns have become more unpredictable. Rainfall is erratic and there have been more frequent floods and droughts.

There are several livelihood zones in the Zambezi River Valley. Whilst at the coast, fishing is the main income source, rain-fed agriculture is the basis of the local rural economy upstream. In the semi-arid areas (Manica and Tete Provinces), livestock provides a substantial source of income and so does the trade in natural resources, especially local timber. Flood recession cropping supplements rain-fed agriculture and provides the basis of the economy.

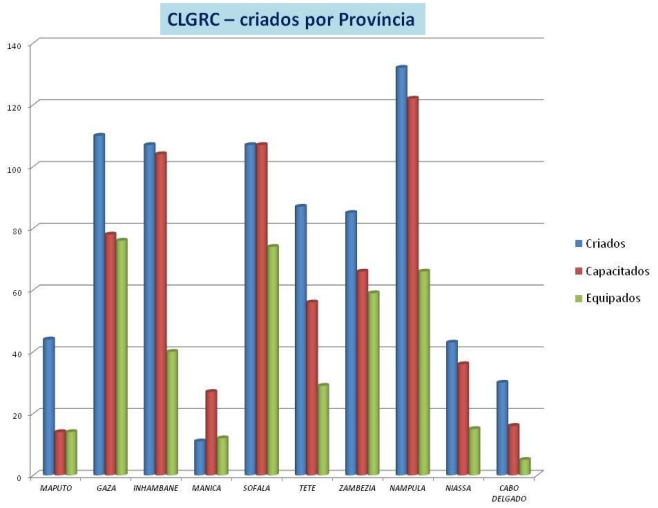
1.3 Disaster Risk Management Structures

The National Institute of Disaster Management (INGC) has the overall responsibility to coordinate disaster risk management activities in Mozambique at national, provincial and district level. It was established in 1999 under the Ministry of Foreign Affairs and Cooperation. Since 2009 it falls under the Ministry of State Administration. The INGC's mandate is also to coordinate relief activities during and after disasters, public awareness on disaster prevention and to coordinate the early warning system.

The operational centres of the INGC are the National Emergency Operational Centres (Centro Nacional Operativo de Emergência – CENOE). They consist of a coordinator and INGC staff who are operating throughout the year. There are three CENOEs: In Vilankulos (Inhambane Province) for cyclones and droughts, in Caia (Zambezia Province) for floods and in Nacala (Nampula Province) for cyclones. During emergencies, the CENOEs are extended and activated for response. The National Civil Protection Unit (UNAPROC), the Mozambique Red Cross (Cruz Vermelha de Moçambique), UN and other agencies are also members and operate as search and rescue and relief agencies.

At the district level, INGC acts through "Local Committees for Disaster Risk Management" (Comités locais de Gestão do Risco de Calamidades - CLGRC). They consist of around 15 members and are responsible for all activities related to disaster risk management in the communities. They also serve as a link between the communities and the authorities intervening in the areas of disaster risk management and response.

Such kinds of communities have been established, trained and equipped since 2005, but do not exist yet in all districts. NGOs and the Mozambique Red Cross are also establishing district teams to contribute to local capacity building. According to Mozambique's Contingency Plan for Floods and Cyclones 2012-2013, there are in total 760 committees existing, of which 206 are in the high risk areas. The figure gives an overview on the number of committees established (blue), trained (red) and equipped (green) in 2012.



The mandate and activities of the INGC originate from the Disaster Management Policy, which was adopted in 1999 and became the country's operative strategy for disaster risk management. It emphasizes the link between development policies and preparedness, prevention, mitigation and vulnerability reduction.[34] In December 2012, a new Disaster Risk Management law was endorsed by the Council of Ministers and has been submitted for approval to Parliament. The law sets out principles for preparedness and prevention and specifies a legal requirement to develop early warning systems and maps that identify areas and populations at risk from disasters. It is an important element that demonstrates both ownership and a strong desire to make climate change considerations an integral part of development.

The Government has made considerable progress in disaster risk reduction in the past years, mainly through comprehensive data collection and analysis, training and equipping staff, development of a reasonably functioning early warning system and the establishment of the above mentioned teams at district level. The INGC is providing effective leadership and coordination in disaster management. It develops an annual contingency plan on floods and cyclones in coordination with the Humanitarian Country Team and organises simulation exercises in preparation for potential disasters. Capacity of INGC at district level is more limited. Staff turn-over especially at provincial and district level is a challenge, and as a result trainings need to be repeated at regular intervals.

The Early Warning System of Mozambique is well developed. The INGC holds overall coordination responsibilities for the system, but monitoring is carried out by specialized agencies. Hence, the National Directorate of Water is responsible for flood forecasting, in collaboration with INGC and the National Institute of

[34] A review of Mozambique's legislative framework on disaster management and recommendations for improvement is provided in: International Federation of Red Cross and Red Crescent Societies (2012): Leis de Resposta a Desastres de Dimensão Internacional (IDRL) em Moçambique. Uma análise da preparação legal de Moçambique para a regulamentação de questões relacionadas com operações internacionais de resposta a desastres naturais;

Meteorology (INAM). INAM and its regional centre are responsible for cyclone monitoring. The Technical Secretariat for Food Security and Nutrition platform (SETSAN) is responsible for the food security early warning system. SETSAN is composed of most ministerial institutions under the leadership of the Ministries of Agriculture and Health. It carries out vulnerability surveys to assess community food insecurity and requirements for emergency relief.

Early warnings are divided into three levels and colors: Green Alert signifies "low risk of floods", Orange Alert signifies "moderate risk of floods" and Red Alert "high risk of floods". Alerts are transmitted from national to provincial and then to district level. The Local Risk Management Committees are then responsible to disseminate the information to the communities.

Disaster Preparedness and Response at the national level is coordinated and supervised by the INGC and supported by the Humanitarian Country Team (HCT). The HCT is led by the Resident Coordinator of the United Nations and consists of the United Nations agencies, national and international NGOs, the Red Cross and partners and is organised into clusters (Education/Protection, Health, Nutrition, Food Security, Shelter, Logistics, Emergency Telecommunications and Initial Recovery). These clusters are integrated into the four sectors of CENOE (Planning and Information, Infrastructures, Social and Communication) and are aligned with their respective ministerial counterparts.

2 Cost Comparison

2.1 Overview

The following cost comparison looks at three scenarios:

- Late response to emergencies results in humanitarian intervention.
- Early response is taken to ensure survival as a crisis is becoming evident.
- Investment is made in building the resilience of communities to cope with crises on their own.

Evidence is presented first from a bottom-up perspective, highlighting unit costs for each scenario, using the best available data. This is followed by a top-down perspective, which again assesses each scenario but using aggregate national data for the cost of response.

The analysis is presented separately for floods and for droughts. In each case, a suite of measures for late humanitarian response, early humanitarian response, and resilience building, was elaborated, and costed to the extent that data was available. Specific activities under flood include food, nutrition, WASH, early warning/evacuation, and shelter. For drought, food, nutrition and WASH were costed. Clearly there are many others, but these were the major sectors for which data was available. The figures presented here are supported by a much more detailed analysis in Annexes A and B.

2.2 Floods: Bottom-up Assessment

2.2.1 Late Humanitarian Response

Food Security: Basic food items are procured and distributed, such as maize, beans and vegetable oil. If local stocks are not sufficient, they have to be procured regionally. Food has to be purchased at the peak of the lean season, when prices are high, and logistics costs of transporting rations are increased due to a lack of prepositioning.

- Provision of food aid for 3 months costs approximately US$1.013 per MT or US$51 per beneficiary. Caseloads are estimated to be 75% of the affected population.

Nutrition: To prevent and respond to acute malnutrition, supplementary feeding is carried out for moderately malnourished children, pregnant and lactating women and people affected by HIV/AIDS. Therapeutic feeding is carried out for severely malnourished children, pregnant and lactating women and people affected by HIV/AIDS. Apart from that, targeted vitamin A supplementation, de-worming and active screening is undertaken. Information and awareness campaigns on healthy nutrition are also carried out.

- Treatment of SAM costs approximately US$195/case; treatment of MAM costs approximately US$31 per case.

Water Sanitation & Hygiene (WASH): As existing water supplies (hand pumps etc.) in the accommodation centers are usually inadequate for the large influx of displaced people, water trucking is carried out. The water is distributed through bladder tanks and tap stands. Buckets and jerry cans are distributed to facilitate water collection, storage and treatment. The dilute liquid chlorine product 'Certeza', which is produced in Mozambique and whose use at household level is familiar, is also distributed. Emergency latrines are installed and hygiene kits and soap are distributed. Hygiene promotion messages are disseminated through face-to-face communications, radio, posters and leaflets.

- These activities are estimated to cost between US$9 and US$19 per beneficiary.

