REPUBLIC OF GUINEA-BISSAU
National Programme of Action of Adaptation to Climate Changes
Ministry of Natural Resources and Environment
Government of Guinea-Bissau
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Nacional Programme of Action of Adaptation to Climate Changes

NAPA GUINEA-BISSAU

PREFACE

Climate changes constitute nowadays the greatest threat against life on earth and they are intimately related to the existence of poverty. Their impact varies according to different geographical zones. The least developed countries (LDCs), among which Guinea-Bissau, are the most affected ones due to their geo-climatic conditions, high reliance on natural resources and their limited capacity to adapt themselves to the negative impact of those changes.

Like many regions of the planet, and West Africa in particular, the country has witnessed in the last years a significant disruption in its rainfall and hydrometric patterns. Rainfall shortfall, coastal erosion and salt invasion area have as their main consequences an accentuated aridity of soils, a significant reduction in major humid zones and the disappearance of some rivers and lakes. Torrential rains and extreme temperatures are also climate phenomena that prove and demonstrate our country's vulnerability.

Guinea-Bissau is thus exposed to the negative effects of climate changes in almost all productive sectors of national life, particularly as regards its population and natural ecosystems. Among the foreseen consequences, we single out a fall in agricultural, forest and grazing production, loss of human lives arising from malnutrition and food insecurity, risk of endemic disease such as diarrhoea, cholera, typhoid fever, tuberculosis, etc.

In such a context, the preparation and finalisation of the National Programme of Action of Adaptation to Negative Effects of Climate Changes (NAPA), financed by the Global Environment Facility (GEF), under the country's joining of the Framework Convention on Climate Changes and the Kyoto Protocol, aimed at assessing the country's vulnerability to the above-mentioned phenomena and proposing steps and priority activities aiming at reducing and/or mitigating the negative effects of climate changes and implementing early warning and forecasting measures enabling a response to future catastrophes.

PANA preparation had as its focus the integration of the environmental dimension into
sector strategies of the fight against poverty and national development. This exercise will lead
to the identifying of the agrarian, water supply, health and coastal area sectors as the priority
ones in the adoption of immediate adaptation steps and actions, representing an overall
financial effort estimated at around US$ 6.300,000, for whose materialisation Guinea-Bissau
counts on the international community's invaluable support and solidarity.

Bissau 18 July 2007.

The Minister of Natural Resources and Environment

Soares SAMBU

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ABBREVIATIONS AND ACRONYMS

AIA Environmental Impact Evaluation
AIDS Acquired Immunodeficiency Syndrome
AMA Multilateral Agreements on the Environment
CIMA Water Inter-ministerial Committee
CN NAPA NAPA National Committee
CAN National Water Committee
CNI Initial National Communication on Climatic Changes
CO2 Carbon Dioxide
CPDA Letter on Agrarian Development Policy
CR NAPA NAPA Regional Committee
CTA Water Technical Committee
CTA Centre of Agrarian Technical Assistance
DENARP Poverty Reduction Strategy Paper
DGA Directorate-general of Environment
DGADR Directorate-general of Agriculture and Rural Development
DGFC Directorate-general of Forests and Hunting
DGRH Directorate-general of Human Resources
DP Development Plan
EPAN-DB Strategy and National Plan of Action for Biological Diversity
EEZ Exclusive Economic Zone
EU European Union

G.B. Guinea-Bissau
GEF Global Environment Fund
GOGB Government of Guinea-Bissau
HDI Human Development Index
HIV Human Immunodeficiency Virus
IA/Portugal Environment Institute
IBAP Institute of Biodiversity and Protected Areas
IFAD International Fund on Agricultural Development
INA National Environment Institute
IUCN International Union for Conservation of Nature
LDCs Least Developed Countries
LVIA Italian Non-Governmental Organization
MADR Ministry of Agriculture and Rural Development
ME Ministry of Economy

MF Ministry of Finance
MINSAP Ministry of Public Health
MRN Ministry of Natural Resources
NAPA National Programme of Action for Adaptation to Climate Changes
NGO Non-Governmental Organisation
OMVG Gambia River Basin Development Organisation
PAC Common Agricultural Policy
PGBZCGB Biodiversity and Coast Management Project
PIB Gross Domestic Product
PNGA Environmental Management National Plan
RT Registered Tonnage
2SN Second National Communication
SPV Vegetation Protection Service
WAEMU West African Economic and Monetary Union
WB World Bank

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EXECUTIVE SUMMARY

Participatory evaluations on vulnerability and adaptation carried out under NAPA on the basis of various studies and sector consultations already made, revealed that the sectors that ensure the subsistence of the overwhelming majority of Guinean households and constitute the country's economic basis are the most vulnerable ones to climate change: the agrarian sector (agriculture, forests and livestock), the sector of water resources and the fishing sector. Anthropic pressure on natural resources, with increasingly onerous and worrying impacts, aggravates this vulnerability.

It is obvious that climate changes and variability in weather patterns may seriously affect the economic growth of countries with scarce resources and hence exacerbate poverty and social inequity.

In Guinea-Bissau the impact of those changes were already being felt in the economy for some time, especially due to a diminishing rainfall and the gradual rise in temperature. In

terms of water resources, this can be seen in aquifers that have decreasing quantities of water
and are more easily flooded by salt water, ground waters increasingly deeper and dried-up
lakes; concerning the agrarian sector, production of Guinean staple food (rice), has diminished
markedly, also due to the salinity and acidity of hydromorphous soils and the flooding
of rice fields. Air temperature is higher as a result of a considerable rise in the sea level
and, consequently, high tides increase in frequency and are more powerful; the dry season
lasts longer, especially in the hinterland (eastern regions); and the surface belonging to
humid zones has decreased.

Guinea-Bissau is one of the poorest countries in the world and it lack means to tackle
problems arising from climate changes. Thus this programme aims at defining priority
actions to be implemented with assistance from multilateral and bilateral partners and/or
domestic partners with a view to meeting their requirements and concerns regarding adaptation
to the nefarious effects of those changes.

A number of priority strategic actions were defined, through a widely participatory exercise,
to deal with concerns felt by the most vulnerable groups relative to climate changes.
Those actions aim essentially at enhancing the level of rural populations' food security so as
to reinforce their adaptation capabilities, reduce pressure on forest and fishing resources and
improve access to potable water for human consumption and livestock, because climate
changes exert a negative influence on the quality and quality of water resources through a
reduction in rainfall. 14 projects were chosen in order to achieve these strategic objectives
namely: (i) Diversification of Food Production; (ii) Improvement in the Supply of Potable
Water in Rural Areas; (iii) Reinforcement of Preventive Capacity and Protection of Mangrove
Rice Fields against High Tides; (iv) Observatory for Mangrove Monitoring and Evaluation; (v)
Follow up of Erosion on Coastal Zones; (vi) Evaluation of Climate Changes Impact in
Productive Sectors; (vii) Promotion of Small scale Irrigation on Embankments of Geba and
Corubal rivers; (viii) Prevention of Natural Catastrophes (ix) Protection, Conservation and
Enhancement of Fishing and Coastal Resources; (x) Integrated System of Information on Food

Security (SISA); (xi) Environmental Education and Communication on the coastal zone; (xii)

Rehabilitation of Small Perimeters of Mangrove Soils for Rice- Growing in Tombali, Quinara,
Bafatá and Oio; (xiii) Support to Production of Short-Cycle Animals; (xiv) Reforesting of
Degraded Zones.

The criteria adopted for the selection and sorting of the above-mentioned options are as
follows: (1) level of significance of impacts; (2) contribution for poverty relief; (3) synergy
with multilateral agreements on the environment (AMA); (4) costs; (5) gender; (6) number
of beneficiaries.

This programme does not constitute an isolated initiative but it is rather integrated in a set
of sector-wide development programmes as well as in the decision processes and national
planning.

Nacional Programme of Action of Adaptation to Climate Changes
1. BACKGROUND
It is recognized by science and the community of nations that climate changes that occur
in our planet constitute a threat to life and mankind. There is a strong probability that those
changes will have dramatic consequences on least developed countries (LDCs), particularly
concerning losses of human lives and negative effects on the economy and investment. The
starting assumption is that LDCs' vulnerability may be dictated by the following factors:

• Their geographical situation and climate conditions
• The extreme dependency of their populations on natural resources
• Their backwardness and economic frailty
• Their limited capacity to adapt to negative climate developments.

Climate changes and variability in weather patterns may affect the rate of economic
growth, exacerbate poverty and social inequalities, and jeopardise chances of success of
development policies meant to fight poverty.

As an unequivocal way to address this situation, the Conference of Parties to the United
Nations Framework Convention on Climate Changes approved in 2001 the preparation of
National Programmes of Action for Adaptation to Climate Changes (NAPA) for LDCs. NAPA's
role consists in proposing immediate and urgent activities that are to be implemented in
order to raise capacity of adaptation, and as result, of resistance to current and future
negative effects of climate changes and extreme meteorological phenomena. Guidelines on
NAPA's preparation process were defined in this Conference (Directive 28/C.P.7). This

Directive asserts that the approach behind NAPA's preparation will be underpinned on (i) complementary aspects based on existing national development plans and programmes with a view to advancing broader objectives aimed at poverty reduction and sustainable development, and (ii) search for synergies between NAPA and Multilateral Agreements on the Environment focusing on adaptation and capacity building. The present NAPA was prepared under the framework towards the enactment of this Directive. The aim is to have NAPA not as an isolated occasional action but rather as part of a set of development sector programmes and an integral part of decision-making and planning processes at the national level. It constitutes a first stage of Guinea-Bissau efforts towards the implementation of initiatives geared at the implementation of initiatives seeking adaptation to long term climate changes and variability in weather patterns.

Starting from the reality that Guinea-Bissau lacks sufficient means to fight problems arising from climate changes, NAPA should allow Guinea-Bissau to define and implement priority actions hereby identified, so as to meet its needs and deal with its concerns in the field of adaptation to the effects of those changes.

2. INTRODUCTION AND PARAMETERS

The present NAPA was prepared as per Directive 28/C.P.7 following the 1st Guinea-Bissau National Communication. It has to be recalled that the said communication argued that Guinea-Bissau's vulnerability in general, and in its coastal zone in particular, results from: (1) the own nature of its geological and geomorphologic formations, and the littoral's dynamics; (2) the concentration in this zone of its main biodiversity resources, which therefore implies a strong demographic pressure on those resources, thus inducing the existence of factors of climate change. Coast rim's formations are essentially of a sedimentary nature, with a alluvial deposits of low altitude and with recent sedimentary deposits (quaternary age) as it is the case of the whole delta area of the Guinean coast and the Bijagós archipelago, whilst in the interior the geological and geomorphologic formations are older (primary and secondary ages). Two thirds of Guinean territory have an altitude inferior to 50 meters and most of this surface is situated in coastal areas. This characteristic favours coastal erosion, which worsens as temperature rises, accompanied by a resulting rise of average sea level.

Guinea-Bissau climate framework is strongly marked by an extreme fluctuation of
rainfall levels, irregularity in rainfall patterns, longer dry season in some regions of the
country, increase of yearly average temperatures (around 1 ° C), and, concurrently, of
average sea level. Projections made by the Meteorology Office for the 2100 time horizon
point to a decrease in rainfall hovering around 11.7 %, a rise in temperature of 2 % and a
rise in the average sea level of 50 cm. (source: 1st National Communication on Climate
Changes, 2004).
The figure below illustrates the evolution of rainfall patterns over time.
Figure n.° 1 : Superposing of isohietes of normal rainfall figures.
Participatory evaluations of vulnerability and adaptation carried out under NAPA preparation
and based on various sector studies-diagnoses, revealed that the sectors that ensure
means of subsistence to the overwhelming majority of Guineans and that constitute the basis
of the country's economy, may be the ones that are most affected by climate changes and the
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-17 -16.5 -16 -15.5 -15 -14.5 -14 -13.5 -13
10.5
11
11.5
12
12.5
13
Bafatá
Bis/AerBis/Obso
Bissorã
Bolama Buba
Bubaque
Bula
Buruntuma
Cacheu
Cacine
Cantchungo
Cat ió
Farim
Fulacunda
Gabú
Ingore
Madina Boé
Mansaba
Nhacra
Pirada
Sonaco
Varela
1100
1200
1300
1400
1500
1600
1700
1800

variability in weather patterns, namely: the agrarian sector (agriculture, forests and livestock), water resources, fisheries and public health.

This finding, supported by technical data provided in reports on sector studies, PRSP and others (cf. bibliography), arises from the fact that (i) the economy is largely dependent on agriculture, whose activity relies on rainfall intensity and regularity, and where cashew is the predominant crop, contributing with 62.6% for the GDP in 2004, against a share of only 12.2% for industry and 25.2% for services in the same year; (ii) a large part of population is concentrated on the coastal zone (80%) and depends vitally on the direct exploration of natural resources for its survival, (iii) infrastructure being highly concentrated on coastal areas, (iv) difficult economic and social conditions, characterised by extreme poverty and high unemployment rate, (v) very fragile soils, exposed to rain-driven and coastal erosion (vi) expansion of agricultural production associated to forest felling and slash-and-burn practices (itinerant agriculture), (vii) bad soil occupancy, due to a lack of agricultural zoning, (viii) an accelerated destruction of forests, estimated at 30,000-60,000 ha/year, with negative effects on current sequestration capacity estimated at 11,288,401 atmospheric CO2,

(ix) a relatively high rate of population growth (2.05% nationwide, and 4% in the capital, Bissau), (x) water-related problems, (xi) outdated and/or ill applied legislation, or even not applied legislation, (xii) weak or non existent intervention capacity on the part of institutions, (xiii) absence of protection rules and norms against climate risks linked to the construction of infrastructure, (xiv) the very precarious nature of traditional housing (made of mud and covered with straw).

The country has survived, at a painful cost for its populations, to cycles of chronic crises, characterized by a worsening of access to water for agricultural purposes, human and animal consumption; a marked fall in agricultural production, staple food items (rice in particular); a rise in costs of some foodstuff, particularly in urban and semi-urban centres, a deterioration in prices of cashew and cotton and a increase in food insecurity.

Potential impacts of this evolution, especially due to decreasing levels of rainfall and a rise in average temperatures, are already empirically noticeable in many areas. Here are some examples:

In terms of water resources, we see aquifers with less water and more easily penetrated by salt water in coastal zones, increasingly deeper ground waters and dried-up lakes; in the agrarian sector, the production of populations' main staple food (rice) had markedly decreased, due also to salinity and acidification of hydromorphous soils, destruction of protective dykes, flooding of rice fields, abandonment of degraded land, erosion and others;

Greater pressure on uplands, with the consequent deforesting arising from upland agriculture and timber exploration; higher air temperatures), higher average sea levels, resulting in more frequent and impetuous high tides; narrower river beds due to silting; longer dry season, particularly in countryside regions (eastern part of the country), leading to the displacement of whole villages; longer cattle transhumance involving a larger number of animals (especially cattle and goats); smaller humid zones surfaces; existence of a greater number of areas of ecological reduction of some aquatic species, fish in particular that are

changed/affected or even destroyed; increasing trends of HIV/AIDS and hepatitis were added to traditionally endemic diseases (malaria and tuberculosis).

It is our belief that both actual and potential impacts of foreseen climate changes may affect adversely the country's development efforts made along many decades, especially as regards the fight against poverty towards a sustainable development.

Aware of the urgent need to prepare the country to tackle the threats and challenges that climate changes represent to mankind and life on earth, the government decided, as a major goal, to commit itself to the preparation of a NAPA for Guinea-Bissau. It is a document axed on the country's short-medium term development objectives, which concur for the attainment of adaptation objectives, and thus raise their effectiveness.

It is under such a perspective that priority actions were selected bearing in mind available adaptation options to meet this new challenge. Meanwhile, NAPA implementation will call

for a great deal of solidarity from the international community taking into account that
Guinea-Bissau is a poor country that has a weak economy and, accordingly, very limited
financial resources and know how, NAPA implementation will require a great deal of
solidarity from the international community.

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Figure n.° 2 Distribut ion of minimum temperatures (°C), 1950-1994
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GEOGRAPHICAL SITUATION
3. COUNTRY'S BROAD CHARACTERIZATION
3. 1- GEOGRAPHICAL SITUATION
Guinea-Bissau is situated on the West African coast (latitude 10° 59' N, between 13° 38´
and 16° 43´ W meridians). It has a surface of 36,125 kmÇ, maximum latitude of 193 km
and a maximum longitude of 330 km. The country has common borders with Senegal to the
north and Guinea-Conakry to the south and east, and has the Atlantic Ocean to the west. Its

territory is divided into a continental zone and an insular one, the latter being constituted
of a contiguous chain of islands - Jeta, Pecixe, Areias, Caiar, Como e Melo and the Bijagós
archipelago, made up of 88 islands and islets of which only 21 are inhabited.

3.2 METEOROLOGIC AND CLIMATE PROFILE

There are two climate regions: the sub-Guinean humid tropical region and the Sudanese
tropical one. The first one coincides with the coastal zone and is characterised by intense
rains (1,500-2,500 mm/year), average temperature variations and heavy air humidity
throughout the year. The second region (Sudanese type), covering the country's eastern half,
is characterised by weak rainfall (1,000-1,500 mm/year), high temperature variations,
heavy air humidity throughout the rainy season and light humidity over the dry season.

