MINISTRY OF ENVIRONMENT AND FISHERY RESOURCES

BURKINA FASO

Unity - Progress - Justice

BURKINA FASO NATIONAL CLIMATE CHANGE ADAPTATION PLAN (NAP)

Main volume

Final version

May 2015

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

AAP	Adaptation in Africa programme
AGRHYMET	Regional Centre for Agricultural, Hydrological and Meteorological Applications
AGSDS	Accelerated growth and sustainable development strategy
AIBP	Agro-industrial by-product
ALR	Agrarian and land reorganisation
AMMA	African monsoon multidisciplinary analysis
AP	Annual precipitation
APIZ	Animal production intensification zone
BAA	DIY Construction Assistance Bureau
BCC	Behaviour change communication
BKF	Burkina Faso
CC	Climate change
CCIA	Chamber of Commerce, Industry and Handcrafts
CIRDES	International Centre for Research and Development on Farming in Sub-Humid Areas
CNPB	National Council of Burkinabe Employers
CNPE	National Economic Policy Committee
CONEDD	National Council for the Environment and Sustainable Development
CR	Report
CSM	Cerebro-spinal meningitis
CSO	Civil society organisation
CSSP	Pastoral Conditions Monitoring Committee
DANIDA	Danish International Development Agency
DCIME	Environmental Skills Development, Information and Monitoring Division
DEP	Directorate of Studies and Planning
DFS	Decentralised financial system
DGMET	Directorate General of Meteorology
DWS	Drinking water supply
ECOWAS	Economic Community of West African States
ESC	Economic and Social Council
EWS	Early warning system
FAO	United Nations Food and Agriculture Organisation
FCFA	Franc of the African Financial Community
GDP	Gross domestic product
GEF	Global Environment Facility
GG	Greenhouse gas

ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and communication technology
IEC	Information-education-communication
INSD	National Statistics and Demographics Institute
IPCC	Intergovernmental Panel on Climate Change
ISWA	Installations, structures, works and activities
IWRM	Integrated Water Resources Management
LAME	Mathematical Equation Analysis Laboratory
LDC	Least developed countries
LFA	Logical framework approach
LLIN	Long-lasting insecticidal nets
LOP	Land occupancy plan
M&A	Monitoring/assessment
MASA	Ministry of Agriculture and Food Security
MEDD	Ministry of Environment and Sustainable Development
MME	Ministry of Mines and Energy
MS	Ministry of Health
NAP	National adaptation plan on climate change
NAPA	National adaptation programme of action on climate change
NAR	Natural assisted regeneration
NERROCP	National emergency relief and rehabilitation organisation and coordination plan
NGO	Non-governmental organisation
NHP	National health policy
NSDP	National sanitary development plan
NSPP	National physical planning plan
NTFP	Non-timber forest product
OECD	Organisation for Economic Co-operation and Development
ONPB	Burkinabe National Observatory of Pastoralism (ONPB)
PACE	Farmers' Climate Insurance Project
PAGIRE	Integrated water resources management action plan
PCAE	Common environmental improvement policy
PET	Potential evapotranspiration
PJAS	Precipitation July-August-September
PRSD	Poverty reduction strategy document
PS/CONEDD	Permanent Secretariat of the National Council for the Environment and Sustainable Development
PUDMP	Planning and urban development master plan
PV	Minutes

RBM	Results-based management
RGA	Revenue-generating activity
SEF	Sahelian Eco-Farm
SLM	Sustainable land management
SO	Specific objective
SONABEL	Burkina national electricity company
TFP	Technical and financial partner
TICAD IV	Fourth Tokyo International Conference on African Development
UCT	University of Cape Town
UNDAF	United Nations Development Action Framework
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WAEMU	West African Economic and Monetary Union
WPMMP	Water planning and management master plan
WPMS	Water planning and management scheme
WSC/SPR	Water and soil conservation/soil protection and restoration

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXES

EXECUTIVE SUMMARY

An analysis of the development of national adaptation programmes of action on climate change (NAPA) in the least developed countries (LDC) illustrates that NAPAs are beset by difficulties, during both formulation and implementation:

- delays in their formulation;
- failure to take due account of climate change in development policies and strategies;
- insufficient funding during implementation.

However, adaptation to climate change is no longer a choice; it is the only option in the quest for sustainable development and a process which effectively includes all stakeholders needs to be set in motion in order to address the root causes of climate change.

Burkina Faso has an advantage over many other LDC, in that its NAPA, adopted in 2007, has been implemented under three projects with technical and financial support from the United Nations Development Programme (UNDP), the Kingdom of Denmark, the Global Environment Facility (GEF) and Japan. It capitalised on that advantage and put it to good use when the national climate change adaptation programme (NAP) was formulated, by applying the accumulated knowledge from NAPA projects.
Generally speaking, NAPA have been unable to really convince funders to finance them. There is clearly an urgent need at present to adopt a new programming framework (NAP) in addition to the NAPA already adopted to respond to the need for urgent adaptation. This new vision adopted under the United Nations Framework Convention on Climate Change has the advantage of ensuring that climate change is better incorporated into development policies and strategies and of bringing funderson board who financeclimate change adaptation. In other words, in theory a NAP has a better chance of being funded and thus implemented than a NAPA.

The objectives of a NAP are to (i) reduce vulnerability to the impact of climate change by developing adaptation and resilience capabilities; (ii) facilitate the integration of climate change adaptation into new or existing policies, programmes or activities and in specific development planning processes and strategies in pertinent sectors and at various levels in a coherent manner.

It ultimately results in a reference document containing practical information with a view to helping to:

- reduce the vulnerability of natural, social and economic systems to climate change;
- integrate climate change adaptation into current or future development policies and strategies.

The vision of the Burkina Faso NAP reads as follows: "**Burkina Faso intends to manage its economic and social development more efficiently by implementing planning mechanisms and measures taking account of resilience and adaptation to climate change between now and 2050**".

The long-term adaptation objectives based on that vision are to:

- protect accelerated growth pillars;
- ensure sustainable food and nutrition security;
- preserve water resources and improve access to sanitation;
- protect persons and goods from extreme climate events and natural disasters;
- protect and improve the functioning of natural ecosystems;
- protect and improve public health.

The Conference of the Parties to the United Nations Framework Convention on Climate Change adopted decision 5/CP.17 on national adaptation plans (NAP) at its 17th session held in Durban (South Africa) on 11 December 2011 in order to help LDC take better account of climate change in their development policies and strategies.

Burkina Faso decided to prepare a NAP in response to that decision. In order to do so, a multidisciplinary team of experts with expertise in the following sectors was set up at national level to formulate the NAP: (i) agriculture; (ii) animal production; (iii) environment and natural resources; (iv) meteorology; (v) energy; (vi) health; (vii) infrastructure and housing; (viii) women's associations; (ix) civil society organisations. The team of experts is listed in the annex. In order to take account of water security, the NAP took account of the written input received from the Global Water Partnership West Africa and the Burkina National Water Partnership, both of which offered to help with national coordination of NAPA projects by providing a water consultant and co-financing workshops with stakeholders.

The NAP was formulated with very close attention to institutional, technical and financial aspects. The Mathematical Equation Analysis Laboratory (LAME) of the University of Ouagadougou (UO), with support from the NAPA-BKF-UNDP/Japan project entitled '**Improving capacities to take better account of climate change-related concerns during the preparation and implementation of development plans, programmes and projects**', prepared climate forecasts for Burkina Faso up to 2100 and evaluated the vulnerability of various development sectors. The Ministry of Environment and Sustainable Development set up a technical committee to monitor formulation of the NAP through the Permanent Secretariat of the National Council for the Environment and Sustainable Development (PS/CONEDD).

The following were established in detail for each development sector: (i) structural vulnerability; (ii) priority adaptation sectors; (iii) court-, medium- and long-term adaptation

measures; (iv) a five-year adaptation action plan; (v) the cost of adaptation measures over a period of between 1 and 15 years.

The Burkina Faso NAP comprises (i) adaptation plans for each development sector and (ii) a global adaptation plan for the entire country. The action plans for the various sectors are summarised below:

The objectives of the action plan for each sector are as follows:

Development sector	Specific objectives of action plan
Agriculture	
	SO 1: Recuperate and restore the fertility of degraded land
	SO 2: Improve access for farmers to high quality agricultural production factors (equipment, inputs, land, results of agricultural research etc.)
	SO 3: Improve the resilience of stakeholders to climate change
	SO 4: Develop early warning systems to ensure efficient management of climate variability and change
Animal production	
	SO 1: Improve the security of pastoral activities through better dissemination and exploitation of information on pastoral resources and associated access.
	SO 2: Ensure the security of animal capital with a view to supporting the pastoral economy on a sustainable basis and improve the resilience of stakeholders in order to achieve sustainable food security in Burkina Faso
	SO 3: Reduce the vulnerability of farmers to climate change and contribute to local economic development
Environment and natural resources	
	SO 1: Increase productivity and the resilience of ecosystems
	SO 2: Improve biodiversity conservation
	SO 3: Improve research and ecological monitoring
	SO 4: Reduce GG emissions
Energy	
	SO 1: Reduce the impact of climate change on the energy sector
	SO 2: Ensure a sustainable supply of energy for cooking
	SO 3: Reduce electricity consumption
	SO 4: Gain more knowledge into the impact of climate change on the energy sector

Development sector	Specific objectives of action plan
Health	
	SO 1: Ensure leadership and governance in terms of adapting to the impacts of climate change on the health sector
	SO 2: Increase human resources in the health sector skilled in adapting to the effects of climate change
	SO 3: Improve the early warning system and the response to climate change-related phenomena
	SO 4: Adapt health infrastructure to the effects of climate change
	SO 5: Improve research in the field of climate change
Infrastructure and housing	
	SO 1: Promote access to decent accommodation for disadvantaged social groups by providing rental accommodation, supporting DIY construction and building social housing stock
	SO 2:Provide public facilities and road, water and rain and waste-water drainage infrastructure which is practical and resilient through good design/implementation and good maintenance
	SO 3:Turn the towns of Burkina Faso into hubs of economic growth and sustainable development by promoting a green economy
Horizontal issues	
	SO 1: Help to improve the capacityof members of women's associationsto address environmental and climate change issues
	SO 2: Help to improve the resilience of members of women's associations by implementing revenue-generating activities
	SO 3: Develop adaptation technologies which take account of the conditions in women's associations on the basis of traditional knowledge
	SO 4: Improve the contribution of NGOs towards better governance in implementing the NAP/CC in Burkina Faso
	SO 5: Ensure the sustainability of civil society initiatives in climate change adaptation
	SO 6: Help to improve public involvement in the process of reflection, analysis and decision-making in connection with climate change adaptation by producing, disseminating and making efficient use of information originating from innovative CSO experiences.
	SO 7:Improve the mobilisation and exploitation of water resources
	SO 8: Improve conservation and protection of water resources
	SO 9: Improve knowledge about (surface and, more importantly, underground) water resources in the context of climate change
	SO 10: Improve access to sanitation

The global NAP for the country as a whole can be summarised as follows:

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
Protect accelerated growth pillars:		
Agriculture	- Cultivate early varieties or drought-resistant crops - Apply water and soil conservation methods (stone barriers, small dikes, filtering dikes, terraces, half-moons, agroforestry, dune fixing etc.) - Promote sustainable land management (SLM) - Improve access to climate information - Introduce agricultural insurance	Short-term Short-term Medium term Medium-term Long-term
Livestock farming	- Combatbush fires in order to prevent destruction of dry-season grazing reserves - Adopt best animal husbandry and pastoral practices (pastoral hydraulics, pastoral resource management, pasture mowing and conservation, pasture crops, silage, animal mobility and transhumance etc.) - Ensure stakeholders take account of climate variability in development project and programme planning by improving their skills - Conserve cattle breeding which is at serious risk from climate variability - Ensure farmers adopt animal production methods adapted to a hot climate	Short-term Short-term Long-term Long-term Long-term
Forestry	- Adopt best forestry and agroforestry practices (selective felling for firewood, natural assisted regeneration, controlled land clearance etc.) - Introduce community and participative management of forestry and fauna resources - Increase sustainable exploitation of non-timber forest products (NTFP)	Short-term Long-term Medium-term
Energy	- Diversify energy sources (solar, wind, biogas) - Introduce water planning and management plans in Sudanian zone where climate forecasts predict a slight increase in rainfall - Promote energy-saving technologies in industry and construction - Promote the use of improved fireplaces to achieve a substantial reduction in consumption of wood and charcoal - Promote alternative energies such as butane and biogas	Long-term Long-term Long-term Short-term Medium-term

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
Infrastructure	- Adhere strictly to dam and hydraulic structure, hydro-agricultural development and housing construction standards	Short-term
	- Update dam and hydraulic structure, hydro-agricultural development and housing construction standards	Medium-term
	- Decontaminate and drain flood zones	Medium-term
	- Preserve water resources and improve access to sanitation	Medium-term
	- Pass and enforce laws and regulations, where applicable, on (i) construction of hydraulic, road and settlement infrastructures; (ii) land use in urban and rural environments, especially of flood zones; (iii) mining activities (gold prospecting); (iv) industrial activities	Long-term
	- Relocate populations in submersible and floodable zones to appropriate zones	Short-term
	- Promote ecological housing and towns with low energy consumption (for air-conditioning and lighting)	Long-term
	- Promote and exploit local construction materials	Medium-term
Ensure sustainable food and nutrition security	- Increase resilience of vulnerable communities and households to food and nutrition insecurity by improving their livelihood	Medium-term
	- Achieve a structural and sustainable reduction in food and nutrition vulnerability of vulnerable communities and households	Long-term
	- Improve social protection of vulnerable communities and households in order to secure their livelihood	Medium-term
	- Capitalise on and share innovations and best practices to support food and nutrition security	Short-term
	- Make increased use of non-timber forest products as food supplements	Medium-term
Preserve water resources and improve access to sanitation	- Monitor water retention (dam dikes, water flow, valve functioning etc.)	Short-term
	- Provide water storage: construct modern wells, high-flow boreholes, dams; develop ponds; divert water courses).	Long-term
	- Combat silting of water bodies	Long-term
	- Develop integrated water resources management (IWRM)	Short-term
	- Formulate water planning and management master plans	Short-term
	- Use appropriate technologies to reduce poor access for women to drinking water in the dry season	Medium-term

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
Protect persons and goods from extreme climate events and natural disasters	- Take account of resilience in development projects and programmes - Formulate contingency plans at regional and local level and plans to support vulnerable populations - Provide sustainable financing for disaster and humanitarian crisis prevention and management by formulating and implementing an appropriate financing strategy - Improve women's skills by disseminating best climate change adaptation practices - Use social safety nets for vulnerable populations	Short-term Medium-term Long-term Short-term Short-term
Protect and improve the functioning of natural ecosystems	- Develop environmental education in both formal and non-formal education systems - Implement reforestation projects and programmes using local species - Disseminate anti-erosion techniques - Rehabilitate and preserve wetlands	Medium-term Long-term Short-term Long-term
Protect and improve public health	***Meningitis***: - Vaccine before first cases are reported - Organise reactive campaigns which target the entire population in epidemic zones - Increase meningitis monitoring using the geographical information system - Step up public awareness-raising and information campaigns ***Malaria:*** - Provide proper treatment in all cases of simple malaria using ACT - Provide intermittent preventive treatment of malaria using ITP for pregnant women and children and distribute long-lasting insecticidal nets (LLIN) in routine mass campaigns - Decontaminate swampy sites and wastewater and excreta - Combat malaria vectors (indoor spraying, behaviour change communication (BCC) at mass media and community relay level, treat breeding grounds)	 Short-term Medium-term Medium-term Medium-term Short-term Medium-term Medium-term Long-term

It is planned to implement the National Adaptation Plan based on a strategy comprising five (5) axes:

- Strategic axis 1: Build long-term capacities of institutions involved in climate change adaptation
- Strategic axis 2: Improve information systems
- Strategic axis 3: Implement efficient and sustainable financing mechanisms
- Strategic axis 4: Reduce the country's overall vulnerability to climate change
- Strategic axis 5: Systematically integrate climate change adaptation into development policies and strategies

The consolidated costs of short-, medium- and long-term adaptation measures (1 to 15 years) by development sector or field are summarised below:

Development sector (including horizontal issues)	Estimated cost in billion FCFA
Agriculture	1 313
Animal resources	375
Environment	375
Health	188
Energy	1 126
Infrastructure and housing	375
Water security	101,75
TOTAL	**3853,75**

The water sector includes horizontal elements. Additional investments may accrue from the other sectors, as listed in the table below.

Proposed actions	Amounts in billion CFA
Baseline quality of water in water agency districts	2
Groundwater dam studies	1, 5
Use of technology to reduce surface evaporation from water bodies	2, 5
Agriculture: Develop water-saving booster irrigation systems (pools, impluvia)	1
Livestock farming: Improve fodder production by mobilising groundwater and surface water (groundwater dams, bourgou pastures)	1
Energy: Formulate water planning and management plans (WPMMP) in order to identify hydroelectric sites (3 water agencies)	0,5

Proposed actions	Amounts in billion CFA
Health: Malaria Treat and dry breeding grounds Increase distribution of mosquito nets to populations living close to water bodies and reservoirs	 0,5 0,5
Total	**9,5**

The NAP will be financed from various sources:

- National budget
- Traditional or emerging bilateral partners
- Traditional or emerging multilateral partners
- International foundations
- Private sector
- NGOs and NGO networks
- etc.

The NAP will be coordinated and steered by the following government bodies:

- National Council for the Environment and Sustainable Development (CONEDD)
- Permanent Secretariat of the National Council for the Environment and Sustainable Development (PS/CONEDD)

If it is to play its full part and achieve its objectives, the NAP will need to be supplemented at a later date by a rigorous monitoring/assessment system and an operational communication strategy.
The NAP monitoring and assessment mechanism will be exactly the same as that of the AGSDS and will comprise: (i) annual review of the NAP; (ii) sectoral reviews and (iii) regional reviews.

In conclusion it can be stated thatdespite the unfavourable natural conditions encountered in Burkina Faso, solutions can be found to help Burkina Faso on its path towards sustainable development. Political decision-makers will need to ensure that climate change adaptation is at the heart of development policies and strategies. Moreover, all development stakeholders (State, technical and financial partners, private sector, civil society organisations, international community) need to join forces to combat climate change. In that context, the NAP is a suitable reference framework which will enable all stakeholders to pool their efforts with a view to helping Burkina Faso reduce its structural vulnerability, increase its resilience and manage its development better.

INTRODUCTION

The government of Burkina Faso, with the support of the UNDP as a Global Environment Facility (GEF) implementing agency, started to prepare its National Adaptation Programme of Action on Climate Change (NAPA) in 2005. In November 2007, the NAPA was adopted at national level. Three adaptation projects were prepared and implemented between 2009 and 2014 under the leadership of the Ministry of Environment and the UNDP.

At the present stage, Burkina Faso is expected to have an adaptation efficacy and cost evaluation document for the medium and long term for several sectors based on the following elements:

- Analysis of local climate change (CC) scenarios up to 2025 and 2050 where data are available
- Analysis of vulnerability to CC of target sectors

Furthermore, the Conference of the Parties to the United Nations Framework Convention on Climate Change adopted decision 5/CP.17 on NAPs at its 17th session held in Durban (South Africa) from 28 November to 11 December 2011 in the aim of helping the least developed countries take better account of climate change in development policies and strategies.

The aforementioned decision 5/CP.17:

- *'Invites* least developed country Parties to use the guidelines and modalities contained in this decision, in accordance with their national circumstances, in preparing their national adaptation plans'.
- *'Also invites* the least developed country Parties to strive to implement institutional arrangements to facilitate their national adaptation plan process, building on existing institutions and consistent with their national circumstances'.

Burkina Faso undertook the formulation of its NAP so as to implement that decision. In order to do so, a multidisciplinary team of experts was set up at national level to prepare the NAP, taking account of gender and of civil society. Experts were appointed from the following fields and sectors: (i) agriculture; (ii) animal production; (iii) environment and natural resources; (iv) meteorology; (v) energy; (vi) health; (vii) infrastructure and housing; (viii) women's associations; (ix) civil society organisations. The experts are listed in the annex.

In order to take proper account of water security, the NAP took account of the written input received from the Global Water Partnership West Africa and the Burkina National Water Partnership.
In fact, these two partners offered their services to the national coordination agency for NAPA projects by providing a consultant who specialises in water and by co-financing workshops with stakeholders.

1) FORMULATION OF NAP - NATIONAL CIRCUMSTANCES

Burkina Faso, like many other developing and certain developed countries, has ratified the United Nations Framework Convention on Climate Change (UNFCCC). For the international community, ratification implied a pledge to be better prepared to contain the impact of climate change through national communications, policies and measures to mitigate the greenhouse effect, national climate change adaptation programmes and systematic monitoring of the problem.

Burkina Faso started the process of formulating its NAPA following ratification of the Kyoto Protocol in March 2005. The NAPA, the main objective of which was to identify priority actions based on the urgent and immediate need for adaptation among vulnerable populations (poor rural populations), was adopted in November 2007 and included the following key intervention sectors: agriculture, water resources, animal resources and forestry/biodiversity.

By ratifying the UNFCCC, Burkina Faso qualified for the Adaptation in Africa Programme (AAP) launched by the UNDP with funding from the Japanese government. In fact, following signature of the Convention in October 2008 between the UNDP and Japan on the implementation of the AAP, twenty (20) African countries, including Burkina Faso, were granted funding for their climate variability and change adaptation programmes. That was made possible by the Fourth Tokyo International Conference on African Development (TICAD IV) held in 2008.
In 2009, two years after validation of its NAPA, Burkina Faso was granted UNDP support in order to mobilise funding with a view to combined implementation of the following three (3) projects:

- Capacity-building in order to adapt and reduce vulnerability to climate change in Burkina Faso (NAPA-BKF-UNDP/GEF)
- Adaptation to climate change with a view to improving human security in Burkina Faso (NAPA-BKF-UNDP/DANIDA);
- Capacity-building in order to take better account of climate change-related concerns during the preparation and implementation of development plans, programmes and projects (NAPA-BKF-UNDP/Japan).

These three projects operated in tandem in order to improve their implementation, as they are complementary and are respectively designed to increase awareness of the impact of climate change, test best practices or adaptation technology packages and underpin strategic planning that takes account of climate change.

- An analysis of NAPAs in LDC illustrated that they had encountered numerous difficulties in both the formulation and implementation stages:
    - delays during formulation;
    - insufficient account taken of climate change in development policies and strategies;

- insufficient financing during implementation.

Climate change adaptation is no longer a choice; it is instrumental to sustainable development. A process of inclusive and efficient involvement of all stakeholders must be put in place in order to combat the harmful effects of climate change.

It is currently recognised that the NAPA is in urgent need of review and that a national adaptation plan on climate change (NAP) urgently needs to be adopted. This advantage of this new vision is that it takes better account of climate change in development policies and strategies.

In order to gain a better understanding of the results expected of the NAP, it is important to understand the similarities and differences between a NAPA and a NAP. Both a NAPA and a NAP have the same goal, namely to reduce vulnerability to the impact of climate change by:

- minimising, reducing or preventing risks and
- improving the capacity to adapt to climate change.

However, a NAPA and a NAP have different objectives, which can be summarised as follows:

Table 1: Similarities and differences between a NAPA and a NAP

NAPA process	NAP process
Urgent and immediate adaptation needs	Long-term adaptation objectives
Project-based	Policy-based
One-off	Iterative
Established process	Flexible process
Existing climate impacts	Anticipated climate impacts
Inputs at community level: important source of information; new research not required	Various sources of information required, including inputs at community level, climate models, socio-economic scenarios etc.
Identification of adaptation needs	Identification and support for effective implementation of adaptation measures

The Burkina Faso NAP was formulated with due regard for the following elements:

- results of climate foresights;
- assessment of the vulnerability of various sectors to climate change led by national and international institutions;
- accumulated knowledge from pilot NAPA projects.

2) METHODOLOGY

The elements described in the sections below give an idea of the action taken during formulation of the Burkina Faso NAP. The national circumstances of the country were taken into account when planning that action. The methodology for formulating a NAP includes four (4) steps or 'elements'.

a) Preparatory workand addressing gaps

The activities undertaken under this element, as set out in decision 5/CP.17 are designed to identify gaps and omissions in intervention frameworks and address them as necessary, to support the formulation of comprehensive adaptation plans, programmes and policies, through, inter alia:

- identification and assessment of institutional arrangements, programmes, policies and capacities for overall coordination and leadership;
- assessment of available information on climate change impacts, vulnerability and adaptation, measures taken to address climate change and gaps and needs, at the national and regional levels;
- comprehensive iterative assessments of development needs and climate vulnerabilities.

b) Preparatory elements

In developing NAPs, consideration is given to identifying specific needs, options and priorities on a country-driven basis, utilising the services of national and, where appropriate, regional institutions, and to the effective and continued promotion of participatory and gender-sensitive approaches coordinated with sustainable development objectives, policies, plans and programmes. Activities may include the following:

- design and development of plans, programmes and policies by considering decision 1/CP.16, paragraph 14(a), to address the gaps and needs referred to in paragraph 1 above;
- assessments of medium- and long-term adaptation needs, and, as appropriate, development needs and climate vulnerabilities;
- activities aimed at integrating climate change adaptation into national and subnational development and sectoral planning;
- participatory stakeholder consultations;
- communication, awareness-raising and education.

c) Implementation strategies

Activities carried out as part of the implementation strategies take into consideration the following:

- prioritising work according to development needs and climate change vulnerability and risk;
- strengthening institutional and regulatory frameworks to support adaptation;
- training and coordination at the sectoral and subnational levels;
- public dissemination of information on the national adaptation plan process, to be made available to the public and to the UNFCCC;
- considering other relevant multilateral frameworks and international programmes and initiatives, with a view to building on and complementing existing adaptation planning.

d) Reporting, monitoring and review

These activities, including national adaptation plan documents, can be included in national strategies and plans, as appropriate.
Under this element, Parties should undertake a regular review, at intervals that they determine:

- to address inefficiencies, incorporating the results of new assessments and emerging science and reflect lessons learned from adaptation efforts;
- to monitor and review the efforts undertaken, and provide information in their national communications on the progress made and the effectiveness of the national adaptation plan process.