Early warnings, evacuation and rescue operations: Early warnings are issued via radio, cell phone messages, megaphone and word of mouth to inform the population at risk. Once a red alert has been issued, evacuation and rescue operations start. Under the coordination of the National Civil Protection Unit (UNAPROC) which includes the INGC, the Ministry of Defense (MDN), the Ministry of the Interior (MINT) and the Mozambique Red Cross (CVM), search and rescue operations are carried out to safeguard the lives of the people affected or at risk. Rescue operations are undertaken with trucks, boats and for serious cases also with helicopters.

- These activities are estimated to cost between US$1 and US$2,5 per beneficiary.

Shelter: Accommodation centers, which ideally have been identified during the contingency planning phase, are set up. People arriving on their own or through evacuation operations are registered and assigned plots. They are provided with tents, tarpaulins and/or shelter kits, which are deployed from local or regional warehouses. Basic sanitation facilities and emergency kitchens are also established. The items are from the contingency stocks in the affected Provinces or, if not sufficient, have to be transported from other Provinces or even other countries.

- These activities are estimated to cost between US$46 and US$67 per beneficiary.

Late Response: Estimated Total Unit Cost Per Beneficiary:

Item	Cost per person
Food	$51
WASH	$9-19
Evacuation	$2,5
Shelter	$46-67
Sub-Total	**US$109-140**
Nutrition[35]	US$195 – SAM US$31 - MAM

The UN Humanitarian Country Team response and recovery proposal for the 2013 floods, which included response plans and budgets for eleven clusters, estimated a total budget of US$30.6 million for 150.000 beneficiaries for 6 months, **at an average cost of $204 per beneficiary**. Along similar lines, an appeal of the International Federation of Red Cross and Red Crescent Societies (IFRC) for 2013, for shelter, health and water and sanitation only, estimated a cost of US$76 per beneficiary (for 6 months).

2.2.2 Early Humanitarian Response

Floods are rapid onset, and therefore the difference in timings between late and early response are reported in hours or days (rather than months as with drought response -see below). As a result, much of early response to floods is focused on preparedness activities - prepositioning, contingency planning, and early warning.

The main evidence on early response for floods comes from the cost savings from early procurement and prepositioning reported by the World Food Programme (WFP).

It is also anticipated that early response should facilitate decreased caseloads - for example, early nutrition interventions will prevent further declines in nutrition that increase caseloads as well as costs. Unfortunately, data on decreases in caseloads was minimal. This data gap is modeled in the HEA modeling in the main report of this study.

[35] Nutrition is calculated separately because it does not apply to the full beneficiary population.

Reducing Lead Times in Flood Response

In relation to the 2012 floods, an evaluation of the NGO consortium Concern, Save the Children and Care (COSACA) response demonstrated significant reductions in lead times, although no cost or caseload implications are estimated.[36] Prepositioning of equipment and human resources was critical to achieving this:

- The project planned to have contingency stocks prepositioned in Beira. The procurement process was completed by October 2011 followed with the transport storage process. In addition, control systems and inventory procedures were established. The prepositioned contingency stock was stored at the WFP warehouse in Beira city from where the requested kits could be sent immediately to any place in Mozambique.
- The project intended to reduce the time taken to respond to emergencies from 1 week to 48 hours. This was achieved. This happened because appropriate human resources were trained and deployed, enabling a rapid response to extreme weather events, particularly floods and cyclones.
- COSACA and INGC planned to reduce the time taken from onset of a disaster to people receiving relief from up to 10 days to a maximum of 72 hours. This target was achieved.
- INGC planned to increase the warning time before the disaster starts from 24 hours to 72 hours. Achieving this is essential to reduce asset and agricultural losses and saving lives. Existing human resources and technical capacity at INGC, Mozambique Red Cross, COSACA and Humanitarian Country Team, combined with support given to improve the early warning systems at the National Institute for Meteorological Services (INAM) and National Directorate for Water (DNA), allowed an increase in the advance notice given to communities before a disaster hits.

Food Security: Basic food items are procured and distributed, such as maize, beans and vegetable oil. Costs can be significantly reduced through forward purchasing/early procurement and prepositioning.

- Provision of food aid for 3 months costs approximately US$819 per MT or US$41 per beneficiary. Caseloads are estimated to be 50% of the affected population.

Nutrition: While SAM cases will still be prevalent, early response should facilitate treatment of a greater proportion of MAM cases. Acute malnutrition in Mozambique is relatively low, and very much overshadowed by a much bigger issue with chronic malnutrition. Hence data on costs for treatment of acute malnutrition was lacking.

- Treatment of SAM costs approximately US$195/case; treatment of MAM costs approximately US$31 per case.

Water Sanitation & Hygiene (WASH): To some degree, early response will look like late response, with some level of water trucking and other emergency measures necessary to reach dislocated populations. However, early procurement and greater prepositioning of supplies, such as chlorine products, can help to reduce costs. Flood preparedness can also facilitate a greater focus on rehabilitation and installation of WASH facilities that are flood resistant (for example raised water pumps), however these activities are covered under resilience measures.

[36] DFID Project Completion Review, May 2012. "Support to 2010/11 Humanitarian Emergencies through the NGOs consortium 'COSACA' and INGC, the National Institute for Disasters Management. "

- Late response activities are estimated to cost approximately US$9 to 19 per beneficiary, and are largely related to supplies that can be prepositioned and procured early. Early procurement of food and shelter are estimated to decrease costs by 24% to 38%. Applying the same ratio to water supplies results in an estimated cost of US$6 to 14.

Early warnings, evacuation and rescue operations: The unit cost of search and rescue is likely to be the same, though caseloads should be significantly smaller with effective evacuation and early warning.

- These activities are estimated to cost between US$1 and US$2,5 per beneficiary.

Shelter: Shelter and non-food items will cost less as part of early procurement and prepositioning. The response to the 2011 and 2013 floods provides specific evidence on this in relation to coverage kits. In 2011, funding was already in place and coverage kits were procured early. In 2013, the same kits, procured early, were estimated to cost US$27,68 per kit. Funding was not readily available, and as a result kits had to be ordered and shipped at the last minute, adding a transport cost of US$10,41 per kit, resulting in a 38% increase in cost.

- These activities are estimated to cost approximately 38% less, equivalent to US$33 to US$48 per beneficiary.

Early Response: Estimated Total Unit Cost Per Beneficiary

Item	**Cost per person**
Food	$41
WASH	$6-14
Evacuation	$2,5
Shelter	$33-48
Sub-Total	**US$83-106**
Nutrition[37]	US$195 – SAM US$31 - MAM

2.2.3 Resilience Building

It is very hard to define what a complete package of resilience building measures might look like, and this is likely to be context specific. Further, the lines between sectors become more blurred – agricultural improvements will do little to improve resilience if they are not paired with water and access to markets, for example. Nonetheless, estimates from the literature are summarized below.

[37] Nutrition is calculated separately because it does not apply to the full beneficiary population.

Food Security/nutrition: Improved agricultural techniques, including improved seeds, soil and water conservation, rainwater harvesting, etc., as well as capacity building of local farmers, are essential to help build food security. Livestock activities are also essential, for instance extension services, veterinary services, and access to markets, to name a few. The data in Mozambique is surprisingly scarce on this subject, and some evidence is pulled from drought programming as the cost of interventions should be broadly similar. Food security should be linked to nutrition, and can be coupled with low cost preventative measures to ensure nutrition.

- A full suite of agriculture interventions costs approximately $30 per person (or $180 per farmer/household)

Water Sanitation & Hygiene (WASH): Rehabilitation and installation of WASH facilities that are flood resistant (for example water pumps built above the latest known flood level), alongside measures such as creation of water management committees, are essential to build resilience.

- These activities are estimated to cost between US$17 to 49 per beneficiary (for a full suite of WASH measures, depending on equipment costs).

Early warnings, evacuation and rescue operations: One NGO estimated the costs of community based early warning systems, including training, equipment and simulation exercises.

- These activities are estimated to cost approximately US$2,4 per beneficiary.

Shelter:

- The cost of building a flood resistant house ranges between US$300 and US$600, depending on the region and availability and use of local material as well as the size of the house.

Resilience Building: Estimated Total Unit Cost Per Beneficiary

Item	**Cost per person**
Agriculture	$30
WASH	$17-49
Community based early warning systems	$2,4
Sub-Total	**US$49-81**
Shelter[38]	$300-600

[38] Flood resistant houses (shelter), are calculated separately because they are usually not provided to all households but the most vulnerable ones.

2.3 Drought: Bottom-up Assessment

2.3.1 Late Humanitarian Response

Food Security (Agriculture, Livestock etc.): Basic food items are procured and distributed, such as maize, beans and vegetable oil. If local stocks are not sufficient, they have to be procured regionally. To prevent the death of livestock, emergency de-worming and vaccination campaigns are also sometimes carried out.

- Provision of food aid for 6 months costs approximately US$895 per MT or US$90 per beneficiary. Caseloads are estimated to be 75% of the affected population.