Average yearly temperature nationwide in Guinea-Bissau is 26.8° C and the low temperature
variations (3-4 °C). High temperatures are recorded in March-May (hot season),
when maximum temperatures reach 32-39 °C and coolest temperatures stand at 20-24 °C.
In the coolest time period of the year (December-February) top temperatures reach 25-30
°C and minimum ones vary between 16° and 20 °C, whilst average relative humidity hovers
around 70 %.

Figure n.° 3 Distribut ion of maximum temperatures (°C), 1950-1994

Sunshine varies on average 8 hours per day. July-September are usually the months of the
year with fewer days of sunshine, since it is the time period with greater and more marked
nebulosity. Sunshine does not constitute a constraining factor on agricultural production.

Winds that predominate in the cooler parts of the year blow from the N and E quadrant,
oscillating from the N to NE. the predominance of winds in the NW and WSW quadrants is
more marked during the first half of February. During the hot season, winds come mostly
from the N to W and S to W quadrants, with persistence on the WNW, W, SW and SSW
directions. Over the rainy season (monsoon), winds predominate on S to W, SSW, the time of
the year where winds blow at their maximum speed. Concerning evaporation/ transpiration,
potential figures (ETP), are high in the dry season, with variation between 2.7 and 5.9
mm/day, due to the frequency of dry and hot winds, with predominance on N and NE
quadrants, coinciding with the Harmattan period.

3.3 GEOMORPHOLOGY

Low altitude predominates throughout the country. The highest spot does not go beyond
300 m (Colinas de Boé, in the country's south-eastern extreme). The geomorphology

is marked by a littoral of wide prairies that sprawl to the countryside where low altitude
uplands start to appear (30-40 m), on a gradual basis, up to the Fouta Djalon mountain
chain. The coast is sliced recortada from north to south (see picture below) where
sedimentary and recent formations predominate.
Figure 4:- Spot Image of the Guinea-Bissau Coastal Zone(Source: J. Biai, 2005)

Distri buição da Temperatura Máxima (°C); 1950-1994
-17 - 16. 5 -16 -15. 5 -15 - 14. 5 -14 -13. 5 -13
10.5
11
11.5
12
12.5
13
Bafat á
Bis/AerBis/Obso
Bissorã
Bolama Buba
Bubaque
Bula
Buruntuma
Cacheu
Cacine
Cantchungo
Catió
Farim
Fulacunda
Gabú
Ingore
Madina Boé
Mansaba
Nhacra
Pirada
Sonaco
Varela
31
31. 5
32
32. 5
33
33. 5
34
0 0.5 1 1.5

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The sedimentary cover on the sandy littoral is not consolidated, in contrast to the mangrove
type with recent deposits from the quaternary age. The escarpment-type littoral is rare,
but there is nonetheless a coast marked by steep slopes in well defined segments in the country's
northernmost (Varela) and in some islands in the Bijagós archipelago (Bubaque, João
Vieira, Meio, Carache and Unhocomo).

3.4 SOILS AND HYDROGRAPHIC BASINS

Around two million hectares may have an agricultural, grazing pastoral or forest vocation.
If we exclude litho soils (22%), upland soils have an iron content (33% of overall surfaces).
Hydromorphous soils (40% of the territory) comprise sweet-water bas-fonds (14%) and
sea alluviums (26%). Phosphorus shortages are widespread. See below a graphical representation
of soil occupancy in Guinea-Bissau:
Figure n.° 5 – Soil occupancy in different vegetation formations

Ocupação dos Solos pelas diferentes formações vegetais
14%
3%2%
63%
6%
10% 2%
Terra cultivada
Palmeiras
dens as
Florest galerias,
palmeiras
Florestas
S avanas
Mangais
Outras
Hydrographical basins, ie., a set of land where rain waters flow into a large waterway, are
part of important coastal and continental ecosystems in Guinea-Bissau. The most important
hydrographic basins are those from Farim River (Surface em kmÇ), Geba (2,225 kmÇ) and
Corubal (22.000 kmÇ). In the sub-regional context, Guinea-Bissau is part of the
Organisation for the Development of the Gambia River Basin (OMVG), possessing less than
1% of the said river’s basin.

3.5 FAUNA AND FLORA
Sub-humid forests, natural palm tree plantations, open forests, bushy savannahs and
mangroves constitute the main formations of vegetation cover in Guinea-Bissau. The literature
consulted gives account of the existence of 1,186 species all over the country, grouped
into about 160 families, of which around 12 species are endemic ones.

Figure 5:

Sub-humid forest,

palm

dry savannah and natural tree plantation

The fauna is rich and diversified consisting of 374 species of birds grouped into around 31 families, of which about 30 species are made up of gulls, seagulls and pewit-gulls. The Bijagós archipelago is considered as a humid zone of international importance because it shelters more than one (1) % of the world population of birds. Estimates point to the existence in Guinea-Bissau of 11 species of primates, 21 species of carnivorous, 19 species of ungulates, 8 species of rodents, 10 species of chiropters, 85 species of reptiles and 31 species of amphibious animals.

Estuaries, large mangrove surfaces, low-depth areas and adequate temperatures are the main features of Guinea-Bissau's coastal area, which shelters important fishing and non-fishing fauna resources of economic interest.

The existing flora and fauna diversity is currently threatened, being even on a downward trend in coastal areas. In fact, the vegetation cover represents not only a resource but also a biotope that shelters various animal organisms (from large- to small-sized fauna, to micro-organisms that take part in nature's food chain and in bio-geo-chemical processes that occur in forest ecosystems) and that are at the heart of complex ecological processes. The degradation of forest ecosystems is a present problem in Guinea-Bissau, for it represents not only a loss of biomass but also the fragmentation of habitats, thus interfering negatively in the wild fauna's migratory process.

3. 6. COASTAL EROSION

The low altitude that predominates in Guinea-Bissau, particularly in coastal areas where coasts are much lower than the average sea level, makes the country quite vulnerable to sea erosion. Damage from coastal erosion is particularly visible on the north-western coast, namely Varela beach where a tourist undertaking made in the 1980s became flooded in 2000. Equally, according to estimations, between 60% and 80% of soils with high iron con-

tent as well as hydromorphic ones are exposed to: (i) erosion and compacting, with a rapid loss of fertility and decrease of the replenishment rate of shallow aquifers "; (ii) salinity due to existing conditions on the territory's waterways and decreases in rainfall. Effects are particularly devastating in sandy littorals, whose sedimentary cover is little consolidated

causes an intensive felling of palm trees and other forest species lined up along the coast;
important quantities of sand on the beach and dunes are affected every year thus laying
fossil layers bare and exposed to the phenomenon.

Figure n.° 6:Coast erosion in Guinea-Bissau northwest (Varela beach)

Photo by Alexandre Cabral, 2006

Figure n.° 7: Coast with mangrove

The littoral is made up of mangrove and is a stable zone as compared to the sandy and
sloped littoral. It is highly penetrated by tides and possesses recent deposits from the quaternary
age. This coast is constantly under the influence of tides and is subject to pressure from
artisan fishermen, settled in illegal encampments, who fell the mangrove for fish smoking
and thus facilitate seawaters' erosive action.

Rocky littoral with escarpment, this type of coast is not predominant in Guinea-
Bissau due to the country's geological and geomorphologic characteristics. The highest
altitude does not exceed 300 metres. Average altitude in the coastal area does not go beyond
20-25 metres. Meanwhile, we can find rocky coast with escarpment in well-defined segments
in Varela and the islands of Bubaque, João Vieira, Melo, Carache and Unhocomo. The
coast is subject to coast and rain erosion. The erosion phenomenon is obvious in almost all
these places and localities.

Figure n.° 8 : Rocky coast with steep slope. Carache island (in G. Pennober, 1999)

… Bubaque island

3.7. EXCEPTIONAL EVENTS
3.7.1. CATASTROPHES
Natural catastrophes are rare. Coastal area floods caused by high tides or torrential rains,
(likes the ones in 2003, 2004 and 2005) are rather the norm. The Directorate General of
Water Services reported in those years that various localities in the country's eastern regions
(Bafatá and Gabú) were affected by foods that damaged infrastructure (bridges and makeshift
housing), and caused a loss of 63 ha of food production and troubles to hundreds of people

forced to leave their villages on a temporary or definitive basis. Those floods were originated
at Geba River's streams and shared streams of Koliba River (Guinea-Conakry) and Corubal
River (Guinea-Bissau).
Five communities from the Bedanda/Cubucaré lost their paddy rice fields in 2005 due to
salt-water invasion in the wake of high tides in September, which destroyed protective dams.
Rural engineering services calculated that around 3,015 ha became non productive for
rice-growing and were pointed out as a direct source for the widespread hunger that hit
populations.

3.8 ANTHROPIC PRESSURES ON NATURAL RESOURCES

3.8.1 AGRARIAN SECTOR

According to estimates over half of the national territory, i.e., about 2.5 million hectares,
have vocation for agriculture, forestry or grazing uses (SCET, 1978). Sources from
GAPLA/MADR (Agriculture Yearbook, 1997), state that ninety thousand (90,000)
family-owned agricultural units are responsible for the production of 90% of overall
agricultural production in the country. This production comes mostly from the so-called itinerant
agriculture, characterised by forest felling and slash-and-burn practices, utilization of
traditional methods and tools. The remaining 10% are produced by the commercial farming

sector and has some level of mechanisation, which is practised by 1,200 ponteiros (modern
farmers) who occupy 27% of available agricultural land and 9% of the country's overall
surface. The average land surface per ponteiro is 136 hectares. Production in each of the
country's three agro-ecologic regions (East, North and South), is based on natural resources
that exist in the ecosystems we describe below:

UPLAND ECOSYSTEM

Among all ecosystems, the upland ecosystem is the one that suffers the heaviest
anthropic pressure, particularly from itinerant agriculture and bad agricultural practices
that facilitate the onset of literate and soil erosion. Intensive soil use and exploitation of this
ecosystem's resources have increased in parallel with the rise in population density and the
deterioration of some weather factors (rains), reflected in the drastic reduction of the fallow
period of those soils lately: from 5 to 15 years in the 1950s and 1970s, it changed nowadays

to 2 to 3 years; the vegetative regeneration of fallow land has been retarded in some of the country's regions (northern and eastern ones) due to the combined action of weather factors and a diminution of the fallow period. The non utilization of fertilizers and more productive agricultural techniques does not favour the maintenance, after the second year of production, of soil natural fertility in those fields thus leading to the abandonment of those lands and the utilization of new ones. Estimates point to 10,000 hectares being felled and burnt out every year for agricultural purposes in uplands, mostly for cereals (millet, rice and sorghum), leguminous plants (groundnuts and beans) and tubercles (cassava and yam).
Upland rice (pampam) occupies 33.000 ha of the planted area and contributes with 15,000 tonnes/year, i.e., 10.7% towards overall national production of this cereal. (Source: report on rice production, PSRDP/WB, 2004)

Besides, the increment of cashew growing (134,000 hectares) and commercial fruit growing (… hectares), constitute nowadays another factor behind the acceleration of the clearing of the country's humid and sub-humid forests.

MANGROVE ECOSYSTEM

In this ecosystem, communities of rice growers cut mangroves and leave soils exposed to rains, which makes those lands lose their salt content. They then build dykes and anti-salt dams to impede salt-water invasion and afterward cultivate exclusively rice on those soils.
Current estimations are that there exist 106,000 ha of mangrove soils with vocation for rice growing all over the country that were obtained, obviously, at the cost of losing an equal area covered by mangrove and the destruction of an important natural habitat for crustaceans and fish. It should be stressed that out of the 106,000 ha of those soils with rice-growing vocation only 50,000 ha (47,1%) are utilised for agricultural purposes by a total of 18,661 agricultural farms, accounting for an annual production of 115,000 tonnes of rice, i.e., 80% of 140,000 tonnes of the country's overall production. (Source: Rui N. Djata et al, Report on rice production /PSRDP/WB, 2004)

SMALL-VALLEY ECOSYSTEM

This ecosystem supports essentially production of rice and varied horticultural species. It

is made up of lands made out of flood depressions commonly denominated as small valleys
or bas-fonds. They are continental hydromorphic soils, temporarily subject to flooding and
sedimentation caused by rainwater. Current estimates point to the existence of 100,000 ha
with agricultural vocation for the production of rice and horticultural produce in lowlands
and perennial plants in slopes. They are located essentially in the eastern (Bafatá and Gabu)
and central (Oio) regions of the country. Women are the main users of this ecosystem; they
are estimated to have enhanced around half (50 mil hectares) of the overall area available.
(Source: Aníbal Pereira et al, Report on Study of Agrarian Sector /NAPA, 2005)

Rice culture in this ecosystem occupies 29.369 ha distributed by 58.190 family-owned
agricultural units that produce an overall quantity of 10,000 tonnes/year, i.e., 7% of
total rice production. The overall area utilised for horticultural production is calculated at x
thousand ha, per y thousand women/year.

3.8.2 FORESTS
According to Atlanta Consult (1985), forests covered 64 % of the country's overall
surface. A preceding study by SCET International in 1978 pointed to a forest-covered area of
approximately 74%. This presupposes that the country's forest area decreased by around
315,000 ha, i.e., an average of 45,000 ha/year between 1978 and 1985, due essentially to
anthropic pressure, as shown in the table below.

Table n.° 1- Evolution of forest resources for the 1978-1985 time span

Types of forests	SCET-International Survey 1978 (ha)	Atlanta Consult Survey 1985 (ha)	Difference (ha)
Sub-humid forests	178,800	135,431	43,369
Dry forest	848,300	844,959	3,341
Gallery Forest	79,950	52,909	27,041
Savannah	1,237,900	996,985	240,915
Total	2,344,950	2,030,284	314,666

Source: Elements d' un Plan Directeur d' Aménagement et de Gestion de Ressources Naturelles, 1992.

With an annual growth rate estimated at 1,500,000 m3/year, forest degradation is
estimated at approximately 600,000 m3/year, excluding surfaces lost to the felling of trees
in villages and farms and by slash-and-burn practises, evaluated at 30,000-60,000 ha/year

(Study for support to the forest sector in Guinea-Bissau, 1997). One can notice that
according to the 1985 forest survey, forests covered 2.1 million hectares and the wood
reserve was 48,300,000 m3. Besides, the Agrarian Development Letter (1997) states that the
devastation of forests is translated into the degradation of (i) 30% of surfaces of sub-humid
forests in the Tombali region, south of the country, (ii) 57% of surfaces of savannahs in the
Bafatá and Gabú regions (east), Oio (Centre) and northwest and (iii) 19% of surfaces of
mangrove forests (Silva e Vaz, 2001).

The overall forest area is thought to be suffering a current drastic reduction of 60,000
ha/year.

National consumption of wood in 1992 was estimated at 1.2 million m3 corresponding to
an increase of 8.3 % per year, equivalent to 81 % of firewood energy, 6 % of sawn wood and
8 % of construction wood as per PAFT data in 1992. This corresponds to an annual cutting
of approximately of 132,000 ha of wood, i.e., 9 times more than the surface surveyed by
DGFC in 1987. This consumption is in strong contrast with the average forest growth rate,
which stands at around 0.3m3/ha/year. Yearly exploitation was estimated at 2,100,000
m3/year in 1992 and national wood consumption was estimated at 4.000-5.000 m3/year
and the sawn wood production estimate was 3,000-20,000 m3/ano.

The wood industry registered in 1992 an overall number of ten saw-mills that had an
obsolete technological equipment capable of processing a maximum of 40,000 m3 of round
wood into 20,000 m3/ano of sawn wood. This industry focus mainly on the exploitation of
Pau de sangue (Pterocarpus einaceous), Pau de Conta (Afzelia africana) and Bissilão (Khaya
senegalensis). Indicators of the annual impact of wood production are shown in the table
below.

Table n.º 2

Formation	A.a.a. (m3/ha/year)	Area (ha)	Overall annual wood production (m3/year)
Dry dense forest			

Dense forest
Degraded forest
Transition forest
0.994
0.404
(0.404)
90,400
62,400
20,000
89,858
22,210
8,080
Open forest
Dense forest
Degraded forest
0.474
0.288
189,600
747,200
89,870
170,362
Savannah
Palm tree forest
Mangrove
“Ripícola” Forest
0.245
-
-
(0.474)
926,000
80,000
248,400
93,200
226,870
pm
not exploited
44,177
TOTAL 2,457,200 654,427

Source: FDFN, 1992; A.a.a. = Annual average accrual

The current pressure exerted by the wood industry tends to be felt increasingly on
southern forests, which are of capital importance for the maintenance of national ecological
balance because they are areas where large species, capable of regulating the country’s
rainfall and hydrological pattern are still plentiful (PNGA- May 2000).

As regards mangrove forests, data collected in 1953-1959 and 1976-1990, indicated that
between the two periods of time, the forest-felling level rose 2.000 ha/year to 3,830 ha/year
(CIRAD/PAPT/DGFC, 1992).