A NAP is formulated in a participatory and inclusive approach, by holding a series of workshops to: (i) inform sectoral stakeholders about the NAP process; (ii) record their concerns for the purpose of formulating the NAP; (iii) obtain their approval of the draft NAP.

The NAP has been devised in two volumes: the main volume contains the main elements of the NAP and the sectoral NAPs which provide detailed information on climate change adaptation in the various development sectors referred to above.
This NAP document, which was developed between November 2012 and January 2015 contains four main sections:

1) Preparatory phase, diagnostic analysis and conclusions from sectoral assessments
2) National adaptation plan
3) Implementation
4) Monitoring/assessment

PART ONE: PREPARATORY PHASE, DIAGNOSTIC ANALYSIS AND RESULTS OF SECTORAL ASSESSMENTS

1.1 NAP FORMULATION AND STAKEHOLDER CONSULTATION PROCESS

The NAP was formulated with very close attention to institutional, technical and financial aspects. First, Burkina Faso adopted the idea in October 2012 of formulating a medium- and long-term climate change adaptation strategy denoted NAPA programming. This idea was fleshed out under the NAPA-BKF-UNDP/Japan project entitled 'Capacity-building for the purpose of taking better account of climate change-related concerns during the preparation and implementation of development plans, programmes and projects'. That project enabled the Mathematical Equation Analysis Laboratory (LAME) of the University of Ouagadougou to prepare climate projections for Burkina Faso up to 2021, 2050 and 2100 and to assess the vulnerability of various development sectors. Thanks to this project, several senior Burkinabe personnel in charge of planning in their various ministries were trained in the T21 multisectoral dynamic model for the purpose of formulating the NAPA program. The persons trained are listed in the annex.

The Ministry of Environment and Sustainable Development instructed the PS/CONEDD and the national NAPA project coordination agency to prepare terms of reference, based on which nine (9) national experts and one expert head of mission were recruited. In order to comply with the directives of the UNFCCC, it was decided to formulate a NAP to replace the NAPA program. Burkina Faso took that decision, firstly so that it would have a document appropriateto its physical and socio-economic conditions and, secondly, so that it would be fully aligned with the UNFCCC recommendations, especially as NAPA programming did not reflect the UNFCCC proposals in either name or content. Having done so, it adopted a methodology and roadmap.
At institutional level, the Secretary General of the Ministry of Environment and Sustainable Development set up an interministerial technical monitoring committee under memorandum no 1049/MEDD/SG of 22 November 2012 to pilot the NAP formulation process. Its specific remit is to:

- monitor and evaluate the entire process;
- validate the work plan;
- authorise consultants to access structures and documents;
- prevalidate the reports and other documents formulated.

The committee is chaired by the Permanent Secretary of the CONEDD and the Director of Studies and Planning (DEP) of the MEDD acts as his alternate. A list of committee members is annexed hereto.

Stakeholders were consulted by development sector in workshops. Stakeholders were asked to consider a basic document prepared by the national expert in charge of the sector. Workshops were organised in the aim of:

- informing the various stakeholders about the NAP formulation process;
- identifying the climate impacts on each sector;

- assessing the vulnerability of each sector;
- determining needs in terms of development and climate change adaptation;
- facilitating the appropriation and operationalisation of the NAP once it had been formulated.

This participatory and inclusive process gave rise to very helpful input from stakeholders.

The huge importance attached to stakeholder consultation is warranted by the very nature of the NAP formulation process, which is predicated on the participation and inclusion of all stakeholders concerned. The quality of the monitoring process is more important than the quality of the document produced due to the fundamental role that stakeholders will need to play during operationalisation of the NAP.

The national approach and strategy applied in order to formulate the NAP are summarised in Table 2 below.

Table 2: National NAP formulation approach and strategy

Planned inputs for NAP process	- Climate change adaptation plan by development sector - National adaptation plan on climate change
Institutional arrangements for the purpose of coordinating, conducting and monitoring the NAP process	- Establishment of an interministerial technical monitoring committee chaired by the PS/CONEDD - Technical supervision of PS/CONEDD - Establishment of a team of nine (9) national experts in nine (9) specialist fields and one senior expert charged with editing the NAP
Stakeholder consultation process	- Organisation of nine (9) stakeholder consultation workshops (one for each development sector:(i) agriculture; (ii) animal production; (iii) environment and natural resources; (iv) meteorology; (v) energy; (vi) health; (vii) infrastructure and housing; (viii) women's associations; (ix) civil society organisations) - Organisation of four meetings of the technical monitoring committee - Organisation of one NAP validation workshop
Technical and financial arrangements	- Technical support for the national NAPA projects coordination agency - Financing of process by national NAPA projects coordination agency

1.2. IDENTIFICATION OF INFORMATION AVAILABLE AND EVALUATION OF CAPACITIES NEEDED FOR THE NAP FORMULATION PROCESS

The NAP formulation process makes provision for identification of available information and capacities and evaluation of the capacities needed. In Burkina Faso the situation is as follows:

Table 3: Inventory of capacities

Capacities available	**Capacities needed**
Competent environmental and sustainable development management structure formally available at national level (SP/CONEDD)	Database on impacts of climate change for each region of Burkina
National structure in charge of disaster and humanitarian crisis prevention available in the form of the National Emergency Aid and Rehabilitation Council (CONASUR) with its own permanent secretariat	Capacity-building for better integration of the climate change adaptation dimension in disaster prevention, preparation and response plans
Database on impacts of climate change available from three (3) NAPA projects	Climate models on reduced (regional) scale
Long-term climate projections prepared by the LAME available (up to 2100)	Designation by the government of a competent ministry (for example the MEDD) to drive sectoral policy review with a view to taking account of climate change adaptation
National skills in T21, R-CLIMDEX, STATA, CROPWAT, E-Infrastructure tools	Involvement and mobilisation of the private sector
Capacity of the Directorate General of Meteorology (DGM) to provide climate information and agro-meteorological advice in real time	Involvement of the government (organisation of a government seminar based on a NAP communication document)
High-performance server (32 000 GB hard disk and 48 GB RAM) available to the Environmental Skills Development, Information and Monitoring Division (DCIME)	Involvement of the National Assembly and the Economic and Social Council (CES) (organisation of awareness-raising workshops for MPs and CES advisors based on a NAP communication document)
Storage and online availability of information on the environment and climate change by the Environmental Skills Development, Information and Monitoring Division (DCIME)	Involvement of the National Assembly and the Economic and Social Council (CES) (organisation of awareness-raising workshops for MPs and CES advisors based on a NAP communication document)
Existence of a network of partners in the various ministries (DEP)	Institutional, financial, technical and material capacity-building by DEP
Availability of guidelines for integrating climate change adaptation into work plans and project cycles	Institutional, financial, technical and material capacity-building by DEP Technical capacity-building for effective appropriation of guidelines
Well organised network of civil society organisations (CSO) evolving in the field of climate change	Capacity-building of stakeholders involved
Network of women's associations involved in the fight against climate change	

This inventory of capacities was prepared by the PS/CONEDD based on inventories carried out in the Directorates of Studies and Planning (DEP) of the following twelve (12) ministries in order to assess their ability to integrate the climate change adaptation dimension in work plans and project cycles. List of ministries:

- Ministry of Agriculture and Water Resources
- Ministry of Environment and Sustainable Development
- Ministry of Animal and Fishery Resources
- Ministry of Scientific Research and Innovation
- Ministry of Mines and Energy
- Ministry of Transport, Post and the Digital Economy
- Ministry of Economy and Finance
- Ministry of Secondary and Higher Education
- Ministry of Infrastructure and Access
- Ministry of Housing and Urban Planning
- Ministry of Communication
- Ministry of Health

This inventory is by no means exhaustive; however, it does give a good idea of the information and capacities available and of the assessment of the capacities needed.

1.3 ELEMENTS OF SOLUTIONS TO ADDRESS GAPS AND SHORTCOMINGS IDENTIFIED IN INTERVENTION FRAMEWORKS

Having identified the gaps and shortcomings that might hamper the normal NAP formulation process, needs in terms of capacities and associated proposals are set out in Table 4 below.

Table 4: Needs in terms of capacities and elements of solutions

Capacities needed	**Elements of solutions**
Database on impacts of climate change for each region of Burkina	Create a freely-accessible database on the impacts of climate change for each region Improve existing databases
Climate models on reduced (regional) scale	Formulate regional climate models
Designation by the government of a competent ministry (for example the MEDD) to drive sectoral policy review with a view to taking account of climate change adaptation	Ministry of Environment and Sustainable Development to file a report to the Council of Ministers
Involvement and mobilisation of the private sector	Organise information and awareness-raising workshops on the impacts of climate change on the economy for the private sector under the aegis of the Chamber of Commerce, Industry and Handicrafts (CCIA) and the National Council of Employers of Burkina Faso (CNPB)
Government involvement	Organise a government seminar on how to take account of climate change adaptation in development policies and strategies

	Formulate and implement a capacity-building plan for senior civil servants in ministry departments on how to take account of climate change in development planning
Involvement of the National Assembly and Economic and Social Council	Organise information workshops on climate change for specialist working parties (networks, commissions) of the National Assembly and the ESC
institutional, financial, technical and material capacity-building of DEP	Formulate and implement a DEP institutional, financial and material capacity-building programme

1.4 ASSESSMENT OF DEVELOPMENT NEEDS AND CLIMATE VULNERABILITIES

At this stage, it is necessary to target the key development objectives which are vulnerable to climate change and should therefore benefit from adaptation measures. Given the relatively large number of policy and strategy documents currently being implemented, the focus has been placed on the accelerated growth and sustainable development strategy (AGSDS), the macroeconomic policy document that will underpin all sectoral development policies and strategies. The analysis covered the four strategic axes of the AGSDS. The climate impact or risk was estimated for each strategic axis and then elements of solutions were proposed. They are summarised in Table 5 below:

Table 5: Vulnerability assessment for each AGSDS strategic axis

AGSDS strategic axes	Climate impact or risk	Proposal for integrating adaptation
Axis 1: Develop accelerated growth pillars (agriculture, livestock farming, forestry, energy, infrastructure)	Frequent droughts and floods may reduce production in the rural sector	Integrate adaptation into individual AGSDS policy and strategy action plans
Axis 2: Consolidate human resources and promote social protection	Significant increase in maximum and minimum temperatures and alternating periods of drought and heavy rainfall may exacerbate certain diseases such as meningitis and malaria	Take account of climate change adaptation in health strategies by reviewing existing planning frameworks and directives
Axis 3: Strengthen good governance	Forced migration of rural populations and animals due to climate change may disrupt physical planning and local governance	Review basic national physical planning plan (NPPP) and agricultural and forestry restructuring (AFR) documents and ensure that climate change adaptation is taken into account
Axis 4: Take account of horizontal priorities in development policies and programmes	Environmental deterioration may make equitable access to natural resources and vital spaces more difficult	Implement national sustainable development policy and its policy act Take account of national gender policy and climate change adaptation in rural development programmes and projects

The same exercise was carried out for each sectoral policy in the aim of assessing vulnerabilities and taking account of climate change adaptation in various sectoral policies. It is on that basis that the sectoral NAPs were formulated.

1.5. ANALYSIS OF CURRENT AND FUTURE CLIMATE CHANGE SCENARIOS

1.5.1 Studies carried out by the Mathematical Equation Analysis Laboratory (LAME)

Climate issues have been at the forefront of development concerns as the main constraint or source of major uncertainty for over a decade. Adaptation activities have gradually been developed in rural areas, with varying degrees of success, importance or visibility based on local, traditional knowledge. These traditional techniques and practices have been optimised by involving researchers.

However, the incorporation of climate issuesinto political visions, orientations and instruments at national level still falls short of what is needed. In addition, aside from a few scatteredpilot interventions here and there in the form of local development projects, consideration of them is stillsparseand, for the most part, informal. A national assessment of the climate factor is required if climate data are to be systematically integrated into national political visions, orientations and instruments.
Within the framework of formulation of the NAP, the Mathematical Equation Analysis Laboratory (LAME) of the University of Ouagadougou carried out climate modelling, risk evaluation and climate change vulnerability studies. The first series of these studies covers climate trends from 1980 to 2010 and the second assesses the risks of and vulnerability to climate change. That second study, which is explained below, attempts to highlight objective and reproducible elements which can be taken into account or documented in strategic development planning.

1.5.2 Global climate context

According to the fourth report of the Intergovernmental Panel on Climate Change (IPCC), rising temperatures, more intense and frequent droughts, reduced local rainfall and even melting glaciers are expected over coming decades. The IPCC has used six scenarios of greenhouse gas emissions with varying levels of pollution to describe the climate of the future in order to arrive at its 'best estimates', i.e. global warming of between 1.8 and 4 degrees Celsius in 2100. More importantly, they estimate that a rise of +2°C is inevitable by the end of the century, irrespective of any efforts made to reduce greenhouse gas emissions.

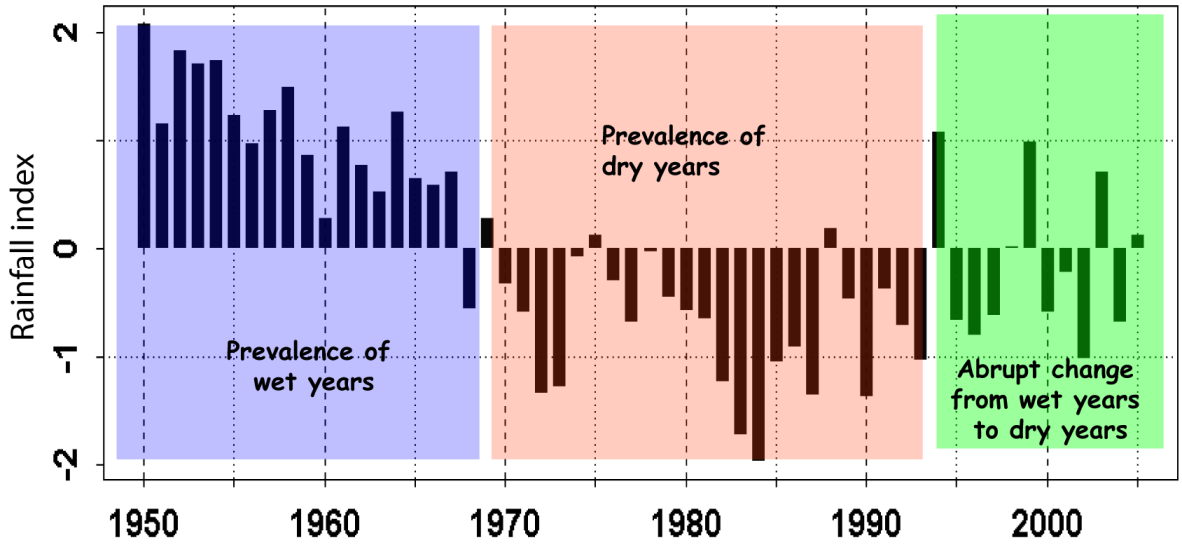
These projections suggest that Africa will see rising temperatures during the 21st century; however the degree of warming depends on the socio-economic and demographic scenario in question and the climate simulation model used.
There are differences of opinion as to the change in rainfall depending on the model used (less than 66 % of the models agree on the change in the Sahelian zone).
These climate changes will have very significant consequences in terms of water resources, biodiversity, sea levels etc. and will impact on numerous sectors of activity (agriculture, tourism, infrastructure, urban planning, health etc.).

1.5.3. Climate of Burkina Faso

1.5.3.1 Change in rainfall

As in the other countries of the sub-region, the signs of climate variability and change in Burkina Faso established by the Directorate General of National Meteorology (DGM) are a reality in terms of rainfall.
Figure 1 below illustrates changes in rainfall in Sahelian countries from 1950 to 2005 recorded by the AGRHYMET of the Permanent Interstate Committee for Drought Control in the Sahel in Niamey in Niger.

Figure1: Change in rainfall index in Sahelian countries from 1950 to 2005



Source: AGRHYMET, Niamey (Niger)

As the figure illustrates, there have been three main trends:

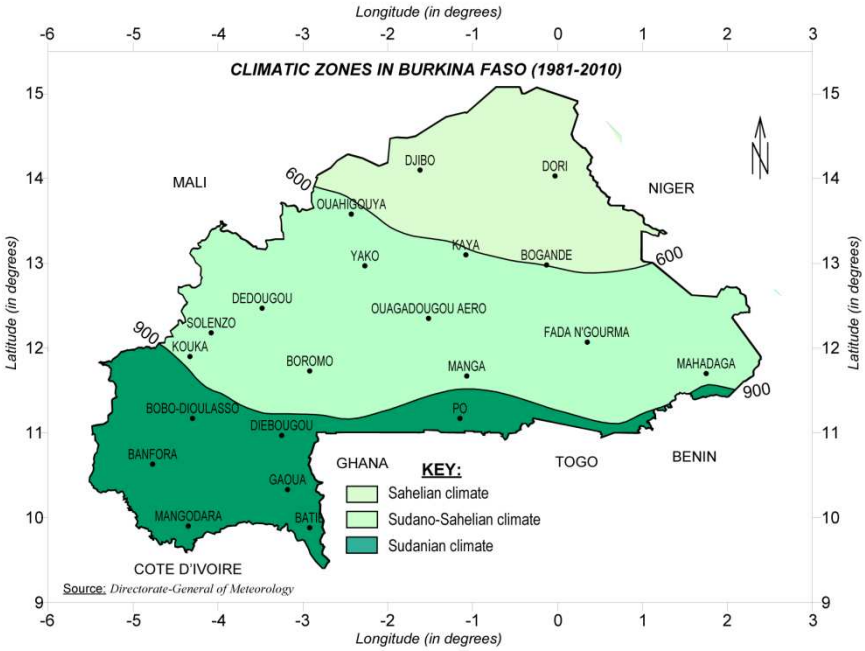
- between 1950 and 1970: prevalence of wet years;
- between 1970 and 1990: prevalence of dry years;
- from 1990 onwards: marked shifts between wet and dry years.

The DGM analysis illustrates that rainfall in Burkina Faso changed during the 20th century. The data compiled for that period indicate:

- a downward trend in total annual rainfall across the entire country;
- a downward trend in the indicator across the number of rainy days;
- an upward trend in the number of consecutive dry days (from 46 to 57 days per decade in the areas of Dédougou, Farakoba and Ouahigouya).

Burkina Faso has three climate zones, as illustrated in Figure 2 below:

Figure2: Climate zone map of Burkina Faso



In all three climate zones, there was a downward trend in rainfall at the reference weather stations at Dori (Sahelian zone), Ouagadougou (Sudanian-Sahelian zone) and Bobo-Dioulasso (Sudanian zone) between 1960 and 2011.
Moreover, cumulative rainfall data analysis for thirty-year periods (normal values) indicates that the 600 and 900 mm isohyets migrated about 100 to 150 km from north to south between 1930 and 2010.

However, a more detailed analysis for 10-year periods indicates that the isohyets moved back about 50 km between 2001 and 2010 in the southern, central/southern and north-western regions of the country.

1.5.3.2 Changes in temperature

Long-term data on extreme temperatures indicate an overall upward trend in the number of hot days and hot nights, except in the south-western regions, where there has been a downward trend in the number of hot nights.

Detailed analysis indicates that there is generally an upward trend in extreme annual temperatures (minimum annual temperatures and maximum annual temperatures) in both the Sudanian and the Sahelian zones (Table 6). However, the rise inminimum annual temperatures is more pronouncedthan the rise in maximum annual temperatures.

Table 6: Changes in extreme temperatures (1960-2011)

District	Variation in minimum annual temperatures	Variation in maximum annual temperatures
DORI	+0.8°C	+0.3°C
OUAGA	+0.8°C	+0.5°C
BOBO	+0.6°C	+0.7°C

LAME, 2012

1.5.4 Climate projections for Burkina Faso

The Mathematical Equation Analysis Laboratory (LAME) of the University of Ouagadougou considered three weather stations representative of the three climate zones of Burkina Faso for the purpose of its studies into climate change:

- Dori for the Sahelian zone (14.03° N, 0.03° W; altitude 276 m)
- Ouagadougou for the Sudanian-Sahelian zone (12.35° N, 1.52° W; altitude 306 m)
- Bobo-Dioulasso for the Sudanian zone (11.17° N, 4.32° W; altitude 460 m)

For each station it considered, first, the historic data recorded and, second, the data from:

- the projections from five regional climate models (CRCMs) from the AMMA (African Monsoon Multidisciplinary Analysis) programme using scenario A1B;
- the projections from nine global climate models (GCMS) by the University of Cape Town (UCT) using scenarios A2 and B1.

The scenarios used by the LAME for climate projections are described in Table 7 below:

Table 7: Climate projection scenarios

Scenario	Description
Scenario A2	Scenario A2 is the most pessimistic scenario and assumes a situation in which there are no restrictions on greenhouse gas emissions. In this scenario the concentration of CO_2 in 2100 is 840 ppm. **Period 2046 to 2065, then 2081 to 2100**.
Scenario B1	Scenario B1 is more optimistic, with a concentration of CO_2 in 2100 of 550 ppm. **Period 2046 to 2065, then 2081 to 2100**.
Scenario A1B	In scenario A1B (intermediate scenario) the concentration of CO_2 in 2100 is 770 ppm. **Period 2021 to 2050**

LAME, 2012

Data on rainfall (annual and in July, August and September), temperatures and evapotranspiration were analysed for the climate projections.
Figures 3 and 4 and Figures 5 and 6 illustrate annual precipitation (PA) and precipitation in July, August and September (PJAS) for scenarios A2 and B1.

Figure3: Trend in annual rainfall, scenario A2, 2046-2065

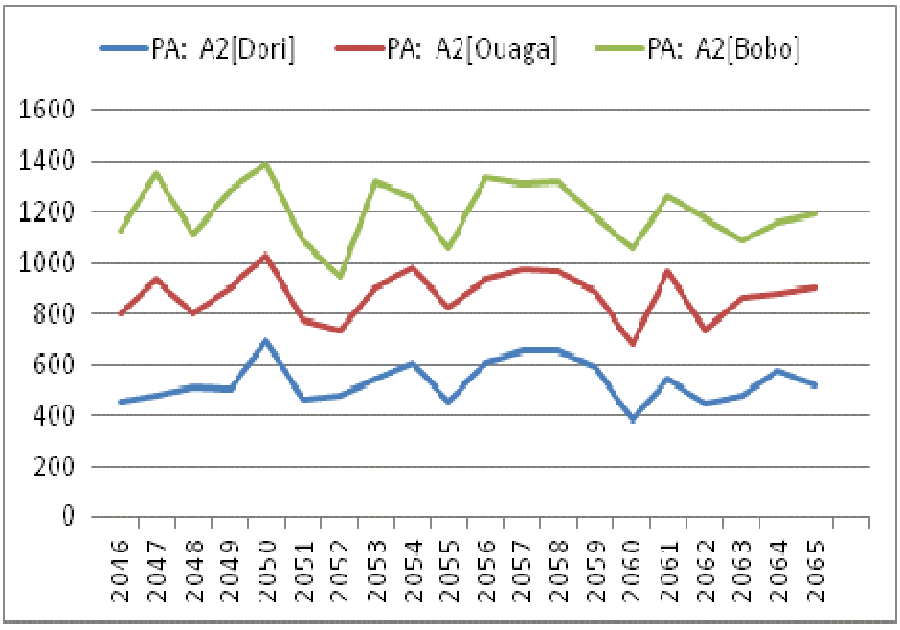
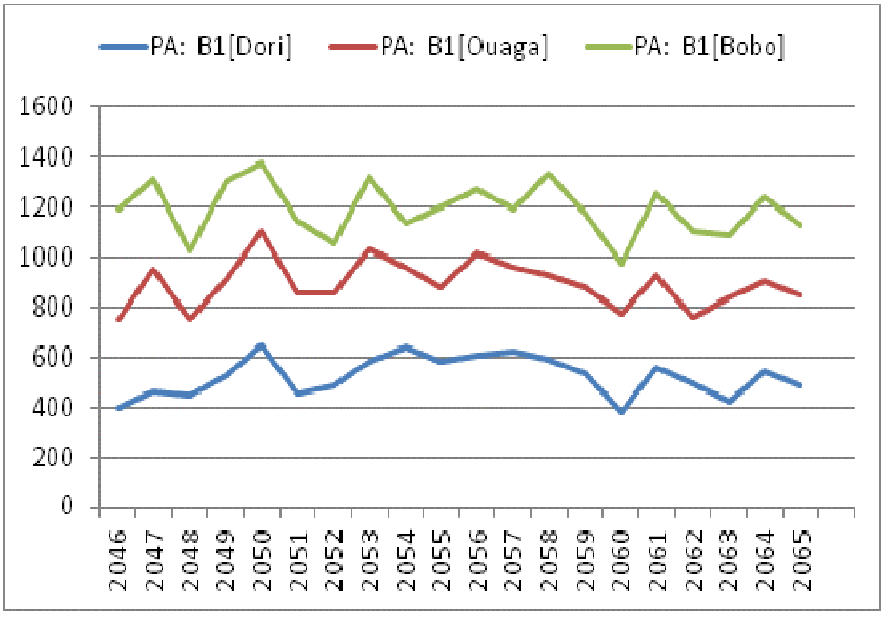


Figure4: Trend in annual rainfall, scenario B1, 2046-2065



LAME, 2012

Figure5: Trend in precipitation in July/August/September, scenario A2, 2046-2065

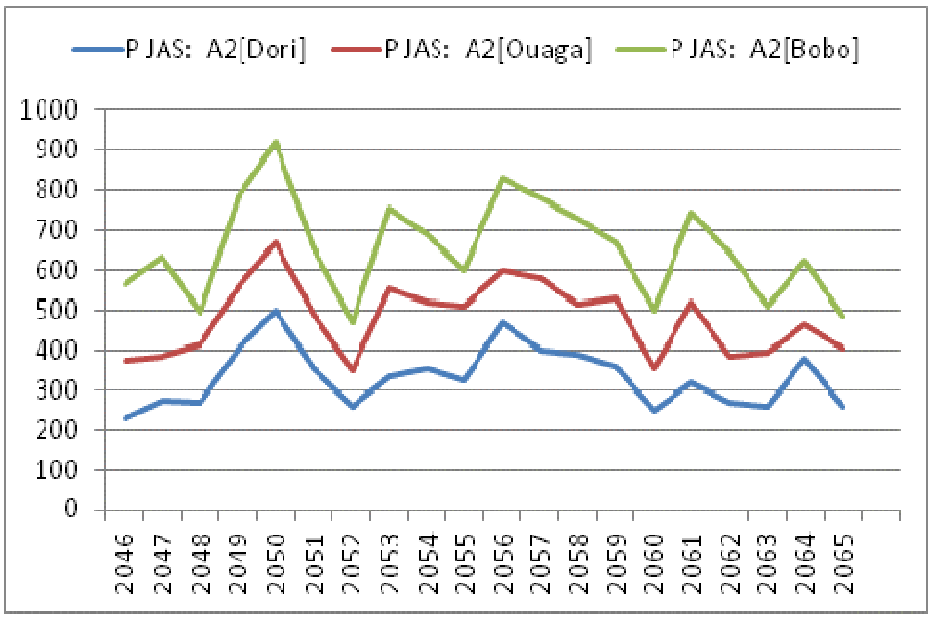
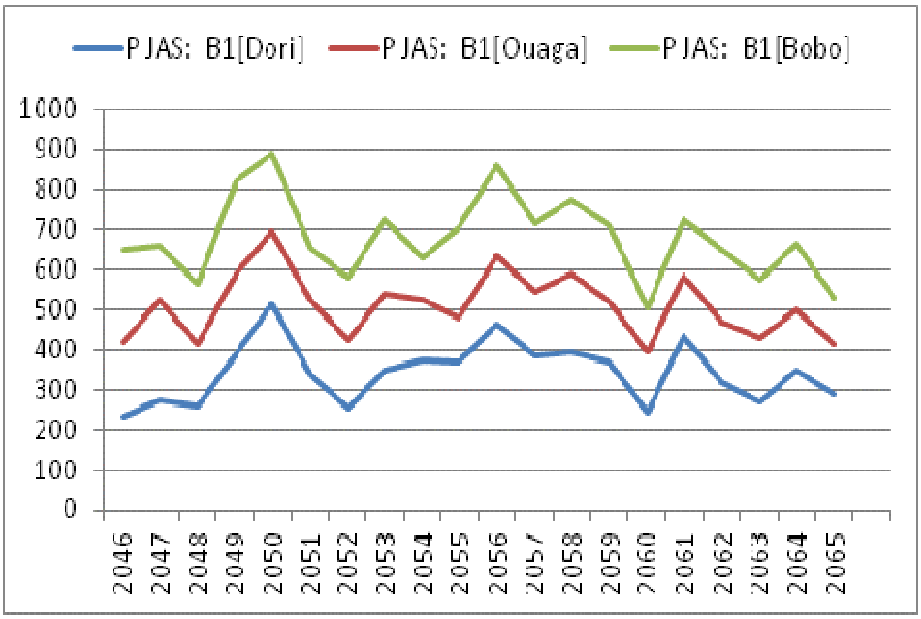


Figure6: Trend in precipitation in July/August/September, scenario B1, 2046-2065



LAME, 2012

In both scenarios for all three weather stations there would appear to be a stable or downward trend in annual rainfall and in rainfall in July, August and September between 2046 and 2065. However, compared to the baseline situation (1981-2010), the volume of rainfall will be larger in scenario A2 and smaller in scenario B1 (Table 8).