Nutrition: To prevent and respond to acute malnutrition supplementary feeding is carried out for moderately malnourished children, pregnant and lactating women and people affected by HIV/AIDS. Therapeutic feeding is carried out for severely malnourished children, pregnant and lactating women and people affected by HIV/AIDS. Apart from that, targeted vitamin A supplementation, de-worming and active screening is undertaken. Information and awareness campaigns on healthy nutrition are also carried out.

- Treatment of SAM costs approximately US$195/case; treatment of MAM costs approximately US$31 per case.

Water Sanitation & Hygiene (WASH): In severe cases, water trucking is carried out parallel to the rehabilitation of rural water supply points and construction of additional water points. Equipment to transport water is provided to families, such as jerry-cans and buckets. To ensure the water is clean, water treatment tablets or liquid is also distributed. Key messages on diarrhea and cholera prevention are disseminated.

These activities are estimated to cost between US$9 and US$19 per beneficiary.

Late Response: Estimated Total Unit Cost Per Beneficiary

Item	**Cost per person**
Food	$90
WASH	$9-19
Sub-Total	**US$99-109**
Nutrition[39]	US$195 – SAM US$31 - MAM

[39] Nutrition is calculated separately because it does not apply to the full beneficiary population.

2.3.2 Early Humanitarian Response

As with flooding, the main benefits from early response to drought will come about through early procurement and pre-positioning of stocks. However, with drought, this opportunity is even greater because of the significant lead times that allow for early planning. Further, reduced case loads are likely to be even more pronounced, as early response can be taken close to the first signs of failed rains, well before human health and asset depletion begin a significant decline.

Food Security: Basic food items are procured and distributed, such as maize, beans and vegetable oil. Costs can be significantly reduced through forward purchasing/early procurement and prepositioning.

- Provision of food aid for 6 months costs approximately US$698 per MT or US$39 per beneficiary. Caseloads are estimated to be 50% of the affected population.

Nutrition: While SAM cases will still be prevalent, early response should facilitate treatment of a greater proportion of MAM cases. Acute malnutrition in Mozambique is relatively low, and very much overshadowed by a much bigger issue with chronic malnutrition. Hence data on costs for treatment of acute malnutrition was lacking.

- Treatment of SAM costs approximately US$195 per case; treatment of MAM costs approximately US$31 per case.

Water Sanitation & Hygiene (WASH): To some degree, early response will look like late response, with some level of water trucking and other emergency measures necessary to reach affected populations. However, early procurement and greater prepositioning of supplies, such as chlorine products, can help to reduce costs. Further, a greater focus on rehabilitation and installation of WASH facilities can also be an appropriate early response measure, given the predictability of the event.

- Late response activities are estimated to cost approximately US$9 to 19 per beneficiary, and are largely related to supplies that can be prepositioned and procured early. Early procurement of food is estimated to decrease costs by 57%. Applying the same ratio to water supplies results in an estimated cost of US$4 to 8.

Early Response: Estimated Total Unit Cost Per Beneficiary

Item	Cost per person
Food	$39
WASH	$4-8
Sub-Total	**US$43-47**
Nutrition[40]	US$195 – SAM US$31 - MAM

[40] Nutrition is calculated separately because it does not apply to the full beneficiary population.

2.3.3 Resilience Building

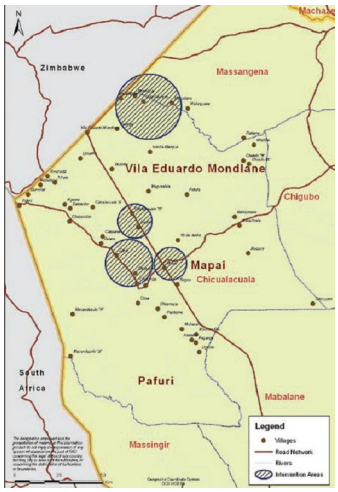
As stated in the previous section on floods, it is very hard to define a package of resilience building measures, as this could be very different depending on livelihood, location, demographics, etc. And it is hard to separate resilience measures into sectors, as they typically each feed into each other. Cost data on measures to build resilience in agriculture and nutrition are limited. WASH is the same as that reported in floods – approximately US$49 per beneficiary for a complete package of interventions.

Perhaps of more use are cost estimates for a couple of recent programmes to develop the resilience of communities in Mozambique. Each of these projects covers a wide range of activities designed to be more holistic in scope. These are described in greater detail below, and summarized here:

The United Nations Joint Programme (UNJP) was a four year programme that aimed to build the resilience of communities, implemented with 50.000 beneficiaries in the semi-arid district of Chicualacuala, Gaza Province. The two components that are relevant to natural hazards came to a total US$1,8m, **equivalent to a cost per person of US$36.**

The "Coping with Drought and Climate Change" programme from UNDP runs for five years (2009 to 2014) and covers seven communities (4.267 households, hence about 25.000 people) in Guija District, Gaza Province.[41] The project budget is US$ 1,9 million, **equivalent to approximately US$76 per person**.

UNJP: One example of a comprehensive longer-term programme to build resilience is the United Nations Joint Programme (UNJP). It was implemented from September 2008 to August 2012 in cooperation between the Government of Mozambique (GoM) and the United Nations (UN) with a total budget of US$ 7 million, funded by the Spanish Government through the Millennium Development Goal Fund. It had in total five components (so-called outputs), two of which will be described and analyzed more in detail here as they directly focused on resilience building of communities for natural hazards in view of climate change.



The programme aimed to reduce the risks of climate change to poverty reduction efforts in affected areas of Mozambique through the mainstreaming of environment in central and local level plans and programmes, and improving the adaptive capacity of the communities and other stakeholders through enhancing their coping mechanisms and diversifying their livelihoods options.

[41] UNDP (2010): Coping with Drought and Climate Change, Mozambique Case Study;

A number of Ministries and government institutions were involved and the programme was funded by several UN agencies (FAO as coordinating agency, UNDP, UNEP, UN-HABITAT, UNIDO and WFP. Civil society partners and local associations were also involved in implementation.

The Joint Programme was implemented in the semi-arid district of Chicualacuala, one of the poorest and most remote of Gaza Province (see map). The total population is about 40.000 people, widely dispersed across and clustered in nine localities. The population density is very low - 2,1 inhabitants per km^2. The main sources of livelihood of the local population are agriculture, charcoal cutting, livestock keeping, and labour migration.

According to project documents, 10.000 families were the direct beneficiaries (50.000 people). At least the same number of people were benefitting indirectly, e.g. those who buy the products produced on the farms of the beneficiaries.[42]

The Table below provides an overview of the outcomes and outputs of the second component of the UNJP, the introduction of adaptation measures (hence resilience building), mainly implemented at the district level. It also gives the budgeted costs for each component according to the main project document. The total costs for these two components is US$1.8m, equivalent to a cost per person of US$36.

[42] FAO (2011): Lessons from FAO Climate Change Projects, Publication produced as an outcome of the "FAO Climate Change Days" Workshop held at FAO Headquarters in Rome, Italy, from 12 to 23 June, 2010.

Outcomes and main indicators	Outputs	Budget (US$)
Outcome 4: Community coping mechanisms to climate change enhanced Main Indicators: • Adoption by communities of best practices in use of natural resources • Reduce current water leakage in irrigation systems by 50%; Baseline study, including strategy for assessing and implementing CC coping mechanisms produced; • CC coping mechanisms reinforced and implemented in three communities; • Demarcation and legalization of community and forestry areas; Community committees and associations established and legalized; • Forestry inventory(ies) completed and management plans implemented; • Territorial planning, including CC and disaster risk reduction tools completed and applied for Eduardo Mondlane and Mapai; • One training session on planning and cadastre; Local building codes and standards revised; • Shelter reinforcement implemented; • Examples of good agroforestry practices implemented in at least three sites; • Tree nurseries and species trials established; Baseline document of existing water reserves completed; Improved water pumping facilities in eight sites, Reinforcement of rain water harvesting systems in ten sites; • Number of additional water points introduced; • 10 sites using Improved water management system; • Map of soil suitability and land use for agricultural activities produced; • At least ten fields where sustainable conservation agriculture practices adopted by end of programme; • Two small scale irrigation systems where improvements implemented and 50 farmers trained on use of efficient irrigation system; • Renewable energy use for irrigation purposes implemented in at least two sites; Inventory of solid waste management and mapping along the Limpopo River; At least five demonstration sites using waste management; Number of training sessions on waste management, manure compost and biodigestion systems. •	4.1 Inventory of strategies and coping mechanisms currently in use by communities and in the Limpopo River Basin	175.001
	4.2 Community based natural forest resource management system established	158.800
	4.3 Territorial planning mechanisms at community level introduced	72.500
	4.4 Agro forestry practices introduced and applied at the community level	121.000
	4.5 Multipurpose integrated water resource management systems created	343.145
	4.6 Sustainable conservation agriculture practices introduced and efficiency in small scale irrigation systems improved	274.284
	4.7 Prospects of biogas generation and composting using waste manure as coping mechanisms to climate variability determined	114.044