The pressure of forest resources is in an upward trend due to market demand and, on the

other hand, it reflects survival needs of an extremely deprived population. Thus, the rising
demand for wood products and charcoal (for domestic use as a source of energy), cibes
(wood for the construction of housing units) and wood (furniture industry) in the urban and
semi-urban market, has pushed an increasing number of Guineans into an unbridled
exploitation of those resources for commercial purposes, hence causing irreparable damage
to forests and the biodiversity. On the other hand, forests are still utilised permanently
by populations as a source of various types of wild fruit, medicinal plants, hunting, honey
and wax, fibres for varied handicraft, etc. There are studies that shed enough light on the
quantities and values that all these elements represent for the economy at household,
community and national levels.

3.8.3 LIVESTOCK

Livestock activity encompasses all production systems. The table that follows illustrates the
overall number estimated by Veterinary services in 2000:

Table n.° 3 – Overall national livestock

Ruminants

Other species

Cattle 524,891

Pigs 33,046

Lambs 311,521

Poultry 478,476

Goats 267,456

Source: Veterinary services

According to Veterinary services, the eastern zone has a cattle potential estimated at 74%,
against 85% of lambs and 58% of goats. The northern zone, on its turn, has 49% of pigs,
and the southern zone just 19% of this overall number. Poultry are evenly distributed
throughout the national territory.

Meanwhile the impact of livestock’s utilization of natural resources is still negligible due
to the relatively low number of animals nationwide.

3.8.4. WATER SECTOR

The country has important water resources that are grouped into (1) rain water resources,
(2) surface-water resources and (3) underground-water resources. The renewal of these

resources depends to a large extent on the intensity and regularity of the rainfall patterns,
whose parameters have been decreasing. Overall, albeit on an indicative basis due to lack of
more updated and reliable data, water resources are estimated at 14 billion m3/year (DGRH
Master Scheme, 1997), of which renewable resources from deep aquifers are assessed
at 8-29 billion m3/and those of surface aquifers are estimated at hundreds of billion
m3/year. Exploitation of surface waters of Geba and Corubal rivers in 1991 was estimated
at 1.5 million m3.

Most of Guinea-Bissau populations live close to springs, water points or perennial and
non/perennial rivers to ensure their access to this vital resource that they utilise for (i) their
own consumption, (ii) consumption of productive animals (animal-production activity),

(iii) agricultural production, etc. It should be stressed that potable-water access rate is only
45.3% for populations residing in rural regions against 78.9% for city dwellers in Bissau, the
capital (Source: Azinhaga et al, Water Sector Report /NAPA, 2005; 1ª CNSMC, 2004)
The agricultural and services sectors are the main users of water resources. Rain waters
are vital for agriculture and they depend totally on the rainfall. Surface-water resources are
utilised for the supply of populations, grazing and irrigation whilst underground waters are
rather utilised as a source of potable-water supply to populations (urban, semi-urban
and rural ones), in agriculture, cattle consumption and the irrigation of horticultural and
fruticultural products.

Updated data on the utilization of the country’s water resources are unavailable, and a
large number of water points were constructed lately, especially in the main urban centres
as a result of the increase in the number of inhabitants in some towns (Bissau and regional
capitals). Both government and populations ordered the mentioned constructions. Boreholes,
modern wells, traditional wells and spring-tapping are utilised to exploit underground
waters. There are over 2,500 boreholes and modern wells currently in use in rural hydraulics
whilst deep boreholes utilised for varied aims (urban supply, irrigation, etc.) hover around
150, according to DGRH data produced in 1997.

The construction of water points without a prior technical study taking into account the

country’s hydro-geological complexity faced some problems namely silting, the utilization of
materials that were ill adapted to water corrosion, wells exhaustion, salt-water invasion,
pollution of ground water due to lack of isolation, and water quality not acceptable to
populations.

Efforts made both by government and private entities from 1975 to date, if we take as a
reference the numerous water points (boreholes, fountains and improved wells) that were
built, are indicators of the intense exploitation of the county’s underground water resources.
Private investment in the construction of traditional and improved wells, without the
required preparatory work by the relevant technical services, has been growing since it is the
kind of solution seen as the most affordable by the overwhelming majority of Guineans:
each household has, at least, a traditional or improved well whose water quality is of a
questionable quality.

Water use for consumption and other purposes presupposes the need for renewal
of quantities utilised in order to ensure the durability of this vital good. Despite the nonexistence
of data to measure the impact on underground water resources, there are fears
that the concentration of the construction of water points in coastal areas may alter the
flowing pattern of underground waters thus facilitating invasion by brackish oceanic water.
Besides, common sense supports the assumption that the increasing use of underground
water resources implies the preservation of aquifers’ natural ability to renew themselves ot
herwise they will run dry at some stage. Well, as we saw earlier on, that renewal capacity in

Guinea-Bissau is greatly dependent on rainfall patterns and a rational use of water, plus the
fact that a large part of rain waters being wasted into the sea, eroding soils on their journey
whilst at the same silting the beds of rivers and lakes.

3.8.5. FISHING RESOURCES
The country possesses a broad coast, calculated at 22 235 KmÇ, which covers 61% of
national territory and shelters 80% of the country’s population. Fishing is carried out against
the backdrop of an important production potential favoured by the existence of a significant
shallow continental platform, the breadth of the maritime front and the existence of a sea

delta represented by the Bijagós archipelago. Fishing is focused on certain species related
to the type of fishing: artisan or industrial fishing. These species represent a biomass that
hovers around 1 300 000 tonnes, whose exploitable share stands at about 40%. This
catch potential encompasses 200 000 tonnes of shallow and deep water species of high
commercial vale and about 100 000 tonnes of "baliste" type species (species with low
economic value and which are object of very little exploitation). Out of this total, about 34
000 tonnes of high value shallow-water species and 110 000 tonnes of deep-sea species are
accessible to artisan fishing (Barros, I., Artisan Fishing, Bissau, 2001).

The same authors state that artisan fishing is dominated by the existence of non-mechanised
pirogues. This type of fishing rose about 300% in 1989-1995, both in terms of the
number of pirogues and the number of fishermen. As a result, catch levels have also
increased, to a level of 400 %, i.e., 10 000 tonnes in 1989 against 52 000 tonnes in 1995.
Fishing authorities estimate that catch levels have risen significantly in the wake of the
cropping up of illegal encampments of fishermen originating from the sub-region (12 were
detected in the Bolama/Bijagós Biosphere, in 2005, by IBAP) and illegal fishing in the
artisan-fishing zone (within 12 miles). Additionally, fishermen from illegal encampments
devastate mangroves for fish smoking or for use as construction material, thus stripping the
coast and exposing it to sea erosion, coupled with perturbations on the natural habitat
various sea species.

Effects of deforestation on upland soils is felt through the silting phenomenon and the non
navigability of rivers and lakes, a reduction of fishing resources caused by sediments dragged
away by rain erosion from high lands to low lands.

Foreign fishing fleets carry out industrial fishing outside 12 nautical miles upon licenses
granted to them by the authorities. Available data (1st CNSMC, p. 34) indicate 115 kg/h as
the average catch per fishing unit in 1990-1996. Top catch levels occurred in fish-catching
fleets (370 kg/h) compared with only 71 kg/h for mollusc-catching fleets and about 14 kg/h
for shrimp-fishing units.

The levels of illegal fishing observed within Guinea-Bissau Exclusive Economic Zone (ZEE)
lead us to think that unrecorded catch levels are far superior to those seen in 1990-1996.

In 2006 the Fishing Surveillance Services (FISCAP) arrested forty industrial-fishing boats

and 147 pirogues. This shows that illegal fishing levels may be extremely high and the
pressure thus exerted on fishing stocks may endanger the existence of some fish species in

the long run. It should be stressed that shallow-water fishing, involving fish, molluscs and
crustaceans (shrimp) constitutes the bulk of industrial fishing, representing 80% of stated
catch (Barros, I., 2001).

To sum up, pressure on Guinea-Bissau's fishing resources tends to rise not only as a result
of a growth of local population but also due to public treasury imperatives, whereby the
issuance of licenses or multiyear fishing agreements are seen as an important source of
revenues. According to data supplied by FISCAP, fines levies in 2006 amount to US$
6,520,000 USD, a risible sum if compared to the ecological damage caused by the practise of
forbidden fishing techniques.

4. SOCIO-ECONOMIC SITUATION:
Guinea-Bissau has a territory of 36,125kmÇ and a population estimated at slightly over
1,300,000 inhabitants distributed over 9 regions. Its population density is approximately 34
people/kmÇ and the average growth rate as per the latest population census (1991) is 2.2%.
About 70 % of local population live in the rural world and have as their main socio-economic
activities the exploitation of renewable natural resources (agriculture, fisheries, forests,
livestock and extraction). The country's coast zone shelters 80% of the country's overall
population and, compared to the countryside or continental zone, it is rich in biodiversity,
being there that the country's five Protected Areas are to be found.

According to data published in the Human Development Report, 2002, many important
social indicators in Guinea-Bissau are below the average in the African region. For instance,
life expectancy in Guinea-Bissau was 45 years at the start of the millennium whilst the
average figure for Africa was 48.9; child mortality was 145/1,000 and the African average
was 105/1,000; maternal mortality was 1,310/100,000 and the African average was
700/100,000. The situation in the education sector was as follows in the mentioned time
span: basic education expenses/overall budget, 3.5for Guinea-Bissau and 15.7% for African
in general; the illiteracy rate was 63.2% and the African average was 41.5%. As for the health

sector, available data point to a sharp deterioration of the health personnel/population ratio;
the relation health personnel and the number of inhabitants changed from 1/7,157 in 1991
to 1/11,371 in 2.000.

The poverty rate is currently very high: 64.7 % of the population are classified as being
poor and around 20.8 % as extremely poor (people that live with less than US$ 1 dollar per
day), according to PRSP data extracted from the Light Inquiry on Poverty Evaluation, ILAP),
2003.

In 2004, Guinea-Bissau's active population was estimated at little over 46% of the
country's overall population. Women have a share of about 52% and children below 15
represent 46%, thus revealing a mostly young population overall.

Existing information on domestic migratory movements is scarce but available data point
to a strong rural exodus. Bissau, the capital, has only 3% of territory but it shelters a quarter
of the country's population.

According to the 2006 Human Development Report, published by UNDP, Guinea-Bissau
is part of the group of countries with the lowest human development indices in the world.
Its HDI in 2006 was 0.349 (173rd spot out of a total of 177 countries).

The paralysis that hit the country from May 1998 to June 1999 due to the civil war has
contributed in a particular way for an additional deterioration of the already precarious
social situation. Thus, lack of control and the malfunctioning of fiscal management
structures worsened and this state of affairs greatly penalised social sectors. These factors
contributed significantly to an increase of local populations' degree, particularly in the rural
world, vis-à-vis climate changes.

Guinea-Bissau began the new millennium with a negative economic growth rate,
standing at an average rate of –0.4% for the 2001-2005 timeframe.

As regards standards of living, the real GDP per inhabitant suffered a decrease en each
year between 2001 and 2004, but it nevertheless rose slightly by 1% in 2005.

The agricultural sector, dominated by cashew, is the most important sector of the
country's economy, contributing with 62.6% for the GDP compared to 12. 2% for industry

and 25.2% for the services sector.

The current fiscal situation is critical thus preventing the government from meeting its obligations namely paying the wage bill, which has exceeded tax receipts since 2003 (111.9%, 155.0% and 108.9% in 2003, 2004 and 2005 respectively), when, in fact it should not be over 35% according to WAEMU convergence criteria. This reveals that Guinea-Bissau is incapable of financing with its own resources projects meant to adapt its most vulnerable segments to climate changes.

5. INFLUENCE OF CLIMATE CHANGES AND WEATHER PATTERN VARIA-BILITY ON BIO-PHYSICAL PROCESSES AND KEY SECTORS

5. 1 HISTORIC FINDINGS

During the survey we often heard statements that confirm the change of parameters related to rainfall, temperature, relative humidity, the sea level and water resources.
Populations have noticed (i) a late start of the rainy season (mid June) as compared to the usual time (early May), (ii) a less regular distribution of rainfall compared to the past, (iii) a shortening of the time period with cooler temperatures, the so called "cold season ", from three months (December to February) to two months only (December and January), (iv) a hotter and drier environment, (v) frequents dust winds, (vi) higher frequency of high tides, which destroy dykes and rice fields, (vii) deterioration of water quality caused by salt-water invasion and infestation of water resources by waterborne plants, (viii) decrease in humid areas' surfaces due to drought.

Figure n.° 9: Bed of Bidigor river, east of the country

Photo by Alexandre Cabral, 2006

5.1.1 INFLUENCE OF CLIMATE CHANGES AND VARIABILITY IN WEATHER PATTERN ON BIO-PHYSICAL PROCESSES

Reflexes at various levels may be quoted in this regard: a) the vegetation cover of Guinea-Bissau, especially in the western and northernmost areas, has also suffered degradation because of the advancing Sahel zone, a process that has contributed to the change of temperature and rainfall parameters. As a result, forests are receding and savannahs are advancing, accidental bush fires are much more frequent, rivers and lakes become narrower and have weaker streams, natural habitats are destroyed or highly disturbed,

biological diversity is threatened, agriculture and the rearing of animals become harder or impossible, large quantities of biomass are lost, and forced migration of wild fauna takes place, etc.

High temperatures in abnormal periods of the year, associated to dust winds from the Sahel that hit the country every year, have damaged the blossoming and ripping of many fruit species.

Locust plagues, helped by rises in temperature, have been frequent in the last five years, causing enormous damage to fruit- and vegetable-growing activities and the consequent abortive effect on plants and fall in production levels. It is known that when temperature levels are above cultures' tolerance levels in a given area, they may lead to changes in the overall framework of species grown in that area. This has happened in some areas of the country where sorghum and cassava are no longer grown due to the prolonged dry period and the irregular rainfall patterns, and have been replaced by cultures that are less sensitive to water shortage and are more tolerant to high temperatures.

Climate change developments have caused changes in habitats, fauna and flora, and affected the fauna and flora diversity of an important number of species nationwide. The decrease in vegetation cover is due in part to a reduction in rainfall and its influence on the hydrological cycle and the regeneration ability of various plant species. This is notorious in many locations in the country with lower rainfall indices and more prolonged dry season (eastern and north-westernmost areas).

Vegetation degradation due to the increasing sahelization of our climate reflects directly on complex ecological processes because it is a biotope that shelters various animal organisms (from large-sized to small-sized fauna, to micro-organisms that participate in nature's food chain and in bio-geo-chemical processes that occur in forest ecosystems).

5.2 IMPACTS ON KEY SECTORS

5.2.1 AGRICULTURE

Empirical data for the latest thirty years reveal that the volume of rainfall has been decreasing in Guinea-Bissau and the rainy season is now limited to only five months (June-October), in contrast to before. Production of rice and other cereals in small valleys

and uplands in the north and east of the country are affected by water shortage. The fact
that rain now is frequently accompanied by strong winds causes a considerable loss of
production in –grain species in months when it rains heavily (August/September). Damage
from flooding is significant in agricultural fields located in low lands (small valleys) and rice
fields in mangrove hydromorphic soils.

Production in the south, centre and islands, where species are more demanding in terms
of water supply, (rice, millet), is also affected by the concentration of rainfall and its bad time
distribution.

In the so-called mangrove soils and in small valleys, rain insufficiency and bad distribution
have contributed to a rise in salinity and acidity levels, which in turn have
rendered non-viable the practice of rice growing. This has led to a rise in the number of
deteriorated rice fields and a rise in the number of deteriorated mangrove rice fields, forcing
peasants to abandon them; this happened in five villages in Cubucaré, south of the country,
whose inhabitants were impeded from working 3,015 ha of bolanhas (rice fields) due to the
destruction of their dykes and the resulting loss of rice fields caused by the invasion of salt
water. Populations were thus forced to seek new lands, which they clear through the use of
slash-and-burning before they transform them into rice fields. Or, as it happens in the
southern littoral, farmers migrate to the north of the neighbouring Republic of Guinea; also
in the east, northwest and some locations in the south of country – regions more affected by
rainfall deterioration. Migratory movements were also registered from uplands to lowlands
(small valleys) or vice-versa.

5.2.2. FORESTS
The increasing advance of the savannah-type vegetation is a visible impact, particularly in
longer dry periods, namely in northern, eastern and north-western areas where higher
temperatures and drought and changes or deterioration of the vegetation cover led to
mutations in the composition of a large part of forest species or even to the extinction of
some of those species, and migration of animals.

Figure n.° 10: Upland Agriculture- South of the Country (Photo: A. Cabral, 2006)

5.2.3 LIVESTOCK

According to the Thematic Report on Climate Changes/Agrarian Sector, 2006, animals subject to extensive raising, consume 30-40 litres of water per day; if temperatures reach the top daily levels of 45-50 °C, and in the air's hygrometric degree is very low, coupled with very strong evaporation/transpiration and very low water content in their fodder, animals' water needs may reach 50 litres or more. The decrease in the number of months with rainfall or an increase in the dry season, associated to a rise in temperature affect negatively the availability of grazing surfaces and natural water points, as well as animal activities and animal productivity. To face these circumstances, some Guinean animal raisers abdicated from the raising of some types of ruminants and now practice transhumance in dry months (January-June). They were forced to move to other villages and bear the losses suffered with the dying of their animals along the journey.