Table 8: Projected rainfall 2046 to 2065 and dispersion

		1981-2010			A2 (2046-2065)			B1 (2046-2065)		
		Bobo	Ouaga	Dori	Bobo	Ouaga	Dori	Bobo	Ouaga	Dori
PA	10%	824	589	322	811	557	274	392	300	189
	Mean	955	709	450	1203	874	532	655	478	333
	90%	1197	834	549	1443	1068	676	778	602	438
PJAS	10%	504	382	247	929	679	383	521	386	249
	Mean	622	511	342	1192	894	523	680	511	344
	90%	780	642	445	1424	1091	671	778	619	421

LAME, 2012

PA: annual precipitation

PJAS: precipitation in July, August and September

In scenario A2, the increases apply mainly to the upper set of values, i.e. above the mean, suggesting that extreme rainfall will increase.
In terms of data on temperatures, all scenarios result in practically the same increase to within 0.5°C for the stations considered and to within 1°C for the scenarios considered.

Table 9: Temperature projections

Change in temperature	**Bobo**	**Ouaga**
Increase (maxima and minima) A2: 2046-2065	from 1.5 to 3.5°C Av. of 2.5°C	from 2 to 3°C Av. of 2.5°C
Increase (maxima and minima) B1: 2046-2065	from 1 to 3°C Av. of 2°C	from 1 to 2,5°C Av. of 2°C
Increase (maxima and minima) A1B: 2021-2050	1 to 1.8°C Av. of 1.5°C	from 1.7 to 2°C

LAME, 2012

The findings are summarised below:

1) There is a low risk of decreased rainfall.
2) There is a riskof the rainy season becoming longer, starting earlier and ending later, with less rainfall in July and August and more rainfall in September and October.
3) There is a riskthat variability from one year to the next will increase.
4) There are risksof more frequent torrential rainand increased variation in the occurrence of pockets of drought at the start and end of the season.
5) There is the riskof an increase in maximum and minimum temperatures of 2.5°C to 5°C.
6) There is the risk that monthly potential evapotranspiration will increase significantly (PET) (2 to 10 mm).

The anticipated consequences are as follows:

1) The significant variation in rainfall from one year to the next and the increase in potential evapotranspiration (PET) represent definiterisks to the uninterrupted growth cycle of rain-fed crops.
2) More frequent and more serious flooding, with a destructive impact on infrastructure and makeshift housing, loss of crops and destruction of biodiversity in the lowlandsand an increase in waterborne diseases such as cholera and other parasitic diseases.
3) An increase in PET combined with anthropogenic activities resulting in faster degradation of ground vegetation and thus a reduction in infiltration for groundwater recharge. Surface water will also evaporate faster and perennialwater-courses will tend to disappear with gallery forests. Currently, over 60 % of water retained behinddams is lost to evaporation.
4) The capacity of forest formations to regenerate will no longer be enoughto compensate for timber cutfor energy.
5) The shortage ofpasture land and bodies of drinking water will force pastoralism to move further and further southwards.

6) The longer rainy season will increase cases of malaria and reduce the dry period which favours meningitis; however, the dry periodwill be marked by a general rise in temperatures.
7) Electricity consumption for air-conditioning will increase by an additional 25-50 % merely by reason of the rise in temperature, which will complicate production management during hot spells.

The LAME has proposed a number of adaptation and mitigation methods, but they will need to be explored and supplemented by specific studies before decisions can be taken within a framework of coherent multi-sectoral policies:

- establish appropriate backup food stocks;
- encourage rational water use practices (e.g.: drip irrigation);
- extend water and soil conservation practices;
- reduce evaporation by constructing water cisterns and using approved chemical products specifically manufactured for that purpose;
- carry out research into short-cycle enterprises;
- develop renewable energies;
- increase energy efficiency;
- strengthen, redimension and extend infrastructure;
- step up actions to prevent malaria and waterborne diseases.

The LAME has already prepared many of these studies covering agriculture, livestock farming, the environment, health, water resources, infrastructure and energy for the purpose of the NAP. These studies have been collated for ease of use in a single volume.

To conclude:

- Forecasts based on the two scenarios suggest extreme variability in rainfall distribution, a relative reduction in JAS rainfall and a longer rainy season. That would mean more scattered and hence less efficient rainfall.
- Even in the best-case scenario, an increase in rainfall and an increase in the frequency of extremes of rainfallmeans that rainy days would be more scattered. Moreover, the recurrence of long dry periods during winter would compromise sensitive crops such as maize, rice and pulses. This situation will inevitably increase the proportion of irrigated and semi-irrigated agriculture; hence the importance of promoting tools for seasonal monitoring of water losses (FAO CropWat, for example).

1.6 ASSESSMENT OF VULNERABILITY TO CLIMATE CHANGE BY DEVELOPMENT SECTOR

1.6.1 Definition of vulnerability

The definition of the term 'vulnerability' has been the subject of major scientific debate. Of all the definitions proposed, we shall use those which apply best to our subject area of climate change and its environmental and socio-economic impacts.

Vulnerability designates a series of predominant or consecutive circumstances comprising physical, socio-economic and/or political factors which have a negative impact on the ability to cope with disasters. Vulnerability may be of a physical, social or behavioural nature.

Vulnerability also denotes the response capacity of the economy or society during and after a disaster. On an analytical level, it measures the capacity of a person or community to anticipate, respond to and recover from a serious event such as a natural disaster or humanitarian crisis or to a major change in living conditions and environment.

From a climate change perspective, the Intergovernmental Panel on Climate Change (IPCC, 2007) defines vulnerability as '*the degree to which a system is susceptible to or, and unable to cope with, adverse impacts of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, the sensitivity and adaptive capacity of that system*'.

The National emergency relief and rehabilitation organisation and coordination plan (PNOCSUR, 1999) of Burkina Faso defines vulnerability as follows: *'Being vulnerable means living in conditions which are so precarious that everything that goes wrong or everything that may change the current situation puts survival itself at risk. Vulnerability is therefore caused by the possibility that a destructive event may occur against which vulnerable populations are unable to defend themselves. It may have origins of a physical nature (types and location of structures), economic nature (possession of livestock, fields, equipment etc.), social nature (weakness of children, sick people, elderly people, salaried employees etc.) or cultural nature (traditions)'*.

1.6.2 Agriculture

Burkina Faso is highly exposed to the harmful effects of climate variability and change by reason of its geographical location in the centre of the Sudanian-Sahelian zone of West Africa. In fact, Burkina Faso lies in a zone in which the average annual depletion of agricultural land is between 51 and 100 kg/ha of $N + P_2O_5 + K_2O$ (FAO 1985[1]).

[1] Sectoral National Action Plan: Agriculture

A vulnerability analysis by priority sector based on surveys of 60 villages and backed up by bibliographical documents and expert opinions is presented in Table 10 below.

Table10: Analysis of vulnerability of exposed sectors in Burkina Faso

Resource/ Sector	Degree of impact	Duration of impact	Severity of impact	Importance of resource/sector
WATER	High	High	High	Very high
AGRICULTURE	High	High	High	Very high
LIVESTOCK FARMING	High to moderate	High to moderate	High to moderate	High
FORESTRY	High to moderate	High to moderate	High to moderate	High

Source: MECV, 2007

The analysis clearly illustrates that the agriculture and water sectors, which are closely interconnected and the sectors most permanently affected by climate change, are the most vulnerable.

Studies assessing vulnerability and the capacity to adapt to climate variability and change highlight the four most vulnerable key sectors, namely agriculture, water resources, livestock and forestry/biodiversity and the most vulnerable groups, namely poor rural communities (women, young people, small-scale farmers).
The most frequent elements of vulnerability in nutrition and economic terms include:

- Famine and its nutrition impacts: inability to maintain a proper diet throughout the year. Some farmers eat just one meal a day at critical times of the year and this impacts on the health and diet of the population.
- Weakening of the economic base, triggering a process of impoverishment: lower agricultural yields and the mortality rate among cattle that survive the cycle of shocks such as drought reduce both food stocks from one year to the next and revenue opportunities. Women are in even worse off in this respect, as they cannot generate an income by selling natural resources.

Poverty is an indicator of vulnerability to climate change. The poorest are the most vulnerable as they do not have the resources needed to combat it. According to reports published by the National Institute of Statistics and Demography (INSD), poverty is worse in rural areas in which almost the entire population is engaged in agriculture. The poverty index in rural areas is 52.3, compared to the national average of 46.4. Poverty is also worse among women. Women have an indicator of 47.1, compared to 45.7 for men. Table 11 below gives an idea of poverty among various socio-economic groups.

Agriculture will always be an economic sector which is very vulnerable to climate change. Farmers in rural zones, women and children will be the groups at highest risk and proactive policies should be adopted for their benefit. Farmers are the most disadvantaged and

households engaged in subsistence farming are the worst affected. That means that a large proportion of farmers are vulnerable to climate change.

Table11: Vulnerability of socio-economic groups.

Socio-economic groups	Poverty indicator (P0)	Depth (P1)
Subsistence farming	43.7	13
Progressive farming	36.4	10.5
Inactive	28.7	8.3
Unemployed	23.4	6.9
Other active	14.4	3.5
Self-employed (non-agricultural)	8.9	2
Unprotected workers	7.8	1.5
Protected workers	1.3	3

Source: INSD, 2008

Declining rainfall, combined with rising temperatures, will reduce the yield of millet (a rural crop) on land with low water reserves in the Sahelian zone. In the Sudanian zone, the yield from millet, sorghum and maize crops grown in deep soil will tend to increase due to the slight improvement in rainfall forecast for June, which will help the seeds to germinate. However, the yields from maize crops grown in soil with low useful water reserves will decline significantly in the same region due to the lack of water in the months of July, August and September.

1.6.3 Livestock farming

The vulnerability analysis of the livestock farming sector will take account of one specific but important element for livestock farmers, sensitivity.Sensitivity, according to the Network of Organisations of African Arable and Livestock Farmers, is the exposure and responsiveness of populations to a very difficult environment, combined with the authorities' failure to provide adequate protection of their citizens' civil and social rights.

1.6.3.1 Sensitivity of means of existence to climate risks

The climate risk sensitivity analysis suggests that the Sahelian zone is at highest risk in the livestock farming sector in terms of means and methods of existence. In terms of pastoral resources, the climate risk sensitivity differential appears to be insignificant between the various zones. Therefore, grazing lands might be exposed to the same climate risk and might prevent pastoral practices designed to exploit regional complementarities. However, livestock farming would appear to stand a greater chance of withstanding the impact of climate extremes in the South Sudanian zone (southwest). That zone will probably see enhanced

integration of livestock farming as a result of a change in practice within the farming system, with fattening simply being transferred to farm holdings.

1.6.3.2 Sensitivity of animal species to an arid climate

The sensitivity of species to climate variability from a zootechnical point of view depends on the animal's ability to adapt to the pastoral resources available in its ecosystem. Monogastric animals such as poultry and pigs feed on local products and, comparatively speaking, are less at risk than ruminants dependent on natural grazing land which, biologically speaking, do not have the same ability to adapt to an increasingly arid climate.

Sheep are very demanding ruminants in terms of their food supply. They cannot ingest more than 30 % of their daily ration in the form of woody products and they will only eat herbaceous food which is delicate and tender. They are therefore the first to feel the brunt of a lack of fodder.

Goats are highly resistant and can take up to 70 % of their diet (or even all of it for a certain period of time) in tree leaves and fruits. That type of food is the most frequently available even at times when herbaceous pastures produce poor vegetation. This enables goats to provide shepherds with minimum means of survival in the event of drought.

Cattle, like sheep, cannot ingest more than 30 % of their ration in the form of woody products due to the tannin content of forage.

On the other hand, they are happy with coarse forage and their ability to adapt enables them to assimilate hard straw. Like dromedaries, they are able to store fat in a hump. But, their main ability to adapt lies in their capacity to go into semi-hibernation in the hot season, with minimum energy expenditure and milk production, and to halt their growth if forage is in short supply. When forage is in abundant supply, they restore their fat reserves and their growth spurts.

Camels can easily do without water for several weeks if necessary and can ingest hard plants and even branches of thorns. They have also evolved the ability to store fat and to use it for energy not provided from forage.

1.6.3.3 Vulnerability of animals depending on climate scenarios

Not all species of animal are at the same degree of risk under the various climate scenarios. The most frequent climate scenarios which result in loss of livestock are: drought causing a shortage of grazing, reduction in agricultural production, flood and hurricane winds and hot spells.

Sheep and cattle are most at risk when there is a shortage of food and water. In the event of poor harvest, goats and pigs are exposed to the risk of sale and poultry farmers are forced to cut back their staff or reform. During hot spells, mortality and egg drop affect laying hens. Floods wash away coops, sties and enclosures for small ruminants.

1.6.3.4 Vulnerability of production system operators to risks

All production systems are vulnerable to climate risk, especially shortage of water and grazing. However, some have practices which enable them to adapt better. Shepherds have the experience to develop a transhumant system and usually circumvent the risk of water and grazing shortages. Arable/livestock farmers are sedentary operators who closely integrate livestock and arable farming. They therefore have the opportunity to set large fodder stocks aside. However, those stocks may be limited if grassland performs poorly and their herd may be exposed to the risk of a lack of drinking water. Livestock will probably have to be sold in the event of poor harvests in order to reimburse agricultural credit. Village farming practised by the poorest and the poor usually involves poultry, small ruminants and pigs. This livestock is at risk of loss in the event of poor harvests and loss of staff in the event of flood.

Fattening during the cold dry season is compromised where fodder stocks are low and agro-industrial by-products are expensive. Modern poultry farmers are often faced with increases in the price of cereals and significantly reduced production during hot spells.

1.6.3.5 Vulnerability of zones

Zone-based vulnerability is where livestock farming may be susceptible to the direct or indirect effects of climate hazards in a given location. It may be rural or urban. In the suburbs, improved livestock farming in towns such as Ouagadougou and Bobo-Dioulasso is at risk of increased production costs, hot spells and outbreaks of animal diseases caused by variations in climate factors and poor household waste management. In rural areas, on the other hand, that vulnerability is made even more complex by zones with an acute shortage of pastoral resources and conflicts and zones in which outbreaks of animal diseases occur or reoccur. This spatial vulnerability is of a temporary nature; it applies in periods in which rain-fed and out of season crops are planted, when harvests are brought in and when water for livestock is in very short supply.

The zones most at risk of a shortage of forage are in the regions of Sahel, Centre-North, East, Centre-East, North and Plateau-Central. However, the zone from South-East to South-West is subject to a rapid deterioration in pastoral resources in the hot season, thereby compromising the length of time for which transhumant herds can stay.

The regions at risk of grazing conflicts are in South-West, Cascades, Centre-South, Boucle du Mouhoun and Centre-East, all of which are areas which transhumant herds use or cross. The region of Centre-North has become a zone at potential risk of conflict due to the obstruction of access corridors to watering holes by market gardens and gold panners. With

its numerous grazing zones and well-known bore-hole (known as 'Forage Christine'), the Sahel includes strategic areas to which livestock can withdraw in the dry period and pastoral conflict may well be triggered by infrastructure management.

1.6.3.6 Gender-based vulnerability

According to sociological and economic studies, gender-based vulnerability in the livestock farming sub-sector may severely affect women in rural areas in terms of membership of professional livestock farming associations and dispossession of animals. Women own small ruminants, pigs and poultry and are responsible for looking after lactating cows. Increasingly short periods between pockets of drought will exacerbate the loss of livestock as a result of sales of goats and pigs. Floods will temporarily stop small-scale livestock farming by women and young people due to the time needed to replace production stock. The profit margin on fattening in the dry cold season, which women take charge of, will narrow due to rising prices of production factors. Women in rural areas who initiate livestock farming in barns will be more dependent on men to construct the building and the land will revert to the latter.

Poor women will see a significant fall in their source of income due to the small quantity of milk available due to the reduction in the size of cow herds and their mobility. Family pig farms will operate in slow motion due to a shortage of local grain. Finally, farming in the lowlands in the dry season will put village sheep farming at greater risk of an acute shortage of forage in the critical dry season.

1.6.4 Environment and natural resources

Precipitation in Burkina Faso fell overall from 1950 to the mid-1980s, rose again in the 1990s and has remained relatively stable over the past 20 years (LAME, 2012). According to the same source, temperatures have risen in the order of 0.6°C (0.15° a decade) since 1975.

According to the various climate scenarios developed by the LAME (2012), there should be no less rainfall, but the rainy season will start earlier and end later, there will be less rain in July and August, more rain in September and October and much greater variations from one year to the next up to 2050. There will be more frequent torrential rainand increased variability in pockets of drought at the start and end of the season.

Maximum and minimum temperatures will rise by between 2.5°C and 5°C. Monthly potential evapotranspiration (PET) will also rise significantly (by 2 to 10 mm).
All the changes to come will put the environmental sector and natural resources at risk of a number of predictable effects, namely:

- biodiversity and ecosystems: the 2007 IPCC report predicts that approximately 20 to 30 % of the animal and vegetable species studied to date are probably at risk of extinction if the average global rise in temperature exceeds 1.5°C to 2.5°C (projections for Burkina forecast an increase of between 2.5°C and 5°C). Based on that sort of rise

in temperature and the associated increase in atmospheric concentrations of CO_2, the projections predict important changes in the structure and function of ecosystems, ecological interactions between species and distribution areas of species, with mainly negative impacts on biodiversity and the goods and services of ecosystems. The size of the problem is such that a specific study is needed in order to understand the domino effect of the impacts;

- the significant variation in rainfall from one year to the next and the increase in potential evapotranspiration (PET) represent definite risks to the uninterrupted growth cycle of plants (loss of biomass). There is therefore a risk that the regeneration capacity of forest formations will be unable to compensate for timber cut for energy;
- more frequent and serious flooding is to be feared, with destructive effects on biodiversity in the lowlands and an increase in water-borne diseases among wild fauna;
- the increase in PET combined with anthropogenic activities will result in faster degradation of ground vegetation and thus a reduction in infiltration for groundwater recharge. Surface water will also evaporate faster and permanent water courses will tend to disappear with gallery forests. Evaporation currently accounts for losses of 60 % of the water retained by dams, putting fish farming, forestry and animal farming at risk, as well as the supply of drinking water and water for crops;
- increased temperatures combined with the action of the wind may accelerate the process of desertification and exacerbate the problem of bush fires and their myriad consequences;
- variations in rainfall from one year to the next and rising temperatures will expose wild fauna to regular water shortages in wildlife areas.

Generally speaking, the determining and dominant risks would appear to be linked to factors other than climate in this sector. Even with constant or improved precipitation, primary production has been declining year on year according to studies carried out by the LAME (2012). These risks will interact with climate risks (reduction in precipitation) and will seriously compromise primary production and the food network based on it.

In terms of vulnerability, evapotranspiration (stable to rising) is the main climate factor that will drive the risks and compromise the sustainable development of ecosystems and the services which they can provide to human communities.

In terms of the mining sector in Burkina Faso, the main potential comprises gold, zinc, manganese, limestone, nickel, copper, lead, diamonds and antimony. Climate change, one feature of which in Burkina Faso is an increase in the scale and intensity of extremes such as pockets of drought, will cause pressure to be exerted by the people on mining resources. In fact, one of the home-grown solutions recommended by the people in response to the impacts of drought on their means of existence and subsistence is to find new sources of income by exploiting mining sites (especially panning for gold), the consequences of which on the environment and human life are incontrovertible. Also, small-scale exploitation or gold

panning cause environmental problems (pollution, deforestation, use of prohibited products etc.) which need to be addressed with a view to sustainable management of mining resources.

1.6.5 Energy

The members of the Intergovernmental Panel on Climate Change (IPCC) are unanimously agreed that numerous natural systems are affected by climate change (IPCC, 2007) and that this is no longer a strictly scientific issue that will impact on the distant future; it is a current concern which impacts on national policy.

The message from the scientists leaves no room for doubt as to the direction these changes will take, even if their scope is still uncertain. Whatever efforts are made to reduce emissions of greenhouse gases, serious change is unavoidable due to the inertia of the climate system. Those changes will affect numerous sectors, including the energy sector, which has been classed third in terms of vulnerability to climate change (IPCC, 2007).

According to the '*Multisectoral vulnerability analysis for the purpose of formulating a national adaptation strategy to climate change in the medium to long term (2025 and 2050) for Burkina Faso*' conducted by the Millennium Institute (2012), other sectors of the economy (agriculture, livestock farming, health, environment, infrastructure, housing etc.) will also put pressure on the energy sector, which will become an important sector for climate change adaptation policies.
The climate variations observed and/or projected illustrate:

- a slight reduction in average rainfall (a reduction in the order of 150 mm is predicted for 2025); however, it is mainly the distribution in space and time that will be affected;
- a slight increase in average temperatures in several towns of close to 1°C (upward trend relative to 2.5°C for the country as a whole in 2025);
- a recurrence of extreme weather conditions (floods, hurricanes etc.).

These forecasts might affect the energy sector as a result of:

- **a reduction in timber resources:** biomass accounts for 85 % of energy consumption at national level (MEDD, 2012). Despite the increase in production of commercial or fossil energies, one cannot discount a reduction in the use of biomass due to the precarious situation of the population and the soaring demography;
- **a reduction in hydroelectric production and thermal production:** the use of water for electricity production depends on the rainfall and drainage systems. A reduction in rainfall and increase in temperature and evapotranspiration may impact on potential hydroelectric production and security of the electricity supply. Similarly, an increase in extreme weather conditions (floods etc.) may compromise the safety of structures and the operation of hydroelectric power stations. Climate change must also be expected to result in stiffer competition for water resources and additional demands in terms of water reserve management. Most electricity in Burkina is generated in thermal power stations.

If the temperature rises, it may be necessary to act for two reasons: first, a higher ambient temperature will reduce the performance and output of thermal power stations and, second, the production capacity may be reduced if there is a shortage of cooling capacity;

- **an increase in consumption of hydrocarbons and electricity:** a rise in temperature may trigger increased consumption of hydrocarbons due to reduced output from thermal motors used in transport and industry. Climate trends concern warming: (i) rising temperatures, especially minimum temperatures; (ii) more frequent hot days and nights; (iii) fewer cool nights and days; (iv) reduction in daily temperature differential etc. All these changes may cause an increase in energy consumption on several counts;

- **recurrent damage to transport and energy distribution installations:** transport and energy storage infrastructure may be affected by climate change on various levels. Rising temperatures and more frequent climate extremes (especially hurricanes) may put the security of electricity installations (especially transmission lines) at risk.

1.6.6 Health

As far as vulnerability to climate change of the health sector is concerned, the main impact will be from climate-sensitive diseases following meteorological events.

1.6.6.1 Vulnerability due to rainfall

As mentioned previously, studies into the impacts of climate change carried out by the LAME highlighted the risks of:

- the rainy season starting earlier and ending later, with less rain in July and August and more rain in September and October;
- greater variation in rainfall from one year to the next;
- more frequent torrential rain;
- pockets of drought with greater variability at the beginning and end of the season;
- an increase in maximum and minimum temperatures of between 2.5°C and 5°C;
- a significant increase in monthly evapotranspiration (2 to 10 mm).

Damage caused by excessive rainfall, especially floods, may pose a risk to public health due to the precarious condition of water works and a gradual deterioration in the quality of water, causing outbreaks of water-borne diseases such as cholera, dysentery and salmonella.