Outcomes and main indicators	Outputs	Budget (US$)
Outcome 5: **Communities' livelihoods options diversified** • Use of alternative/renewable energy for production purposes; • Sustainable livelihood options identified; Provide three communities with knowledge and skills on sustainable livelihood options; • Existing and feasible energy renewable sources documented; • At least two pilot demonstration sites using renewable energy sources per year; • Train 50 persons on the use and management of renewable energy technologies; Improved stoves introduced in 5 communities; Number of basic cattle infrastructures built; • Livestock mortality reduced by 25% to 50% by end of programme; • At least four training workshops conducted during the project; • Establishment of meat processing facility (slaughter house); • Refrigeration system installed; • At least three training sessions conducted on food processing covering 100 people; • At least 200 farmers introduced in the use of animal traction.	5.1 Options for livelihood diversification identified	119.600
	5.2 Inventory and feasibility assessment of potential renewable energy sources carried out	206.364
	5.3 Animal husbandry grazing and veterinary service coverage improved	159.445
	5.4 Agro-processing and marketing activities developed	46.300
	5.5: Use of animal traction promoted to encourage land preparation and transport	24.254
TOTAL Budget for Outcomes 4 and 5		1.814.737

Source: Joint Programme on Environment Mainstreaming and Adaptation to Climate Change Mozambique (main project document with signatures);

UNDP: Another example for a longer-term intervention on drought is the "Coping with Drought and Climate Change" programme from UNDP. Its duration is five years (2009 to 2014) and covers seven communities (4.267 households, hence about 25.000 people) in Guija District, Gaza Province.[43] The project budget is US$1,9 million which is equivalent to approximately US$76 per person.

The project's objective is to develop and pilot a range of coping mechanisms for reducing the vulnerability of farmers and pastoralists to future climate shocks. Project activities include improving water supply, training the communities to grow drought-resistant crops, diversification of income opportunities, improving communication lines to make weather forecast and climate information available to communities, water harvesting and storing systems etc. The financing plan of the project is as follows:

[43] UNDP (2010): Coping with Drought and Climate Change, Mozambique Case Study;

Output	**Total**
Output 1.1 – Diversity and resilience of community food and income sources improved	525.000
Output 1.2 – Diversity and productivity of livestock population increased	400.000
Outcome 1 total budget	**905.000**
Output 2.1 – Integrated drought information system established	175.000
Output 2.2 - Capacity of community level institutions and practitioners in application of climate information in decision support developed	175.000
Outcome 2 total budget	**350.000**
Output 3.1 Community Based Drought Mitigation and Preparedness Plans implemented	163.180
Output 3.2 – Access to land as postulated by the law	101.660
Output 3.3 – Water access and better management	215.000
Outcome 3 total budget	**479.840**
Output 4.1 A platform for exchange of knowledge.	80.000
Output 4.2. Technical support to the national project team.	55.000
Outcome 4 total budget	**135.000**
GRAND TOTAL	**1.889.840**

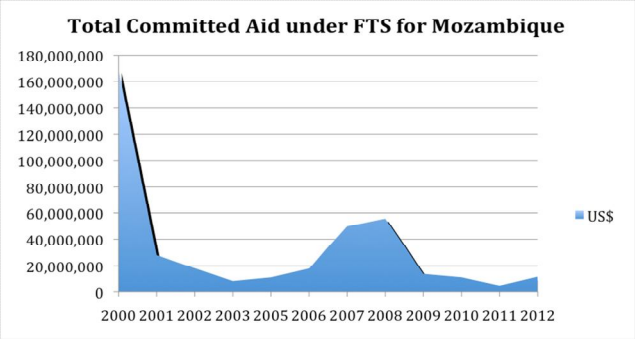
Source: GEF (2005) Medium-sized Project proposal, REQUEST FOR GEF FUNDING,

2.4 Top-down Assessment

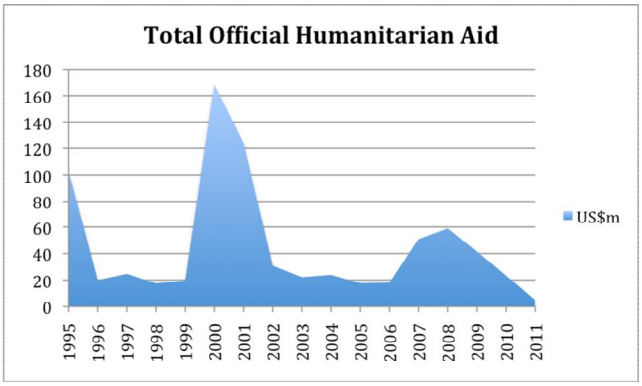
The top down assessment aims to identify national level statistics on humanitarian response and resilience. As with the bottom up assessment, three scenarios are described below: late humanitarian response, early response, and resilience.

2.4.1 Late Humanitarian Response

Data on humanitarian aid costs in Mozambique are aggregated by several different sources, and vary as each source has different approaches to collecting data.



The FTS reports humanitarian aid registered on the financial tracking service. However, registration of commitments is voluntary, and therefore not necessarily systematic.[44] Under the FTS, average aid flows between 2000 and 2012 have averaged US$33m per year.



Global Humanitarian Assistance (GHA) attempts to combine numerous sources of data on humanitarian aid flows, to provide a more complete estimate. Under the GHA, average aid flows between 1995 and 2011 have averaged US$45m per year.

The Africa Risk Capacity (ARC) facility is a proposed pan-Africa drought risk facility, to which donors and, to at least a notional extent, member countries would pay annual premiums. In return the facility would make timely claim payments to insured governments if satellite weather indices indicate that a response to a severe drought is needed. An analysis of the feasibility of such a facility was done for six African countries, including Mozambique. Using data on historical modeled food security needs, the study estimates **the average annual modeled response cost to drought (1983-2011) at US$128m,** or US$5,5 per person. The maximum historical modeled response cost is US$538m. These costs specifically pertain to the humanitarian

[44] http://ochaonline.un.org/AppealsFunding/FinancialTracking/tabid/2665/language/en-US/Default.aspx;

response costs that would be required for food security needs in response to drought.[45]

2.4.2 Early Humanitarian Response

Responding early to events should 1) reduce caseloads and 2) reduce unit costs. There is little quantitative evidence around the magnitude of either of these effects at a national scale. The one clear piece of evidence on cost savings was reported in the GFDRR's disaster risk financing report:

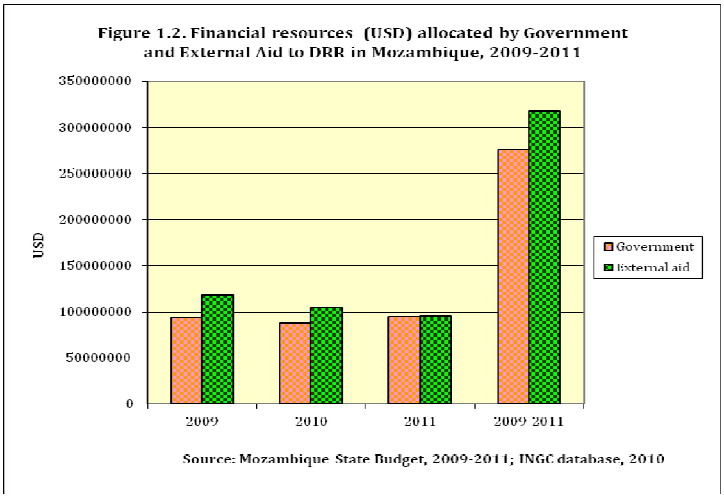
"According to INGC, the positive impact of reduction activities – in particular, improved early warning, resettlement out of flood plains and public disaster awareness initiatives– have translated into reduced expenditure on response. This has been particularly evident in the cost of evacuation;

- In 2007 INGC had two days of advance warning to evacuate around 150.000 people, resulting in a spend of around US$5 million.
- In 2008 five days of warning was given to evacuate around the same number of people - US$3 million was spent.
- In 2011 INGC had 10 days of warning before event occurrence and the response (of a similar scale to 2007/2008) cost under US$1 million. "[46]

Multi-year humanitarian funding will facilitate early response, both by facilitating early procurement and pre-positioning and allowing for more proactive planning. Evidence from the bottom up assessment suggests that this could result in savings by as much as 24% in the case of flooding and by as much as 57% in the case of drought.