Figure n.° 11: Transhumance from the east to the south of the country. Photo: Alexandre Cabral, 2006

5.2.4 FISHERIES

The impact of changes in climate parameters, rainfall (downward trend) and temperature (upward trend) on fishing activities is still unknown. However, actors active in the sector have revealed that the fishing of some species in lakes and in some rivers has been affected and the catching of some species has turned more difficult; this situation may be related to over fishing of those species. On the other hand, one supposes that these changes have caused the migration of various species that were abundant in the past. One knows that the decrease in rainfall is contributing to a rise in water salinity levels, which thus upset fish life in estuarine, aquatic maritime and continental ecosystems, adding to the effect of floods that silt the sea bed. Reports indicate that intense rainfall in August-September influence fish lives, their concentration or dispersion, when they deposit sediments and nutrients dragged away from uplands into rivers, lakes and the sea.

5.2.5 WATER RESOURCES

According to 1st CNSMC, 2004 rainfall is the climate parameter that most affects the sector if we take into account that there was a decrease of 10 % in the coastal area and 15

% on average in the countryside for the 1941-1969 timeframe and from 1970 onwards. This
decrease affected negatively the refilling of surface aquifers, on the one hand and river
debits on the other hand, thus favouring salt-water progression. It should be stressed that a
study carried out on Corubal River's basin demonstrated that there is a direct relation
between rainfall and the flowing of rain water: if the former decreases the latter follows suit,
as can be seen in data collected during 16 years of observation, in 1957/58 - 1986/87,
excluding the 1963/64 - 1976/77 time period.

5.2.6 HEALTH

Temperature and rainfall, associated to serious sanitation, are two parameters that have
had influence on the recrudescence of various diseases in the country, of which malaria
(60% of appointments in hospital emergency cases), hepatitis, cholera, etc. In times of
greater rain concentration and high temperatures, the number of Guineans with malaria
problems rises whilst diseases like measles and meningitis increase at times of less rain and
strong winds, e.g., meningitis in the eastern zone or bronchitis and other respiratory ailments
observe din dry periods, Namely January (Source: 1st CNSMC, 2004).

6. FRAMEWORK OF ADAPTATION PROGRAMME

6.1 VARIABILITY IN WEATHER PATTERNS AND CLIMATE CHANGES OBSERVED

Empirical observation of rainfall developments in the latest 30 years (1961-1990) or even
in the latest 45 years (1954-2000) show a downward trend: in the south, 2,440 to 1,800
mm; in the centre, 2,200 to 1,600 mm and in the north, 1,600 to 1,200 mm (Silva, C.
quoted by Da Silva, A. O., 2001). For the 1953-1983 timeframe, a study shows that whilst in
the north, at the border with Senegal, average rainfall over a period of just 70 days was 1,300
mm, average rainfall in the country's southernmost area was over 3,000 mm during a
period of over 120 days of rain. For 1961-1990 (Imbali, F. & Da Silva, A. 1997), the average
number of rainy days recorded was 162. In fact, we see an annual decrease in rainfall and
its concentration in just five months (June-October) contrary to what happened before
(May-November). Nowadays rains are frequently accompanied by strong winds that cause
damage to plantations and cultures. Reflexes of other climate parameters (temperature) can
be seen in floods caused by semi-daily tides, whose amplitude are among the highest in West

Africa, namely in Porto-Gole and Buba, where it reaches 6.42 m during high tide. Other
examples of amplitude known in the country are 1.97 m for Farim, 4,24 m for Bubaque,
3,61m for Pecixe, 5,10 m for Bissau, 4,90 m for Bolama and 2.32 m for Varela (J. P.
Barusseau et al. in riviéres du sud, quoted by Da Silva, A. O., 2001). With almost two thirds
of its territory in the coastal zone, at below 50 metres of altitude, Guinea-Bissau is a
country that is prey of high tides and coast erosion, whose impact has been increasing in a
demolishing way on the coast, agricultural land and coast ecosystems, presumably aided by
climate changes (longer dry season, higher sea temperature). Indeed, it is thought that
erosion effects may diminish the country's overall surface from the current 36,125 kmÇ to

28.000 kmÇ (Source: 1st CNSMC, 2004).

6.2 VARIABILITY OF WEATHER PATTERNS AND PROJECTED CLIMATE CHANGES

Forecasts contained in the 1st CNSMC 2004, developed according to the Magic Schengen
model, predict that until 2100 temperature will rise 2%, rainfall will diminish by 11.7%, the
probability of cloud formation will rise by 3.3%, and the average seal level will rise 50cm.

7. POTENTIAL IMPACTS OF CLIMATE CHANGES

7.1 POTENTIAL IMPACTS

Thematic reports on climate changes and the 1st CNSMC stress essentially the following:
a rise in temperature and rainfall that surpasses the cultures' tolerance limits will cause
significant changes in blossoming, yield, smell, taste, plague- and disease incidence, etc.,
depending species and varieties. Based on current figures for maximum and minimum,
varying between 32 °and 39 °C (March - May) and 20 ° to 24 °C, (December - February), a
rise of 2 °C in the 2100 time horizon would lead to a rise of 34 °to 41 °C in hotter months
and 22 ° to 26 ° in cooler ones.

In the above circumstances both cashew blossoming and harvest, which occur between
March and May, as well as the production of horticultural species would be affected.

Torrential rain, concentrated in August and September, would worsen existing drainage
problems and complicate the growing, transplant and adaptability of varieties that
currently utilised. Broadly speaking, the danger for the agricultural sector stems essentially
from the irregular rain pattern.

Other than the risks arising from pressure on forest resources, climate changes would affect the vegetation cover, thus degrading and leading human settlements to move successively from one vegetation formation to another. The sahelisation and desertification process would thus be reinforced.

Concerning water resources, the decrease in rainfall may lead to a continuous diminution of water resources and main rivers' stream, an accentuation of water deficit in dry months, a decrease in rainwater to hydrographical networks, currently estimated at 45 billions of cubic meters.

As regards livestock, taking aside the eastern regions, where the extension of the dry season and the consequent reduced availability of grazing areas and water wells, coupled with the practise of transhumance tend to be more accentuated, no major losses are expected. The fisheries sector also is not greatly threatened in the 2100 horizon. Nevertheless, a rise in average sea level by 50 cm may endanger the reproduction of some species of sea mammals, e.g., turtles, due to the submersion of fish-spawning beaches. In fact, the rise in sea levels constitutes a latent and permanent risk if we take into account the predominance of a low altitude and important coast prairies: even if we consider a rise in sea level below 50 cm (stronger scenario until 2100), Guinea-Bissau would not be in condition to protect its coastal area. Phenomena like erosion, salt intrusion, gales and floods may be reinforced in the future in coastal areas. And if by then (2100) this fact is not duly taken into account, physical processes (wave energy, tides and streams, transportation of sediments, etc.), causing considerable impacts, not only in coast ecosystems and its multiple types of production, functional regulations but also concerning biodiversity resources (fish, crustaceans, molluscs, forest essences etc.) and the type of use (tourism and sea transportation).

7.2. POTENTIAL IMPACTS THAT WILL AFFECT POPULATIONS THE MOST Table n.° 4 below seeks to synthesize these impacts as follows:

Nature of Impacts	
Agriculture	Loss of soils suitable for agriculture (continental and m aritime hydromorphous soils) due to salinity and acidification (rai n shortage) and invasion of sa lt water (rise in sea levels);

20-30% fall in yield of agricultural species affecting especially horticultural products, cereals (rice and millet), groundnuts and cashew, due to drought, high t emperatures, bad distribution of rains and/or flood ing of low lands for prolonged time periods; a third (33%) of populations are submerged by food insecurity.
Worsening of cereal deficit, especially rice, which will rise to 75,000 tonnes/year, and heavier country food depende ncy vis-à-vis imported rice.
Deterioration of populations' living conditions, rural ones in particular.
Livestock Worsening of (i) shortage of g razing and water points for animals, due to extension of dry months, (ii) conflicts betw een animal raisers and farmers concerning th e delimitation of natural g razing corridors and water points.
Marked loss of annual revenues and productivity due to nutrition deficiencies, water imbalance and physical efforts during transhumance.
Forests Increment of uncontrolled slash -and-burn practices thus jeopardising populations and wild fauna
Increased difficulty to collect/extract products from the forest for current consumption for multiple purpose s (food, health, ornamentation, handicraft, traditional ceremonies, etc.) due to accelerated degradation of vegetation cover (from dense forest to open f orest and from open forest t o savannah, resulting from the accentuation of the sahelization and desertificatio n processes).
Impossibility of hun ting some wild species because they bec ome rare (due to migration) or extinct (the modified habitat is hostile to them)

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Please see the below matrix, from the 1st CNSMC, containing an identification exercise for adaptation measures and their linkage with national policies and plans.

Table n.° 5 – ESSENTIAL ADAPTATION NEEDS AND THEIR LINKAGE WITH NATIONAL POLICIES AND PLANS

Primary sector
(agrarian)
Adaptation strategies and measures Linkages with national policies and plans
Agriculture i) Extension of short-cycle seeds, ii) Greater dissemination of varieties less demanding in water

and resis tant to prolonged drought periods;
iii) Increase in hydraulic works,
iv) Construction of micro dams and s mall dykes
for water retention,
v) Promotion of low-cost irrigation systems;
vi) Production diversification
-The L etter of Agraria n
Development states as i ts
objectives the ensuring of
food security and th e
diversification of
production; its plan of
action contains measures
that encompass these
strategies.
-PRSP takes the
agricultural sector's
strategies into account in its
fight against poverty.
Forests Launching of nationwide survey on forests;
-Setting-up of conserv ation units , especially in important and
fragile ecosystems;
-Promotion of local initiatives focusing on conservation and
development;
-Supply of financial and technical means to technical services;
-Introduction of commun ity-based management of forests
and their extension to the north and south of the country;
-Selection of rapid-growth species plants for energy purposes.
-Reforesting of zones degrad ed and their restoring through the
use in e ach agro-ecological zone of local species; sustainable
management of tho se spec ies thus allowing their future natural
regeneration
-The Forest Master Plan
and the Forest Law fores ee
actions that contribute
towards the implementation
of adaptation measures;
-Measures foreseen in the
PRSP plan of action and in
the PAFI.

Livestock -Utilization of agricultural sub-products namely sugar can e,
rice
straw coated with urea and sugar-can e syrup, and, if possible, the
use of cassava and other residue;
-Improving of grazing fields through the introduction of
plants with high nutritional quality and greater prod uction
potential, especially leguminous species that contribute towards an
improvement of animals' diet and simu ltaneously on soil-enriching
with nitrogen ;
-Promotion and strengthening of production of short -cycle animals
(goats and sheep); residues;
-CPDA and its Plan of
Plano de Action analysed
and foresaw measures that
fit well with the strategies in
the liv estock do main ;

-Measures foreseen in the
DENARP plan of action
encompass these measures.
Fisheries 1. Preparation of an Integrated Management Programme of
Coastal Resources (PGIRC), and its respective Plan of Action on
the Coast (PAC).
2. Acquisition of knowledge on intern al dynamics of populations
of sea resources in the area;
-Integrated management of those resources and respective zone;
-Appropriate legislation to ensure protection of resources,
particularly reg arding th eir access and assessment of local
hydrometeorological risks
Strateg ies and measures
envisaged are reflected in
the Fisheries Master Plan
and PRSP
Secondary sector
Water
a) Rehabilitation, renewal and extension of needed infrastructure
for a quan titative and qua litative improvement of water and
sanitation resources;
b) Rehab ilitation and i mplementation of infrastructure for the
evacuation of rain water and the evacuation of residual water in
critical locations in large urban centres;
c) Organization and sensitisation of popu lations for a change in
mental attitudes (setting up of water-consumer associations); better
knowledge on water resour ces (hydro-geology and h ydrology) and
their functioning (Training);
d) Effective protection of those resources and t h eir tapping for
supply purposes;
e) Effective and in tegrated management of different ways to
utilise water.
f) Institution al organization, reactivation of CTA, CIMA and
CNA;
g) Legislation updating.
-The W ater Master
Scheme encompasses these
strategies.
-Measures under the
DENARP plan of action
encompass these measures.
-The Wa ter Code, also
approved by Government in
1992 sets out the general
framework for water –
resource management, utilisation and conservation, and
determines their institutional
framework;
-The linkage is equally
done regarding the integrated management of hydrographical basins and
water resources, namely
with OMVG and th e AGIR
project but the terms of
reference should b e extended to encompa ss a greater
sub-regional synergy.
Costal Zone -A requ irement to guide traditional and modern
techniques in research, experimenting and base studies
for the exploitation of sea resources with a view to
ensuring the sustainable use of stocks of commercial
importance thus reducing pressure on those resources
-In order to minimise its sea fauna vulnerability to

climate changes, the country needs to define an efficient management of its living sea resources aiming at:
Making use of actors' good sense when faced with shortage of scientific information;
An immediate implementation of conservation measures before obtaining reliable data and reaching scientific consensus (which requires a l ong timeframe) on the status of sea resources;
To promote experimental aquaculture in coastal areas
The Tourism Master Plan, when establishing the link between tourism development and biod iversity conservation and its risks for the s ector, takes into accoun t the proposed s trategies, especially when it envisages the updating of this plan and its adaptation to climate changes in the future.

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1. Fishing re-Vulnerable or very vulnerable to sedimentological The National Office on sources and m aridynamics and issues and the coastal dynamics generally Coast Planning, as a time, estuarine resulting from anthropic actions and climate hazards forerunner of measures and aquatic con-Identification through studies and research of zones directed at conservation tinental biotopes most vulnerable to changes of sedimentological nature and sustainable deveand that constitute a bottleneck in upstream ecological lopment of the coastal processes. area in all its men-Identification through studies and research of zones tioned aspects, n amely most vulnerable to sea and coastal erosion phenomena ecosystems, and integrate these issues into a b roader search for biodiversity, costal erosolutions (Sub-regional and international level). sion and its causes, -Support and enhancement of the Mangrove ecologic monitoring, Observatory project, so as to include the follow up of demonstrates the exissedimentological dynamics, namely relating to the ting strong linkage be- contribution of the Corubal-Geba water system and the tween proposed straphysic-chemical composition of biotopes. tegies and national po-To ensure a natural transportation of sediments along licies. The latter were waterways and carry out, on a joint basis with the recently consolidated Ministry, the dredging of rivers in critical points, or through the approval of works meant to deal with natural effects. PNGA and EPAN-DB, in addition to t he Fra-
Very vulnerable to rising salinity and episodic flooding, mework Law for Pro- increases in NMM, and reduction of rivers' debits and tected Areas and pros- stream. pects relative to IBAP,
-Guinea-Bissau joining of major international and sub-INA e AIA. regional programmes on climate change as main factors behind this vulnerability (tides dynamics, "bombement" of continental platform, decrease in rainfall and rise in

average sea level) needs global measures that surpass
by far a State’s borders.
-A better utilisation of rain water and, if needed, the
carrying out of dredging works on hydrographical
basins so as to increase the quantity of sweet water
leading to a decrease in the level of salinity of surface
water streams and aquifers, and soil salinity and
acidification and consequently ensure, on a direct basis,
a propitious biotope for mangrove and other coastal
types of vegetation, and water and sea fauna and,
indirectly, for users of fishing resources.
2. Coast Line, -Promotion of scientific research with
Mangrove and
Coast Vegetation

The intervention of scientists and scholars on climate changes’
issues linked to the coastal zone and coastal ecosystems,
-Mangrove prote ction bearing in mind that protection of the
littoral against coast erosion isone ofthat ecosystem’sattributes;
-Setting up of a Mangrove Observatory, based on t he project
already existing at the Coast PlanningProgramme.
-Based on agronomic research and experiment and base studies, to
guide traditional techniques of land exploitation towards
recovering and enhancing land for r ice-growing purposes,
particularly in “bolanhas” (salt and sweet water), aiming at
increasing yield of cultivated areas.

Rise of sea level

-Research, intervention by scientists and scholars of climate
change linked to the coastal zone and coast ecosystems, which, if
adequately equipped for their work, may end up proposing
alternative techniques to traditional ones, regarding the unbridled
exploitationof mangrove forfish smoking;
-Carrying out of base studi es, research, experimenting, extension
and technical assistance that may enable Guinea-Bissau to monitor
risks relatedto thesea level;
-Adoption of settlement and infrastructure strategies that minimize
potential risks, avoiding their placing close to the coast line;
-Setting up of tide-monitoring stations and their geographical
distribution;
-Guinea-Bissau has a considerable coast zone and large swaths of
low lands; scientific research focusing on coast protection thus
constitutes an urgent need.