This new situation caused by flooding might pose a risk to food security if harvests are destroyed, thereby also resulting in increased malnutrition, especially among children.

The health sector will also be more vulnerable to the direct effects of flooding, such as infection. The incidence of diarrhoeal diseases, which already account for a large proportion of health problems in Burkina Faso, might well increase.

1.6.6.2 Vulnerability due to rise in temperature

According to the climate scenarios prepared for Burkina Faso, minimum and maximum temperatures are expected to rise in all climate zones.A rise in temperature would shorten the incubation time of the parasite in its vector, thereby increasing the vectorial capacity of the anopheles mosquito. Based on these predictions, people would be at greater risk of catching malaria.

The LAME report on health suggests that malaria tends to flare up in periods of high humidity. Temperatures are also slightly higher at those times of year.

Similar observations suggest that heat enables the anopheles mosquito which transmits the parasite that causes the disease to grow more quickly (William Ndegwa); humid conditions increase its life expectancy and favour its reproduction.

This information suggests that there is a link between rain, rising temperatures and the incidence of malaria in the three climate zones of Burkina Faso.
Furthermore, high temperatures contribute directly to death from cardiovascular or respiratory diseases, especially among the elderly.

Furthermore, the presence of ozone and other pollutants in the air that exacerbate cardiovascular and respiratory diseases increase when the temperature rises.

1.6.6.3 Vulnerability due to other factors

Other factors, such as humidity and dust may encourage certain diseases. Cerebro-spinal meningitis epidemics occur during the dry season, which coincides with periods of low humidity and dusty conditions and disappear with the onset of the rainy season (Molesworth, 2003[2]).

One study carried out in Burkina Faso illustrates that cerebro-spinal meningitis epidemics occur at a particular time of year, namely between January and May, when the climate is dry and hot (Harmattan) and the atmosphere is dusty (Yaka[3]*et a*l. 2008).

According to the LAME 2012 health report, the period when most cases of meningitis are reported (October to December) coincides with rising temperatures and increasing wind speeds. As the temperature falls, humidity rises and as the winds drop, fewer cases of

[2] National Action Plan: Healthcare
[3] National Action Plan: Healthcare

meningitis are reported. That is the period from June to October. Another major factor identified is that more and more cases of meningitis are reported when humidity falls and temperatures and wind speeds increase. The impact of climate change on the health sector will be greater in zones in which climate projections forecast rising temperatures and a reduction in rainfall.

1.6.7.Infrastructure and housing

1.6.7.1 Vulnerability of roads and associated structures

According to findings in LAME studies, failure to complete road structures (waste-water facilities) during housing developments represents a serious handicap in terms of the maintenance of road infrastructure. This results in torrential runoff of rainwater, which erodes the soil around the road infrastructure, which is already in poor condition. During the rainy season, run-off erodes gullies and breaks up the tarmac at the side of the road. According to the LAME, climate change will result in faster deterioration of roads due to rainwater, hence the need for emergency action to repair all structures by restoring the road surfaces which have been washed away.

1.6.7.2 Vulnerability of housing

Climate projections based on LAME studies suggest that the high number of rainy days and long rainy seasons will have a negative impact on buildings, especially makeshift housing made of adobe. That is because adobe is a porous material which absorbs water until it is saturated, at which point it collapses.

Moreover, during the rainy season, the extremely heavy rainfall weakens buildings, especially those made of adobe. The same impact will be seen if the rainy season is long. Thus buildings will mostly deteriorate under the effect of heavy run-off of large quantities of water brought by a long rainy season.

When maximum rainfall falls in a single day, housing and public facilities may give way under the effect of erosion caused by run-off which may even be sufficient to cause flooding.

The same type of impact might affect this infrastructure if maximum rainfall over five (5) consecutive days, rainfall on very rainy days and torrential rain result in large quantities of water. Similarly, if the longest sequences of consecutive rainy days are longer and there is a large number of days with rainfall in excess of 40 mm, this is likely to have the same impact on this infrastructure.
Exposure to wind and relative humidity helps to determine the characteristics and sustainability of housing and public facilities.

Hurricanes may cause buildings and even public facilities to collapse or be damaged. Humidity will have an impact when it is high, at which point it may cause adobe housing to collapse.

To conclude, climate change will cause serious challenges for several types of infrastructure, as they are designed based on an analysis of historic climate data, the relevance of which must be questioned in a situation in which climate conditions are changing. The challenge is even greater where the planned lifetime of infrastructure exceeds several decades, as a result of which it will be exposed to climate conditions which differ from those for which it was designed.

Several non-climate-related factors make infrastructure even more vulnerable to climate change, such as ageing buildings, poor planning and design, lack of adequate maintenance and change of use of infrastructure. Physical planning, which also affects the type and intensity of infrastructure use, is another fundamental factor that will determine the scope and extent of impacts on the built environment and communities.

1.6.8 Horizontal issues

The main horizontal issues are the need to take account of water security, the situation of women in terms of climate change adaptation and the involvement of civil society organisations. It is important to note that, when the NAP was formulated, it was expressly decided to focus on questions of water security and the situation of women, as they are vulnerable at various interdependent levels.

1.6.8.1 Vulnerability of water resources

The impacts of climate variability and change on water resources in Burkina Faso will depend on rainfall and temperature and how they change within the water cycle (in this case the continental cycle of the Sahelian zone). Rainfall induced by evapotranspiration feeds water courses and penetrates the subsoil and the water flows in aquifers which necessarily relate to a zone which can be identified in space and time known as a catchment area, the limits of which are determined by watersheds.

The water resource forecasts based on the LAME studies indicate that the annual volume of water will fall in two of the catchment areas in Burkina Faso and increase in the other two. In 2050, the volume of water will be much lower than the normal level in 1961-1990 across all catchment areas of Burkina Faso. There will be a drop of 68.9 % for the Comoé, 73 % for the Mouhoun, 29.9 % for the Nakanbé and 41.4% for the Niger.

The vulnerability of water resources also applies to aquifers. The vulnerability of groundwater manifests in the form of falling piezometric levels of subsurface waters (extracted via large diameter wells) and lowland and wetland waters and of deep waters in certain aquifers fed by

efficient infiltration of pore water and of drying out of natural sources or a very marked reduction in their flow rate.

Reduced rainfall, evaporation, evapotranspiration, run-off and infiltration, erosion and sedimentation are natural factors which make water a rare resource in Burkina Faso. This shortage will have a serious impact on the vulnerability to climate change of other sectors which are important to the development of Burkina Faso, namely agriculture, livestock farming, the environment, energy, health, infrastructure and housing.

a) Agriculture

The vulnerability of water resources is felt in the agricultural sector in terms of reduced crop yields and a reduction in food stocks and increasing poverty in the countryside where out-of-season crops have enabled people to adapt. The availability of water resources is in large part what determines the vulnerability of this sector.

b) Livestock farming

The vulnerability of the livestock farming sector depends on the vulnerability of water resources in that growth in that sector depends on the availability of that resource. In fact, the current livestock farming system (sedentary or transhumant) depends heavily on the availability of water and of grazing in the wetlands. It goes without saying that the vulnerability of the livestock farming sector depends on the vulnerability of water resources.

c) Environment

The vulnerability of water resources in the environment sector may compromise the balance of ecosystems and, by extension, biodiversity. Similarly, the vulnerability of the environment may affect the vulnerability of water resources in the sense that degradation of ground vegetation will case a reduction in infiltration for groundwater recharge. Moreover, this vulnerability of the environment will contribute to the degradation of river banks and water bodies or even the disappearance of the wetlands. As well as being reservoirs of biodiversity, the wetlands help to replenish aquifers, naturally purify the water and limit flooding.

The vulnerability of the environmental sector and of water resources are interdependent.

d) Energy

The vulnerability of water resources is felt in the energy sector in general and the electricity sector in particular. In fact, the vulnerability of the energy sector in Burkina Faso is partly affected by the availability of water resources to feed power dams. It is also felt to a lesser degree in the consumption of wood for energy, as numerous wetlands provide the locals with firewood.

e) Health

The impact of the vulnerability of water resources on the health sector takes the form of damage caused by excessive rainfall, especially floods, which may pose a risk to public health due to the precarious condition of water works and a gradual deterioration in the quality of

water, causing outbreaks of water-borne diseases such as cholera, dysentery and salmonella. This risk of flooding might pose a risk to food security if harvests are destroyed, thereby also resulting in increased malnutrition, especially among children.

The health sector will also be more vulnerable to the direct effects of flooding, such as infection and diarrhoeal diseases.

f) Infrastructure and housing

The vulnerability of water resources in this sector manifests at the level of road structures, housing and water resource mobilisation structures. In fact, failure to complete road structures (waste-water facilities) during housing developments represents a serious handicap in terms of the maintenance of road infrastructure. This results in torrential runoff of rainwater, which erodes the soil around the road infrastructure, which is already in poor condition. During the rainy season, run-off erodes gullies and breaks up the tarmac at the side of the road.

At the housing level, climate projections based on LAME studies suggest that the high number of rainy days and violent downpours will have a negative impact on buildings, especially makeshift housing made of adobe. Thus buildings will mostly deteriorate under the effect of heavy run-off of large quantities of water brought by a long rainy season.

g) Women and civil society organisations (CSO)

The impact of the vulnerability of water resources here concerns (quantitative and qualitative) access to water, firewood and other forest resources which provide women with a source of income (supply difficulties).

1.6.8.2 Vulnerability of women in terms of access to resources

Women are more vulnerable to climate change than men. Climate variations have a direct impact on their life. In their own words: '*You have to walk further to find wood. Our wells have dried up, You can't find products to sell. Our land has become unproductive. We have no money. It doesn't rain like it used to' etc.*. These were the responses given during an opinion poll of women conducted in 2013 during formulation of the NAP.

The impact of climate change on women can best be assessed based on the sectors in which they are most active, i.e. natural resources such as water, firewood, non-timber forest products (NTFP) and agriculture. Their vulnerability is further exacerbated by factors such as access to education and the status of women in Burkina Faso. That vulnerability is described in the main sectors below.

a) Access to water

Climate change may exacerbate the current water shortage. As women are largely responsible for collecting water for the household, they are more susceptible to seasonal and climate changes which affect quantity. Variable rainfall causes women real difficulty in terms of

access to water, especially in zones with insufficient boreholes or equipped wells, let alone running water. This makes the job of collecting water for family consumption and their various activities an exhausting chore. It requires patience and time going back and forth to check if the water level in the well is high enough to draw water. With the water level falling continuously, most wells need to be 45 to 50 metres deep and even they are not replenished normally.
This is due to the impact of climate variables on subterranean resources which decline when rainfall is in short supply.
Women are often forced to travel long distances and still may be unable to find drinking water, as numerous other constraints make this a difficult chore, such as salinisation, dry wells or contamination. Although the State has improved the technical potential with modern boreholes and wells, access to water for women is still a problem on the whole. This impacts on their health and on children's health in terms of the quality of the water and the physical effort required.

b) Firewood and other forest resources

Firewood is still the main source of energy in Burkinabe households, despite increased use of butane, which accounts for 7.8 % of total energy consumption. Paradoxically, the success of the State's policy to promote the use of butane has not benefitted rural women. Rural women are still undeniably dependent on natural biomass, with all the supply difficulties and the risks posed to them and their children. It has become extremely hard to find wood in many zones where forest resources have deteriorated. Women are therefore forced to use unconventional fuel (such as cowpats, plastic, harvest residues etc.), which are a source of disease and repetitious work. The lack of choice following hours of walking explains this state of affairs.

The forest is also an important source of revenue and jobs (FAO, 2001). Although forests are useful to everyone, women depend on them even more for their revenue and to support their family (Byron and Arnold, 1997[4]).

Forest products are crucial to women's associations in Burkina Faso, both for subsistence (food, firewood, building wood, medicinal products, fruit etc.) and for the production of goods for sale (handicrafts, production wood, food etc.). They form groups to collect and convert non-timber forest products (honey, nuts, fruit, mushrooms, medicinal products etc.) to produce consumer goods for their families and for sale.

Deforestation due to production of firewood and charcoal and over-exploitation of non-timber forest products (NTFP) in the context of climate change are factors which cause a loss of vegetable resources. The consequences of this are crucial for women who, faced with restricted access to fuel, have fewer commercial opportunities in terms of selling forest products and therefore less income. This certainly makes them very vulnerable from an economic perspective.

[4] National Action Plan: Environment and Natural Resources

According to forecasts in LAME studies in the forestry sector, there will be a net reduction over the timeframes considered in biomass potential, which will fall from just under 200 million m^3 in 1999 to just over 110 million m^3 in 2050.

c) Agriculture

Agriculture in Burkina Faso is mostly rain-fed (over 90 % of land cultivated), which exposes it to the random factor of good and poor rainfall. The vulnerability analysis carried out by the LAME provides important information. The impacts and consequences for women can be deduced from that vulnerability analysis.

In the **Sudanian zone**, risks posed by quantity of precipitation and dry sequences are acceptable or non-inexistent in terms of cycle length for all crops.

Vulnerability is low and depends on the increase in PET. Opportunities are also few and far between and depend on the quantity of rainfall, which is favourable overall.

In the **Sudanian-Sahelian zone**, risks are similar to those in the Sudanian zone at the Boromo station and lesser in extent at the Dédougou station. Risks are higher at the other two stations. Risks associated with the length of the rainy season are acceptable for crops with a cycle of less than 90 days, but are unacceptable for longer cycles. The risk of loss of seedlings is unacceptable for the Fada N'Gourma and Ouagadougou stations and the risks during the growth period are unacceptable (>10 %) except at the Boromo station.

As regards vulnerability, the relevant*climate stimuli* (parameters which potentially interact with a unit of exposure) are an increase in dry sequences and PET. This vulnerability is of average value for yields from crops such as yam, cotton, cash crops, market garden and other out-of-season crops. Opportunities, which are also average, depend on the increase in the number of rainy days and on rainfall in July, August and September (JAS). They also depend on agricultural yields and subsistence farming activities. This counterbalancing of opportunities and vulnerability means that opportunities can be relied on in order to address vulnerability, mainly through seasonal management of water and monitoring of the water balance using appropriate tools.

In the **Sahelian zone**, agriculture is at high risk of impacts in the form of losses of over 50 % even for crops with a cycle of less than 65 days. These risks depend on the quantity of precipitation, which is low and very variable, and on dry sequences during the seedling stage and during the growth phase.

However, no particular vulnerability has been identified in terms of the positive development of climate parameters. The opportunities identified are all average and relate to yields from the main cereal crops, subsistence farming activities and the productivity of agricultural land,

all under the effect of the increase in precipitation and extremes of rainfall. This should not mean that we lose sight of the fact that the basic situation is very unfavourable.

Women account for over 70 % of activities in the agricultural sector, but own hardly any land (AGSDS, 2010). Women are responsible for cultivating the family field, their own fields, if they have any, and the collective perimeters of women's groupings/associations. They are also active in converting/selling agricultural products. They also work in the fields and, because they do not have the right tools, they rely solely on their physical strength.

Equipment to facilitate their work has been distributed under various programmes, but those programmes did not integrate any vision of the energy required to take account of the physical condition of women.

In periods of drought, work in the fields will take up more and more of women's time and they will not have enough time to spend on their associations or other income-generating activities and yields will remain low.

d) Other factors which aggravate the vulnerability of women

These factors basically depend on the status of women in Burkinabe society and their lack of access to education and information. Although responsible for collecting water and firewood, women have no decision-making powers over water and forestry resources.

The level of school attendance of girls is low compared to boys in Burkina Faso, as in many other Sahelian countries. With no access to education, women are at an even greater disadvantage, as they are excluded from debates on the exploitation and sustainable protection of natural resources.

1.6.8.2 Role of civil society organisations (CSO)

Another important horizontal issue concerns the role of CSOs in climate change adaptation. The vulnerability of CSOs to climate change differs from that of clearly defined development sectors. In fact, CSOs are not a separate development sector and they operate horizontally. Consequently, the vulnerability problems which they have are taken into account in various ways in the other development sectors.

PART TWO: NATIONAL ADAPTATION PLAN

According to the UNFCCC, a NAP may take the form of an overall adaptation plan for the entire country or a sectoral NAP. Burkina Faso has opted to present both types of NAP. If planning capacities (financial and material resources and availability of disaggregated data) permit at a later date, we intend to formulate a regional adaptation plan for each region of Burkina Faso, so that climate change adaptation can be managed more accurately and efficiently.

2.1. VISIONS AND STRATEGIC GUIDELINES

2.1.1 Vision

The vision of the Burkina Faso reads as follows: **"Burkina Faso intends to manage its economic and social development more efficiently by implementing planning mechanisms and measures taking account of resilience and adaptation to climate change between now and 2050"**.

2.1.2 Bases for NAP

2.1.2.1 International basis

The NAP provides an opportunity to establish synergies with a number of international environmental agreements, especially:

- the United Nations Framework Convention on Climate Change;
- the United Nations Convention to Combat Desertification;
- the Convention on Biological Diversity;
- the Ramsar Convention on Wetlands.

The NAP will provide a framework for the application of these four conventions. These conventions are supplemented by the main West African environmental programmes and policies on climate change listed below:

- the ECOWAS environmental policy;
- the WAEMU joint environmental improvement policy;
- the West Africa water resources policy;
- the regional policy on access to energy services for rural and suburban populations in order to achieve the Millennium Development Goals;
- the ECOWAS forestry policy;
- the ECOWAS disaster prevention policy;
- the sub-regional action programme to combat desertification in West Africa and Chad;
- the sub-regional action plan to reduce vulnerability in West Africa.

2.1.2.2 National bases

Burkina Faso adopted a new development strategy in 2011 to accelerate growth and promote sustainable development, in order to put the country on the path to emergence.

That accelerated growth and sustainable development strategy (AGSDS) is based on the 'Burkina 2025' vision to make Burkina Faso 'a nation of solidarity, progress and justice which commands respect on the international scene'.
It is based in part on the need for public policy to integrate priority horizontal development questions, especially: gender, population, environment, physical planning and capacity-building.
Its vision up to 2015, entitled *'Burkina Faso, a productive economy that accelerates growth, improves living standards and improves and maintains living conditions and the living environment through informed and efficient governance',* focuses on economic growth priorities and the people's aspirations for better living standards.

The overall objective of the AGSDS is to bring about strong, sustained and quality economic growth which has exponential effects in terms of improved income and living standards and which respects the principle of sustainable development.
The main pillars of accelerated growth identified under the AGSDS are agriculture, livestock farming, forestry, energy and infrastructures. However, these pillars will be affected by risks inherent in natural conditions.

Climate change and climate variability are a reality; the floods which occurred in Ouagadougou on 1st September 2009 illustrate that. Also agriculture, in which nearly 80 % of the total active population is engaged, is highly dependent on climate variables. At the same time, the planned adaptation programmes receive very little financing, few producers have adopted new intensive crop methods (use of organic fertiliser and improved seed, mechanisation) and water management is still a source of concern. These are all factors that exacerbate the risk and threat represented by climate conditions.
All in all, the objectives of the AGSDS cannot be achieved unless development takes specific account of climate change adaptation. If the NAP is to be truly helpful, it must be designed to flank and facilitate the implementation of the AGSDS and other development policies and strategies adopted in the future.

The NAP is also based on the National Sustainable Development Policy and its implementing act, the aim of which is to define the overall sustainable development framework and general guidelines for formulating and framing sectoral policies and development strategies, plans and programmes at both national and decentralised level.

In order to support LDCs in formulating their NAP, the United Nations Framework Convention on Climate Change recommends an approach which determines climate change adaptation objectives and measures. It involves asking the following two basic questions:

1) What aspects of development are most at risk from climate change?
2) What type and scope of impacts will it have?

The type and scope of the impacts of climate change on socio-economic development in Burkina Faso have been explained above based on the studies carried out by the LAME. We now need to determine the development aspects most at risk from climate change.

For Burkina Faso, in terms of the AGSDS, the main aspects are as follows:

- accelerated growth pillars: agriculture, livestock farming, forestry, energy and infrastructure;
- food and nutrition security;
- water resources;
- physical safety of people and goods;
- natural ecosystems;
- health.

2.1.3. Guiding principles of the NAP

Implementation of the NAP will be governed by the following specific guiding principles, in order to safeguard appropriation and sustainable intervention by all stakeholders. These guiding principles are based on the guiding principles laid down in a number of policy and strategic guidance documents at national level, especially the AGSDS and the national sustainable development policy. They are as follows:

***1.Participation*:** Successful implementation of the NAP depends on broad participation by stakeholders. The provision of and access to information and scientific and technical data for stakeholders is vital if they are to make the right practical intervention choices. The opinions and priorities of beneficiaries will be taken into account when putting options into practice and in adaptation measures recommended in keeping with current regulations.

2.Coherent interventions:This principle requires actions to be carried out in a coherent and concerted manner in order to obtain more tangible results. Coherence is vital if the NAP is to be implemented in keeping with the development priorities defined at national level and the efficient implementation measures required.

3. Stakeholder empowerment:Stakeholder empowerment is a vital step in terms of achieving results. It is the corollary to the participative approach. Effective involvement of all stakeholders in the preparation and implementation of actions leading to change is vital if the objectives of the NAP are to be achieved effectively and efficiently. The main purpose of empowerment is to involve and include stakeholders committed to the implementation of the strategy in relevant actions and even to trigger behavioural changes.

4. Gender aspect:The adaptation options identified in the NAP will be more relevant and will have a significant impact if both men and women participate in the actions. Also, given the increased vulnerability of women to the harmful effects of climate change and their participation in development, systematic account needs to be taken of the gender aspect when actions are implemented.

5. Equitable implementation: The need for equitable implementation of the NAP at the social and environmental level is vital in order to safeguard the coherence, continuity and sustainability of interventions. This principle guarantees that regional sensitivities are taken into account and disparities and concentration of interventions are limited, given that climate change transcends territorial boundaries and agro-climatic, administrative and other limits.

6. Principle of partnership: Permanent dialogue needs to be established between the representatives of various groups of stakeholders in the sector. Partnership will allow synergies to be generated and actions co-financed. Partnerships need to be forged between public- and private-sector stakeholders, as well as civil society and beneficiaries of programmed interventions. Isolated and sectoral interventions have proven to be inadequate in terms of coherence and efficacy.

2.1.4. Features of the Burkina Faso NAP

The NAP:

- ***is flexible:***each country can select the steps and actions most relevant to it, in the order which suits it;
- ***may result in variable outputs:***depending on requirements, a NAP may comprise a single national planning document for climate change adaptation or several sectoral planning documents;
- ***is implemented on a rolling basis:***new priorities emerge as progress is made in resolving capacity shortages, in mobilising investment and in integrating policy and need to be taken into account in development plans;
- ***is ambitious:***it is not limited by resources currently available, so as to rally partners and backers around long-term objectives.