2.4.3 Resilience Building

According to the "National Progress Report on the implementation of the Hyogo Framework for Action 2009-2011" (INGC 2011) resources spent on Disaster Risk Reduction (DRR) in Mozambique (government and external aid combined), have averaged US$197m per year over the three years from 2009-2011. The bulk of this has been spent on "development", followed by early warning, reconstruction and



[45] Clarke, D. and R. Vargas Hill (2012). "Cost Benefit Analysis of the African Risk Capacity Facility". Commissioned by the WFP in cooperation with and on behalf of the African Union Commission to contribute to the evidence base for the African Risk Capacity (ARC) facility.
[46] GFDRR (2012), "Mozambique: Disaster Risk Financing and Insurance Country Note". Personal Communication from INGC.

contingency.[47]

Table 1.1. DRR resources allocation by categories, 2009-2011

Categories	2009	2010	2011	2009-2011
Early warning and assessments	4.828.994,37	11.407.573,87	11.949.929,59	28.186.497,83
Development	192.515.335,08	161.935.847,40	165.116.798,70	538.103.522,91
Reconstruction	6.283.714,82	4.897.959,18	3.587.352,36	14.769.026,36
Contingency Plans	4.502.814,26	3.655.193,42	3.722.084,37	11.880.092,05
Total	**211.531.148,52**	**191.359.944,51**	**190.048.046,12**	**592.939.139,14**

These figures are also reported in a recent report by GHA tracking DRR spend. However, in the same report, the GHA estimated spend on DRR in Mozambique using the OECD DAC database, and a bespoke methodology to identify DRR investments (DRR does not have a specific code and hence is notoriously difficult to track) This exercise found that DRR spend was US$ 46,9m, based on an analysis conducted prior to 2009.[48] On the one hand, the difference could represent an overstatement in reporting to the HFA. On the other hand, there could have been an increase in DRR allocations after 2009. Equally, the OECD DAC search may not have captured all of the DRR allocations that were relevant. Most likely the figure lies somewhere in the middle and is a result of all of the above factors.

As climate change and its impact are closely linked to disaster risk management the INGC has become increasingly active in undertaking or commissioning studies and projects since 2008. Phase I (2008-2009) consisted of a comprehensive study on the potential impacts of climate change in Mozambique.[49] Phase II (2009-2012) concentrated on identifying and designing adaptation solutions.[50] Now in its Phase III (2012-2015), the project plans to implement the potential solutions and opportunities identified during Phase II, but funding is still being looked for. The budget of the five-year Strategy (2012 to 2016) is US$ 324.665.000.[51]

Along similar lines, a recently developed government strategy on climate change, the "National Climate Change and Adaptation Strategy, 2013-2025" has a budget of US$142 million for 2013 to 2014.[52]

The third Poverty Reduction Action Plan (PARP III, 2011-2014) outlines a number of measures for disaster risk reduction and climate change adaptation. The total funding envelope program for the period 2011-2014 will rise from 132 to 187 billion Meticais. Total investment for the objective "Boosting agricultural and fishery

[47] The figures are on http://www.preventionweb.net/files/16411_figure1.4andtable1.1.xls and http://www.preventionweb.net/files/16411_figures1.2and1.3.xls ;
[48] Kellet, Jan & Sparks, Dan, Briefing Paper, March 2013: Disaster Risk Reduction. Spending where it should count;
[49] INGC (2009): Synthesis report. Study on the impact of climate change on disaster risk in Mozambique. [van Logchem B and Brito R (ed.)];
[50] INGC (2012): Responding to Climate Change in Mozambique. Synthesis Report. [van Logchem B and Brito R (ed.)];
[51] INGC (2012): "Ownership and Implementation. Project Document October 2012";
[52] REPÚBLICA DE MOÇAMBIQUE, MINISTÉRIO PARA A COORDENAÇÃO DA ACÇÃO AMBIENTAL, Estratégia Nacional de Adaptação e Mitigação de Mudanças Climáticas, 2013-2025;

productivity", which includes activities such as drought and flood management, agricultural production, market activities, food and nutrition security, and environmental education and management, amongst many others, is US$612m for 2011. The budget is not broken out thereafter, but can be assumed to increase by approximately 10% each year in line with the overall budget, indicating approximate spend of US$673m in 2012, US$741m in 2013, and US$815m in 2014 (the end of the plan).

The National Programme for Agrarian Extension (PRONEA) ("Programa Nacional da Extensão Agrária") for 2007-2016 has a budget of US$ 50 million.[53] The National Irrigation Strategy (2011 to 2019) has a budget of US$ 645 million and aims at doubling total irrigated land in the provinces of Sofala, Manica and Zambézia from 66,000 hectares to 113,000 hectares by 2019. The "Strategic Plan for Agricultural Development" (PEDSA), 2011 to 2020, does not contain a budget.

As obvious from these strategies and plans, there have been visible efforts to integrate Disaster Risk Reduction as an important cross-cutting issue into the main policies. The success in implementation becomes obvious in the reduction of number of affected and the speed of response through improved coordination. For example, in the Zambezi Valley, an analysis of the floods that have occurred in 2007 shows that 161.000 people were affected, compared with 103.000 in 2008 and 7.500 in 2010.[54]

The main developments in the past years have been:

- Increasing involvement of communities in Disaster Risk Reduction activities, through the formation, equipment and training of Local Risk Management Committees
- Simulation exercises involving all stakeholders from political and technical levels, NGOS and members of the communities
- Two multi-sector coordination and intervention structures, namely the National Emergency Operational Centre (CENOE) and the National Civil Protection Unit (UNAPROC) which have contributed, in cases of emergency, to timely response;
- Improvement in the early warning system through increasing the number of points where river levels are measured in all the main basins, improvement in the exchange of information with the upstream countries in the most problematic rivers, and the improved use of computerised methods for gathering data and information to monitor natural phenomena;
- Implementation of programmes for adaptation to drought in the arid and semi-arid areas, with emphasis on training communities in conservation

[53] MINISTÉRIO DA AGRICULTURA, DIRECÇÃO NACIONAL DE EXTENSÃO AGRÁRIA, PLANO DIRECTOR DE EXTENSÃO AGRARIA, 2007 – 2016; May 2007;
[54] Contingency Plan for 2012-2013, Government of Mozambique;

agriculture, drought resistant crops, the installation of small systems to make use of rain and ground water, reforestation and income generating projects using local resources, among others.

- To some degree also resettlement programmes from flood prone areas to safer places (Zambezi Valley, Save in Inhambane province, Limpopo in Gaza, the Búzi in Sofala, Miangaleua in Cabo Delgado).[55]

3 Conclusions and Recommendations

In the past years, an increased focus has been put on investing in mid- and longer-term resilience building at various levels. Consequently, the Government of Mozambique, national and international donors and organizations have started to integrate disaster risk reduction measures in all development sectors, especially in view of the potentially devastating impact of climate change for the country's economy and people. However, as the comprehensive literature search and consultation meetings undertaken for this study have revealed, detailed cost-benefit analysis on emergency response compared to long term resilience programming is still lacking. It was particularly difficult to get costs of resilience building measures. Reports and evaluations of such programmes tend to focus on the qualitative impact of the activities, but do not evaluate the costs per community or per beneficiary. It was also found that budgets and financial reports on these kinds of programmes are not shared easily, and hence accessibility and transparency limit the amount of analysis that can be done.

Multi-year humanitarian funding commitments will enable national and international organisations to properly plan, implement and evaluate early response and longer-term resilience building programmes. Relief items could be procured and pre-positioned in a timely manner. Evidence from the bottom up assessment suggests that this could result in savings by as much as 24% in the case of flooding and by as much as 57% in the case of drought. At the same time, longer-term resilience building programmes, by their nature, ensure capacity building of human resources – both for those implementing the activities as well as for the beneficiaries.

To further support the argument for multi-year humanitarian funding and greater investment in resilience, more quantitative evidence on the ongoing impacts of initiatives would be helpful. At the same time, donors and implementing agencies need to continue to be prepared for the unforeseen. This will be become especially important under a changing climate, where disasters are predicted to increase in

[55] Efforts to do so had been undertaken after previous floods since independence from Portuguese rule, but with only partial success. A study found that despite the government's establishing resettlement areas and providing construction material, people who had lived in the risk zones preferred to return there after the flood waters receded because these areas had fertile soils, their ancestors were buried there and rituals took place in these localities: Chambote, R.M. and Boaventura S.V. (2008): Reassentamento pela Metade no Vale de Zambeze. O caso de Mutarara, Maputo: Oxfam; Universidade Eduardo Mondlane (2009): Estudo sócio-antropológico sobre reassentamento pós-cheias no vale do Zambeze – 2008: Tete, Manica, Sofala e Zambézia. Elaborado pelo Departamento de Arqueologia e Antropologia da Universidade Eduardo Mondlane Para o INGC, Maputo;

intensity and frequency, and likely will happen at places and times that were not anticipated by scientific forecasts and analysis. In that sense, longer-term resilience building programmes will always be worth the effort, as they can only improve the capacities and conditions of those who are most at risk.