-Recovery and enhancement of land for agriculture, rice growing
in bolanhas (salt-and sweet water), aiming at increasing the yield
of cultivated areas and hence relieve pressure on mangrove forests;

-Setting up of national and natural parks;
3.Hydrographical
-Sensitisation of population on the utilization of precocious fires;

-Preparation of legislation on land slash-and-burning;
-Use of ef ficient agricultural techniques that are capable of
preventing or decreasing the loss of surface layer

soils and basins

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Sanitation -Updating and implementation of code of
behaviour of town councils and Master Town
Planning framework, which foresee the
building of toilets for each house and type of
ditch to be adopted;
-To stimulate the building of latrines following
some technological measures for protection of
ground waters, especially in urban centres;
-Setting up of rubbish depots and their
respective
treatment;
Linkage
broadly
PRSP
concerns are
expressed in
-Preparation of a national strategy for
management of urban residues;
-Strengthening of programmes for public-
education and sensitisation;

Health -Building of disease-res earch centres; strengthening of
measures to fight and prevent the on-setting of diseases
among populations.
-Designing of a broader vision on the issues of climate-
sensitive diseases.
-Promotion of capacity building in research.
-Streng thening of health-information system aiming at
obtain ing global and co mplete data about the
epidemiological situation.
Besides the PRSP,
strategies here
presented in the field
are part of a bro ader
and more complete
range of measures and
strategies in cluded in
the PRSP, and upd ated
in 2002.

Food -Setting up of nation al security stock; Both CPDA, in its
security -Setting up of cereal banks (silos) by peasants
guarantee a food reserve in all regions;
to objectiv es translated
into th e Plan of action
-Setting up of an Early Warning System against risks; and DENARP are in
-Streng thening of sensitisation campaign about th e line with the
strategies
importance of diversifying eating habits . hereby defined.

8. SYNTHESIS OF POTENTIAL RISKS AND IMPACTS
A survey of present and future climate risks was carried out on the basis of a participatory evaluation, facilitated by national experts. The survey allowed (i) an assessment

of resources, sectors, geographical zones and more vulnerable human groups, (ii) the
identification and setting out of vulnerable modes of existence. The matrix below illustrates
the respective outcomes.

Nacional Programme of Action of Adaptation to Climate Changes
Economic
Impact
Loss of
humanlives
Mortality
rate Duration
Area
Involved Frequency Trend
Total
or
%RISKS VULNERABILITY
Scale (1-5)
Seasonal
Drought -Fall of agricultural yield
-Water shortage
-Reduced economic yield
2 1 1 2 2 3 37%
Acute Drought -More accentuated fall in agricultural yield
-Worsening of water shortage
-Widespread food security
-Visible dependency on food imports
-Biodiversity losses
-Economic risks
-Social crisis
-Hunger, diseases
-Rural exodus
5 4 2 4 4 1
67%
Rise inOcean
Temperature
-Reduction of Sea Biodiversity, reduction of protein
availability
-Decomposition of calcareous structure (shells)
3 2 1 2 4 1
43%
Reduction in oceans’ capacity to retain carbon gas
(C02)
Rise in
atmosphere
temperature
-Fall in agricultural production; marked water
shortage;
Rise in respiratory and heart diseases, malaria, skin
cancer, etc.
Fall in economic production and productivity
3 3 2 4 4 3
63%

Table no. 6: Survey of Potential Risks and Impacts:

Cyclones
(Strongwinds)
-Health problems, losses of human lives
Coastal erosion
-Loss of arable land, salt invasion, economic and
biodiversity losses;
-Loss of beaches, appearance and disappearance
of some islands
Reduction of fishing activities
4 3 2 1 4 1
50%
A.S.L.
Average sea
level
-destruction of infrastructure in coastal areas,
salt-invasion phenomenon, deterioration of sweet
waters' quality, coastal erosion,
disappearance of beaches, loss of land
decrease of fishing activities on the coast
loss of income and displacement of populations from
one place to another;
5 3 1 2 4 1
53%

9. SENSITIVITY ANALYSIS ON MORE VULNERABLE RESOURCES, SECTORS, ZONES AND HUMAN GROUPS
The table below, developed through a participatory approach, shows the results of a
sensitivity analysis on climate risks facing vulnerable environment goods and services, activity sectors and groups of actors.

CLIMATE RISKS
Exposition
Indicator
in (%)
Seasonal
Drought
Acute
Drought
Intense
Rains
Increase in Ocean
Temperature
Increase in
Atmosphere
Temperature
Cyclones
(Strong Winds)
A.S.L.
Average Sea
Level
Environmental Goods and Services Scale (1 to 5)
Soil Fertility 1 4 4 1 3 1 3 48%
Water Resources 3 5 5 3 4 1 4 60%

Biodiversity
Arable land exposition
to risks
22
55
24
31
33
33
54
66%
63%
SectorsAgriculture 2 5 4 1 3 3 2 57%
Livestock 3 5 3 1 4 2 1 54%
Fisheries
Infrastructure
21
42
13
41
21
14
44
51%
46%
Health 1 2 3 1 5 3 4 54%

Table no.7: Hypothetical Sensitivity Matrix

10. TYPOLOGY OF PARTICULARLY VULNERABLE GROUPS
Vulnerability levels of different social groups were assessed on the basis of available
socio-economic indicators, especially those supplied by the Light Inquiry on Poverty
Evaluation (ILAP) and indications of impact of climate changes on activity sectors identified
sector studies carried out under NAPA preparation. Thus, small subsistence constitute the 1st
group (54%), cattle raisers the 2nd group (49%), resident paid workers living in main town
centres, the 3rd group (46%) and fishermen the 4th group (34%).

Table no. 8: POPULATIONS' MORE VULNERABLE GROUPS

Small farmers 3 5 4 1 2 2 2
60%
54%
Urban
Workers 1 2 2 1 3 2 5
51%
46%
Cattle raisers
51%
49%
Fishermen 1 1 2 2 1 3 2
37%

34%
Impact
Indicator 38% 78% 54% 32% 37% 46% 48%

11. NAPA IMPLEMENTATION STRATEGY
The implementation will follow the envisaged strategy under sector policy letters in force
and the PRSP so as to ensure necessary linkages for a larger synergy and impact of planned
activities. A participatory and complementary approach will take centre stage and will entail
a full involvement of populations and different actors regarding the implementation of measures adopted. The table denominated "Strategies and Adaptation Measures and their
Articulation with National Policies and Plans ", in Annex … provides details of this strategy
and its degree of articulation with NAPA.

12. COORDINATION AND INSTITUTIONAL ARRANGEMENTS FOR ADAP-TATION
12. 1 COMMITTEE COMPOSITION
The Environment Directorate General, upon proposal by the project National Coordinator,
launched the process following the decree that set up the NAPA National Committee (NC).
NAPA NC is composed of 15 institutes representing the public sector (9) and civil society (6).
The choice fell on public technical institutions and civil society entities (non-governmental

organizations) that operate in activity sectors deemed by the government as the most
vulnerable ones and are thus seen as priority ones under the preparatory process of NAPA in
Guinea-Bissau.

12. 2 COMMUNICATION STRATEGY FOR ADAPTATION
Throughout this programme’s implementation stage, Regional Committees and the
National Committee will play an important role concerning the dissemination of NAPA-
related information and targeted NGOs will prepare radio programmes to be broadcast in
community radios since rural communities, among which small farmers and cattle raisers,
constitute the most vulnerable segment of the population.

12. 2.1 SURVEY OF ADAPTATION OPTIONS
13. CRITERIA FOR SELECTION OF ADAPTATION OPTIONS
The criteria adopted for the selection and sorting of options are as follows: (1) the level of
seriousness of impacts, which estimates the degree of the sector’s vulnerability to climate
changes; (2) contribution to poverty relief, which estimates the level of impact of probable
effects of the adaptation option on improving populations’ living conditions; (3) synergy with

AMA, which assesses the degree of linkage and complementariness of adaptation options
with Agreements and International Protocols on environment; (4) costs, which classifies
adaptation options under a cost/benefit perspective; (5) gender, which assesses implications
for the most vulnerable segments, with emphasis on women and children; (6) the number of
beneficiaries, which assesses the numerical and geographical comprehensiveness of the
adaptation option.

The evaluation scale on the importance of each criterion relative to each option goes from
1 to 5.

SCALE: 1 to 5

1.
Significance level of impacts:
1 = Very weak; 2 = Weak; 3 = Average; 4 = Strong; 5 = Very strong
2. Poverty relief
12 345
< 3% >3 % <6% >6 % <9% > 9%<12% >12%

3. Synergy with AMA
1. Very weak 2 Weak 3 Average 4 Strong 5 Very strong
4. Costs (US$)
12 3 45
> 500.000 > 400.000 < 500.000 >300.000 < 400.000 >200.000 < 300.000 < 200.000

5. Gender
1 Very weak implication 2 – Weak implication 3- Average implication 4- Strong implication
5 – Very strong implication
6. Beneficiaries
123 45
< 20.000 > 20.000 < 60.000 >60.000 <
80.000 > 80.000 < 100.000 >100.000
14. PRIORITIZATION OF ADAPTATION OPTIONS
A group of representatives from different public agencies and civil society assembled in a
workshop identified particularly vulnerable sectors and population groups under the
National Strategy on Poverty Reduction and taking into consideration findings of sector
studies on vulnerability and adaptation to effects of climate changes. Furthermore, a second
workshop, based on the matrix below for analysis of multiple criteria arrived at the
following order of priority:

Estimates point to a degradation rate of forest capital of approximately 600,000 m3/year

against a backdrop of an annual growth rate of 1,500,000 m3/year, excluding losses of surface provoked by forest clearing in villages and farms by slash-and-burning, assessed in 30,000-60,000 ha/year (Study for assistance to forest sector in Guinea-Bissau, 1997). It should be noted that according to the forest survey carried out in 1985 forests covered 2.1 million hectares and the wood reserve was 48,300,000 m3. Furthermore, in accordance with the Letter on Agrarian Development Policy (1997), forest felling translates into the degradation of (i) 30% of sub-humid forests in the Tombali region, south of the country, (ii) 57% of savannah surfaces in Bafatá and Gabú regions (east), Oio (Centre) and northeast (iii) 19% of mangrove areas (Silva & Vaz, 2001).

Overall forest surface is currently estimated to be decreasing at a rate of 60,000 ha/year.
National consumption of wood in 1992 was estimated at 1.2 million m3, corresponding to an increase of 8.3 % per annum, which is equivalent to 81 % of firewood, 6 % of sawn wood and 8 % of service wood (construction) according to PAFT data in 1992. This corresponds to an annual cutting down of approximately 132,000 ha of wood, i.e., a nine-fold increase as compared to the forest surface surveyed by DGFC in 1987. This consum-ption is in stark contrast with the average forest growth level, now estimated at around 0.3m3/ha/year. The annual exploration rate was estimated at 2,100,000 m3/ year in 1992, national consumption of wood at 4,000-5,000 m3/year and sawn wood production at 3,000-20,000 m3/year.
The wood industry was made up until 1992 of ten saw-mills that had an obsolete technological park with capacity to process up to 40,000 m3 of round wood into 20,000 m3/year of sawn wood. This industry is based mainly on the exploitation of Pau de sangue (Pterocarpus einaceous), Pau de Conta (Afzelia africana) and Bissilão (Khaya senegalensis).
Indicators of the annual impact of wood production are presented in the table below. It is suitable to analyse annual production data as per type of forest:

Table n.° 9 – Options resulting from the analysis of multiple criteria: 1 level of seriousness of impacts; 2 poverty reduction; 3 synergy with AMA;4 costs; 5 gender;6 beneficiaries

PROJECTS	1	2	3	4	5	6	TOTAL
Coastal Zone 1 (Protection, conservation and enhancement of fishing							

and coastal resources) 3 2 3 3 4 3 18
2 (Mangrove Observatory) 5 3 3 3 4 4 22
3 (Prevention of natural
catastrophes) 4 2 2 3 2 5 18
4 (Nat. Res. com..) 5 4 3 2 4 4 22
Water Resources
5 (Rural waters) 4 5 2 1 5 5 22
6 (DGGH Ins titutional
support) 4 3 2 2 2 4 17
Agriculture
7 (Integrated system of
information on food
security) 4 4 2 3 2 5 20
8 (Production
Diversification). 5 5 3 2 5 5 25
9 (Alternativ e Energies) 4 3 4 4 4 4 23
10 (Promotion of small
irrigation schemes on Geba
and Corubal banks) 4 4 3 1 5 3 20
11 (Reforesting of degrad ed
zones) 3 3 3 3 2 1 15
12 (Reh abilitation of small
perimeters of mangrove
soils for rice growing) 4 4 2 2 3 3 18
13 (Production of short-
cycle animals) 2 4 2 2 3 3 16

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Table n.º 10 – The following sorting of projects, with their location and costs, resulted from the exercise carried out

Order of
priorities
Project denomination Geographical Intervention
Zone
Cost Estimates
1º Support to Diversi fication of
Production and Food Di et
Project
Southern Province (Quinara and
Tombali)
US$ 600,000
2º Improvement of W ater Supply
in Rural Zones Project
Southern Province (Quinara and
Tombali regions)
Eastern Province (Bafatá and Gabú
regions)
US$ 1.000,000
3º Capacity building in Prevention
and Protection of Mangrove
Bolanhas against High-Tide
Invasion Project
Southern Province (Quinara and
Tombali regions)
Northern Province (Cacheu region)
US$ 600,000
4º Observatory for Mangrove

Monitoring and Evaluation
Project
Northern Province (Cacheu region)
Southern Province (Bolama/Bijagós
region)
US$ 800,000
5° Monitoring of Coastal Area
Erosion
Northern Province (Cacheu region)
Southern Province (Bolama/Bijagós
region)
US$ 400,000
6° Assess ment of Impact of
Climate Changes in Produ cers'
Sectors Project
Nationwide US$ 350,000
7° Promotion of Small-scale
Irrigation in Geba and Corubal
rivers Pro ject
Eastern Province (Bafatá and Gabú
regions)
Northern Province (Oio region)
US$ 800,000
8° Prevention of Natural
Catastrophes Project
Nationwide US$ 300,000
9° Protection, Conservation and
Enhancement of F ishing and
Coastal Resources Project
Coastal Area (Northern and Southern
Provinces)
US$ 450,000
10° Integrated System of
Information on Food S ecurity
Project (SISA)
Nationwide US$ 300,000
11° Environmental Education and
Commun ication in Coastal
Areas Project
Coastal Zone (Northern and Southern
Provinces)
US$ 200,000
12° Rehabilitation of Small
Perimeters of Mangrove Soils
for Rice Growing in Tombali,
Quinara, Bafatá and Oio Project
Eastern Province (Bafatá region)
Northern Province (Oio region)
Southern Province (Quinara and
Tombali regions)
US$ 500,000
13° Support to Produ ction of Short-
Cycle Animals Project
Eastern Province (Bafatá region)
Northern Province (Oio region)
Southern Province (Quinara and
Tombali regions)
US$ 400,000
14° Reforesting of D egraded Areas
Project
Eastern Province (Bafatá region) US$ 500,000

TOTAL US$ 6,300,000
These priorities aim essentially at augmenting rural populations' food security levels with
a view to strengthening their adaptation capabilities, reducing pressure on forest and sea
resources and improving access to potable water for human and animal consumption,
taking into consideration the negative influence climate changes have on water resources'
quality and quantity due to reductions in rainfall. The conservation and enhancement of
fishing and coastal resources, as well as the optimisation of the enormous agrarian potential
available are also concerns of no lesser importance.

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It has to be recalled that, according to the Letter of Agrarian Development Policy (CPDA),
the country cannot ensure its food security without a diversifying of its food production,
including short-cycle animal production. The country is very dependent on rice. As internal
rice production is not enough to cover the self-reliance cycle, most households in Guinea-
Bissau use the income arising from cashew nuts' sale, the main export product, essentially to
cover the cereal deficit.

Other than the destruction of thousands hectares of mangrove rice fields through floods
caused by high tides during last year's harvest, cashew nuts' price decreased substantially in
the international market, thus reflecting negatively on producers' price, which decreased
from CFAF 250 in 2005 to an average of CFAF 100 in 2006. This fall in producers' price has
greatly constrained the financial capacity of a large majority of rural populations in the
country, a fact that has had consequences at various levels and increased the vulnerability of
households to hunger and/or malnutrition. Accounts by peasants from various regions in the
country confirmed this situation, including anecdotic evidence that religious ceremonies to
honour the dead had to be postponed because relatives could not afford them (In Rádio Sol
Mansi, rebroadcast by Rádio FM/Bombolom).

This choice goes in tandem with the need to keep synergies between this programme and
other international conventions, and Guinea-Bissau's plans and internal policies.

15. METODOLOGICAL PROCESS FOR THE PREPARATION OF THE NATIONAL ADAPTATION PLAN -NAPA
It should be stressed that the criteria for the choice of sectors to be targeted under sector
study-diagnosis were set out taking as a reference CNI base lines.

According to the Letter on Agrarian Development Policy (CPDA), the country cannot
ensure its food security without a diversification of its food production, including short-cycle
animal production. The country is very dependent on rice. Since domestic production is not
enough to cover local needs, most households in Guinea-Bissau utilize income from the sale
of cashew nuts, the country's main export, essentially to cover the grain shortfall.