2.1.5. Objectives

Based on the directives of the UNFCCC, the overall objectives of the NAP are as follows:

- ***To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience***;
- ***To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate***

Based on these overall objectives, the specific long-term adaptation objectives for Burkina Faso are as follows:

- protect accelerated growth pillars;
- ensure sustainable food and nutrition security;
- preserve water resources and improve access to sanitation;
- protect persons and goods from extreme climate events and natural disasters;
- protect and improve the functioning of natural ecosystems;
- protect and improve public health

2.2. ADAPTATION OPTIONS

The short-, medium- and long-term adaptation measures proposed in keeping with the above specific objectives are listed in Table 25 below:

Table 12: Short-, medium- and long-term adaptation objectives and measures

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	RECOMMENDED ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
Protect accelerated growth pillars:		
Agriculture	Cultivate early varieties or drought-resistant crops	Short-term
	Apply water and soil conservation methods (stone barriers, small dikes, filtering dikes, terraces, half-moons, agroforestry, dune fixing etc.)	Short-term
	Promote sustainable land management (SLM)	Medium-term
	Improve access to climate information	Medium-term
	Apply integrated soil fertility management	Medium-term
	Build capacities for use of meteorological data in action planning in the agricultural sector	Medium-term
	Apply water-saving irrigation techniques	Short-term
	Adapt irrigation systems to take account of evapotranspiration from water bodies on the perimeters of developed areas	Medium-term
	Introduce agricultural insurance	Long-term
	Support locust monitoring and control measures	Short-term
Livestock farming	Combat bush fires in order to prevent destruction of dry-season grazing reserves	Short-term
	Define and organise pastoral zones	Medium-term
	Organise pastoral water plans and places	Long-term
	Reforest with palatable species	Medium-term
	Enlarge pastureland	Long-term
	Adopt best animal husbandry and pastoral practices (pastoral hydraulics, pastoral resource management, pasture mowing and conservation, pasture crops, silage, animal mobility and transhumance etc.)	Short-term
	Improve transhumant herd management	Long-term
	Maintain and strengthen a climate of good social coexistence between stakeholders	Long-term
	Ensure stakeholders take account of climate change in development project and programme planning by improving their skills	Medium-term

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	RECOMMENDED ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
	Protect the livelihoods of pastoralists in order to improve their contribution to the national economy	Medium-term
	Protect national livestock production resources as the basis of the pastoral economy	Medium-term
	Promote diversification of income sources through livestock farming	Medium-term
	Maintain level of consumption of healthy animal products	Medium-term
	Apply strategic destocking of animals during the lean season	Long-term
	Control cattle mobility towards strategic safe areas during the critical dry period	Long-term
	Preserve livestock farming at serious risk from climate variability	Long-term
	Develop sustainable milk production to increase public food security	Long-term
	Apply agroforestry practices in intensification areas to ensure sustainable management of natural resources	Medium-term
	Ensure farmers adopt animal production methods adapted to a hot climate	Long-term
	Monitor and control cross-border animal diseases	Medium-term
Forestry	Adopt best forestry and agroforestry practices (selective felling for firewood, natural assisted regeneration, controlled land clearance etc.)	Short-term
	Introduce community and participative management of forestry, fauna and fishery resources	Long-term
	Increase sustainable exploitation of non-timber forest products (NTFP)	Medium-term
	Apply agroforestry practices for sustainable management of natural resources	Medium-term
	Implement sustainable supply firewood and charcoal supply plans for towns	Long-term
	Protect the banks of water courses and water bodies	Medium-term
	Increase organised areas in forests to satisfy cooking needs	Medium-term
Energy	Promote energy efficiency	Long-term
	Invest in micro-hydro plants	Long-term
	Diversify energy sources (solar, wind, biogas)	Medium-term
	Implement water development and management plans in the Sudanian zone, which is likely to see a slight increase in rainfall according to climate forecasts	Long-term
	Improve hydroelectric structures	Long-term
	Promote energy-saving technologies in industry and the construction sector	Long-term
	Promote improved cooking stoves with a view to significantly reducing wood and charcoal consumption	Short-term

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	RECOMMENDED ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
	Promote alternative energies such as butane and biogas	Medium-term
	Increase the use of biomass (harvest residues) in the form of briquettes	Long-term
	Improve stakeholder/consumer knowledge and awareness of energy-saving methods and heating equipment options (motors, refrigerating systems)	Short-term
	Use bioclimatic design techniques to reduce cooling requirements in new buildings	Long-term
	Develop and disseminate new air conditioning technologies (solar air conditioning, evaporative air conditioning)	Long-term
Infrastructures	Ensure strict compliance with construction standards for dams and hydraulic structures, hydro-agricultural facilities and habitat planning	Short-term
	Update construction standards for dams and hydraulic structures, hydro-agricultural facilities and habitat planning	Short-term
	Establish sanitation and drainage systems in flood zones	Short-term
	Conserve water resources and improve access to sanitation	Short-term
	Pass and enforce laws and regulations, where applicable, on (i) construction of hydraulic, road and settlement infrastructures; (ii) space occupancy in urban and rural environments, especially flood zones; (iii) mining activities (gold prospecting); (iv) industrial activities	Medium-term
	Ensure strict compliance with legislative measures (Urban Development and Housing Code, planning and urban development master plans, land use plans, Agrarian and Land Tenure Reorganisation etc.)	Short-term
	Relocate populations from low-lying or flood zones to suitable areas	Medium-term
	Use long-lasting materials for housing construction	Long-term
	Promote the use of more durable local materials	Medium-term
	Promote ecological housing and towns with low energy consumption (for air conditioning and lighting)	Long-term
	Promote and exploit local construction materials	Short-term
	Restrict the spread of short-term and make-shift dwellings which are not fit for habitation	Medium-term
	Protect the banks of dams	Medium-term
Provide food and nutritional security on a sustainable basis	Increase the resilience of vulnerable communities and households to food and nutritional insecurity by improving their means of livelihood	Medium-term
	Achieve a structural and sustainable reduction in the food and nutritional vulnerability of vulnerable communities and households	Long-term
	Improve the social protection of vulnerable communities and households in order to secure means of their	Medium-term

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	RECOMMENDED ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
	livelihood	
	Introduce grain banks at village level	Medium-term
	Develop grain storage infrastructures at regional and national level	Long-term
	Ensure the long-term maintenance of a functional and efficient early warning system	Medium-term
	Improve food and nutrition security governance at national, regional and local level	Medium-term
	Support the implementation of local food crisis management and prevention structures	Short-term
	Capitalise on and share innovations and best practices to support food and nutritional security	Short-term
	Improve food processing and preserving methods	Medium-term
	Make increased use of non-timber forest products as food supplements	Medium-term
Preserve water resources and improve access to sanitation	Monitor water reservoirs (dikes, dams, water flows, valve operation etc.)	Short-term
	Establish water reservoirs: construct modern wells, high-flow boreholes, dams; pond management; watercourse diversions	Long-term
	Combat the silting of water bodies	Long-term
	Reduce water consumption for domestic purposes (watering plants, swimming pools) during shortage periods	Short-term
	Use water more efficiently	Short-term
	Develop integrated water resource management systems	Short-term
	Draft water management and development plans	Short-term
	Use appropriate technologies to improve access for women to drinking water in the dry season	Medium-term
	Develop sanitation infrastructure in urban and rural environments	Long-term
	Improve knowledge about water resources in the context of climate change	
Protect persons and goods from extreme climate events and natural disasters	Incorporate resilience into development projects and programmes	Short-term
	Monitor the vulnerability of at-risk populations and areas	Short-term
	Increase public awareness of potential risks	Short-term
	Develop financial or non-financial insurance and mutual schemes	Medium-term
	Implement community training programmes on climate change	Medium-term
	Include the topic of climate change in national curricula	Medium-term

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	RECOMMENDED ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
	Intensify scientific research into climate change	Medium-term
	Adopt appropriate legislative, regulatory and organisational measures to mitigate the impact of floods (which are likely to increase in scale and frequency as a result of climate change)	Medium-term
	Incorporate risks and disasters into teaching and research programmes	Medium-term
	Carry out public education and awareness raising measures concerning security and resilience to natural disasters and humanitarian crises	Short-term
	Prepare contingency plans at regional and local levels and plans to support vulnerable populations	Medium-term
	Provide sustainable funding for disaster and humanitarian crisis prevention and management by preparing and implementing an appropriate financing strategy	Long-term
	Incorporate risk reduction into development programmes	Medium-term
	Identify and map risk zones	Medium-term
	Relocate populations from low-lying and flood zones	Long-term
	Develop and promote the use of decision-making tools for the management of climate change risks	Medium-term
	Create and use climate change insurance schemes	Long-term
	Improve women's skills by disseminating best practices in the field of climate change adaptations	Short-term
	Improve women's resilience to climate change by creating revenue-generating activities	Medium-term
	Use social safety nets for vulnerable populations	Short-term
Protect and improve the functioning of natural ecosystems	Develop environmental education in both formal and non-formal education systems	Medium-term
	Implement reforestation projects and programmes using local species	Long-term
	Disseminate anti-erosion techniques	Short-term
	Establish integrated hydrographic basin management schemes	Long-term
	Rehabilitate silted basins and redevelop catchment areas	Long-term
	Plant woody and herbaceous species to prevent gully erosion	Medium-term
	Rehabilitate and preserve wetlands Develop research programmes on the resilience of fish, wildlife and forest species	Long-term

SHORT-, MEDIUM- AND LONG-TERM ADAPTATION OBJECTIVES	RECOMMENDED ADAPTATION MEASURES	SHORT-, MEDIUM- OR LONG-TERM
Protect and improve public health	***Meningitis***:	
	Carry out vaccinations as soon as the first cases are reported	Short-term
	Organise reactive campaigns which target the entire population in epidemic zones	Medium-term
	Increase meningitis monitoring using the geographical information system	Medium-term
	Step up public awareness raising and information campaigns	Medium-term
	Fund research activities in this area	Medium-term
	Increase the level of funding deployed to prevent meningitis epidemics	Medium-term
	Malaria:	
	Provide proper treatment in all cases of simple malaria using ACT	Short-term
	Provide intermittent preventive treatment of malaria using TPI for pregnant women and children, distributing long-lasting insecticidal nets (LLIN) in routine mass campaigns	Medium-term
	Provide sanitation for swampy sites and wastewater and excreta	Medium-term
	Combat malaria vectors (indoor spraying, behaviour change communications (BCC) in the mass media and community relays, treatment of breeding grounds)	Long-term
	Behaviour change communications in the mass media and community relays	Short-term
	Encourage all pregnant women to attend prenatal consultations at maternal and child health services.	Short-term
	Promote housing and environmental hygiene.	Medium-term
	Carry out epidemiological monitoring, follow-ups, evaluation and research	Long-term

2.3 ADAPTATION OPTIONS BY SECTOR

2.3.1. Agriculture

2.3.1.1 Identification of long-term adaptation requirements

Long-term adaptation requirements cover options such as improved water resource management systems, the adoption of new technologies, stakeholder capacity building and diversification into other economic sectors, in particular:

- adapting crop types to the climate and abandoning certain crops in favour of those which are more resistant to climate shocks and more profitable;
- focusing on research and technological innovations aimed at helping farmers to cope with climate change;
- developing water management and development plans;
- promoting efficient post-harvest crop preservation technologies;
- developing technologies to combat soil erosion and desertification;
- improving access to credit for farmers for the procurement of adaptation technologies and equipment;
- providing training for stakeholders on emerging issues.

2.3.1.2 Priority adaptation areas

Targeted action is needed to mitigate the adverse effects that climate change is expected to generate. The following adaptation measures are proposed on the basis of the foreseeable climate shocks and their effects:

a) restore soil fertility in order to limit its continued degradation

- recover degraded land by means of sub-soiling and reforestation;
- implement water and soil conservation and soil defence and restoration techniques;
- implement sustainable land management (SLM).

b) improve agricultural productivity

- adopt production-driven systems (intensification of production);
- use adapted varieties (production of short-cycle seeds);
- improve land tenure security as a basis for land conservation and management;
- promote water-saving irrigation systems;
- promote off-season farming practices (market gardening and irrigated crops).

c) strengthen the resilience capacities of post-disaster populations (floods, droughts, large-scale predator attacks etc.):

- ensure that crop-growing plots are located outside river and dam beds;
- build capacities for the use of meteorological data;

- anticipate disasters which may potentially affect the agricultural sector;
- improve the organisation of emergency aid for victims.

d) carry out research into methods for counteracting rising temperatures

Higher temperatures mean greater demand for water. Droughts will increase in frequency as a result of the interrelationship between precipitation and increased evapotranspiration. With a view to mitigating the impact of a steady decrease in water resources, systems are often put in place to:

- reduce various losses (including evaporative and infiltration losses) from lakes and reservoirs;
- increase storage capacities (reservoirs/storage tanks, rainwater basins etc.);
- develop a system for monitoring the impact of rising temperatures on dam levels (improved evapotranspiration management);
- adapt irrigation systems to take account of evapotranspiration phenomena in waterbodies along the perimeters of developed areas,

e) Combat high winds and other sandstorms, by:

- developing protection technologies that are better adapted to the various agro-climatic zones (living hedges or shelterbelts);
- building capacities for the use of meteorological data in agricultural sector planning.

The main adaptation measures recommended in direct relation to soil restoration with a view to improving food production are as follows:

- diversification of crops;
- adjustments to production cycles;
- the construction of anti-erosion dikes (stone barriers);
- the use of Zaï (traditional and mechanical soil restoration techniques);
- the use of half-moons;
- assisted natural regeneration (ANR);
- tree plantations;
- the use of grassy strips;
- the use of living hedges;
- organic fertilisation;
- the designation of protected areas to mitigate the devastating impacts of bush fires;
- mulching;
- the Sahelian Eco-Farm (SEF), which is an innovation recently developed by ICRISAT in Niger.

2.3.1.3 Climate change adaptation plan for the agricultural sector

A proposed adaptation plan for the agricultural sector, based on the LAME climate projections, is set out below. The overall objective of the action plan is to "**increase the resilience of family farms through climate change adaptation actions**". It is structured around four (4) specific objectives, as presented in Table 12 below:

Table13: Adaptation action plan for the agricultural sector

Overall objective: increase the resilience of family farms through climate change adaptations				
Specific objectives	**Outcomes**	**Indicators**	**Source and method of verification**	**Hypothesis**
SO 1: recover and restore the fertility of degraded soils	Degraded soils have been recovered and their fertility restored	Rate of recovery and restoration of the fertility of degraded soils	Technical reports by MASA [Ministère de l'Agriculture et de la Sécurité alimentaire, Burkina Faso Ministry of Agriculture and Food Security] Information bulletins by MASA and professional farming organisations MASA website	Availability of funding Stakeholder collaboration
SO 2: Improve access for farmers to high-quality agricultural production factors (equipment, inputs, land, agricultural research outcomes etc.)	Improved producer access to production factors in terms of both quantity and quality	Rate of producer access to: agricultural inputs, agricultural equipment, agricultural credit	Technical reports by MASA Information bulletins by MASA, professional farming organisations and decentralised financial systems MASA website	Availability of funding Collaboration of stakeholders
SO 3: increase stakeholder resilience to climate change	Stakeholders are more resilient to climate change	New climate-change-adapted production techniques have been developed Rate of adoption of climate-change-adapted techniques	Technical reports by MASA and MEDD [Ministère de l'Environnement et du Developpement Durable, Ministry of the Environment and Sustainable Development] Information bulletins by MASA and professional farming organisations MASA website	Availability of funding Stakeholder collaboration
SO 4: develop early warning systems to ensure efficient management of variability and climate change	Early warning systems for the efficient management of variability and climate change have been put in place and are functional	Efficiency of new early warning systems. Capacity of vulnerable populations to anticipate vulnerability and climate change	Technical reports by MASA and MEDD Information bulletins by MASA and professional farming organisations MASA website	Availability of funding Stakeholder collaboration

2.3.2 Livestock production

Livestock farming adaptation proposals are based on an analysis of climate change impacts in this sub-sector and the **B1 scenario (most realistic)**: "*transhumance will be increasingly oriented towards areas in the south of the country or involve neighbouring countries, with the attendant risk of conflict. The sporadic or haphazard nature of farming activities in the Sahelian and Sudano-Sahelian regions respectively, as identified from an analysis of the agricultural sector, will however open up areas for livestock grazing throughout the northern half of the country following the abandonment of farms. The Sahel could in practice be used solely for livestock farming and intentional or indirect fodder production (crops which have not completed their growing cycle). Remaining vulnerability factors would include temperatures for calf and milk production and decreasing precipitation for fodder production, rangelands and transhumance routes*." Particular challenges faced in this context include:

- improving readiness for rapid responses to the impacts of climate change;
- building the climate-change resilience capacities of poor households;
- stimulating livelihoods in production areas.

The following three climate change adaptation projects are proposed:

- Project 1: National Observatory of Pastoralism in Burkina Faso [Observatoire National sur le Pastoralisme Burkinabè, ONPB]
- Project 2: Livestock Farmers' Climate Insurance Project [Projet d'Assurance Climatique des Eleveurs, PACE]
- Project 3: Project involving the creation of three Livestock Production Intensification Areas (Zones d'Intensification des Productions Animales, ZIPA).

The above has been approved by the Ministry of Animal and Fisheries Resources in the National Action Plan for the sector.

The projects are described in more detail below. Since the National Action Plan covers the entire sector, it only refers to specific objectives and short- and long-term outcomes for the sake of brevity. Further details can be found in the National Action Plan for the livestock farming sector.

Table 14: National Action Plan for the livestock farming sector

Project 1:	**National Observatory of Pastoralism in Burkina Faso**
Overall objective	Improve the security of pastoralism through better dissemination and promotion of information on pastoral resources and the relevant access conditions.
Specific objectives	• Improve real-time access to pastoral information; • Attain better knowledge of the main transhumance routes. • Improve pastoralism-related communications; • Promote lasting social peace by reducing tensions relating to pastoral conflict. • Ensure that the main pastoral warning systems are operational.
Short-term outcomes	• An office for the National Observatory of Pastoralism in Burkina Faso has been set up and is operational, • A website for the National Observatory of Pastoralism in Burkina Faso has been set up and is operational. • Regular reports and bulletins are available with pastoralism-related information. • A Pastoral Situation Monitoring Committee [Comité de Suivi de la Situation Pastorale, CSSP] has been set up and is operational. • Maps of transhumance routes and outbreaks of emerging diseases have been produced and/or updated. • Climate risk reduction and management tools are used in the livestock farming sector. • The main centralised systems and the National Livestock Farming Laboratory have been allocated additional material and human resources. • Radio and television programmes showing experiences of managing pastoral crises have been made and broadcast. • SMS-based systems for obtaining information on cattle prices and pastoral risk areas have been disseminated.
Long-term outcomes	• Transhumance movements are better managed. • A climate of positive social cohesion is maintained and strengthened. • Variability and climate change aspects are better integrated by policy makers into new development projects and programmes. • Pastoralists retain their livelihoods and make an increased contribution to the national economy.

Project 2:	**Livestock Farmers' Climate Insurance Project**
Overall objective	Improve the protection of animal capital in order to provide sustainable support for the pastoralist economy and improve stakeholder resilience with a view to sustainable food security in Burkina Faso.
Specific objectives	• Support the replenishment of household regeneration hubs following climate events. • Ensure the survival of regeneration hubs by means of better sanitary coverage. • Reduce cattle-related economic losses by better anticipating pastoral crises. • Support dairy and egg production by livestock farmers during heat spikes. • Protect the health of consumers of heat-perishable foodstuffs of animal origin.
Short-term outcomes	• The annual livestock ownership of the 5,000 poorest households is maintained. • Economic losses resulting from animal deaths have been reduced, • Fewer animals are sold on cattle markets during economic downturns. • More livestock farmers belong to associations and the rate of animal disease notification is increased. • The rate of animal mortality in emerging animal disease outbreaks is reduced. • Fewer breeding animals are lost due to food shortages, • Livestock farms are better adapted to heat-related impacts, • Consumer health is protected in relation to products of animal origin.
Long-term outcomes	• National livestock production resources have been protected as the basis of the pastoralist economy. • Livestock farming revenue sources have been diversified. • The consumption of high-quality animal products remains at its previous level. • National production markets can still supply adequate livestock numbers.

Project 3:	**Project involving the creation of three Livestock Production Intensification Areas**
Overall objective	Reduce the climate vulnerability of pastoralist farmers and promote local economic development.
Specific objectives	• Establish and equip three strategic areas for the critical dry period. • Increase the supply and performance of domestic ruminants in the Livestock Production Intensification Areas. • Protect the livelihood of pastoralist farmers and promote their socioeconomic integration. • Reduce large-scale cattle mobility on a national and cross-border basis. • Transfer technology packages to livestock farmers in order to intensify production. • Establish dairy basins in the Livestock Production Intensification Areas.
Short-term outcomes	• Three Livestock Production Intensification Areas have been established and are operational. • The three Livestock Production Intensification Areas have been provided with appropriate pastoralism-related and socio-economic infrastructures. • A pastoral dam has been built in each Livestock Production Intensification Area. • Pastures have been developed and are maintained using an irrigation system in the dry season. • Eighty percent of livestock farmers produce fodder, • Improved fodder seed is produced in the Livestock Production Intensification Areas. • Fodder stocks are built up for the critical dry season, • Animal vaccination and deworming campaigns are carried out on an annual basis. • Livestock farmers are taught modern farming techniques at training centres.
Long-term outcomes	• Three hubs of economic growth through domestic ruminant production have been established. • Cattle mobility is controlled towards strategic safe areas during the critical dry period. • Cattle breeding practices which are highly vulnerable to climate variability are safeguarded. • Sustainable milk production systems are established to increase public food security. • Agroforestry practices are established in Livestock Production Intensification Areas to ensure the sustainable management of natural resources. • Livestock farmers adopt production methods which are appropriate for hot climates

The logistical details of these projects are set out in the annex (National Action Plan for the livestock farming sector).

2.3.3 Environment and natural resources

2.3.3.1 Identification of medium- and long-term adaptation areas

Four medium- and long-term adaptation areas can be identified:

1) Improved ecosystem productivity and resilience.
2) Biodiversity conservation.
3) Ecological research and monitoring.
4) Greenhouse gas mitigation.

2.3.3.2 Identification of medium- and long-term adaptation actions

Table 13 below lists the relevant actions by priority adaptation area.

Table 15: Medium- and long-term adaptation action plan for the environment and natural resources sector

Overall objective: ensure the sustainable conservation of natural resources				
Specific objectives	**Outcomes**	**Indicators**	**Source and method of verification**	**Hypothesis**
SO 1: Increase ecosystem productivity and resilience	Forest biomass production has increased and new fuelwood technologies have been promoted Land management practices have become more sustainable Best practices have been introduced in the field of fisheries and aquaculture	Change in forest biomass Rate of recovery and restoration of the fertility of degraded soils Changes in state-monitored stocked waterbodies	Technical reports by MEDD Information bulletins by MEDD MEDD website	Availability of funding Stakeholder collaboration
SO 2: Improve biodiversity conservation	biodiversity (forests, wildlife etc.) has been increased and protected from climate-change-related risks	Changes in protected plant and animal species	Technical reports by MEDD Information bulletins by MEDD MEDD website	Availability of funding Stakeholder collaboration
SO 3: Improve ecological research and monitoring	A permanent R&D facility devoted to climate change adaptations has been set up and is operational Climate change impacts on ecosystems are monitored on a permanent basis	Adoption rate for climate change adaptation techniques	Technical reports by MEDD Information bulletins by MEDD MEDD website	Availability of funding Stakeholder collaboration
SO 4: Mitigate greenhouse gas emissions	Urban pollution mitigation measures have been established, and a national observatory for the environmental and natural hazards has been set up	Greenhouse gas emission reduction rate	Technical reports by MEDD Information bulletins by MEDD MEDD website	Availability of funding Stakeholder collaboration

2.3.4. Energy

2.3.4.1 Identification of adaptation options

Areas that may be disrupted or disadvantaged by climate change include thermal, hydro and solar photovoltaic energy production, timber resources, energy storage and transportation facilities and demand for electricity. Short-, medium- and long-term adaptation measures are summarised in Table 14 below:

Table 16: Adaptation options in the energy sector

Areas affected	Proposed measures
Hydropower production	• Establish a climate monitoring/early warning system; • Diversify electricity supply sources by developing other renewables (solar, biomass and wind); • Build hydraulic capacities in the Sudanian zone, which is likely to see a slight increase in rainfall according to climate predictions • Provide increased flood protection for dams on the basis of strict compliance with construction standards; • Store energy in hydraulic form through turbine water conservation and reuse; • Make improvements to hydroelectric structures where necessary; • Produce water management and development plans.
Thermal power production	• Diversity electricity production sources by interconnecting and promoting renewables; • Promote energy-saving technologies in industry and the construction sector • Ensure that peak demand times are better managed.
Reduce the use of wood energy	• Promote improved cooking stoves with a view to significantly reducing wood and charcoal consumption and improving household cooking conditions • Promote alternative energies such as butane and biogas; • Promote the use of agricultural residue biomass in the form of briquettes.
Energy storage and transportation infrastructure	• Ensure that engineers and technicians involved in the design, monitoring and use of structures are better able to deal with climate change problems and related impacts; • Improve energy transmission lines; • Appoint a committee to bring codes and standards more into line with climate change requirements; • Establish rapid intervention teams with sufficient resources to deal with emergencies as quickly as possible.
Control energy consumption	• Improve stakeholder/consumer knowledge and awareness of energy-saving methods and heating equipment options (engines, refrigerating systems); • Reduce energy consumption in the residential and industrial sectors; • Use bioclimatic design techniques to reduce cooling requirements in newly constructed buildings; • Draft and adopt energy regulations for buildings; • Develop and disseminate new air conditioning technologies (solar air conditioning, evaporative air conditioning); • Develop alternatives to hydrocarbon-based engine fuels (biofuels, biogas etc.) • Promote public transport; • Abolish long lunch breaks.

2.3.4.2 Proposed adaptation plan for the sector

The adaptation action plan for the energy sector covering the next five (5) years has one overall objective and four (4) specific objectives. The overall objective is to **establish satisfactory energy production and distribution practices**. The substance of this action plan is set out in Table 15 below.

Table 17: Adaptation action plan for the energy sector

Overall objective: Establish satisfactory energy distribution and production practices				
Specific objectives	**Outcomes**	**Indicators**	**Verification sources**	**Hypotheses and risks**
SO 1: Reduce the impact of climate change on the energy sector	Energy sector stakeholders are better informed about climate change	number of people targeted in information and awareness-raising measures	Activity reports by MME [Ministère des Mines et de l'Energie, Ministry of Mines and Energy]	- Availability of funding - Good cooperation among stakeholders - Involvement of political authorities
	Account is taken of climate change when drafting and implementing energy policies	Action plans, projects and programmes make allowances for climate change	Activity reports by MME	
	1.8 million improved cooking stoves are distributed in rural areas over the next five years	Rate of penetration of improved cooking stoves	Investigative reports	- Availability of funding - Good cooperation among stakeholders - Involvement of political authorities
SO 2: Provide a sustainable supply of cooking energy	Butane gas consumption is promoted	Household penetration rate for butane gas	Investigative reports	
SO 3: Reduce electricity consumption	The public is more aware of the need to save energy	Changes in electricity consumption	- Activity reports by SONABEL [Société Nationale d'électricité du Burkina Faso, National Electricity Company of Burkina Faso] - Study reports	- Availability of funding - Good cooperation among stakeholders - Involvement of political authorities
	Consumers have been provided with information and made aware of the need to save energy	Energy saved (as a percentage)	- Activity reports by SONABEL - Study reports	
	Twenty administrative buildings have been fitted with solar (absorption-based) and evaporative air conditioning systems on an experimental basis	Penetration rate of solar and evaporative air conditioning	Study reports	
SO 4: Improve knowledge of the impact of climate change on the energy sector	Key stakeholders in the sector have access to more detailed climate predictions	Climate prediction usage rate	- Activity reports by MME - Research reports by MRSI [Ministère de la Recherche Scientifique et de l'Innovation, Ministry for Scientific Research and Innovation]	- Availability of funding - Good cooperation among stakeholders - Involvement of political authorities - Participation of researchers
	Solar, wind and hydro power potential is better evaluated in the context of climate change	Study report available	- Activity reports by MME - Research reports by MRSI	
	Technologies which are better adapted to climate change have been developed and are in use	Efficiency of new technologies	- Activity reports by MME - Research reports by MRSI - Study reports	

2.3.5. Health

2.3.5.1 Identification of medium- and long-term adaptation needs

Development-related needs in the healthcare sector in Burkina Faso can be evaluated on the basis of the eight (8) strategic headings of the National Health Policy. Climate change issues are not given adequate space under these strategic headings, which are broken down into actions in the National Sanitary Development Plan. Furthermore, most of the action plans drawn up within the healthcare sector fail to take account of climate change projections and the relevant potential impacts.

The 2012 LAME climate projections study refers to a significant increase in maximum and minimum temperatures and alternating periods of drought and heavy rainfall over the next 30 to 50 years, leading inter alia to the increased vulnerability of populations due to a greater incidence of certain diseases such as meningitis and malaria.

Table 16 below sets out proposed adaptation needs based on the strategic headings of the National Sanitary Development Plan.