Annex A: Detailed cost calculation for floods

The table gives an overview on three scenarios and the respective standard activities carried out:

a) Late response - when floods have already happened, people are seriously affected and hence in great need of assistance; the emergency operation is launched
b) Early Response – when floods are expected to happen or water levels have just started to rise; preparedness for response activities are launched;
c) Resilience – when floods are considered as normal part of the annual cycle and hence longer-term activities are carried out to strengthen capacities to cope with, mitigate the impact and recover;

The listed activities and costs are based on plans, reports and budgets of key stakeholders: the Mozambican Government, UN agencies, Red Cross and NGOs[56]. Following are the main sources of information.

For late and early response:

- UN, Humanitarian Country Team: „Mozambique Floods 2013, Response and Recovery Proposal, January 31, 2013“[57]; includes response plans of 11 clusters with budgets for each cluster, but no detailed information; total amount of the proposal: 30.6 million USD for 150.000 beneficiaries and a period of 6 months; **34,-USD/beneficiary/month**.
- UN, Humanitarian Country Team members: CERF proposals and detailed budgets for 3 months for the Floods 2013 and the clusters for Agriculture, Health, Food Security, WatSan, Shelter (submitted between January and March 2013).[58]
- UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012“, February 2012: contains detailed budgets, but no average calculation per beneficiary is possible, as within clusters themselves numbers of beneficiaries vary according to the activities.[59]
- International Federation of Red Cross and Red Crescent Societies (IFRC): Revised Emergency Appeal MDRMZ010, March 1, 2013[60]: CHF 2,044,428 (around USD 2.158.620) for 28.500 beneficiaries for 6 months on shelter, health and WatSan: detailed description of activities, but no detailed budget/activity; **12,6 USD/beneficiary/month**.
- International Federation of Red Cross and Red Crescent Societies (IFRC): Emergency Appeal MDRMZ002, Mozambique Floods, February 16, 2007[61]: CHF 7,464,923 (USD 5,971,938) for 6 months for 100,000 beneficiaries: **9,9 USD /beneficiary/month**.

[56] Some of the budgets of the NGOs are not available officially and therefore their names are not disclosed.
[57] http://mz.one.un.org/eng/content/download/8494/79321/file/MOZAMBIQUE%20FLOODS%202013%20-%20RESPONSE%20AND%20RECOVERY%20PROPOSAL.pdf
[58] provided by UN Humanitarian Country Team;
[59] provided by UN Humanitarian Country Team;
[60] http://www.ifrc.org/docs/Appeals/13/MDRMZ010rea.pdf

ling:

ry of State Administration, Disaster Management Coordinating Council: Contingency Plan for the Rainy and Cyclone
trition for 255.300 beneficiaries for 6 months: 13.141.700 USD (399.112.506 MT): 8,-USD/benf./month; Agriculture
315.060 (252.528.250 MT) for seeds, animal health, pest control, monitoring & evaluation; other information on
led per Ministry responsible for the area/cluster and not per beneficiary.

MINISTÉRIO PARA A COORDENAÇÃO DA ACÇÃO AMBIENTAL, Estratégia Nacional de Adaptação e Mitigação de (National Strategy for Adaptation and Mitigation for Climate Change, 2013-2025). The budget for the first two years overs a wide range of activities and sectors. However, given that the plan is for 2025, it is likely that this budget is budget required for the plan (unknown).

10 months 2006-2007, focusing on WatSan (rehabilitation and installation of boreholes, installation of latrines, water): USD 385.260,- for 23.200 direct beneficiaries and another 18.800 indirect beneficiaries; (early response/resilience **; 9,1 USD/ village inhabitant;** detailed activities and budget available.

r flood and cyclone season 2010/11: 1.900.000 USD for 43,721 beneficiaries; **USD 183/beneficiary**. Activities es and purchase of rescue boats, measures to improve coordination, and increased capacity to response to tion exercises).

d resilience building (on-going): 1.500.000 USD for 82.000 beneficiaries for 40 months: detailed activities and budget ngency plans and community risk mapping, establishment of a community based early warning system, introduction chniques including alternative seed kits, improved WASH, and capacity building for emergency response (e.g. first te an overall cost per beneficiary as each activity benefits a different number of people.

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
Food Security (Agriculture, Livestock etc.)	• Food assistance (procurement, warehousing, distribution etc.) • Emergency de-worming and vaccination campaigns	• Procurement of food items when surpluses are available; prepositioning of food; • Targeted food assistance and/or cash transfers • Distribution of agricultural tools and seeds; • Establishment of platforms for livestock during floods • Regular de-worming and vaccination campaigns • Flood resistant fodder storage/pre-positioning of fodder	• Cooperation with research institutes and local authorities on improved farming techniques; • Training on flood resilient farming techniques and dissemination (educational material, demonstration plots etc.) • Construction of small dams to withhold water from small rivers and/or rains; irrigation schemes (where feasible); • Diversification of agriculture; support and promotion of homestead gardens • Establishment/support of farmers associations/groups • Promotion and support of flood resilient seed and food storage systems; establishment of flood resistant seed-banks; • Facilitation of market places; • Diversification of income sources (skills training and development, market facilities etc.) • Saving and micro-finance schemes • Flood resistant fodder storage systems • Identification of safe areas for livestock and re-enforcement; • Regular de-worming and vaccination campaigns; training and medical supplies;
Costs for Food Security	*WFP:* ***US$1,013 per MT, or US$51 per person for 3 months assistance.***	*WFP:* ***US$819 per MT, or US$41 per person, for 3 months assistance.***	*NGO:* • *Farming techniques for 1,125 households, 6,750 people. The budget for specific activities is*

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012": • *cereals: 2,96,- /benf./month (800 tons/month for 100.000 benf.; 3 months)* • *pulses: 0,78,-/benf./month (360 tons for 100.000 benf.; 3 months)* • *Total cereals & pulses for 1 benf. per month: 3,74,-* • *plus 90% of total costs for operational costs, logistics, advocacy, training – Total Cost per person per month = $7.1* *UN, Humanitarian Country Team members, 2013 CERF proposal for food security cluster:* • *"immediate life-saving and life-sustaining food assistance to 150.000 beneficiaries for 3 months: USD 1.500.000; USD 10/beneficiary in total; USD 3/beneficiary/month;*		*marked up in line with the total budget to incorporate overheads, staff, and other running costs of the project as a whole, equating to US$201,640, or **US$30 per beneficiary**. Activities include capacity building and training, establishment of farmer field schools, demonstration plots, distribution of drought resistant seeds, and improved grain conservation.* • *The drought annex contains further data for drought specific agriculture interventions that range between US$21 to US$36, suggesting these figures are broadly in line.*
Nutrition	• Supplementary feeding for moderately malnourished children, pregnant and lactating women and people affected by HIV/AIDS.	• Provision of nutrition supplies and anthropometric equipment (scales, height boards etc.) to identified	• Nutritional education courses to communities and health centre staff • Awareness sessions in communities on healthy nutrition for pregnant and lactating women,

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	• Therapeutic feeding for severely malnourished children, pregnant and lactating women and people affected by HIV/AIDS. • Vitamin A supplementation, de-worming and active screening • Information and awareness campaigns on nutrition	health centres • Treatment of MAM • Nutrition education sessions including food preparation demonstrations • Training on management of acute malnutrition	babies and young children;
Costs for Nutrition	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012":* • *6 months of treatment of SAM (inpatient and outpatient), including therapeutic milk, oral rehydration, Ready to Use Therapeutic food, job aids and health centres, radio spots on breastfeeding, support for nutrition education, MUAC tape, zinc, logistics and technical support, for 6 months* ***= $195 per SAM case*** *WFP:* ***MAM treatment costs US$31 per person assisted****.*	*Costs are estimated to be the same as late response, while caseloads are less.* • ***SAM treatment: US$195 per case*** • ***MAM treatment: US$31 per case***	• *Unknown – improvements in nutritional status will require greater resilience in all sectors – food, agriculture, WASH, health, and hence cannot be split out.*
Water Sanitation & Hygiene (WASH)	• WASH emergency supplies (water purification plants, water pumps, tanks/containers, jerry cans, buckets, plastic sheeting, latrine slabs, household water treatment products,	• Inventory, maintenance/repair and pre-positioning of WASH emergency supplies available in country at strategic	• Rehabilitation of existing water supply facilities and construction of flood resistant water points; • Establishment and training of water committees for maintenance and management of local water points;