Other than the destruction of thousands of hectares of mangrove rice fields through
floods caused by high tides during the preceding harvest season, the international price of
cashew nuts fell substantially and thus reflected negatively on producer prices, from CFA 250
in 2005 to an average of CFA 100 in 2006. This fall in producer price has greatly constrained
the financial capacity of the overwhelming majority of rural populations in the country, a
fact that has had grave consequences at various levels and increased households vulnerability to hunger and/or malnutrition. Accounts from farmers coming from various regions in
the country have confirmed this situation. Even religious mourning ceremonies had to be
postponed because relatives lacked the required purchasing power (In Rádio Sol Mansi,
rebroadcast by Rádio FM/Bombolom).

This choice is in line with the need to keep synergies between this programme and other
international conventions, plans and internal policies of Guinea-Bissau.

16. METHODOLOGICAL PROCESS FOR NAPA PREPARATION

It need to be said that the choice of sectors to be covered by the sector study-diagnosis was
done using as reference the CNI baselines. The communication included, among other
aspects, an exhaustive analysis of the country's development priorities relating to climate
changes and the institutional framework, with incidence on key sectors deemed as potentially vulnerable to climate changes, namely: the agrarian sector (agriculture, forests and
livestock), fisheries, water resources, health and education.

NAPA CR supervised, fitted and facilitated at the local level the whole process entailing the
carrying out of sector studies and the sounding out of actors and local populations. In all the
country's administrative regions, both at regions' capitals and in a significant number
of villages, workshops were held to allow the discussion and validation of sector reports
prepared by experienced national consultants, focusing on the analysis of both national

problems and problems specific to each region. Experts from NGOs specialised on rural
animation were called upon to assist the consultants' team to run those sessions as
facilitators of the whole process.

Following the validation of studies at three different levels (national, regional and
community), the NAPA document for Guinea-Bissau, itself also a subject of analysis and
validation by representatives from Government, Parliament, civil society organisations and
populations, was prepared.

17. NAPA'S RELATIONS WITH DEVELOPMENT PROGRAMMES AND MULTILATERAL AGREEMENTS ON THE ENVIRONMENT

Table n.° 11: List of projects relating to NAPA

Denomination	Funding entity	Time period	Funding	Execution Entity	Relation with PD
AGRARIAN SECTOR					
1. Chinese Technical Agricultural Mission (for the development of small valleys)	People's Republic of China	2006-2008	MADR	CPDA	PRSP
2. Structural Reduction of Food Insecurity in Guinea-Bissau Project	EU	2006-2008	Euro 500,000	LVIA	PRSP
			Euro 35,000	Beneficiaries	
			Euro 28,000	LVIA	CPDA
3. Strengthening of Agricultural Production Systems in Oio and Quinara Regions Project	EU	2006-2008	LVIA	CPDA	PRSP
			Beneficiaries		
4. Rehabilitation of Agrarian and Rural					

Sector Project
(PRESAR)
AfDB
GOGB
2006-2010 US$ 8,526
US$ 1,1025
MADR CPDA
PRSP
4. Quebo/Coli
Horticultural-
Fruticultural Project
5. EU
Portugal
2006-2010 MADR CPDA
PRSP
5. Support to
Development of
Services of Agricultural
Information,
Documentation and
Dissemination Project
6. CTA 2006-2008 Euro 42,583 MADR CPDA
PRSP
PAN-LCD
PRSP
Food Security
Information Project
7. EU 2006-2008 Euro
2,000,000
MADR CPDA
PRSP
7. National Capacity
Building for the Fight
against Locusts Project
8.
EU 2006-2008 Euro
1,150,000
MADR/S
PV
CPDA
PAC/UEM
OA
PAN-LCD
PRSP
8. National Rice-
Development Project
(PNDA)
9.
Kuwait 2007-2011 US$
4,300,000
CPDA
PRSP
9. Rural Rehabilitation
and Community
Development Project
(PRRDC)
10. IFAD 2007-2010 US$
8,554,000
MADR CPDA
PAC/UEM
OA

PRSP
FISHERIES SECTOR
9. Support to Fisheries
Sector Project (PASP)
11.
AfDB 2006-2008 US$
7,673,400
MPEM

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The advance of the desert, particularly in the country's eastern and northern regions,
constitutes a current reason for concern to CILLS member countries. The Guinea-Bissau
government validated in December 2006 its National Plan of Action to Fight against
Desertification (PAN-LC), which proposes to invest US$ 27 million in the next 5 years in
projects to mitigate the effects of desertification on populations, particularly as regards soil
degradation, loss of vegetation cover, decrease of humid areas and agrarian productivity.

18. OBSTACLES TO IMPLEMENTATION
Obstacles to implementation can be summarised as follows:
1. Key actors' institutional weaknesses
2. Low level of knowledge on the part of populations and key actors on climate changes.
3. Unpredictability of effects of climate changes.
4. Possibilities to obtain sufficient resources for execution.
5. Expected difficulties regarding change in populations' attitudes and practices.
19. MEASURES IMPLEMENTED TO DEAL WITH CLIMATE CHANGES
The country pondered in the various development programmes it has implemented
actions that had some bearing on mitigation efforts to climate change effects. The following
actions may be summarised per each sector:

AGRARIAN SECTOR:

1. Agrarian Zone 1 Integrated Rural Development Programme, 1983-1994, (Northern
Zone). This programme executed a broad set of rural extension and research activities that
involved the collaboration of technical staff and producers and contributed to (i) setting up
of a system of agricultural, grazing and forest production, (ii) construction of anti-salt dykes
and/or recuperation of mangrove soils' productive capacity, (iii) construction of rural wells,
(v) intensifying of horticulture, (vi) adoption of precocious-fire techniques in contrast to
uncontrolled slash-and-burn practices, (vii) introduction of rapid-growth exotic forest
essences as sources of firewood, and improved cookers, as a strategy to reduce firewood

consumption, and (viii) granting of agricultural micro-credit (small agricultural tools,
purchase of seeds and fertilizers).
2. Eastern Agrarian Zone's Integrated Rural Development Programme (PDRL-2), 19831993, (Eastern Zone). This programme performed actions involving its technical staff and
farmers that helped to: (i) fight desertification through an extension of the agricultural,
grazing and forest system, (ii) the fostering of horticulture, (iii) the use of large swaths of bas
fonds for rice growing and horticulture, (iv) forest resettlement of some degraded areas, (vii)
the building of community fountains, (vi) purchase of diverse agricultural material and
equipment.
3. Programme of Support to Boé Integrated Development (PADIB), implemented in 19901998. This programme provided farmers in the country's easternmost area considerable
support to their production efforts in the agricultural, fruticultural and horticultural fields
and forest resources as well.

4. The agricultural, grazing and forest Project (PASP), whose execution involved a large
participation of cattle raisers and farmers in the eastern region, contributed towards (i) the
installation of agricultural, grazing and forest fields, (ii) the setting up of natural grazing
areas in the dry season, (iii) the resolution of conflicts between cattle raisers and farmers
concerning access to grazing areas and water, (iv) greater availability of food for animals
during the dry season (production of hay), (vi) reduction of forest fires, and (vii) extension
of annual tree-planting by communities.
5. Tombali Rice-growing and Fruit-growing Project (PDOT), 1996-1998, a project that
helped local communities to recover various hectares of mangrove soil for rice growing and
to diversify their cultures, through the fostering of fruticulture, allowing them access to
various agricultural materials and equipment and to carry out income-generating activities.
6. Komo-Caiar Rice-growing Development Project, implemented in 1985-1990, this
project contributed towards the rehabilitation of mangrove soil for rice growing, dissemination of rice huskers and reinforcement of food security.
7. Agrarian Sector Rehabilitation and Development Programme, in 2006-2008. It will
benefit populations in the Cacheu, Bafatá and Biombo regions and will focus on (i) food
security through the rehabilitation/protection of rice fields destroyed by salt-water invasion,
agricultural funding and institutional capacity building.
Environmental Sector

1. The Guinea-Bissau Biodiversity and Coast Management Project (PGBZCGB), being

implemented in 2004-2010, aims at building national capacity in terms of nature conservation and biodiversity preservation through (i) the strengthening of management of the network of protected areas through IBAP, (ii) the development of regulating tools that integrate environmental costs in development decision-making, such as environmental-impact studies and (iii) reduction of impacts of human activity on species and habitats, through the financing of grassroots initiatives that contribute to a sustainable and rational use of natural resources.

2. Regional Programme of Support to the Integrated Management of Natural Resources (AGIR), whose phase I lasted from 2000 to 2006. This project, encompassing the country's eastern (Bafatá and Gabú) and southern (Tombali) regions, centred on the definition and protection of safe cross-border corridors of wild fauna (eastern and southern zone) as well as on the introduction of knowledge about the sustainable exploitation and utilization of natural resources.

Structural reforms

1. The Trade and Investment Promotion Support Project (TIPS), executed in 1994-1998, contributed towards the promotion of a market economy and the production, processing, and domestic and international commercialisation of six products deemed as strategic ones for Guinea-Bissau: rice, cashew, fisheries, non-wood forest products, fruit and vegetables. Legal and regulatory reforms, sustainable-management plans of fishing resources as well as the formulation of pro-market public policies were developed and adopted by the

authorities; numerous private-sector associations were assisted to emerge and consolidate their organisation and institutional-management capabilities.

2. Private Sector Development Project, 2000-2007, which assisted in the preparation of reform for the economic sector and in capacity building to the benefit of both private sector organisations and those of the public sector in the area of legal reform and the creation of an enabling environment to business.

3. National Good Governance Programme, implemented in 2002-2004 with the aim of strengthening governance capacity at different levels. For instance, it assisted in the formulation of the Environmental Management National Plan (PNGA).

Actions undertaken by NGOs

1. Other than these public programmes/projects, whose 90% of resources come from

external assistance (grants or credit), NGOs settled in the country (local and foreign ones),
have also implemented various activities in the fields of community development,
micro-credit, capacity building and the environment (nature conservation and biodiversity
preservation).

PROJECT FILE N.° 1

Project Title:
Support to the Diversification of Production and Food Diet Project.

Location:
Quinara and Tombali regions

Justification:

Rice is the country's main food crop. It is produced both in the mangrove production
system and in small valleys and uplands.

Despite being the country's main food crop local production can only meet 50%-55 % of
national needs. The difference between supply and demand is covered by importations. The
mangrove rice's production system (the country's main type) has been steeply degrading
lately due to structural and occasional problems. The downward trend seen on rainfall
patterns coupled with a rise in river waters' levels, thus leading to penetration of rice fields
by salt water and their consequent destruction, tends to worsen. The 2005/2006 harvest
may be quoted as an example to illustrate this point. Production in the south of the country
was almost totally lost. This is was a very critical situation indeed but it also helped to
awaken mangrove-rice growers (one-crop farmers) for the need to diversify production. The
food shortage that set in led farmers to seek for alternatives themselves and we can see them
currently growing cassava, sweet potato and yam. Despite being at a very reduced scale die
to the insufficiency of vegetation material, it is already an initiative that may be utilised to
launch a broad programme to diversify production as an alternative for cases of insufficient
rain bearing in mind that the initiative and interest came from the farmers themselves. The

project thus appears as a relief to the food insecurity problem caused by lack of rain or water
penetration of mangrove-rice fields.

Project actions (production, processing and commercialisation) will be designed in such
a way that beneficiaries will be responsible for their execution, and actions will have
continuity after the project's completion.

Global objective:

Increase in food security

Specific objectives:

To foster the diversifying of production and consumption of foodstuff in the Quinará and
Tombali regions.

Components:

-Production, processing and commercialisation of cereals;
-Production, processing and commercialisation of fruit and vegetables;
-Food and nutrition.
Expected results:
-A diversified consumption of local produce Production of
vegetables in adequate
quantity and quality.
-Populations become accustomed to consume a diversified mix of local produce with
higher nutritional value.

-Lower risk of food insecurity malnutrition.
-Increase in households' incomes through the commercialisation of surplus production
Beneficiaries:
Rural communities.
Institutional Implementation Framework:
Ministry of Agriculture and Rural Development, DGA, DSER, Directorate of Producers'
Service Support, Ministry of Public Health.
Monitoring and Evaluation:
To be ensured by DGA, GAPLA, Directorate General of Environment and CAIA.
Risks and Barriers:
There are no risks and barriers that may jeopardise the project's implementation.
Project duration:
3 years.
Budget:
US$ 600,000

PROJECT FILE N.° 2

Project Title: Rural Zones Sanitation and Water-Supply Improvement Project

Location:
Southern Province (Bolama, Quinará and Tombali regions) Eastern Province (Bafatá and Gabú regions)

Justification:

Potable water supply and sanitation are domains that affect populations' quality of life and public health. There is a need to increase the supply of potable water and sanitation services in villages in order to decrease the risk of waterborne diseases that are, in general, much frequent in the rural world. It should be recalled that the latest cholera epidemic, in 2005, registered about 25,000 cases and 400 fatalities (National Human Development Report, UNDP), due to bad sanitation conditions.

Global objective:

To improve access to quality water and reduce the risk of contraction of waterborne- and infectious diseases.

Specific objectives:

-To improve rates of access to quality water;
-To eliminate conditions that contribute to the appearance of cholera outbreaks and other diseases.
Components:

-Sensitisation;
-Construction of latrines and environmental sanitation;
-Construction of improved wells and boreholes.
Expected results:
-60 % of population have access to potable water;
-Non-appearance of cholera epidemics and other diseases related to water consumption and sanitation conditions.
Beneficiaries:
Communities and schools
Institutional Implementation Framework:
The Directorate General of Water Resources will implement the "Construction of wells" component and components concerning sensitisation and the construction of latrines will be placed under the Ministry of Public Health, which will benefit from support of some NGOs.

Monitoring and Evaluation:
Components' supervising agencies and the donor, to whom the project management will be accountable and will submit reports for appraisal and approval, will ensure the monitoring of this project's activities.

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Risks and Barriers:

The main risk factors may arise form political instability and the mental attitude on
the part of populations. Therefore, special attention ought to be paid to populations'

sensitisation.

Duration:
2 years

Budget:
US$ 1.000,000

Nacional Programme of Action of Adaptation to Climate Changes
PROJECT FILE N.° 3

Project Title: Capacity Building in Prevention and Protection of Salt-Water Rice against
High-Tide Invasion Project

Location:
Country's Coastal Zone (Mangrove rice fields)

Justification

Salt-water invasion, driven by high tides into mangrove rice fields, remains the main cause
of decrease in rice production in the mentioned ecosystem. On the other hand, protection of
those rice fields remains the main obstacle against those fields' enhancement. In the last few
years climate changes, especially man-made ones have accentuated worldwide resulting in
global warming and a rise in average sea level. This latter aspect embodies concerns by
littoral populations regarding physical protection of their ecosystems and biodiversity.
Mangrove rice fields are part of this ecosystem and require pressing solutions for its rehabilitation and protection.

Almost every year high tides cause enormous damage to dykes and other infrastructure built for the control and protection of rice fields against salt-water invasion. This
phenomenon occurs usually at the end of the rainy season, in September-October, after the
finalisation of rice sowing and rice transplant. For that reason, any invasion of rice fields by
salt in that time of the year may kill the rice plant since the decrease in rainfall makes it
difficult to find enough additional water to wash off the salt thus introduced.

Global objective:

Improvement of the country’s food security

Specific objectives:

To improve rice production in mangrove rice fields thanks to the implementation of
preventive and protective measures against high-tide invasion.

Components:

-Rehabilitation of the country’s main meteorological stations;
-Installation of PRESLOG automatic tide-level recording devices in different ports in the
country;
-Training national technical staff in processing of meteorology, hydrology and hydrometrics data;
-Systematic dissemination of information on rainfall, temperature and high tides in
coastal areas;
-Technical studies (hydraulic and hydrologic) and designing of infrastructure for
protection against, and control of, high tides;
-Execution of hydraulic works;
Expected results:
1. Hydrologic and hygrometric information is collected and disseminated so as to allow
farmers to prepare each September and October (day and time) for the arrival of high tides.

2. Rice fields are protected from the invasion of high tides through the building of
enhanced dykes and the learning of new water control and management techniques.
3. Food insecurity associated to rupture in households’ rice stocks is reduced thanks to an
increase in mangrove-rice production levels (from 500-700kg/ha to 2500kg/ha).
Beneficiaries:
Rural communities and Directorate General of Meteorology
Institutional Implementation Framework:
A unit will be set up whose role will be to deal with the execution of project activities in
strict collaboration with rural engineering services, INPA, regional offices of the Ministry of
Agriculture and Rural Development and NGOs.

Monitoring and Evaluation:
Monitoring and evaluation will fall under the Ministries of Agriculture and Rural
Development, and Transportation and Communications as well as on donors.
Risks and Barriers: Project duration:
2 years
Budget:
US$ 600,000

Nacional Programme of Action of Adaptation to Climate Changes
PROJECT FILE N.° 4

Project Title:
Observatory for Mangrove Monitoring and Evaluation Project

Location:
Costal Areas

JUSTIFICATION:

Mangrove is a vegetation formation that is under tides' influence. It is found in coastal areas and is characterised by different species, of which: Rhizophora, tall mangrove, with an average height of 10 m, seen in littoral rims and riverbanks totally submerged by tides - it covers a riverbed of approximately 20-100 m in riverbanks; Avicennia, low mangrove, whose main difference from Rhizophora is its average height of approximately 5 m. This mangrove species is frequently felled and the respective soil is then utilised for rice growing ("Salt-water rice field "). Lagunculária racemosa and Conocarpus erectus (south of the country) are other mangroves-associated species that exist in the country.