Table 18: Climate change adaptation potential

Strategic headingsunder the National Sanitary Development Plan	Intervention targets under the National Sanitary Development Plan	Priority actions under the National Sanitary Development Plan	Climate impact or risk (related to climate change)	Adaptation integration potential
Develop leadership and governance in the healthcare sector	Improve the internal coordination of Ministry of Health interventions	Improve policy making within the Ministry of Health with a focus on gender and equity	Current policies and policy-making structures may be disrupted by the consequences of climate change (greater incidence of certain diseases such as diarrhoea, malaria, meningitis, measles, malnutrition etc.).	Integrate climate change issues into policies, strategies and policy-making structures
	Strengthen intersectoral collaboration and partnerships in the healthcare sector	Establish/strengthen appropriate frameworks for collaboration and sanitation development planning between the Ministry of Health and other stakeholders at all levels	The consequences of climate change may mean that the current collaboration structures are no longer fit for purpose.	Ensure that account is taken of climate change issues during intersectoral collaboration in the field of risk management
Strengthen human resources in the healthcare sector	Ensure that high-quality human resources are available in the healthcare sector	Draft a national CPD strategy with consolidated plans at all levels of the healthcare system	The level of knowledge among healthcare personnel may not be sufficient to deal with climate change impacts	Incorporate climate change issues into training courses for healthcare personnel
Health promotion and disease prevention	Improve communications with a view to behavioural change	Implement communication plans for the healthcare sector	Climate change impacts may make populations more vulnerable	Incorporate climate change impacts into communication strategies with a view to behavioural change
	Step up measures to prevent transmissible diseases	Strengthen the monitoring system at all levels	Climate change impacts (raised temperatures, floods) may increase the incidence of epidemics (measles, cholera, meningitis) and certain diseases (malaria)	Incorporate climate change impacts into prediction and response tools

Strategic headings under the National Sanitary Development Plan	Intervention targets under the National Sanitary Development Plan	Priority actions under the National Sanitary Development Plan	Climate impact or risk (related to climate change)	Adaptation integration potential
Improve healthcare infrastructures, equipment and products	Build infrastructures	Establish new sanitary infrastructures at each level which comply with the relevant standards	Floods may damage certain sanitary infrastructures	Incorporate climate-change-related impacts into the design and implementation of sanitary infrastructures
Promote research in the healthcare sector	Improve the institutional and operational capacities of the Ministry of Health in the field of research	Improve the operational capacities of the Ministry of Health in the field of research	Modify the transmission dynamics of climate-sensitive diseases	Incorporate climate change issues into research topics in the healthcare sector
Increase funding for healthcare and the public affordability of healthcare services	Mobilise healthcare funding	Advocate for an increase in the state healthcare budget	Managing climate-change-related risks and disasters may overburden healthcare budgets	Incorporate the management of climate change impacts into the state healthcare budget

2.3.5.2 Proposed adaptation action plan for the health sector

The proposed action plan has an overall objective and five (5) specific objectives as described below. The overall objective is to *bring about climate change adaptations in the healthcare sector so that populations are better protected.*
Details of this action plan are provided in Table 17 below:

Table 19: Summary of adaptation actions

Strategic headings	Specific objectives	Intervention targets	Adaptation actions	Anticipated impacts and outcomes	Indicators
Develop leadership and governance in the healthcare sector	Develop leadership and governance for climate change impact adaptations in the healthcare sector	Improve coordination	Incorporate climate change issues into healthcare strategies	Climate change issues have been incorporated into healthcare strategies	National healthcare strategies incorporating climate change issues are available
			Strengthen collaboration between the climate change and healthcare sectors	Intersectoral collaboration has improved	A framework for collaboration is in operation
Strengthen human resources in the healthcare sector	Build human resource capacities in the healthcare sector	Ensure that high-quality human resources are available in the healthcare sector	Improve levels of knowledge among personnel in relation to climate-change-sensitive diseases	Training is provided on climate change	A training plan has been produced
				Healthcare personnel are more knowledgeable about climate change	Number of people trained
Health promotion and disease prevention	Improve detection and response rates for climate-change-related phenomena	Improve communications aimed at behavioural change	Develop a communication strategy for climate change impact adaptations	Populations are more aware of climate change impacts	A communication strategy is available Awareness-raising resources are available
		Step up the fight against climate-sensitive diseases	Build capacities for forecasting and responding to climate-change-related phenomena	Capacities for forecasting and responding to climate change-related phenomena have been improved	Forecasting and response tools are available
Improve healthcare infrastructures, equipment and products	Adapt healthcare infrastructures to climate change impacts	Build infrastructures	Establish sanitary infrastructures which are adapted to climate change impacts	Sanitary infrastructures have been adapted to climate change impacts	Sanitary infrastructures have been constructed to take account of climate-change-related risks
Promote research in the healthcare sector	Promote research into climate change	Promote research	Promote research in the fields of healthcare and climate change	More is known about the impacts of climate change on the healthcare sector	Number of research studies dealing with healthcare and climate change

2.3.6. Infrastructure and housing

2.3.6.1 Identification of medium- and long-term adaptation requirements

The following climate change adaptation requirements can be identified in the infrastructure and housing sector:
For the sub-sector of stormwater and wastewater systems:

- adapt gutters by ensuring that new infrastructures are no longer designed to be used for wastewater or solid waste and can no longer act as bottlenecks during periods of heavy rainfall,
- raise user awareness of the need to maintain the structures,
- place covers on structures to avoid them being used for solid waste during periods of rain.

For the sub-sector of water resource distribution and mobilisation infrastructure (dams and surface/underground reservoirs, wells and boreholes, pumping stations and distribution networks), the below points must be taken into account with a view to climate change adaptations:

- Infrastructure should be adapted to an appropriate size, again to avoid the risk of being used for solid waste.
- In the short term, the key areas for action include observing climate change impacts and carrying out information campaigns. In the medium and long term, it is important to carry out research into the impacts of climate change on networks and to propose adapted standards for the country.

For the sub-sector of roads and associated structures:

- Strict compliance with and updating of current regulations regarding environmental impact assessments and highway construction standards;
- Ensure that appropriate consideration is given to transportation and mobility requirements when planning and building roads;
- Build roads in urban developments.

For the sub-sector of construction (social housing and facilities):

- Fund projects in the field of;
- Construct buildings which require less energy for air conditioning systems, which do not have air conditioning systems or which use low-power air conditioning systems.

2.3.6.2 Priority adaptation areas

For the sub-sector of stormwater and wastewater networks, the chief objective is to guarantee a healthy living environment where all citizens have access to well-built stormwater and wastewater drainage systems which are resistant to climate change impacts. Table 18 below summarises the main long-term actions:

Table 20: Long-term adaptation measures for the sub-sector of stormwater and wastewater systems

Research measures	Engineering/evaluation measures	Advocacy measures	Information, education and communication campaigns
• Adopt contextualised standards at national level • Contextualise tools and design formulae • Improve control over various climate change parameters in relation to stormwater and wastewater systems	- Provide local communities with the tools required for stormwater and wastewater systems - Expand/increase the density of stormwater and wastewater systems - Control land use - Train skilled personnel - Establish early disaster (flood) warning systems to minimise damage	Use advocacy to promote specific actions to national and local decision-makers Encourage TFPs to make it easier for vulnerable persons to access funding/finance Encourage ministries to reduce case processing times	• Raise awareness among the public and community relays of best practices for the use and maintenance of stormwater and wastewater structures • Eco-citizenship education

For the sub-sector of water resource distribution and mobilisation infrastructure, the following actions are proposed:

- Update design methods and standards for hydraulic structures (dams, highway structures, irrigation systems): promote scientific research into the production of new standards and increase the density of networks for hydrological data collection and archiving and database management;
- Integrated water resources management: publicise new irrigation techniques (drip irrigation, reducing water losses in drinking water supply and irrigation pipes, reducing the effects of evaporation, protecting collection, storage and distribution structures.

For the sub-sector of roads and associated structures, the following actions should be taken:

1) Enhance and enforce regulations;
2) Update highway infrastructure construction standards;
3) Urban land use planning:
    - Produce planning and urban development master plans
    - Produce land use plans
4) Produce a manual of highway infrastructure procedures;
5) Facilitate stakeholder collaboration
6) Carry out infrastructure projects in accordance with reference documents.

For the sub-sector of construction (social housing and facilities), the following actions should be prioritised:

Table 21: Actions to be taken in the sub-section of construction

1	**Planning and scheduling of priority actions**
	• Update planning tools (planning and urban development master plans and land use plans) to take account of climate change • Produce land use plans for other cities in the country; • Redevelop areas of makeshift housing in zones which are earmarked for housing purposes in planning documents; • Develop and protect flood areas; • Carry out an environmental, architectural and urban planning assessment for any urban or architectural development project.
2	**Construction standards, materials and research and the use of new construction technologies**
	• Product an energy efficiency code for the construction sector; • Carry out research into renewables and apply the research in practice; • Promote the use of solar energy for disadvantaged areas and nearby public facilities; • Produce guidelines for the use of appropriate construction materials (specifications and techniques); • Build weather forecasting capacities;
3	**Monitor and evaluate priority actions**
	• Improve and monitor land use by appointing multi-disciplinary teams to monitor the use of flood areas and vulnerable areas; • Maintain municipal stormwater and wastewater drainage structures; • Open up developed areas; • Monitor compliance with the provisions of the Urban Development and Construction Code
4	**Communication**
	• Raise stakeholder awareness of the need for compliance with the provisions of the Urban Planning and Construction Code; • Raise public awareness of climate change challenges; • Prohibit the production or importation of plastic packaging and ensure that it is replaced by biodegradable packaging.

2.3.6.3 Proposed adaptation action plan for the infrastructure and housing sector

Details of the proposed action plan for the infrastructure and housing sector are provided in Table 20 below:

Table22: Climate change adaptation action plan for the infrastructure and housing sector

Overall objective: Increase the resilience of populations and the built environment to climate change with a view to sustainable development				
Specific objectives	**Outcomes**	**Indicators**	**Method and source of verification**	**Hypothesis/risk**
SO 1: Improve access to adequate housing for disadvantaged populations by means of rental properties, self-build funding and new social housing	Access to adequate housing for everyone is guaranteed through the provision of rental accommodation, support for self-builds and the construction of social housing	Social housing built (number) Number of people in receipt of self-building grants from the Self-Build Assistance Office Self-Build Assistance Office client numbers Average cost of house building Level of enforcement of rental accommodation regulations Level of research into appropriate construction materials and techniques Ease of access to accommodation	Draft document Proof of key hand-overs for accommodation Reports by the Self-Build Assistance Office Visual confirmation of housing construction (photographs) Regulations on private rental properties	Funding is available Trained staff are available Parties interested in building their own home are clients of the Self-Build Assistance Office Landlords enforce the regulations
SO 2: Construct public facilities and infrastructures (road, hydraulic and stormwater/wastewater drainage) which are fit for purpose and resilient thanks to high-quality design and implementation and proper maintenance	Infrastructure and superstructure facilities are planned, designed, implemented and maintained properly and are long-lasting	Average service life of facilities High-quality and climate-change-resilient structures Number of awareness-raising meetings held Updated standards High-quality outcomes of research into appropriate construction materials and techniques	Planning documents (National Land Use Guidelines, planning and urban development master plans, land use plans) Tender dossiers, work completion certificates Final acceptance report Minutes of awareness-raising meeting Standards	Funding is available Technical staff are available Contracts have been awarded in line with the rules Public support has been gained
SO 3:Turn the towns of Burkina Faso into hubs of economic growth and sustainable development	Recognise the role played by the towns of Burkina Faso as hubs of economic growth and development Attempts are underway to combat urban poverty	Changes in urban poverty rates Number of projects/investments in secondary towns Number of towns participating in development projects Number of rehabilitated old districts Changes in rural exodus rate	Planning documents (National Land Use Guidelines, planning and urban development master plans, land use plans, traffic plans) Project documents Minutes of meetings with local communities	The creditability of investors and all stakeholders is guaranteed Funding is available Public support has been gained

Overall objective: Increase the resilience of populations and the built environment to climate change with a view to sustainable development				
Specific objectives	**Outcomes**	**Indicators**	**Method and source of verification**	**Hypothesis/risk**
		Number of land tenure titles granted to disadvantaged groups	Visual confirmation of project implementation Water planning and management master plans Water planning and management schemes	

2.3.7 Incorporation of cross-cutting issues

The overall National Action Plan focuses on the cross-cutting issues of water security and, in particular, women and civil society organisations. Two out of nine (9) national experts have been selected by the Permanent Secretariat of the National Council for the Environment and Sustainable Development to facilitate collaboration between the relevant stakeholders and solicit their contributions to the overall National Action Plan.

2.3.7.1 Identification of medium- and long-term adaptation requirements for women

Very few best practices have been identified in relation to climate change adaptations for women in Burkina Faso. Most adaptation practices partly ignore their vulnerability compared to men.

In this context, the following climate change adaptation requirements can be identified for women:

- Education and training: promote education and training for women in order to raise their awareness of climate change problems and, more generally, sustainable land management;
- Access to adaptation techniques which adequately integrate gender mainstreaming in order to avoid highlighting inequalities between men and women;
- Access to decision-making forums: integrate women and women's associations in project steering committees and decision-making bodies at local level to facilitate their full participation in drafting and implementing development plans at all levels, including climate change adaptation plans;
- Access to improved cooking stoves and wind and solar energy for women in rural areas.

2.3.7.2 Priority adaptation areas for women

Given the projected rainfall deficiencies and raised temperatures, long-term adaptation measures must be aimed at minimising the adverse impacts of these changes on women's lives. Several adaptation options are available, the most relevant of which are listed below:

- Option 1: Build the capacity of women's associations to implement best practices in the field of climate change adaptations;
- Option 2: Improve access for women to drinking water during periods of water shortage;
- Raise women's awareness of the nutritional value of non-timber forest products with a view to better safeguarding and utilising revenue-generating species
- Build technical capacities among women in relation to best practices for food gathering, processing and natural and assisted regeneration methods
- Option 3: Promote revenue-generating activities for women.

2.3.7.3 Proposed adaptation action plan for women

Based on an analysis of climate change impacts in the major areas of intervention by women's associations, the following climate change adaptation projects can be proposed:

1) Training/information/awareness raising among women's associations;
2) Improve the resilience of women's association and their capacity to adapt to climate change by introducing revenue-generating activities;
3) Research into best practices in the field of climate change adaptations which are beneficial and accessible to women.

Project 1: Training/information/awareness raising among women's associations	
Overall objective	Increase the capacity of members of women's associations to overcome climate-change-related and environmental problems.
Specific objectives	• Increase the level of basic training provided to members of women's associations in the fields of non-timber forest products, market gardening, fuelwood, traditional medicine, household waste management and sanitation practices and methods for processing fisheries, agriculture and livestock products. • Raise awareness among women with a view to increased participation in local governance. • Build capacities among women and men in the field of gender and female leadership.
Short-term outcomes (0-5 years)	• The level of basic training provided to members of women's associations in the fields of non-timber forest products, market gardening, fuelwood, traditional medicine, household waste management and sanitation practices and methods for processing fisheries, agriculture and livestock products has been increased. • The capacity of women's associations to implement best practices in the field of climate change adaptations (in relation to non-timber forest products, fuelwood, waste, agriculture etc.) has been strengthened.
Medium-term outcomes (5-10 years)	• Women in women's associations play a valid role in local governance. • Women in women's associations are trained in gender and female leadership issues.
Long-term outcomes (over 15 years)	• Women are provided with tools to increase their resilience to climate change.

Project 2:	**Improve the resilience of women's associations and their capacity for climate change adaptations by introducing revenue-generating activities**
Overall objective	Improve the resilience capacities of members of women's associations through the introduction of revenue-generating activities.
Specific objectives	• Improve the capacity of women's associations to engage in revenue-generating activities in the interests of empowerment. • Ensure that irrigation water is managed in market gardening plots through the rehabilitation of wells and boreholes. • Improve the nutritional status of the most vulnerable groups (women and children) through the availability of an adequate quantity of high-quality products. • Provide women with appropriate facilities and technologies to carry out their jobs properly. • Increase grain and market gardening outputs with a view to increasing food security.
Short-term results (0-5 years)	• Wells and boreholes have been protected and are in use • Women's revenues have increased. • Female empowerment has increased. • Market gardening plots have been rehabilitated. • Women have been provided with appropriate facilities and technologies to do their jobs properly. • Grain and market gardening production has been increased with a view to improved food security. • A healthy living environment is present in urban and suburban areas and household waste is properly managed.
Medium-term outcomes (5-10 years)	• The nutritional status of the most vulnerable groups (women and children) has improved. • Women's revenues have increased. • Women have been empowered. • Natural resources are protected.
Long-term outcomes (over 15 years)	• Women's capacity for resilience to climate change has increased thanks to the introduction of revenue-generating activities.

Project 3:	Research into best practices in relation to climate change adaptations which are beneficial and accessible to women
Overall objective	Develop adaptation technologies which take account of the conditions faced by women's associations on the basis of traditional knowledge.
Specific objectives	• Incorporate traditional local knowledge into research strategies in order to improve climate change adaptation practices among women. • Publicise improved technologies which are less physically taxing and labour-intensive to use
Short-term outcomes (0-5 years)	• Research into climate change adaptations among women has been carried out on the ground on the basis of traditional knowledge. • Improved technologies targeted at women have been identified.
Medium-term outcomes (5-10 years)	• Climate change adaptation practices among women have improved. • Improved technologies which take into account the conditions faced by women have been publicised.
Long-term outcomes (over 15 years)	• Women's capacities for resilience to climate change have increased thanks to the adoption of new technologies.

This outline of the climate change adaptation action plan for women is primarily intended to highlight its key actions. In practical terms, the actions will be made operational by means of action plans in the various development sectors.

2.3.7.4. Involvement of civil society organisations

The key objective in relation to civil society organisations is to secure their long-term support for implementation of the National Action Plan. An action plan has therefore been proposed which contains three projects:

- Project 1: Improve and strengthen the involvement of civil society organisations in climate change adaptation decisions.
- Project 2: Improve the sustainability of civil society climate change adaptation initiatives.
- Project 3: Capitalise on and disseminate best practices by civil society organisations in the field of climate change adaptations.

The objectives and anticipated outcomes of these projects are outlined below:

Project 1:	**Improve and strengthen the involvement of civil society organisations in climate change adaptation decisions.**
Overall objective	Increase the involvement of civil society organisations in order to improve operational governance of the National Action Plan for Climate Change in Burkina Faso.
Specific objectives	Build capacities for intervention among civil society organisations in relation to climate change adaptations
Short-term results	Between now and 2018, at least fifty (50) civil society organisations gain the resources required to engage in discussions and decision-making on climate change adaptation issues at local, regional and national level.
Medium-term outcomes	Between now and the end of 2023, at least five proposals from civil society organisations have been incorporated into national climate change adaptation policies.
Long-term results	Between now and the end of 2028, at least ten proposals from civil society organisations have been incorporated into national climate change adaptation policies.

Project 2:	**Improve the sustainability of civil society climate change adaptation initiatives**
Overall objective	Ensure the sustainability of civil society climate change adaptation initiatives.
Specific objectives	**I**mprove the sustainability of climate change adaptation initiatives implemented by civil society organisations and rural communities in the thirteen (13) regions of Burkina Faso.
Short-term results	Between now and the end of 2018, at least two hundred (200) micro projects have been implemented at national level with a view to the consolidation of achievements and the development of innovative civil society organisation initiatives in the field of climate change adaptations.
Medium-term outcomes	Between now and the end of 2023, at least three hundred (300) micro-projects have been implemented at national level with a view to the consolidation of achievements and the development of innovative initiatives by civil society organisations in the field of climate change adaptations.
Long-term results	Between now and the end of 2028, at least five hundred (500) micro-projects have been implemented at national level with a view to the consolidation of achievements and the development of innovative initiatives by civil society organisations in the field of climate change adaptations.

Project 3:	Capitalise on and disseminate best practices by civil society organisations in the field of climate change adaptations.
Overall objective	Improve public involvement in the reflection, analysis and decision-making process for climate change adaptations by producing, disseminating and making effective use of lessons learned from innovative civil society projects.
Specific objectives	At national level, capitalise on climate change adaptation experiences gained by civil society organisations and disseminate lessons learned and best practices through appropriate the tools and channels.
Short-term results	Between now and the end of 2018, relevant and innovative experiences gained by civil society organisations in the field of climate change adaptations in five (5) regions have been capitalised on, undergone participatory validation and disseminated by means of information and publicity tools and channels.
Medium-term outcomes	Between now and the end of 2023, relevant and innovative experiences gained by civil society organisations in the field of climate change adaptations in eight (8) regions have been capitalised on, undergone participatory validation and disseminated by means of information and publicity tools and channels.
Long-term results	Between now and the end of 2028, relevant and innovative experiences gained by civil society organisations in the field of climate change adaptations in thirteen (13) regions have been capitalised on, undergone participatory validation and disseminated by means of information and publicity tools and channels.

As was the case for the climate change adaptation action plan for women, the climate change adaptation action plan for civil society organisations will also be implemented in the form of action plans in the various development sectors.

2.3.7.5 Water security

Water security is a further cross-cutting issue which must be taken into account, since implementation of the above-mentioned plans will be impossible without genuine water security. Even though the action plans for each of the sectors refer to water security as a specific objective or action, an action plan which deals comprehensively with this issue is still required.

The overall objective of the action plan outlined below is to "**protect water resources against the harmful impacts of climate change**". This overall objective is subdivided into four (4) specific objectives, as shown in Table 21 below:

Table 23: Action plan for water security

Overall objective: Protect water resources against the harmful impacts of climate change				
Specific objectives	**Outcomes**	**Indicators**	**Method and source of verification**	**Hypothesis/risk**
SO 1: Improve the mobilisation and exploitation of water resources	new design standards which take account of climate change considerations have been introduced for water resource exploitation and mobilisation infrastructures Water mobilisation infrastructures (dams) have been rehabilitated Water resource exploitation infrastructures (irrigated areas) have been rehabilitated New water mobilisation structures which are adapted to climate change impacts have been constructed New water resource exploitation structures (irrigated areas) which are adapted to climate change impacts have been constructed Stakeholder capacities to monitor and maintain dams and irrigated areas have been strengthened High-flow boreholes have been constructed Economical water transportation systems have been established	A document has been produced on the new standards Number of degraded dams which have been rehabilitated Number of irrigated areas which have been rehabilitated Number of new dams which have been built Number of new irrigated areas which have been built Number of stakeholders trained in the monitoring and maintenance of hydraulic structures Number of dams and irrigated areas which are monitored Number of dams and irrigated areas which are maintained (preventive measures) Number of high-flow boreholes Number of economical water transportation infrastructures built	Study report on new standards Study reports by minister responsible for water Acceptance reports for the works Data collection and monitoring reports Summary reports Data collection and monitoring reports Activity reports	Support from the state and technical and financial partners Involvement and participation of stakeholders
SO 2: Improve water resource protection and conservation	Water planning and management master plans have been produced and implemented Reliable evaporation reduction	Number of water planning and management master plans produced	Specific research reports by the minister in charge of water Specific research reports by the	Involvement and collaboration

Overall objective: Protect water resources against the harmful impacts of climate change				
Specific objectives	**Outcomes**	**Indicators**	**Method and source of verification**	**Hypothesis/risk**
	technologies have been introduced Water losses from large dams and waterbodies have been reduced The Regulations on Facilities, Structures, Works and Activities have been publicised and are observed	Rate of evaporative water loss reduction Rate of reduction in water losses from large dams Percentage of facilities, structures, works and activities implemented in line with the regulations Rate of implementation of pluriannual projects/programmes under the water planning and management master plans	minister in charge of water Website: www.eau. Burkina Technical report by the DGRE [Direction Générale des Ressources en Eau, Directorate-General for Water Resources] on compliance with the Regulations on Facilities, Structures, Works and Activities Monitoring report on implementation of the water planning and management master plans (SP/PAGIRE [Secrétariat Permanent du Plan d'Action pour la Gestion Intégrée des Ressources en Eau, Permanent Secretary for the Action Plan for Integrated Water Resource Management])	of the relevant stakeholders Support from the state and technical and financial partners Availability of financial resources
SO3: Improve knowledge about surface and, more importantly, underground water resources in the context of climate change	Knowledge of water resources in the context of climate change has been improved	Number of stations (hydrometric, piezometric, rainfall and water quality) stations monitored Number of existing stations which have been rehabilitated and are monitored Number of new stations which have been established and are monitored	Study reports by the minister in charge of water Data collection and monitoring reports Summary reports	Support from the state and technical and financial partners Involvement and participation of stakeholders
SO 4: Improve access to sanitation	Recognised flood areas have been drained Swampy areas have been decontaminated Wastewater and excreta are	Rate of flood area reduction Decontaminated areas Change in volumes of wastewater and excreta used and recycled	Research report on effective implementation Specific research reports by the minister in charge of water Specific research reports by the	Involvement and collaboration of the relevant stakeholders

Overall objective: Protect water resources against the harmful impacts of climate change				
Specific objectives	**Outcomes**	**Indicators**	**Method and source of verification**	**Hypothesis/risk**
	collected and recycled Populations living next to waterbodies are protected against waterborne diseases	Rate of reduction in waterborne diseases	minister in charge of water Website: www.eau. Burkina Technical reports by the Ministry of Health	Support from the state and technical and financial partners

2.3.8 Summary of sectoral action plans

The action plans for the various development sectors, including cross-cutting issues, can be summarised as follows:

Table 24: Summary of action plans for the various development sectors

Development sector	Specific objectives of the action plan
Agriculture	
	SO 1: Restore the fertility of degraded soils
	SO 2: Improve farmers' access to high-quality agricultural production factors (equipment, inputs, land, agricultural research outcomes etc.)
	SO 3: Improve the resilience of stakeholders to climate change
	SO 4: Develop early warning systems to ensure efficient management of variability and climate change
Livestock production	
	SO 1: Improve the security of pastoralism through better dissemination and promotion of information on pastoral resources and the relevant access conditions.
	SO 2: Improve the protection of animal capital in order to provide sustainable support for the pastoralist economy and improve stakeholder resilience with a view to sustainable food security in Burkina Faso
	SO 3: Make pastoralists less vulnerable to climate change and promote local economic development.
Environment and natural resources	
	SO 1: Increase ecosystem productivity and resilience
	SO 2: Improve biodiversity conservation
	SO 3: Improve ecological research and monitoring
	SO 4: Mitigate greenhouse gas emissions
Energy	
	SO 1: Reduce the impact of climate change on the energy sector
	SO 2: Provide a sustainable supply of cooking energy
	SO 3: Reduce electricity consumption
	SO 4: Improve knowledge of the impact of climate change on the energy sector

Development sector	Specific objectives of the action plan
Healthcare	
	SO 1: Develop leadership and governance for climate change impact adaptations in the healthcare sector
	SO 2: Build human resource capacities for climate change adaptations in the healthcare sector
	SO 3: Improve early warning and response systems for climate change phenomena
	SO 4: Adapt healthcare infrastructures to climate change impacts
	SO 5: Promote research into climate change
Infrastructure and housing	
	SO 1: Improve access to adequate housing for disadvantaged populations by means of rental properties, self-build funding and new social housing
	SO 2: Construct public facilities and infrastructures (road, hydraulic and stormwater/wastewater drainage) which are fit for purpose and resilient thanks to high-quality design and implementation and proper maintenance
	SO 3:Turn the towns of Burkina Faso into hubs of economic growth and sustainable development by promoting the green economy
Cross-cutting issues	
	SO 1: Increase the capacity of women's association members to address environmental and climate change problems
	SO 2: Increase the capacity for resilience of women's association members through the development of revenue-generating activities
	SO 3: Use traditional knowledge to develop adaptation technologies which take account of the conditions faced by women's associations
	SO 4: Boost the contribution of civil society organisations in order to promote good governance for implementation of the National Adaptation Plan for Climate Change in Burkina Faso
	SO 5: Ensure the sustainability of civil society initiatives relating to climate change adaptations
	SO 6: Improve public involvement in the reflection, analysis and decision-making process for climate change adaptations by producing, disseminating and making effective use of lessons learned from innovative civil society projects.
	SO 7:Improve water resource mobilisation and exploitation
	SO 8: Improve water resource protection and conservation
	SO 9: Improve knowledge of water resources (surface and, more importantly, underground) in the context of climate change
	SO 10: Improve access to sanitation

2.4 COSTS AND BENEFITS OF ADAPTATION OPTIONS

In 2012, while the National Adaptation Plan was being drafted, several senior representatives of various government bodies were given training by the Washington-based Millennium Institute on use of the T21 multi-sectoral modelling tool, which is a dynamic simulation tool designed to support long-term development planning. It incorporates economic, social and environmental development considerations in order to model the potential impact of development policies. The T21 model is summarised in one of the annexes to this document.