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	hygiene kits etc.) • Construction of pit latrines and other sanitation facilities • Provision of equipment to families (jerry-cans, buckets, soap, household water treatment, hygiene kits etc.) • Dissemination of key messages on diarrhoea and cholera prevention • Borehole and well disinfection • Cholera response (chlorine, treatment of patients etc.)	locations (water purification plants, water pumps, tanks/containers, jerry cans, buckets, plastic sheeting, latrine slabs, household water treatment products, hygiene and family kits etc.); • Rehabilitation of existing water supply facilities and construction of flood resistant water points; • Support of self-construction of household latrines • Hygiene promotion activities; Provision of water treatment tablets, education and awareness campaigns on prevention of epidemics	• Hygiene promotion activities; education and awareness campaigns on prevention of epidemics • Support of self-construction of household latrines
Costs for WASH	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012" and CERF Proposal 2013, WatSan cluster:* • *Sets per family (jerry can, bucket, water purifier, chlorine, latrine kit, hygiene kit, latrine kit), awareness raising activities, programme management etc.: about* ***8,8***	• ***Reduction in costs estimated between 24% (difference in WFP food aid costs) and 38% (difference in STC estimated costs – see shelter below).***	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012"*: • *new borehole: 20,-/beneficiary (1 new borehole = 10.000)* • *rehabilitation of borehole: 10,-/benf. (1 rehab. = 2.000)* • *rehab. of sanitary complex: 4.000,-/complex* • *social mob.: 4,-/benf. (3 months)*

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	USD/beneficiary. *UN, Human. Country Team: „Mozambique Floods 2013: Response and Recovery Proposal":* *Water trucking, distribution through bladder tanks and tap stands, distribution of water containers, certeza, emergency latrines, family hygiene kits about* ***19 USD/beneficiary.***		• *latrine slab for household latrine: 65,-* • *household water filter and chemicals for treatment: 100,-* ***Average cost per beneficiary = USD 48.6*** *NGO Project in Gaza Province for 10 months 2006-2007, focusing on WatSan (rehabilitation and installation of boreholes, installation of latrines, water treatment, local capacity building): USD 385.260,- for 23.200 direct beneficiaries and another 18.800 indirect beneficiaries;* ***16,6 USD/direct benef; 9,1 USD/ village inhabitant.*** *Note that the latrine slab here is estimated at $20, as compared with $65 above, accounting for a large portion of the difference in estimates.*
Early Warning and rescue/evacuation	• Dissemination of early warning and evacuation/rescue operations;	• Early warning system (equipment, training, staff etc.); • Logistic hubs (vehicles, boats) • Early evacuation to safe places minimizes search and rescue.	• Establishment of community based early warning systems; strengthening of district and provincial level EWS (equipment, trainings etc.); linkage to community based EWS; • Establishment, training and equipment of disaster risk management committees etc.; Simulation exercises;
Cost for Early Warning and rescue/evacuation	*Government Contingency Plan:* • *3.000.000 MT (about 100.000,- USD) to guarantee dissemination of meteorological information and operation of provincial and district structures;*		*National Strategy for Adaptation and Mitigation for Climate Change, 2013-2025: "Strengthening of Early Warning System for 2013 and 2014":* • *2.000.000 USD*

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	• *22.253.900.00 MT (about 800.000 USD) to ensure Search & Rescue* • *The contingency plan is based on 3 potential scenarios, but the budget is not specified. The three scenarios estimate between 307k and 987k people affected, which equates to an average cost* ***between $1 and $2.5 per person****.*		*NGO:* • *Community based early warning system covering 82.000 beneficiaries: 64.210,- USD;* ***USD 0,78/beneficiary****.* *Assuming the below costs are required for each community, this equates to a total cost of USD 9.117 per community, or* ***USD 1,60/beneficiary*** • *1 DM Committee establishment and training: 2.000 USD* • *1 set of equipment per committee: 5.100,-* • *1 Simulation exercise: 1.900* ***Total average cost is USD 2.4 per beneficiary***
Shelter	• Establishment and equipment of accommodation centres (tarpaulins, tents, kitchen sets, blankets, clothing, shelter kits etc.)	• Pre-positioning/contingency stocks of shelter tool kits (rope, handsaw, nails, shovel, hoe and wooden handle, machete, snips for cutting sheets, tie wire, hammer); • Establishment/strengthening of flood platforms • Strengthening of houses and other basic infrastructure	• Flood resistant construction techniques (trainings, provision of basic material, education and awareness material) • Identification and strengthening of potential accommodation areas (flood platforms, schools etc.); • Support to individual families with shelter tool kits
Costs for shelter	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012*“: • *The package of shelter items includes*	*Save the Children, personal comm.: a coverage kit procured early would have cost approximately $27.68 in 2011.*	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012*“: • *Construction of resistant houses: USD*

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	shelter kits, coverage kits ($40), family tents, blankets, sleeping mats, kitchen sets, logistics costs, training, shelter advisors, and M&E for an average cost per household of USD 335 or ***USD 67 per person****.* *UN, Human. Country Team: „Mozambique Floods 2013: Response and Recovery Proposal": **US$46 per person*** *UN, Humanitarian Country Team members, 2013 CERF proposal for shelter cluster:* • *Coverage Kits (2 tarpaulins and 30 meters of rope, regional purchase) 60,-* • *shelter tool kit for community use: 50,- (local purchase*) ***US$20 per person***	*Due to late response, transport was an additional $10.41 per kit (had to rely on air transport), raising the total cost to $38.09 (which matches the HCT figure given). Hence early response would have resulted in a* ***38% cost saving****.*	*3.750/family,* ***USD 600/beneficiary*** *(this includes training, mobilisation and awareness activities, material etc.).* *NGO:* ***USD 1.900 per demonstration house, or USD 300 per beneficiary***
Health	• Procurement and distribution of emergency kits to health services (First Aid, PEP, vaccines and other medical supplies); drugs for chronic diseases (HIV, TB etc.); • Distribution of mosquito nets • Delivery kits to pregnant women and	• Rehabilitation and establishment of health facilities and pre-positioning of medical supplies (including vaccines, diseases outbreak emergency kits etc.); • Immunisation and awareness	• Training and awareness sessions on prevention and basic treatment of diseases; • First Aid trainings and kits to community volunteers; • Immunisation campaigns • Supply of equipment and drugs to health centres; regular training of staff;

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	midwifes; dignity kits to women; • Information campaigns on HIV/AIDS, malaria, TB etc.; provision of condoms.	campaigns; • Distribution of mosquito nets • HIV prevention and treatment • Epidemiological surveillance and early warning systems for the early detection and control of communicable diseases	
Costs for Health	*UN, Humanitarian Country Team members, 2013 CERF proposal for health cluster:* • *USD 500.500,- (270.000,- directly for medical supplies and kits and the rest is for surveillance, campaigns, staff), for 180.000 beneficiaries for 3 months:* ***USD 2,7 per beneficiary for 3 months; USD 0,9/beneficiary/month.*** *UN, Humanitarian Country Team: „Mozambique Floods 2013, Response and Recovery Proposal, January 31, 2013:* • *USD 1.118.000 for 150.000 beneficiaries for 3 months:* ***USD 1,24/beneficiary/month***	• *Costs are likely to be similar to late response, though caseloads are likely to be smaller.*	• *Unknown – health covers a wide range of issues and levels of facilities and is usually part of DRR projects; no details could be calculated;*

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
Education	• Provision and establishment of tents as temporary schools (including water and sanitation facilities) • Provision of school and teacher kits; text books;	• Assessment of disaster resilience of schools; support of physical strengthening of buildings; • Training of teachers and students on flood preparedness and response; • Simulation exercises with students and teachers	• Education and awareness sessions at schools on disaster risks and how to behave during a disaster; • Integration of issues on disaster management and climate change into curriculum • Activities with school children on disaster risk reduction (drawing and essay competition, educative games, evacuation drills etc.)
Costs for Education	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012“:* • *Estimate for immediate needs includes school tents, school kits and textbooks, teacher's kits, child protection resources, OVC kits, etc, for an* ***average of USD 35 per child.***	• *Costs are likely to be similar to late response, though caseloads should be smaller*	• *No project budgets were available.*

Annex B: Detailed cost calculation for drought

The table gives an overview on three scenarios and the respective standard activities carried out:

d) Late response - when droughts have already occurred, people are seriously affected and hence in great need of assistance; the emergency operation is launched;
e) Early Response – when droughts are expected to happen; preparedness for response activities are launched;
f) Resilience – when droughts are considered as normal part of the annual cycle and hence longer-term activities are carried out to strengthen capacities to cope with, mitigate the impact and recover;

Since no major drought has happened in Mozambique for a couple of years, recent plans, reports and budgets are limited. Some activities carried out in response to droughts are similar to those for floods in terms of unit costs (for example food aid) and therefore related activities and costs from flood emergency response operations were used in the drought scenario.[62] Following are the main sources of information.