This type of vegetation covered an overall surface of 287.000 ha in 1978, i.e., 10% of overall national territory, according to SCET. That area decreased to 250,761.1 (7% of the national territory) in 1993, according to GEOSYSTEMES). The functioning of this ecosystem is determined by tides, the water regime (rains in particular), deposit of sediments and temperature.

Other than its physical function (anti-erosion, protection against storms, etc.) mangrove has an ecological function of extreme importance for Guinea-Bissau's economy. It is considered as a zone for the reproduction and raising of maritime and terrestrial fauna, as well as sea birds (fish-spawning, feeding, growth, rest and refuge, etc.). A large part of molluscs and crustacean there produced constitute the main source of protein for many coastal ethnic groups. As an example, oysters glue themselves to its aerial roots, which normally are submerged at high tide, and many sea herbivorous animals seek its leaves to feed themselves. Its role in shrimps' reproductive cycle should be stressed, bearing in mind that most industrial fishing licences focus on shrimps and they have an important repercussion in the state budget.

However, despite the existence of preliminary information on the diminution or degradation of this vegetation formation, stemming especially from the clearing of mangrove for

rice- growing purposes, fish smoking and the construction of roads, and their consequences
in terms of rainfall decrease in the north of the country and increase in salinity, additional
information and studies are need to document and quantify eventual changes in mangroves
in the last decades. Thus a study of the dynamics behind those changes and a monitoring of
changes that have occurred become pertinent.

Global objective:

-Setting up of a tool for mangrove's monitoring on ecologic and economic grounds;
-To provide a propitious framework for evaluation of projects and actions that have
a direct or indirect impact on mangrove, thus setting out a reference framework on the
functioning and ways to utilise this ecosystem in Guinea-Bissau's coastal areas.

Specific objectives:

This project aims specifically at:

-
Improving scientific knowledge on mangrove's ecosystem and determining monitoring
modalities;
-Protecting habitats and ecological processes and stabilising the littoral;
-Contributing towards mangrove organisation through an enhancement of its products;
-Making available technical-scientific bases for evaluation of projects and actions with
direct and indirect impact on mangrove and proposing recovery measures for heavily
degraded zones.
Expected results:

-Stations and Observatory office set up, equipped and endowed with qualified technical
staff;
-Monitoring and research programmes are adopted on the basis of a strong institutional
and technical cum scientific partnership;
-A manual on mangrove's protection and management measures, ecologic processes and
littoral stabilisation is prepared and disseminated;
-Specific legislation and data bank exist;
-Different actors and modus operandi in the production field are identified;
-A manual on techniques and micro-projects aimed at the enhancement of mangrove
products is prepared;
-The data bank contains sufficient information for studies on environmental impact (EIA);
-Proposals for the recovery of degraded areas are prepared and presented to decision-

making entities.
Beneficiaries:

The main beneficiaries of this project are the State, universities, research institutions, entity
in charge of coast planning, local government and local population.

Institutional Implementation Framework:

The National Mangrove Observatory (ONM) will operate with the structures shown in the
organisation chart below.

ONM will be placed under the direct supervision of the Coast Planning Office. Its
management will have a director, a coordinator for research programmes and monitoring,
an administration and financial officer and a secretary. Its executive function will be to
ensure the observatory’s daily operations and management in its administrative, financial,
personnel and programme area, as well as its relations with other peer institutions.

The Inter-institutional Scientific Council is made up of different institutions that develop
activities linked to the mangrove ecosystem. Its role consists in taking major decisions on scientific
matters (appraisal and approval of research and monitoring programmes, evaluation
of scientific performance) and advising management as regards procedures leading to decision
taking by public authorities.

The following stations will be set up:

-Cacheu, for the country’s northern and central areas
-Iemberem, for the south
-Orango, for the Bijagós archipelago
Each station will be run by a station head with research background and will have a technical
staff member, who will report to the ONM director and the programme coordinator.

MONITORING AND EVALUATION:

Monitoring of ONM activities will be carried out by: (i) the supervising entity and donors,
to whom the observatory will report through regular reports (ii) the scientific council,
which, as earlier indicated, will be in charge of, inter alia, the validation of programmes, i.e.,
proposed actions and outcomes, and (iii) national institutional partners and the population
at large, at regular restitution meetings, whose periodicity will be set out by the observatory’s
management.

RISKS AND BARRIERS:

The observatory's heavy dependence on external funding for the financing of activities,
scientific research in particular. The second potential risk could be a conflict in project
execution between institutions that work with mangroves, either directly or indirectly.

DURATION:
2 years

BUDGET:
US$ 800,000

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PROJECT FILE N.° 5

Project Title:
Coastal-Areas Erosion Monitoring Project

Location:
Coastal Areas

JUSTIFICATION:

Guinea-Bissau has a coastal zone of approximately 270Km. That zone is characterised by
an intense dynamics marked by accumulation and erosion spots along the coast and in some
islands of the Bijagós archipelago. Some palpable examples may be quoted to illustrate this
point. There is intense coast erosion in Varela beach, in the northwest, caused in part by
direct wave action on the coast and, on the other hand, by rainwater falling out a cliff facing
the coast. This phenomenon tends to worsen because of the increasing pressure of urbanization
towards the coast. A plantation of ornamentation trees and some infrastructure that exist
on the coast have been disappearing gradually.

Another zone with a visible erosion phenomenon is located in the islands of Bubaque and
João Vieira, in the Bijagós archipelago. Erosion in Bubaque is linked above all to direct sea
action (waves) on the coast and a stream of rainwater and water originating at Hotel
Bubaque. This zone has an active escarpment whose erosion tendency is likely to last for
many years. It is pertinent to underscore that part of the surrounding vegetation had already
disappeared due to this phenomenon. Erosion in João Vieira is linked especially to the impact
of waves on the coast and part of the natural vegetation has already disappeared.

There is little systematised information and in-depth studies that explain the causes and
consequences of coastal erosion in Guinea-Bissau.

It is in such a perspective that a project for the monitoring (research-action) of coastal
erosion should be seen, endeavouring to deepen knowledge about this phenomenon
and its negative impact on the littoral in particular, and the environment in general, on
Guinea-Bissau's coastal zone.

Global objective:

Production of a synthesis of multidisciplinary knowledge on coastal erosion and the
workings of the coastal environment with a view to finding a tool meant to help in decision-
making.

Specific objectives:

-Follow up with the aid of modern methods of remote detection and fieldwork of the
status of erosion in critical sites on the above-mentioned coastal zone;
-Dissemination of information and knowledge about coast erosion;
-Proposals to minimise the coast-erosion phenomenon in specific critical zones.
Expected results:
-An easily accessible and usable data bank for involved local and international partners
is set up;

-An institution in charge of coast erosion monitoring and study is set up at a national
level, in consensus with other institutions;
-Small-scale works to provide protection against coast erosion are carried out in critical
locations;
Beneficiaries:

State, universities, research institutions, entity responsible for coast planning, local
government and local population;

Institutional Implementation Framework:

The Ministry of Agriculture and Rural Development will be in charge of this project's
supervision and the Coast Planning Office will ensure its technical execution, in partnership
with universities and research centres from countries in the North, the Directorate of
Geology and Mines and the Ministry of Public Works. In his context, universities, making use
of students in training schemes or working on their thesis, will be in charge of the scientific
monitoring of coast erosion developments in predefined critical sites.

The Directorate of Geology and Mines and the Ministry of Public Works will provide
technical assistance, particularly as regards the proposal for the execution of small works
that minimize the negative impact of erosion on the coast.

Monitoring and evaluation:

The project will be subject to regular multidisciplinary and inter-ministerial evaluation in
accordance with policies and procedures set out by donors for the project's supervision and
execution. Different reports will be prepared as per requirements set out by donors and the
execution agency.

External auditing will be done regularly.

Risks and barriers:

The project's reliance on external funding constitutes the main risk facing the project.
Another risk relates to national universities; none of the two universities has hitherto
curricula and courses on natural sciences and the environment. Such a fact may affect the
scientific monitoring of activities and the setting up of a data bank as well as a knowledge
base on erosion and coast dynamics.

Duration: 3 years
Budget:
US$ 400,000 USD

Nacional Programme of Action of Adaptation to Climate Changes
PROJECT File N.° 6

Project Title:
Evaluation of Impact of Climate Changes in Productive Sectors' Project

Location:
Nationwide (Guinea-Bissau)

Justification:

Guinea-Bissau is a country whose coastal area corresponds to 61% of the national
territory. Ecosystems in this zone are sensitive and vulnerable to nefarious effects of climate
changes.

Negative effects from anthropic actions constitute one of the main factors that accelerate
climate changes and, as result, increase natural resources' degradation and deterioration.

Factors behind climate changes are visible through the extinction of various species and
various problems related to human health are evident.

After independence several programmes, projects and sector development plans were
implemented without taking into account environmental and social aspects. As a result,
significant infrastructure is at risk and various species, habitats and ecosystems are endangered
and degraded.

The country has a serious prospect of finding and eventually exploiting important deposits
of minerals (Bauxite, Phosphate and Oil), which justifies the setting up of an early alert
system for the prevention and evaluation of risks and the negative effects these activities may
imply regarding the acceleration of climate changes.

Prevention is considered as the best way to protect, preserve and guarantee ecosystems'
structural and functional equilibrium and related dynamics.

In this context, and aiming at reaching Millennium Development Goals and ensuring a
sustainable development as per commitments made both locally and at the international
level, the government set up in late 2004 a unit for the Evaluation of Environmental Impact
(CAIA).

Through the creation of this unit the government aims at foreseeing, correcting,
preventing, identifying and/or mitigating through environmental evaluation (environmental
audits for projects being implemented and socio-environmental impact studies for projects
being designed, evaluation of risks and natural and anthropic catastrophes) negative effects
that anthropic actions (projects, programmes, plans and policies) cause and/or may cause on
the environmental system.

This challenge requires awareness at all levels, an enormous availability of qualified
technical and scientific capabilities, legal framework and norms and procedures as well as
clear and well defined institutional aspects, material means and equipment.

This project fits into overall efforts to ensure technical, legal and institutional capacity at
the national level in terms of environmental evaluation, particularly as regards the impact of
climate changes in productive sectors.

Global objective:

-To ensure national capacity building in the field of environmental and social evaluation
of negative effects of climate changes on development sectors and projects, programmes,
plans and sector development policies;
Specific objectives:

-Strengthening of technical capacity (sensitisation, training, empowerment and specialization)
of national technical staff in environmental evaluation;
-Strengthening of a legal and institutional framework that is appropriate, acceptable,
credible and stable;
-Setting up of an adequate mechanism for an environmental evaluation and monitoring
of negative effects of changes before, during and after the implementation of projects,
programmes, plans and policies.
Expected results:

-Guinea-Bissau provided with a credible institution in terms of studies of assessment of
social and environmental impact;
-Sector guides,
Guidelines and Manual of Procedures on environmental evaluation
prepared, published and disseminated in all local mass media;
-Permanent mechanism for the monitoring and evaluation of negative effects of climate
changes and anthropic actions set up;
-Legal framework set up, published and disseminated in all local mass media;
-Data bank set up and available for users.
Beneficiaries:
National cadres and staff, the government, Guinean population, investors, local communities
and the international community will be the main beneficiaries

Institutional Implementation Framework:

The body responsible for the implementation of this project is the unit for Evaluation of

Environmental Impact, in joint collaboration with development partners.

Monitoring and evaluation:

The project will be subject to a regular evaluation in accordance with the policy and
procedures set by donors and the government for the project’s supervision and execution.
The project head will submit each year a half yearly report and an annual synthesis. He will
submit also a final report at the end of the project. The different reports will be sent to the
government, donors and the agency.

Risks and Barriers:

The main risk relates to the State’s dependence on projects financed from abroad.

DURATION:
2 years

BUDGET:
US$ 350. 000

Nacional Programme of Action of Adaptation to Climate Changes
PROJECT FILE N.º 7

Project Title: Project Promotion of Small-scale Irrigation Schemes in Geba and Corubal
rivers' Project

Location:
Bafatá, Gabú and Tombali regions.

Justification:

Guinean agriculture remains predominantly dependent on rainfall, which does not allow high yields in agricultural production. This situation is compounded by the influence of climate factors namely in years where there are long time intervals without rain. In the Gabu region, Pitche and Pirada suffer from seed losses and populations are forced to sow again their seeds; production shortages losses and sudden rain stoppages do not allow cultures to complete their vegetative growing cycle.

Yet, there are considerable potentialities and actual water resources, particularly in Corubal River. This opportunity is far from being tapped. The use of water resources and the optimisation of the use of lands in Geba and Corubal riverbanks for irrigation would be an alternative in the search for solutions to diminish the risk of effects of low rainfall and water shortage for agriculture. Irrigated agriculture allows the employment of modern control and management techniques, leading to high production yields.

Global objective:

Increase in food security.

Specific objectives:

To increase agricultural production through the employment of efficient techniques for water control and management.

Components:

-Technical studies
-Hydro-agricultural execution
-Beneficiaries' training and fitting.

Expected results:
-Potential sites for agricultural development identified and surveyed.
-Summarised ante-project files prepared in search for funding to enable projects'
expansion.
-Hydro-agricultural and development works in a perimeter of approximately 100
hectares per year.
Beneficiaries:
Farmers' associations, rural communities, private sector.
Institutional Implementation Framework:
Ministry of Agriculture and Rural Development, DGA, DSER.

Monitoring and Evaluation:
Supervising entity (MDRA), Directorate General of Environment, CAIA, NGOs, farmers'

organisations and partners.

Risks and Barriers:

Conflicts may arise on land tenure, cattle transhumance and other aspects that the

project needs to clarify. Steps will have to be taken at the outset to overcome existing risks.

Duration:
3 years

Budget:
US$ 800,000

PROJECT FILE N.° 8

Project Title:
Natural-catastrophe Prevention Project

Location:
Nationwide

Justification:

Guinea-Bissau has a surface of 36 125 kmÇ. Its overall population is 1 200 000 inhabitants.
The country is frequently hit by drought, floods and erosion like in other West African
countries. Drought and the danger of accelerated desertification threaten a weak economy
and lead to a population exodus towards the countryside.

The government, aware of the situation, has formulated a number of guidelines, of which
one relating to the prevention of catastrophes thanks to meteorological information.
Unfortunately, meteorology and hydrology services are currently unable to provide an
effective contribution into a natural-catastrophe prevention system due to the existing
insufficiency in terms of specialised personnel for the application of new technologies and
methodology in this field.

On the other hand, lack of equipment and weak management means, coupled with the
absence of a national plan for situations of natural catastrophes, need to be taken into
consideration under this project. A coherent training and specialisation programme is of
capital importance and urgency.

Global objective:

The project's global objective is to contribute towards an improvement in populations'
living conditions and the protection of the environment and production against effects of
natural catastrophes, particularly those related to meteorological and hydrological phenomena
through the setting up of an appropriate system of meteorological and hydrological
prevention and the dissemination of warnings and advice to users in particular and the
population in general.

Specific objectives:

-To establish a national centre for meteorological and hydraulic prevention supplied with
equipment and qualified personnel capable to ensure the operation of the mentioned
centre;
-To educate and sensitise populations on meteorological and hydrological phenomena
likely to provoke natural catastrophes;
-To provide meteorological and hydrological information and forecasts through the
national committee whilst improving at the same time aeronautical, maritime and
fluvial forecasts.
Expected results:

-Population sensitised and educated on meteorological and hydrological phenomena
likely to cause natural catastrophes;

-A group of
meteorologists and hydrologists at the national meteorology centre,

personnel from other services, including provincial officers involved in the fight against
natural catastrophes, trained;
-Grade IV meteorology and hydrology personnel trained.
Beneficiaries:
-National decision makers for the prevention, planning and the fight against natural
catastrophes caused by meteorological and hydrological phenomena;
-Transporters (aeronautical, maritime and fluvial) and fishermen;
-Farmers.
Institutional Implementation Framework:

The Directorate General of National Meteorology National (DGMN), Ministry of
Transportation. Taking into consideration contributions of activities relative to
natural-catastrophe prevention, all technical services from the Ministries of Natural
Resources, Interior, Defence, Rural Development, Information and Communication will be
associated to the project's implementation. A national project-monitoring project committee
may be set up with the participation of the Ministries of Planning and Public Health.

Monitoring and evaluation:

The project will be subject to regular evaluation in accordance with the policy and
procedures set out by donors for the project's supervision and execution. The project head
will submit a half-yearly report and a yearly synthesis report each year. He will also present
a final report at the end of the project. The different reports will be sent to the government,
finding agencies and execution agency.

An overall evaluation of project outcomes will take place in the first and third years of its
execution, according to procedures set out by financing agencies. Donors will organise
evaluation missions in collaboration with the execution agency and the respective outcomes
will be communicated to governmental entities.