One of the outcomes of this capacity building has been an ability to calculate the relative amounts of funding which should be earmarked for the various development sectors in Burkina Faso to allow them to respond to climate change impacts.

Climate change adaptation options over the short, medium and long term (between 1 and 15 years) have thus been proposed for each of the development sectors covered by the National Adaptation Plan. Details of the consolidated cost of each of these options in the short, medium and long term are provided below:

Table25: Estimated cost of adaptation options in the short, medium and long term

Development sector	**Estimated cost in billion FCFA**
Agriculture	1 313
Livestock resources	375
Environment	375
Healthcare	188
Energy	1 126
Infrastructure and housing	375
Water security	101,75
TOTAL	**3853,75**

The vulnerability to climate change of all the development sectors is closely linked to water security. An awareness of water security issues in the context of the global water cycle will ensure the relevance of sectoral action plans and the greater effectiveness of their adaptation solutions, contributing to sustainable social and economic development.

The cost of adaptations under the National Adaptation Plan should not present a deterrent to funding efforts. What matters most is to achieve an optimum cost/benefit ratio during their implementation. Although the adaptation measures involve significant investment, they will also provide many development gains for Burkina Faso, the most important of which are summarised below:

- greater resilience of agriculture and ecosystems;
- greater security for pastoralism and sustainable development of the pastoralist economy;
- greenhouse gas mitigation;
- improved public health protection;
- improved access for women to natural resources and decision-making arenas;
- etc.

The social and economic gains to be made from implementation of the National Adaptation Plan are specified in more detail below:

1) **Increased productivity and revenue streams for rural populations:** implementation of the National Adaptation Plan will help to make natural, social and economic systems less vulnerable, boosting productivity and revenue streams in the agriculture/forestry/pastoralist sectors.

2) **Strong GDP growth:** reducing the vulnerability of natural, social and economic systems will increase the added value of each economic sector and its contribution to gross domestic product (GDP).

3) **More high-quality green jobs:** production conditions will become more conducive to investment, which in turn will create jobs in both the public and private sector, in particular for young people. This will promote human wellbeing and social equity at the same time as greatly reducing environmental risks and resource scarcity.

4) **Spillover effects for the rest of the economy:** the development sectors covered by the National Adaptation Plan are key sectors which drive development in Burkina Faso. Their improved performance will generate tangible spillover effects for other economic sectors such as industry, trade and tourism.

The economic evaluation of the environment and natural resources carried out in 2011 in Burkina Faso as part of the Poverty Environment Initiative project testified to the fact that environmental protection comes with a price tag, but environmental degradation costs money [5]. This is evident from the economic significance of primary-sector activities, accounting for 44.61% of GDP (2008 figures). In an economic evaluation of environmental damage and inefficiencies, the annual cost of environmental degradation in Burkina Faso in 2008 was estimated to be 18-22% of GDP, 0.5% of which was due to climate change (based solely on greenhouse gas emissions).
In 2012, while training government representatives on use of the T21 model, the Millennium Institute carried out an analysis of multisectoral vulnerability in Burkina Faso with a view to the formulation of a national strategy for medium- and long-term climate change adaptations by 2025/2050. This analysis reached the following conclusions:

[5] MEF, MEDD, UNDP 2011: Economic evaluation of the environment and natural resources in Burkina Faso

- Climate change will have a **multisectoral impact**;
- Climate change will have a **serious impact**;
- **Cumulative GDP loss** will amount to approximately USD 28-55 billion by 2050 compared to a no-climate-change scenario;
- Adaptation **costs** will represent 0.6-1.5% of Burkina Faso's annual GDP;
- Adaptation **costs are minimal** compared to their benefits;
- Any **delay** in implementing adaptation strategies **will cause non-linear cost increases**.

Incorporating these findings and conclusions into the National Adaptation Plan will make it possible to accelerate economic growth in Burkina Faso at the same time as greening the country's economy.

2.5 INCORPORATION OF CLIMATE CHANGE ADAPTATIONS INTO DEVELOPMENT POLICIES AND STRATEGIES

It is vitally important for climate change adaptations to be proactively incorporated into development policies and strategies. Macroeconomic and sectoral policies and strategies which are currently in force should be revised to ensure that they incorporate climate change adaptations appropriately and effectively, and future development policies and strategies should do so on a mandatory basis.

The incorporation of climate change adaptations into national and sectoral planning processes requires a long-term and methodical approach. The government should therefore adopt and implement a methodology and timetable for the revision of existing national development policies, strategies, plans and programmes.

The United Nations Framework Convention on Climate Change sets out a practical methodology for incorporating climate change adaptations into development processes based on the following considerations:

1) The stages required to incorporate climate change adaptations into development planning processes;
2) The identification of national development policies, plans and programmes;
3) The incorporation of climate change adaptations at various stages of national policy-making;
4) The identification and mobilisation of stakeholders;
5) The building of human resource capacities in order to incorporate climate change adaptations into development processes.

2.5.1 The stages required to incorporate climate change adaptations into development planning processes

Six different stages are listed:

1) Understand the relevance of **current climate conditions to policies**, plans and programmes at national, sectoral, regional and executive agency level and the climate-sensitive nature of these **policies**, **plans and programmes**;
2) Use readily available resources to **evaluate** the **social, economic and environmental** impacts **of climate change**;
3) Identify and evaluate the **likelihood and consequences** of certain **climate-related risks**;
4) Identify **options for responding to climate-based risks** by using existing management practices or amending policies and programmes;
5) Implement specific **measures** to **incorporate adaptations** into policies, plans or programmes;
6) Identify and **manage challenges and opportunities**.

2.5.2 The identification of national development policies, plans and programmes

National development policies, strategies, plans and programmes can be identified using the following sources of information:

- National Vision documents (e.g. Vision 2020);
- strategies and plans for economic growth and national development;
- medium- and long-term national development targets (such as the Millennium Development Goals);
- national policies, strategies and plans targeting key vulnerable sectors (such as agriculture, water, wetlands and healthcare) and cross-cutting issues such as climate change, including sectoral approaches
- national poverty reduction strategy documents;
- national policies on governance and community councils;
- other relevant policies on data and information collection and management, disaster readiness and risk mitigation;
- strategies and action plans adopted by multilateral agencies (World Bank Country Assistance Strategy, United Nations Development Assistance Framework (UNDAF) etc.);
- bilateral cooperation activities and strategies, in particular indicative cooperation programmes adopted by development agencies.

2.5.3 The incorporation of climate change adaptations at various stages of national policy-making

The proposed approach takes the form outlined in the table below:

Table26: Proposed methodology for the incorporation of climate change adaptations into the policy and strategy drafting process

Policy formulation stage	• Demonstrate a clear awareness of climate-related risks and the need to incorporate adaptations into the relevant policies; • Adopt a climate-focused approach to policy and strategy formulation.
Planning stage	• Adopt a climate-focused approach to draft sectoral plans; • Take a proactive approach to programmes or projects aimed specifically at facilitating climate change adaptations.
Resource allocation	• Redirect funds towards particularly vulnerable sectors or regions; • Provide funding for certain adaptation plans or activities.
Implementation	• Translate national priorities and budgetary envelopes into local and sectoral plans and budgets at government level.

2.5.4 The identification and mobilisation of stakeholders

The scale and nature of adaptation activities are different for the various stakeholders, for example according to the main risks they face. The following approach is therefore recommended:

- establish partnerships with the relevant government bodies and other stakeholders (community organisations, NGOs, pressure groups etc.);
- identify and involve the ministry, agency or organisation which is primarily responsible for and coordinates the relevant activity.

2.5.5 The building of human resource capacities in order to incorporate climate change adaptations into development processes

Appropriate legislative and regulatory frameworks are required for the successful incorporation of climate change adaptations into development processes. In particular, this relates to:

- Laws/acts on climate change,
- Laws/acts on the environment,
- Regulations coordinating institutional activities,
- Laws on the sustainable use or protection of natural resources.

2.6 IMPLEMENTATION OF THE NATIONAL ADAPTATION PLAN

A strategy for implementation of the National Adaptation Plan within a framework of five (5) priorities is set out below:

Strategic priority 1:	Build the long-term capacities of institutional structures involved in climate change adaptations;
Strategic priority 2:	Improve IT systems;
Strategic priority 3:	Establish effective and sustainable funding mechanisms;
Strategic priority 4:	Reduce the country's overall vulnerability to climate change;
Strategic priority 5:	Incorporate climate change adaptations into development policies and strategies on a systematic basis.

Specific objectives, outcomes and indicators have been identified for each strategic priority, and details of the strategy are provided in Table 27 below:

Table27: National Adaptation Plan implementation strategy

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Hypotheses and risks
STRATEGIC PRIORITY 1: Build the long-term capacities of institutional structures involved in climate change adaptations				
Expand the technical, human and financial resources of SP/CONEDD and its operational structures	A programme for building the climate change adaptation capacities of SP/CONEDD and its operational structures has been developed and is in place	- A programme for building the capacities of SP/CONEDD and its operational structures is available - Quality of technical and financial reports by SP/CONEDD	- Document with details of the capacity-building programme - Training reports - Evaluation reports by SP/CONEDD	- Political instability - Institutional change - Lack of support from technical and financial partners and the state
Build the capacities of institutional structures involved in managing climate change adaptations	Dynamic long-term planning mechanisms that incorporate climate change adaptations have been put in place	Policy documents and development strategies refer to climate change adaptations	Policy documents and development strategies	- Political instability - Institutional change - Lack of support from technical and financial partners and the state
	Problems relating to climate change adaptations are resolved promptly	Satisfaction rate for climate change victims	Evaluation reports	
	Risks relating to variability and climate change are better managed	Anticipation capacities of institutional structures involved in managing climate change adaptations	Evaluation reports	
STRATEGIC PRIORITY 2: Improve IT systems				
Improve knowledge of climate change adaptations	Climate change adaptations are more widely known of and documented	A climate change adaptations database has been created and is functional	Reports by SP/CONEDD SP/CONEDD website Website: www.eau.Burkina	- Political instability - Institutional change - Lack of support from technical and financial partners and the state
Ensure that the existing early warning system is functional	The early warning system works effectively	Improve the anticipation capacities of the early warning system	Evaluation reports	- Political instability - Institutional change - Lack of support from technical and financial partners and the state
Foster a culture of resilience and adaptation to climate change among citizens	Citizens gradually develop a well-informed and responsible approach to variability and climate change adaptations	Adoption rate for best practices in the field of climate change adaptations	Evaluation reports	- Low rate of political involvement - Political instability

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Hypotheses and risks
STRATEGIC PRIORITY 3: Implement effective and sustainable funding mechanisms				
Build capacities and leadership in Burkina Faso with a view to mobilising the funding required for climate change adaptations	More funding is available for climate change adaptations	Increase in funding mobilised	Signed funding agreements	- Low rate of political involvement - Lack of continuity in political commitments - Political instability - Lack of support from technical and financial partners and the state
Provide sustainable funding sources for climate change adaptations in Burkina Faso	Burkina Faso has stable and sustainable funding sources for climate change adaptations Burkina Faso has stable and sustainable sources of funding for the rehabilitation/recovery of climate change victims	Funding is available A sustainable funding mechanism is in place	Signed funding agreements Water rates are charged The principles of "user pays" and "polluter pays" are enforced Funding tools (FIE [Fonds d'Intervention pour l'Environnement, Environmental Intervention Fund], Social Corporate Responsibility, Green Fund, EMOFA-B [Entité Nationale de Mise en Œuvre des Fonds d'Adaptation aux Changements Climatiques du Burkina Faso, National Entity for the Implementation of Climate Change Adaptation Funds in Burkina Faso])	- Low rate of political involvement - Lack of continuity in political commitments - Political instability - Lack of support from technical and financial partners and the state
STRATEGIC PRIORITY4: Reduce the country's overall vulnerability to climate change				
Reduce the structural vulnerability of at-risk populations and areas	The structural vulnerability of at-risk populations and zones is better managed	Reduction in the number of structurally vulnerable people and areas	- Reports by SP/CONEDD - Project activity reports - Study or research reports	- Low rate of political involvement - Lack of continuity in political commitments - Political instability - Lack of support from technical and financial partners and the state

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Hypotheses and risks
Ensure that development policies, projects and programmes take greater account of the need to reduce social and environmental risks	The need to reduce social and environmental risks is documented in development policies, projects and programmes	Development policies, projects and programmes refer to the need to reduce social and environmental risks	- Reports by SP/CONEDD - SP/CONEDD website - Website: www.eau.Burkina - Evaluation reports - EIE and EES project and programme reports - Audit report - Implementation reports for social and environmental management plans	- Low rate of political involvement - Lack of continuity in political commitments - Political instability - Lack of support from technical and financial partners and the state
- **STRATEGIC PRIORITY 5: Incorporate climate change adaptations into development policies and strategies on a systematic basis**				
Encourage those with research or planning responsibilities to be aware of the need to incorporate climate change adaptations	Policy documents and development strategies incorporate climate change adaptations	The need for high-quality policy documents and development strategies is recognised	- Reports by stakeholders in the development sector	- Low rate of political involvement - Political instability

2.6.1 Assessing the performance of the National Adaptation Plan

A methodical approach is required to monitor the effectiveness of the National Adaptation Plan implementation strategy. A performance assessment plan is therefore proposed in Table 28 below:

Table28: National Adaptation Plan performance assessment plan

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Data collection method	Data collection frequency	Entity responsible for data collection
STRATEGIC PRIORITY 1: Build the long-term capacities of institutional structures involved in climate change adaptations						
Expand the technical, human and financial capacities of SP/CONEDD	A programme for building the climate change adaptation capacities of SP/CONEDD and its operational structures has been developed and is in place	A programme for building the capacities of SP/CONEDD is available Quality of technical and financial reports produced by SP/CONEDD	Document with details of the capacity-building programme Training reports Evaluation reports by SP/CONEDD	Use of SP/CONEDD activity reports Use of SP/CONEDD meeting reports Use of SP/CONEDD website Ad-hoc studies	Every year Every two years	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
Build the capacities of institutional structures involved in managing climate change adaptations	Dynamic long-term planning mechanisms that incorporate climate change adaptations have been put in place Problems relating to climate change adaptations are resolved promptly Risks relating to variability and climate change are better managed	Policy documents and development strategies refer to climate change adaptations Satisfaction rate for climate change victims Anticipation capacities of institutional structures involved in managing climate change adaptations	Policy documents and development strategies Evaluation reports Evaluation reports	Use of SP/CONEDD activity reports Use of SP/CONEDD meeting reports Use of SP/CONEDD website Ad-hoc studies	Every year Every two years	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
STRATEGIC PRIORITY 2: Improve IT systems						
Improve knowledge of climate change adaptations	Climate change adaptations are more widely known of and documented	A climate change adaptations database has been created and is functional	Reports by SP/CONEDD SP/CONEDD website	Use of SP/CONEDD activity reports Use of SP/CONEDD meeting reports Use of SP/CONEDD website	Every year	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Data collection method	Data collection frequency	Entity responsible for data collection
Ensure that the existing early warning system is functional	The early warning system works effectively	Improve the anticipation capacities of the early warning system	Evaluation reports	Use of SP/CONEDD activity reports Use of SAP activity reports Ad-hoc studies	Every year Every two years	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
Foster a culture of resilience and adaptation to climate change among citizens	Citizens gradually develop a well-informed and responsible approach to variability and climate change adaptations	Adoption rate for best practices in the field of climate change adaptations	Evaluation reports	Use of SP/CONEDD activity reports Use of SP/CONEDD meeting reports Ad-hoc studies	Every year Every two years	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
STRATEGIC PRIORITY 3: Implement effective and sustainable funding mechanisms						
Build capacities and leadership in Burkina Faso with a view to mobilising the funding required for climate change adaptations	More funding is available for climate change adaptations	Increase in funding mobilised	Signed funding agreements	Use of SP/CONEDD activity reports Use of the Official Gazette Use of SP/CONEDD meeting reports	Every year	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
Provide sustainable funding sources for climate change adaptations in Burkina Faso	Burkina Faso has stable and sustainable funding sources for climate change adaptations Burkina Faso has stable and sustainable funding sources for the rehabilitation/recovery of climate change victims	Funding is available	Signed funding agreements	Use of SP/CONEDD activity reports Use of the Official Gazette Use of SP/CONEDD meeting reports	Every year	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
STRATEGIC PRIORITY 4: Reduce the country's overall vulnerability to climate change						
Reduce the structural vulnerability of at-risk populations and areas	The structural vulnerability of at-risk populations and areas is better managed	Reduction in the number of structurally vulnerable people and areas	Reports by SP/CONEDD Project activity reports Study or research reports	Use of SP/CONEDD activity reports Use of SP/CONEDD meeting reports Use of SP/CONEDD website	Every year	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation

Specific objectives	Anticipated outcomes	Performance indicators	Data sources	Data collection method	Data collection frequency	Entity responsible for data collection
				Ad-hoc studies	Every two years	
Ensure that development policies, projects and programmes take greater account of the need to reduce social and environmental risks	The need to reduce social and environmental risks is documented in development policies, projects and programmes	Development policies, projects and programmes refer to the need to reduce social and environmental risks	Reports by SP/CONEDD SP/CONEDD website Evaluation reports	Use of SP/CONEDD activity reports Use of SP/CONEDD meeting reports Use of SP/CONEDD website Ad-hoc studies	Every year Every two years	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
STRATEGIC PRIORITY 5: Incorporate climate change adaptations into development policies and strategies on a systematic basis						
Improve knowledge of climate change among policy-makers	Government officials know more about the impact of climate change on development A timetable has been adopted for the revision of policy documents and development strategies	Policy documents and development strategies refer to the need for climate change adaptations	Minutes of meetings of the Council of Ministers	Use of minutes of meetings of the Council of Ministers	Every year	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation
Encourage those with research or planning responsibilities to be aware of the need to incorporate climate change adaptations	Policy documents and development strategies incorporate climate change adaptations	The need for high-quality policy documents and development strategies is recognised	Reports by stakeholders in the development sector	Use of reports by stakeholders in the development sector	Every year	SP/CONEDD monitoring/evaluation section Sectoral contacts for monitoring/evaluation

PART THREE: IMPLEMENTATION

3.1. INSTITUTIONAL IMPLEMENTATION MECHANISM

3.1.1 Agencies

Effective governance is required to secure the full benefits of the National Adaptation Plan. The permanent nature of climate change means that strategic monitoring will also continue to be necessary in order to prevent adverse consequences.

Until texts are adopted in application of Law No 008-2014/AN of 8 April 2014 setting out a framework law on sustainable development in Burkina Faso, the following governance agencies should be tasked with coordinating and steering the National Adaptation Plan:

- CONEDD
- SP/CONEDD;
- CONEDD's specialist committees

The expansion of existing structures is evidently preferable to the creation of new ones.
CONEDD will play the following specific roles in relation to coordinating and steering the National Adaptation Plan:

- supervise implementation of the National Adaptation Plan;
- examine and approve activity programmes and draft budgets;
- examine and approve outcome reports, activity reports and financial reports;
- initiate or commission any studies relating to climate change adaptations;
- put forward any initiatives and proposals likely to improve the incorporation of climate change adaptations into development policies and strategies.

The tasks assigned to SP/CONEDD in this context will include the following:

- act as secretariat for CONEDD;
- carry out preparations for scheduled CONEDD meetings;
- draw up minutes or reports for scheduled CONEDD meetings;
- lead CONEDD's activities.

The part played by the specialist committees will depend on the specific concerns that emerge during implementation of the National Adaptation Plan. The Specialist Committee for Climate Change and Disaster Prevention, in existence since the third CONEDD conference in 2009, will also play an active role.

3.1.2. Structure

The institutional mechanism for monitoring and evaluating implementation of National Adaptation Plan is structured as follows: (i) annual review of the National Adaptation Plan, (ii) sectoral reviews and (iii) regional reviews.

The annual review involves validating the draft performance reports for the previous year, the impact evaluation report produced at least every three years and the draft performance matrix for future years.

The sectoral reviews are held twice a year (mid-year and annual), and generate reports used as an input for the annual review of the National Adaptation Plan. Mid-year sectoral reviews involve an examination of mid-term outcomes for year n and the identification of corrective actions required in relation to implementation of the National Adaptation Plan and priorities for future years.

The statutory purpose of regional reviews is to ensure that actions taken under regional development plans are consistent with the priorities of the Strategy for Accelerated Growth and Sustainable Development [Stratégie de croissance accélérée et de développement durable, SCADD] and to review their implementation. Similarly to sectoral reviews, they take place at least twice a year, and the validated review reports are incorporated into the annual review of the Strategy for Accelerated Growth and Sustainable Development. Regional reviews ensure that implementation of the National Adaptation Plan is monitored in terms of the proper incorporation of climate change adaptations into local development plans (regional and communal development plans).

3.1.3 Collaboration between the government and its partners

Collaboration between the government and its financial and technical partners in relation to the National Adaptation Plan must be maintained on the basis of the statutory arrangements described above. Initial collaboration between these stakeholders could take place in the form of a round table of donors with a view to mobilising funding, followed by other meetings to review funding mobilised, progress made, problems encountered and proposed solutions.

As regards collaboration between the government and NGOs/associations, use should be made of the structure established by Decree No 2011-296/PRES/PM/MEF/MATD of 13 May 2011 concerning the creation, funding, organisation and operation of a framework for collaboration between the state and non-governmental organisations/development associations.

3.2 REGULATORY FRAMEWORK

The National Adaptation Plan is intended to guide and facilitate the incorporation of climate change adaptations into development policies and strategies, and will shape the methodological approach to long-term development planning in Burkina Faso. It is therefore vital that the National Adaptation Plan be adopted by a decree of the Council of Ministers. Implementing orders should be enacted for the decree with further details of National Adaptation Plan implementation methods for the various development sectors.

3.3 MOBILISATION OF TECHNICAL AND FINANCIAL RESOURCES

The following are potential sources of funding for the National Adaptation Plan:

- National budget;
- Traditional or emerging bilateral partners;
- Traditional or emerging multilateral partners;
- International foundations;
- Private sector (mining companies, companies working in the renewable/non-renewable energy sector etc.);
- Civil society organisations (NGO networks, associations etc.);
- etc.

The Minister for the Economy and Finance will be chiefly responsible for mobilising funding, in collaboration with his or her counterparts in the various sectors. A round table of donors is recommended in order to document the financial commitments of the various technical and financial partners wishing to support the implementation of the National Adaptation Plan.
Several steps must however be taken in order to ensure that the round table can deliver the desired outcomes, and these are described below:

1) Political and technical support measures

These include:

- Identifying a lead technical and financial partner for the duration of the National Adaptation Plan;
- Drafting and implementing a donor mobilisation strategy;
- Drafting and implementing a communications strategy.

2) Mobilisation and awareness-raising measures

Missions should take place:

- to OCED countries, in particular the Scandinavian countries and Japan;
- to private foundations and international NGOs.

3) Round table and following up on commitments

The following practical suggestions can be made:

- organise and hold the round table in Ouagadougou;
- maintain a scoreboard of financial and technical commitments;
- follow up on round table commitments.

3.4 COMMUNICATIONS STRATEGY

Successful implementation of the National Adaptation Plan requires a proactive communications strategy, aimed at promoting ownership of the National Adaptation Plan among the public and development partners.

The strategy will primarily target national, regional and local decision-makers, as well as (i) centralised and decentralised administrative structures, (ii) local authorities, (iii) civil society and the private sector, (iv) communications and media experts, (v) educators, (vi) researchers, (vii) women, (viii) young people, (ix) technical and financial partners, (x) opinion leaders and traditional and religious authorities, (xi) local communities in the countryside and in towns.

Different channels may be used for communications concerning the National Adaptation Plan, in particular information and communication technologies (ICT), the structures and facilities of the ministry responsible for communications and the private media, and traditional channels of communication such as direct collaboration with stakeholders.

Particular emphasis will be placed on the use of national languages in order to facilitate the simultaneous dissemination of information on a mass and grass-roots basis. Tailored information should also be communicated to the international community, in particular with a view to mobilising more funding for implementation of the National Adaptation Plan. A communications strategy is essential in all cases to improve the reach of information about the National Adaptation Plan at all levels.