For late and early response:

- Republic of Mozambique, Ministry of State Administration, Disaster Management Coordinating Council: Contingency Plan for the Rainy and Cyclone Season 2012-2013: Food and Nutrition for 255.300 beneficiaries for 6 months: 13.141.700 USD (399.112.506 MTN): 8,-USD/benf./month; Agriculture (no. of benfs. not mentioned): 8.315.060 (252.528.250 MT) for seeds, animal health, pest control, monitoring & evaluation; other information on costs also provided, but not divided per Ministry responsible for the area/cluster and not per beneficiary.
- UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012“, February 2012[63]: contains detailed budgets, but no average calculation per beneficiary is possible, as within clusters themselves numbers of beneficiaries vary according to the activities.
- UN, Humanitarian Country Team members: CERF proposals and detailed budgets for 3 months for the Floods 2013; the cluster budget for Agriculture (under Food Security) can be considered as early recovery, as it includes agricultural kits (see below).[64]

For resilience building:

[62] The budgets of the NGOs are not available officially and therefore their names NGOs are not disclosed.
[63] provided by UN Humanitarian Country Team;
[64] provided by UN Humanitarian Country Team;

- UNDP: Coping with Drought and Climate change, 1.900.000 USD for 5 years for 7 communities (4.267 households, hence about 25.000 people) in Guija District, Gaza Province; **76 USD/beneficiary; until 2014**; specific activities include agricultural activities to increase crop yields, livestock support, early warning systems, community based drought preparedness activities, improved water access, and technical support.
- UNJP Project „Joint Programme on Environment Mainstreaming and Adaptation to Climate Change, Mozambique": from 2008 to 2012 (4 years), 7.000.000 USD for 50.000 direct and at least another 50.000 indirect beneficiaries; completed in 2012; **140 USD per direct beneficiary**; detailed information and activities available, but not for expenditures; detailed budget for activities in original project proposal. Activities include environment and climate mainstreaming, support for community coping mechanisms including agriculture, and livelihood diversification.
- NGO Project in Gaza Province for 10 months 2006-2007, focusing on WatSan (rehabilitation and installation of boreholes, installation of latrines, water treatment, local capacity building): USD 385.260,- for 23.200 direct beneficiaries and another 18.800 indirect beneficiaries; (early response/resilience building): **16,6 USD/direct benef.; 9,1 USD/ village inhabitant**; detailed activities and budget available.
- NGO Project on drought and flood resilience building (on-going): 1.500.000 USD for 82.000 beneficiaries for 40 months: detailed activities and budget available. Activities include contingency plans and community risk mapping, establishment of a community based early warning system, introduction of drought tolerant agriculture techniques including alternative seed kits, improved WASH, and capacity building for emergency response (e.g. first aid). It was not possible to estimate an overall cost per beneficiary as each activity benefits a different number of people.

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
Food Security (Agriculture, Livestock etc.)	• Food aid • Emergency de-worming of livestock and vaccination campaigns • Fodder distribution	• Prepositioning of food stocks (procurement when surpluses are available; • Targeted food assistance and/or cash transfers • Distribution of agricultural tools and seeds; • Monitoring of pests and pest control (crickets etc.) • Regular de-worming and vaccination campaigns of	• Cooperation with research institutes and local authorities on improved farming techniques; • Training on drought resilient farming techniques and fruit trees; dissemination (educational material, demonstration plots etc.); • Diversification of agriculture; support and promotion of homestead gardens; promotion of collection of wild fruits; • Water management for agriculture (small dams and reserves, irrigation schemes, rainwater harvesting, drip-fed agriculture etc.); • Support to environmental friendly fertilisers and

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
		Livestock • Rehabilitation and/or reconstruction of infrastructures to water the animals (dams and holes • Production and conservation of fodder for drought season.	pesticides; • Establishment/support of farmers associations/groups and seed banks; • Support marketing facilities for agricultural and animals and its by-products • Diversification of income sources (skills training and development, market facilities etc.) • Savings and micro-finance schemes • Fodder production and conservation systems; • Support livestock breeding, also of small species (chicken, ducks etc.) • Rehabilitation and/or reconstruction of infrastructures to water the animals (dams, holes, rainwater harvesting etc.) • Veterinary services • Livestock insurance schemes • Facilitation of marketing (buyers, transport etc.)
Costs for Food Security (Agriculture, Livestock etc.)	*WFP:* ***US$895 per MT or US$90 per beneficiary for 6 months assistance.*** *Government Contingency Plan:* • *255.300 people for 6 months = 399.112.506 MT (333g of grain and 40g of pulses per person/month) = 13.303.000 USD; 8 USD/person/month;* *UN, Humanitarian Country Team*	*WFP:* ***US$698 per MT or US$39 per beneficiary for 6 months assistance.***	*NGO:* • *Farming techniques for 1.125 households, 6.750 people. The budget for specific activities is marked up in line with the total budget to incorporate overheads, staff, and other running costs of the project as a whole, equating to US$20.,640, or* ***US$30 per beneficiary****. Activities include capacity building and training, establishment of farmer field schools, demonstration plots, distribution of drought resistant seeds, and improved grain conservation.* • *The UNDP project is estimated to cost approximately US$76 per person, for a range of activities****. Ag and livestock activities are approximately US$36 per person***

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	members, CERF proposal for agriculture (under food security): • *Agricultural kit (distributing seeds and tools post flooding as part of early recovery):* ***USD 52 per family (USD 10/beneficiary) for low lands and 47 (USD 8/beneficiary) for high lands****.*		***out of the total budget, with agriculture alone costing approx $21 per person*** *(activities include improved seeds and agricultural inputs, provision of technical assistance, introduction of new agricultural techniques.*
Nutrition	• Feeding programme; micronutrients for mothers and children, vitamin A treatment etc. • Treatment of SAM • Blanket supplementary feeding programmes (BSFPs);	• Provision of nutrition supplies and anthropometric equipment (scales, height boards etc.) to health centres • Training on management of acute malnutrition • Treatment of MAM • Nutritional education courses to communities and health centre staff	• Nutritional education courses to communities and health centre staff • Awareness sessions in communities on healthy nutrition pregnant and lactating women, babies and young children
Costs for Nutrition	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012*“: • *6 months of treatment of SAM (inpatient and outpatient), including therapeutic milk, oral*	*Costs are estimated to be the same as late response, while caseloads are less.* • ***SAM treatment: US$195 per case*** • ***MAM treatment: US$31 per case***	• Unknown – improvements in nutritional status will require investments mainly in the sectors health and livelihood (food security, agriculture).

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	rehydration, Ready to Use Therapeutic food, job aids and health centres, radio spots on breastfeeding, support for nutrition education, MUAC tape, zinc, logistics and technical support, for 6 months = ***$195 per SAM case*** *WFP:* ***MAM treatment costs US$31 per person assisted****.*		
Water Sanitation & Hygiene (WASH)	• Water trucking • Rehabilitation of rural water supply points and construction of additional water points; • Provision of equipment to families (jerry-cans, buckets, household water treatment) • Dissemination of key messages on diarrhoea and cholera prevention	• Rehabilitation of existing water supply facilities and construction of additional water points; • Provision of water treatment tablets • Hygiene promotion activities; education and awareness campaigns on prevention of diseases and epidemics;	• Rehabilitation of existing water supply facilities and construction of additional water points • Establishment and training of water committees for maintenance and management of local water points; • Hygiene promotion activities; education and awareness campaigns on prevention of epidemics
Costs for WASH	*UN, Humanitarian Country Team members: CERF proposal for WASH:* • *161.000 direct operational costs for water trucking plus 100.000 for staffing and*	• *Resilience interventions are likely to be similar to the early response scenario, and hence the figures in the next column can be used.*	*UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012“:* • *1 borehole for 500 beneficiaries: USD 10.000/new borehole: USD 20,-/beneficiary* • *rehabilitation of borehole: 10,-/benf. (1 rehab. = USD 2.000)*

Category	Late Response – when the disaster hits	Early response – anticipating the next disaster	Disaster resilience –the ability to resist, absorb, accommodate to and recover from the effects of a hazard
	*admin costs = USD 261.000 for 100.000 beneficiaries**:*** ***2,61 USD/beneficiary for 3 months; 0,87 USD/beneficiary/month*** *UN, Human. Country Team: „Clusters Preliminary Funding Request for Flooding and Cyclone Season 2012“:* • *USD 380.000 for 75.000 beneficiaries for 3 months for a basic set of bucket, jerry can, chlorine and water purifier:* ***USD 0,16/beneficiary/month***		• *rehab. of sanitary complex: 4.000,-/complex* • *social mob.: 4,-/benf. (3 months)* • *latrine slab for household latrine: 65,-* • *household water filter and chemicals for treatment: 100,-* • ***Average cost per beneficiary = $48.6*** *NGO Project in Gaza Province for 10 months 2006-2007, focusing on WatSan: USD 385.260,- for 23.200 direct beneficiaries and another 18.800 indirect beneficiaries; (early response/resilience building):* ***16,6 USD/direct benef; 9,1 USD/inhabitant.*** *Note that the latrine slab here is estimated at $20, as compared with $65 above, accounting for a large portion of the difference in estimates.*