Risks and Barriers:

The project's main risk lies in the State dependence towards projects funded from abroad.
Those projects may arrive to and end without assurances of continuity to actions started.
Another risk relates to the creation of a budget line needed to ensure the employment of
trained cadres and effective outcomes on numbers and quality with a view to retaining those
cadres after the project's completion. To deal with the risk, donors' financial contribution
will be important throughout project implementation in order to allow a gradual transfer of
project to national structures.

DURATION:
3 years

BUDGET:
US$ 300,000

Nacional Programme of Action of Adaptation to Climate Changes
PROJECT FILE N.° 9 Project Title:
Protection, Conservation and Enhacemenent of Fishing and Coastal

Resources Project

Location:
Nationwide

JUSTIFICATION:

Guinea-Bissau has one of the broader continental platforms in West Africa, with an approximate surface of 53 000 KmÇ. Its maritime part, including the Bijagós archipelago is characterised by the existence of sand banks and shallow canals that may go 20 metres deep, thus making difficult navigation by large vessels. This zone is considered as one of reproduction, growth and feeding to various sea species. This is justified by the quantity and diversity of fishing and coastal resources found in the Guinean coast, without forgetting the contribution of the ressurgency phenomenon that brings with it a large quantity of nutrients to feed sea fauna.

This riches in fishing resources attracts fishermen from sub-region countries namely: Senegal, Guinea-Conakry, Sierra Leone and Ghana, who set themselves up in illegal fishing camps in the islands or along the coast where they freely carry out their fishing activities. Fishing arts and types practised in many of these camps are inappropriate: they range from the use of forbidden nets to the cutting of sharks' fins to the clearing of mangrove for fish smoking.

This situation goes on at a time when Guinea-Bissau authorities lack means under a coherent surveillance policy for the artisan fishing carried out by foreign fishermen. Various conflicts have taken place between local populations and foreign fishermen.

This project is part of the aim to ensure a participatory management of fishing resources to the benefit of Guinea-Bissau coastal communities through the appropriation of their water space and resources.

Special attention will be paid to local development initiatives, placing emphasis on a
rational exploitation of coastal fishing resources, the processing of fishing resources and
their commercialisation with economic advantages for the local population.

Global objective:

The project's overall objective is to ensure the sustainable co-management and exploitation
of fishing resources in coastal areas to the benefit of local populations.

Specific objectives:

-To seek viable solutions, in collaboration with all stakeholders in this production field,
for a responsible management of sea and coastal resources and environment;
-To foster the sector's sustainable development through catch enhancement, mangrove
and sea products, thus contributing to the fight against poverty affecting involved
communities;
-Setting up of a durable institutional mechanism aiming at mediating conflicts around the
utilisation of coastal fishing resources between users;

Expected results:

-Fishing resources are well managed and a monitoring system makes available data
discussed with partners (fishermen, managers and economic interest groups) to manage
and regulate annual exploitation of resources;
-Living conditions of fishing communities and other stakeholders are improved through
fish processing, conservation, and commercialisation activities;
-An effective fishing-surveillance system is set, implemented and appropriated by
fishermen residing in pilot villages;

Beneficiaries:

Local communities living in the coastal area, and those population segments that depend
directly on fishing for their living are the main beneficiaries.

Institutional Implementation Framework:

The Ministry of Fishing and Sea Economy is the supervising agency and technical
execution will be placed under the Directorate General of Artisan Fishing in partnership with
local NGOs and grassroots associations;

MONITORING AND EVALUATION:

The project will be subject to regular evaluation in accordance with the policy and

procedures set out by donors and the government for the project's supervision and
execution. The project head will submit a half-yearly report and a yearly synthesis report
each year. He will also present a final report at the end of the project. The different reports
will be sent to the government, finding agencies and execution agency.

Risks and Barriers:

The project's main risk lies in the State dependence towards projects funded from abroad.
The lack of commitment by local population towards the project may constitute an
important risk since Guineans are not traditional fishermen but rather farmers. Benefits may
go towards foreign fishermen.

DURATION: 2 years

BUDGET:
US$ 450,000

Nacional Programme of Action of Adaptation to Climate Changes
PROJECT FILE N.° 10

Project Title:
Integrated Food-Security Information System Project (SISA)

Location:
Nationwide

Justification:

Great disturbances have affected agricultural production lately as a result of the late start
of the rainy season and bad rainfall distribution across time. This situation has led to an
insufficient supply of agricultural products to populations, rural ones in particular. Services
charged with the monitoring of food production through the provision of information on
rainfall, cultivated areas, expected income and production levels, animals' and cultures'
phytosanitary situation, foodstuff availability in markets, namely agricultural statistics,
vegetation protection services, livestock and meteorology services are not operating well due
to lack of necessary and adequate means. Hence, it has not been possible to follow up on
vulnerability and food security and the consequences translate into considerable delays and
even in the non-mobilization of necessary assistance for populations facing food shortage.
The situation becomes more serious when the nutritional status of children, pregnant women
and elders is affected. This is due to lack of information to allow a rapid reaction based on

real data. This is the reason behind the SISA project, which aims at building the capacity of
units dealing with the gathering, processing, analysis and dissemination of information about
the climate and availability, access and stability of food items, as well as information about
the market for those produce.

Global objective:

Increase in food security

Specific objectives:

To ensure the availability of credible data about the different vulnerability, production
and food security parameters.

Components

The early warning system (SAP EWS) and the market monitoring system (SIM MMS) are
the components of this project.

Expected results:

-Yearbooks on food production and bulletins on food and meteorology situation
published.
-Market bulletins published.
-Information available on a timely manner.
Beneficiaries:
GAPLA, Vegetation Protection Services, Agricultural Statistics, Livestock Services,
Meteorology and Food Security Office and populations.

Institutional Implementation Framework:

GAPLA on behalf of the Ministry of Agriculture and Rural Development.
Monitoring and Evaluation:
GAPLA/DSSP

Risks and Barriers:
Non-allocation of funds in state budget for services involved in SISA
Duration:
2 years.
Budget:
US$ 300,000

PROJECT FILE N.° 11

Project Title:
Environmental Education and Communication in Coastal Areas Project

Location:
All coastal areas in Guinea-Bissau

JUSTIFICATION:

Climate changes are pointed as one of the main threats against our country's sustainable development. Pressure man has been exerting on natural resources to ensure his daily subsistence; the existence of production systems directly associated to widespread poverty situations, which provoke land degradation, coast erosion, an indiscriminate cutting down of large trees for commercial purposes, shortage of potable water, an increasing reduction in underground water, drought in the east and floods on rice fields in the south due to rises in sea level show that Guinea-is very vulnerable to climate changes.

The present project is proposed bearing in mind the low level of awareness about the existing risks and consequences arising from the above-mentioned environmentally-negative practises and the degree of the country's vulnerability to climate changes.

Global objective:

To contribute towards raising environmental awareness among Guinean populations, particularly as regards impacts of climate changes on main sectors for the development of economic activity.

Specific objectives:

-Strengthening of technical capacities and competences of target groups in adaptation to climate changes through natural resources' management and biodiversity conservation;
-To raise populations' awareness through specific programmes on private and community radio stations focusing on climate changes through a rational management of natural resources and biodiversity.

COMPONENTS:

Environmental education and communication on climate changes through a rational management of natural resources and biodiversity under the fight against poverty.

Expected results:

-Training and upgrading sessions held to the benefit of teachers and journalists from private and community radio stations concerning climate changes through a rational management of natural resources and biodiversity;

-Workshops and studies organised aiming at the dissemination of the Convention on
Climate Changes and Biodiversity and national communication on NAPA;
-Lectures organised in high schools, universities, training schools on climate changes on
a rational management of natural resources and biodiversity;
-Radio debates organised at Environment and Culture Houses and among grassroots
communities about climate changes on a rational management of natural resources and
biodiversity;

-Debates organised in private radio stations focusing on climate change on a rational
management of natural resources and biodiversity;
-
Programmes produced in private, public and community radio stations and national TV
on climate changes and a rational management of natural resources and biodiversity;
-Advertisement spots and information magazines produced on climate changes and a
rational management of natural resources and biodiversity at Rádio Pindjiguiti;
-Photo exhibitions organised about the effects of climate changes on priority national
development sectors at cultural centres, Environment Houses and in schools;
Beneficiaries:

Populations living in areas most vulnerable to climate changes

Institutional Implementation Framework:

ONG GAEC PALMEIRINHA

Monitoring and evaluation:

The PALMEIRINHA NGO, in close collaboration with the National Environment Institute,
will carry out project monitoring and evaluation.

Risks and barriers:

Political instability during the project’s implementation and late disbursing of funds after
the project’s approval.

DURATION:
3 (three) years

BUDGET:
US$ 200.000

PROJECT FILE N.° 12 Project Title:

Rehabilitation of Small Perimeters of Mangrove Soils for growing of rice
Location:
Quinara, Tombali, Bafatá e Oio
Justification:
Potable water supply is a domain that affects populations' life quality and public health.

The aim is thus an increase in the supply of drinking water in order to decrease the risks of
contracting waterborne diseases, which are frequent in the rural world. It should be recalled
that the latest cholera epidemic, in 2005, registered about 25,000 cases and 400 fatalities
(National Human Development Report, UNDP), due to bad sanitation conditions.

Global objective:

To improve access to quality water and reduce the risk of contraction of water- and
infectious diseases.

Specific objectives:

-To improve rates of access to quality water;
-To eliminate conditions that contribute to the appearance of cholera outbreaks and other
diseases;
Components:

-Reforestation;
-Conservation and protection.
Expected Results: To increase vegetation cover with drought-resistant species. Improved
soil constitution. Integrated management of land in villages by communities is strengthened.
Beneficiaries:
Local populations, sector administrative services
Institutional Implementation Framework:
The Directorate General of Water Resources will implement the "Wells building"

component and components that relate to sensitisation and construction of latrines will be
placed under the Ministry of Public Health, with support from NGOs.
Monitoring and Evaluation:
Supervising entities and the donor will monitor project activities and project management
will be accountable and submit reports for their appraisal and approval.
Risks and Barriers:
Main risk factors may relate to political stability and lack of change in populations' mental
attitudes. Therefore special attention sought to be paid to sensitisation issues.
Duration:
2 years
Budget:
US$ 500,000

Nacional Programme of Action of Adaptation to Climate Changes
PROJECT FILE N.º 13

Project Title:
Support to Production of Short-Cycle Animals Project

Location:
Nationwide

Justification:

The short-cycle-animals' raising project should be seen as a food security strategy designed for rural and semi-urban communities. Climate changes lead to uncertainty in the production of vegetal foodstuffs and that calls for the seeking of other alternative sources of food, e.g., animal protein to feed our population. Guinea-Bissau has an enormous potential in grazing land plus a population well experimented in raising animals, assets that need to be optimised. Short-cycle livestock is a quick source of income, especially for women that may draw great benefits from it and hence improve their families' living conditions, thus contributing to poverty relief in the rural world. This project aims at augmenting production of meat and animal proteins, and enhancing fishing and agricultural sub-products for animal feeding culminating in an improvement in rural populations' living conditions.

Global objective:

To increase food security.

Specific objectives:

To increase production and consumption of animal food items (meat, milk, eggs, etc.).

Components:

-Production modernization;
-Animal health;
-Institutional support;
-Training and fitting;
Expected results:
-10 pilot units for training and demonstration nationwide are set up;
-Consumption of meat, milk, eggs and other produce from animal sources increases nationwide;
-Higher household incomes;
Beneficiaries:
Animal raisers, NGOs, population and farmers' organisations;
Institutional Implementation Framework:
Ministry of Agriculture and Rural Development (MADR) and Directorate General of Livestock (DGP).

Monitoring and Evaluation:
Monitoring and evaluation will be placed under DGP, GAPLA, Directorate General of
Environment, Environmental Impact Evaluation Unit.

Risks and Barriers:

- Lack of a master plan for livestock development
- Non-approval by parliament of regulations governing the implementation of the Land
Law.

DURATION:
2 years.
BUDGET:
US$ 400.000 (Two hundred thousand dollars)

PROJECT FILE N.° 14

Project Title:
Reforestation of Degraded Zones Project

Location:
Cambaju, Contuboel Sector (Bafatá region); Pitche, Sonaco (Gabú region)

Justification:

The marked disappearance of vegetation cover in areas in Cambaju due not only to
negative growing practises and the predominant growing of cotton and groundnuts added to
an itinerant agriculture, associated to animal grazing and the intense exploitation of
resources by local populations, make easier not only the erosion and sedimentation of small
valleys usable for agriculture but also the area’s desertification.

The degradation progresses and extends already further into the Contuboel sector. This
means that if it the situation is not addressed quickly through reforesting actions it may
become soon an ecological disaster for the whole Gabú region, an area already arid and
under strong influence from the Sahel.

Global objective:

Rational utilization of agricultural, grazing and forest resources;

Specific objectives:

To recover soils and increase forest cover in degraded areas;

Components:

-Reforesting;
-Conservation and protection;
Expected results:
-Larger area of vegetation cover, consisting of species that are adaptable to drought;
-Improved soil constitution;
-Better-integrated management of village lands by communities;
Beneficiaries:

Local population, regional and sector administrative services;

Institutional Implementation Framework:

Ministry of Agriculture and Rural Development through the Directorate General of

Forests and Fauna;

Monitoring and Evaluation:

Directorate General of Forests and Fauna, GPPLA and IBAP;

Risks and Barriers:
Lack of rigour in the application of forest laws;
Duration:
2 years.
Budget:
US$ 500,000

Bibliography

(COASTAL AREA SECTOR)

Cabral, A., Silva, A., (2005):
Initial Guinea-Bissau National Communication on
climate changes.

CUQ, F., GOURMELON, F. et MADEC, V., (1993).
Letter on soil occupancy in
Guinea-Bissau at 1 :200 000. Guinea-Bissau Coast Planning.
Vol. 2. UICN/DGFC-MDRA.

CUQ, F ed. (2001).
Geographic Information System to Assist the Integrated
Management of the Bolama Bijagós Archipelago (Guinea-Bissau). Géosystémes-
CNRS.IUEM/UBO.87p.

MDRA-DGFC & IUCN (1993)
Coast Planning- Guinea-Bissau – Technical
Report/Renato Maretti C.C. & collaborators, Bissau, 118p.

Ministry of Natural Resources and Environment (2001).
National Strategy and
Plan of Action on Biodiversity. (Draft.) 143p.

SIMÃO DA SILVA. A. e RACHID SAID, A. (1998)
Contribution to the Preparation
of a Strategy and National Plan of Action on Biodiversity. DGA/UNDP.
Bissau.

. PRSP

. CIPA Plan of Action (see section on agriculture, forests and livestock)
. LCD proposed plan of action . PNGA
Bibliography (Water Resources Sector)

1 .
Water and Sanitation Sector Master Scheme.
Updated Version 1997
2 .
Water for XXI century, from vision to action for West Africa.
3 .
Studies on Guinea-Bissau Vulnerability and Adaptation to Nefarious Effects
of Climate
Changes – Directorate General of Environment,
GBS/97/G/33/GEF/PNUD
Project.
4 .
Water resources vis-à-vis climate changes in West Africa;
What are the regional strategies to be implemented to optimise water
availability. -
R.. Malou (UCAD)

Nacional Programme of Action of Adaptation to Climate Changes
5.
ogrammes of Action, NAPA, - Publication
UNFCCC LEG-2003.
6 .
Hydrological Evaluation of Sub-Saharan Africa, West African Countries,
Country
Report: Guinea-Bissau,
July 1992
7.
Guinea-Bissau National Plan of Action for Environmental Management, 2002
Lourenço A. Vaz, Carmen Pereira, Mário Biague
8 .
Poverty Reduction Strategy Paper
(PRSP) August 2004
9 .
Workshop on Water, Humid Areas and Climate Change in West Africa. Overall
Synthesis.

Bamako, 23-25, April 2003
10.
West African Conference on Plans of Action for Integrated Water Management Systems
(GIRE)
11.
Dictionary of Sustainable Development, IEPF Publication – 2004
12.
Mission Report on Identification of Floodable Areas at Hydrographical Basins under
OMVG Jurisdiction: Gambia, Kayanga/Geba and Koliba/Corubal Rivers. – Paulinho
Sousa Azinhaga,
October 2005
13.
Courrier de la Planète n° 61 & Global Chance n° 14, special editions 2001
14.
To reduce West Africa's Vulnerability to Climate Impacts on Water Resources,
Humid Areas and Desertification. – Elements of a Regional Preparation and Adaptation Strategy. – Madiodio Nhasse, Abel Afouda & Abou Amane
(IUCN 2004)

15. Sector Reports
a .
Synthesis Report on the Agrarian Sector
b .
Synthesis Report on the Water Sector
c .
Synthesis Report on the Coastal Areas and Fisheries Sector
16.
2004 HDI Report, UNDP, Guinea-Bissau
17.
1ª National Communication, 2006
18.
Letter on Agrarian Policy
19.
Health Development National Programme
(PNDS)
20.
Environmental Management National Plan
(PNGA)
21.
Water Master Scheme
22.
Rice Sector Diagnosis,
MEF/PRDP, Dajta, e al, 2004

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