3.5 RESEARCH AND DEVELOPMENT

Climate change is not a new phenomenon, but it is evident that the alarming scale and frequency of recent climate change events has prompted a resurgence of interest in this area. There are many reasons why climate change attracts so much attention and causes so much concern in every region of the world; the most important is that the age-old phenomenon of climate change has accelerated in pace in recent decades. It has also become increasingly clear that the environmental repercussions and economic impacts of climate change are sizeable. Finally, populations everywhere in the world are beginning to experience adverse consequences of climate change on aspects of their own lives and environments, not least their health and wellbeing. These developments are all the more concerning for Burkina Faso due to its location in the heart of the Sahel, one of the most climate-change-sensitive regions in the world. The formulation of National Adaptation Plans by least-developed countries such as Burkina Faso is therefore entirely justified.

Research and development activities play an important role in improving awareness and management of climate change with a view to successful implementation of the National Adaptation Plan. A number of centres of excellence in Burkina Faso are involved in research into climate change. The following is a non-exhaustive list of centres and institutions working in this field:

- National Centre of Forestry Seeds [Centre national de semences forestières, CNSF];
- International Centre for Research and Development on Livestock Farming in Sub-Humid Areas [Centre international de recherche-développement sur l'élevage en zone subhumide, CIRDES];
- National Centre for Scientific and Technological Research [Centre national de la recherche scientifique et technologique, CNRST];
- International Institute for Water and Environmental Engineering [Institut international d'ingénierie de l'eau et de l'environnement, 2IE];
- University of Ouagadougou;
- Polytechnic University of Bobo-Dioulasso;
- International Centre for Forestry Research [Centre international pour la recherche forestière, CIFOR].

Despite the efforts already underway, further action is needed. Climate change research must take account of the three main options for responding to climate change, namely:

- the production of scientific knowledge;
- mitigation and
- adaptation.

With specific reference to the National Adaptation Plan, accompanying research programmes are needed in order to learn more about climate change and find solutions to practical issues, for example by:

- analysing the vulnerability of Burkina Faso's different regions in order to identify tailored adaptation measures;
- forecasting climate change impacts on the key development sectors in Burkina Faso;
- identifying interrelationships between climate and society;
- investigating environmental disaster prevention;
- finding new crop varieties adapted to climate change;
- studying agroforestry;
- studying carbon sequestration;
- studying climate-sensitive emerging and re-emerging diseases;
- etc.

PART FOUR: MONITORING AND EVALUATION

The following factors relating to monitoring and evaluation of the National Adaptation Plan will be examined below in turn:

- importance of monitoring and evaluation;
- resources and capacities required for monitoring and evaluation;
- methodological approach to monitoring and evaluation;
- monitoring and evaluation mechanism;
- revision and updating process;
- external evaluations.

4.1 IMPORTANCE OF MONITORING AND EVALUTION

Monitoring and evaluation plays a key role in relation to implementation of the National Adaptation Plan, making it possible to:

- provide an up-to-date overview of progress at all times, so that the bodies responsible for overseeing the National Adaptation Plan can take appropriate decisions whenever necessary;
- put forward recommendations aimed at addressing any shortcomings observed in relation to implementation of the National Adaptation Plan;
- make activities more effective and efficient in order to achieve anticipated outcomes;
- increase the visibility of the National Adaptation Plan throughout the implementation period.

All of the factors listed above mean that particular emphasis should be placed on monitoring and evaluation, and sufficient funding made available for this purpose.

4.2 RESOURCES AND CAPACITIES REQUIRED FOR MONITORING AND EVALUATION

The following resources and capacities will therefore be required;

- **Human resources:** the monitoring and evaluation section within SP/CONEDD will be expanded to include at least three (3) new recruits responsible for processing the data collected from ministries and institutions involved in climate change adaptations. In addition to this, however, human resource capacities must be regularly expanded in order to respond to current challenges.
- **Technical resources:** the technical resources required will be essentially limited to a monitoring and evaluation manual and software/computers. A consultant or specialist company should be assigned the task of designing the monitoring and evaluation manual and software. In the meantime, a simple and practical monitoring and evaluation methodology should be put in place.
- **Financial resources:** financial resources must be consistently mobilised for the monitoring and evaluation mechanism. Approximately 10% of the cost of each operational

project under the National Adaptation Plan should be allocated specifically for this purpose in order to build funding capacities.

4.3 MONITORING AND EVALUATION METHODOLOGY

The methodology is based primarily on monitoring and evaluation of the National Adaptation Plan performance assessment plan, described in Table 29 above for the overall performance assessment plan. The table lists specific objectives, anticipated outcomes, performance indicators, data sources, data collection methods, data collection frequencies and entities responsible for data collection for each of the strategic priorities of the National Adaptation Plan.

The summary tables set out below will enable regular reviews of progress made in relation to the National Adaptation Plan, and can be tailored as required:

Table 29: Monitoring of activities under the National Adaptation Plan

Planned activities	Implemented activities	Implementation rate (%)	Activities not implemented	Explanation of discrepancies
Strategic priority 1: Build the long-term capacities of institutional structures involved in climate change adaptations				
Activity 1:				
Activity 2:				
Activity No.:				
Strategic priority 2: Improve IT systems				
Activity 1:				
Activity 2:				
Activity No.:				
Strategic priority 3: Implement effective and sustainable funding mechanisms				
Activity 1:				
Activity 2:				
Activity No.:				
Strategic priority 4: Reduce the country's overall vulnerability to climate change				
Strategic priority 5: Incorporate climate change adaptations into development policies and strategies on a systematic basis				
Activity 1:				
Activity 2:				
Activity No.:				

Table30: Monitoring of outcomes under the National Adaptation Plan

Outcomes	Name of indicator	Unit of measurement	Planned level	Implemented level on …..
STRATEGIC PRIORITY 1: Build the long-term capacities of institutional structures involved in climate change adaptations				
Outcome 1:				
Outcome 2: Outcome No.:				
STRATEGIC PRIORITY 2: Improve IT systems				
Outcome 1:				
Outcome 2:				
Outcome No.:				
STRATEGIC PRIORITY 3: Implement effective and sustainable funding mechanisms				
Outcome 1:				
Outcome 2:				
Outcome No.:				
STRATEGIC PRIORITY 4: Reduce the country's overall vulnerability to climate change				
Outcome 1:				
Outcome 2:				
Outcome No.:				
STRATEGIC PRIORITY 5: Incorporate climate change adaptations into development policies and strategies on a systematic basis				
Outcome 1:				
Outcome 2:				
Outcome No.:				

Table31: National Adaptation Plan impact monitoring

Objectives	Name of indicators	Unit of measurement	Planned level	Implemented level on …..
STRATEGIC PRIORITY 1: Build the long-term capacities of institutional structures involved in climate change adaptations				
Specific objective 1:				
Specific objective 2:				
Specific objective No.:				
STRATEGIC PRIORITY 2: Improve IT systems				
Specific objective 1:				
Specific objective 2:				
Specific objective No.:				
STRATEGIC PRIORITY 3: Implement effective and sustainable funding mechanisms				
Specific objective 1:				
Specific objective 2:				
Specific objective No.:				
STRATEGIC PRIORITY 4: Reduce the country's overall vulnerability to climate change				
Specific objective 1:				
Specific objective 2:				
Specific objective No.:				
STRATEGIC PRIORITY 5: Incorporate climate change adaptations into development policies and strategies on a systematic basis				
Specific objective 1:				
Specific objective 2:				
Specific objective No.:				

4.4 MONITORING AND EVALUATION MECHANISM

The monitoring and evaluation mechanism involves two entities:

- the SP/CONEDD monitoring and evaluation section, which will be responsible for reviewing the overall implementation progress of the National Adaptation Plan, and supplied with additional human, technical and financial resources to this end. It will also be tasked with running a database containing National Adaptation Plan performance assessments for use by the government and all other stakeholders.
- monitoring and evaluation contacts in the ministerial sectors covered by the National Adaptation Plan, who will work together with the SP/CONEDD monitoring and evaluation section to update the database with information on the progress made by each sector in relation to the National Adaptation Plan.

The SP/CONEDD monitoring and evaluation section and the monitoring and evaluation contacts in the ministerial sectors covered by the National Adaptation Plan will produce regular reports and information for decision-makers and the general public on progress achieved under the National Adaptation Plan.

4.5 REVISION AND UPDATING PROCESS

Climate change takes a variety of forms, and its impacts may differ over time. The National Adaptation Plan must therefore be reviewed and updated after a certain implementation period. Reviews should also be carried out as necessary to incorporate progress made, new adaptation challenges, social and environmental developments, new policies and national and international government undertakings.

Reviews may be carried out in two ways:

- a regular review carried out every five (5) years, e.g. to increase the effectiveness of the National Adaptation Plan;
- ad-hoc reviews, triggered by factors such as adaptation outcomes, the effectiveness of adaptation measures, variations observed compared to initial climate projections, changes in the vulnerability of development sectors etc.

Regardless of the changes made in relation to implementation of the National Adaptation Plan, a review must be carried out every five years in order to maximise the gains for sustainable development in Burkina Faso. The National Adaptation Plan should therefore be integrated into a continuous process of development planning at national level, which requires ongoing collaboration between the relevant stakeholders. A participative and inclusive approach should be taken when reviewing the National Adaptation Plan.

4.6 EXTERNAL EVALUATIONS

Independent external evaluations should be carried out at the end of the first five-year implementation cycle of the National Adaptation Plan. These evaluations should incorporate lessons learned during the first five years of implementing the National Adaptation Plan. They will therefore be specifically aimed at the systematic and objective evaluation of progress made towards the anticipated outcomes of the National Adaptation Plan. They will take three different forms:

1) A mid-term evaluation focusing on the effectiveness and efficiency of the first five-year implementation cycle of the National Adaptation Plan, to take place at the end of the first half of the five-year cycle;
2) An evaluation of outcomes achieved at the end of the five-year cycle, which can be used as a basis for decisions aimed at improving outcomes during the second five-year implementation cycle of the National Adaptation Plan, and will take place at the end of the first five-year implementation cycle;
3) A retrospective evaluation to assess impacts, lessons learned and the sustainability of outcomes, again intended to provide an appropriate basis for future policies and strategies. This evaluation may be carried out two or more years after the end of the first five-year implementation cycle of the National Adaptation Plan.

Although the proposed monitoring and evaluation system is intended to review the implementation and outcomes of the National Adaptation Plan, it will form part of and consolidate the SP/CONEDD monitoring and evaluation system.

CONCLUSION

Burkina Faso's geographical position means that it is one of the most climate-change-sensitive countries in the world. Recent scientific findings suggest that the Sahel will be subject to climate disruptions over the next few years, in particular an increase in variability and alternating droughts and floods.
Climate change in Burkina Faso is still characterised by a more or less marked movement of isohyets, a significant shift in isotherms, high rainfall variability and an increase in the scale and intensity of extreme climate events such as droughts, floods, heat waves, strong winds and dust storms. Burkina Faso is therefore at risk of natural disasters which will have unforeseeable impacts on the country's environment, peoples and economy.

The disasters which have hit the country in recent years (in particular the 2009 floods in Ouagadougou), and which are likely to be a result of climate change, have caused significant damage in human terms and in relation to healthcare, education, housing, means of production, drinking water supply, road and hydro-agricultural infrastructures etc.

The studies carried out for the purpose of this National Adaptation Plan also demonstrate that the sectors most vulnerable to climate change in the medium and long term include the environment and natural resources, energy, agriculture, livestock production, healthcare, infrastructure and housing.
Despite this vulnerability and unfavourable natural conditions, however, solutions can be found to help Burkina Faso on its path towards sustainable development. In order for this to happen, policy-makers must ensure that climate change adaptations take centre stage in any development policy or strategy.

All other development stakeholders, including technical and financial partners, the private sector, civil society organisations and the international community, should also join together to tackle to the impacts of climate change. In this context, the National Adaptation Plan can be used as a reference framework for consolidating the efforts of various stakeholders in order to reduce Burkina Faso's structural vulnerability, increase its resilience and better manage its development.
Stakeholders at all levels must therefore be mobilised in order to respond to the anticipated harmful impacts of climate change, with the aim of, inter alia, (i) expanding the human resources available to respond to the consequences of climate change in each of these sectors, (ii) building the capacities of the main stakeholders and (iii) responding to the estimated costs of adaptations for vulnerable sectors in the medium and long term.

Strong policies must therefore be adopted and implemented by Burkina Faso in this field, in particular:

- a national teaching strategy on climate change;
- greater synergies between parties active in the field of climate change (researchers, government technical services, producers, the private sector, NGOs and associations etc.);

- an increased number of training and awareness-raising measures informing the public about the consequences of climate change for their livelihoods and means of subsistence;
- regular meetings between the government and its various partners with a view to implementation of the current National Adaptation Plan;
- the establishment of a committee to monitor implementation of the National Adaptation Plan.

GLOSSARY[6]

Adaptation
An adjustment of natural or human systems in response to current or anticipated climate change or its impacts, with a view to mitigating damage or exploiting benefits.

Natural or climate-related risks
A natural or climate-related phenomenon which may lead to the loss of life, injury or other health-related impacts, damage to property, loss of means of subsistence and services, socio-economic upheaval or environmental damage.

Early warning
All of the capacities required to produce and disseminate timely warnings which allow at-risk individuals, communities and organisations to make preparations and take appropriate action in good time so as to mitigate the risk of damage or loss.

Mitigation
All of the measures taken or policies adopted to reduce atmospheric emissions of greenhouse gases by targeting the sources of emissions or sequestering carbon already present in the atmosphere in natural or artificial structures (carbon sinks), for example forests.

Adaptation capacity
The capacity of a natural or human system to adapt to climate change (in particular climate variability and extreme climate events) in order to mitigate potential damage, exploit any opportunities and respond to the consequences of anthropogenic climate change.

Climate change
Modifications to the climate which are directly or indirectly attributable to human activities, which alter the composition of the world's atmosphere and which are observable over a long period.

Capacity building
The process through which people, organisations and society can stimulate and develop skills over time in order to achieve economic and social objectives, for example improved knowledge, systems and institutions.

Adverse effects of climate change
Changes in the physical environment or biota resulting from climate change that have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems, the operation of socio-economic systems or human health and wellbeing

[6]***Extract from a glossary of climate-change-related terms and expressions, National Adaptation Programme Projects, 2012***

Emissions
The release of greenhouse gases or greenhouse gas precursors into the atmosphere above a particular area and during a particular period.

Greenhouse gas
An atmospheric gas (natural or anthropogenic) which absorbs and emits heat and infrared radiation emitted by the earth's surface, the atmosphere itself and clouds (e.g.: carbon dioxide, methane, nitrous oxide, ozone, water vapour, chlorine or fluorine compounds etc.).

Adaptation measures
Measures aimed at counteracting the impacts or effects of climate change.

Mitigation measures
Measures which make it possible to prevent an impact or reduce its severity, generally by modifying a project or its mechanisms.

Preventive measures
Actions which make it possible to eliminate climate change risks or reduce them to an acceptable level.

Climate model
The numerical representation of a climate system based on the physical, chemical and biological properties of its components, their interactions and feedback processes, and which takes account of all or part of its known properties.

Prevention
All of the activities which allow the negative impact of risks to be completely eliminated and any associated environmental, technological and biological disasters to be minimised.

Forecast
A statement or statistical estimate of the likelihood of a future event or specific conditions in a particular area.

Projection
An indication of potential future changes to a variable or a collection of variables, often calculated using a model. Projections differ from forecasts in that they are based on hypotheses, for example regarding changes in socio-economic conditions or techniques which may or may not prove valid. This means that are subject to a high degree of uncertainty.

Resilience
The capacity of an at-risk system, community or a society to withstand, absorb, accept and rectify the effects of a risk in good time and efficiently, in particular by preserving and restoring its essential structures and basic functions.

The capacity of a social or ecological system to absorb disruptions while maintaining its basic structure and modes of operation, and the capacity to organise itself and adapt to stress and change.

Disaster risk
The potential for a disaster which may occur within a community or society in the future and affect human life, health, means of subsistence, goods and services.

Climate scenario
A plausible and frequently simplified representation of the future climate, based on an intrinsically coherent set of climate interrelationships and produced for the express purpose of determining the possible consequences of anthropogenic climate change. Often used as the basis for impact models. Climate projections are frequently used as an input for climate scenarios, generally together with additional information such as current climate observations.

Climate change scenario
The difference between a climate scenario and the current climate.

Sensitivity
The capacity of a system to respond to a change in climate conditions, for example: the rate of change in the composition, structure and mode of operation of an ecosystem and in particular its primary productivity in relation to a specified variation in temperature or precipitation.

Climate system
An umbrella term for the atmosphere, the hydrosphere, the biosphere, the geosphere and their interactions.

Vulnerability
The characteristics or circumstances of a community or system which mean that it is exposed to the impacts of a risk. Vulnerability defines the extent to which a system may be degraded or damaged by climate change, and depends not only on sensitivity but also on the capacity of the system to adapt to new climate conditions. The term combines the degree of physical risk faced by a society with its capacity for adaptation.

BIBLIOGRAPHY

BIKIENGA I.M., 2013: Rapport de capitalisation du Projet PANA- BKF-PNUD/Japon [Report on the capitalisation of the PANA- BKF-PNUD/Japan project]. 29 pages.

BIKIENGA I.M., 2013: Rapport de capitalisation du Projet PANA- BKF-PNUD/FEM: Renforcement des capacités pour l'adaptation de la vulnérabilité aux changements climatiques [Report on the capitalisation of the PANA- BKF-PNUD/FEM project: building capacities for adapting to climate change vulnerability]. 44 pages.

BIKIENGA I.M., GARANE A., 2012: Etude sur la prévention et la gestion des catastrophes et crises humanitaires au Burkina Faso [Study on the prevention and management of disasters and humanitarian crises in Burkina Faso]. Volume I: Contexte général des catastrophes et crises humanitaires au Burkina Faso [General context of disasters and humanitarian crises in Burkina Faso]. Ministry of Social Action and National Solidarity. Ouagadougou. Burkina Faso. 126 pages.

BIKIENGA I.M., GARANE A., 2012: Etude sur la prévention et la gestion des catastrophes et crises humanitaires au Burkina Faso [Study on the prevention and management of disasters and humanitarian crises in Burkina Faso]. Volume II: Stratégie nationale de prévention et de gestion des risques et catastrophes au Burkina Faso [National Strategy for the Prevention and Management of Risks and Disasters in Burkina Faso]. Ministry of Social Action and National Solidarity. Ouagadougou. Burkina Faso. 33 pages.

BIKIENGA I.M., GARANE A., 2012: Etude sur la prévention et la gestion des catastrophes et crises humanitaires au Burkina Faso [Study on the prevention and management of disasters and humanitarian crises in Burkina Faso]. Volume III: Loi d'orientation relative à la prévention des risques et catastrophes au Burkina Faso [Framework law on the prevention of risks and disasters in Burkina Faso]. Ministry of Social Action and National Solidarity. Ouagadougou. Burkina Faso.42 pages.

BURKINA FASO 2011: Strategy for Accelerated Growth and Sustainable Development 2011-2015. Ouagadougou. BURKINA FASO. 116 pages.

National coordination of projects under the National Adaptation Programme: Activity reports for 2010, 2011, 2012.

PANA-BKF-PNUD/FEM project document. 79 pages.

PANA-BKF-PNUD/Japan project document. Building capacities to ensure that greater account is taken of concerns relating to climate change adaptations during the preparation and implementation of development plans, programmes and projects. 31 pages.

IPCC, 2007, Climate Change 2007, Contributions of Working Groups 1, 2 and 3 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC, Geneva, Switzerland, 2008, 114 pages

KABORE T.B., KABORE T. M, TRAORE S., 2012: Mid-term evaluation of the PANA-BKF/FEM project. Final version. 90 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Climate trends 1980-2010. University of Ouagadougou. BURKINA FASO. 114 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Climate data. University of Ouagadougou. BURKINA FASO. 68 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Climate scenario projections in Burkina Faso. University of Ouagadougou. BURKINA FASO. 59 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Sociological analysis of natural disasters. University of Ouagadougou. BURKINA FASO. 38 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Report on healthcare. University of Ouagadougou. BURKINA FASO. 77 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Report on the environment. University of Ouagadougou. BURKINA FASO. 118 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Report on agriculture and livestock farming. University of Ouagadougou. BURKINA FASO. 111 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Hydrographic basins and water resources. University of Ouagadougou. BURKINA FASO. 14 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Report on energy. University of Ouagadougou. BURKINA FASO. 107 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Geology and mining areas. University of Ouagadougou. BURKINA FASO. 12 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Report on infrastructures. University of Ouagadougou. BURKINA FASO. 40 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Climate change

and social vulnerability in Burkina Faso: interdisciplinary approach to impacts and adaptation measures for vulnerable populations. University of Ouagadougou. BURKINA FASO. 22 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Assessment of risks and vulnerability: environmental, agricultural and livestock farming sectors. University of Ouagadougou. BURKINA FASO. 90 pages.

LAME, 2012: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Assessment of risks and vulnerability: water resources and infrastructures. University of Ouagadougou. BURKINA FASO. 27 pages.

LAME, 2013: National Adaptation Programme for Burkina Faso. Climate modelling studies, risk assessment and analysis of vulnerability to climate change. Risk assessment and vulnerability to climate change. Summary report. University of Ouagadougou. BURKINA FASO. 193 pages.

MECV [Ministère de l'environnement et du cadre de vie, Ministry of the Environment and Quality of Life, 2007, National Action Programme for Adapting to Variability and Climate Changein Burkina Faso, 76 pages

MEDD, 2012, Forestry Investment Programme, 70 pages.

MEF [Ministère de l'Economie et des Finances, Burkina Faso Ministry for Economy and Finance], MEDD, UNDP, 2011: Poverty Initiative project. Economic evaluation of the environment and natural resources in Burkina Faso. 163 pages.

Millennium Institute, 2012, National Adaptation Action Programme for Burkina Faso:

Analysis of multisectoral vulnerability in Burkina Faso with a view to the formulation of a national strategy for medium- and long-term climate change adaptations between now and 2025/2050, final report, 70 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Sectoral report: Agriculture. Ouagadougou. BURKINA FASO. 116 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Report: Livestock resources. Ouagadougou. BURKINA FASO. 79 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Sectoral report: Environment and natural resources. Ouagadougou. BURKINA FASO. 58 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Sectoral report: Healthcare. Ouagadougou. BURKINA FASO. 56 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Sectoral report: Energy. Ouagadougou. BURKINA FASO. 80 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Sectoral report: Infrastructure and housing. Ouagadougou. BURKINA FASO. 46 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Sectoral report: Women's associations. Ouagadougou. BURKINA FASO. 75 pages.

SP/CONEDD, 2013: National Climate Change Adaptation Plan for Burkina Faso. Sectoral report: Civil society organisations. Ouagadougou. BURKINA FASO. 83 pages.

THIEBA D., OUATTARA I., 2013: Final evaluation of the Africa Adaptation Programme. Burkina Faso: PANA-BKF-PNUD/Japan. Final version. 71 pages

UNFCCC, 2013: Training workshops held in 2012-2013 by an LDC Expert Group.

YAKA, P., 2008: "Rôles des facteurs climatiques et environnementaux dans l'apparition et la prédiction des épidémies de méningite cérébro-spinale en zone sahélo-soudanienne de l'Afrique de l'Ouest; cas du Burkina Faso et du Niger [Role of climate and environmental factors in the emergence and forecasting of cerebrospinal meningitis epidemics in the Sahelo-Sudanian zone of Western Africa; example of Burkina Faso and Niger]", Monday 21 April 2008. Paris: Pierre and Marie Curie University, doctoral thesis.

SECTORAL NATIONAL ADAPTATION PLANS CONSULTED:

- Agriculture,
- Livestock farming,
- Environment and natural resources,
- Healthcare,
- Energy,
- Infrastructure and housing,
- Women's associations,
- Civil society organisations.

OTHER DOCUMENTS CONSULTED:

- Report by the National Water Partnership of Burkina Faso, 2014: Plan national d'adaptation aux changements climatiques du Burkina Faso. Prise en compte de la sécurité en eau [National Climate Change Adaptation Plan. Water Security Issues]. 34 pages.
- MEAHA, 2014: Contribution à l'amélioration du plan national d'adaptation aux changements climatiques secteur eau et assainissement, Ministères de l'Eau, des Aménagements Hydrauliques et de l'Assainissement (MEAHA) [Proposal for Improvements to the National Climate Change Adaptation Plan for the Water and Sanitation Sector, Ministries of Water, Hydraulic Structures and Sanitation]. 8 pages.

ANNEXES

Annex 1: List of national experts consulted when drafting the operational programme

Sectors/structures	Surname and first name	Contact details
Environment and natural resources	Rigobert BAYALA	rigobertbayala@hotmail.com 76 86 36 36, 70 54 02 62
Agriculture	Dr OUEDRAOGO Souleymane	ouedsouley@hotmail.com / 70278473
Livestock production	SOME Désiré	adesiresome@yahoo.fr / 70248429
Healthcare	Dr S. KOUANDA	sekouanda@yahoo.fr
Meteorology	GARANE Ali Jacques	ajgarane@yahoo.fr / 76674595
Infrastructure and housing	Sanou Valérie	goungoungavalerie@yahoo.fr; 76 68 09 99, 78 88 58 69
Climate change coalition of civil society organisations	Ms. KI /THIOMBIANO Colette	colettekithiombiano@yahoo.fr / 70356680
Women's associations	Ms. SOME Madjelia	dao.ebou@yahoo.com / 70266509
SP/CONEDD/PFCC [Préparation pour le changement climatique, Preparations for Climate Change]	KABORE Augustin	kabaugustino@yahoo.fr / 70124485
Energy	YABRE D. Isaac	yabrosis@gmail.com 70 73 81 79

Annex 2: Composition of Technical Committee for Monitoring of the National Adaptation Plan

MINISTERE DE L'ENVIRONNEMENT
ET DU DEVELOPPEMENT DURABLE
-=-=-=-
SECRETARIAT GENERAL

BURKINA FASO
-=-=-=-
Unité - Progrès - Justice

N° 1049 /MEDD/SG

Ouagadougou, le 22 NOV 2012

NOTE DE SERVICE

-----oOo-----

Dans le cadre de la formulation d'un Plan National d'Adaptation aux changements climatiques du Burkina Faso pour le moyen et le long terme, un Comité Technique de Suivi est mis en place.

Le mandat du Comité Technique de Suivi est de piloter le processus de l'élaboration du Plan National d'Adaptation aux changements climatiques du Burkina Faso pour le moyen et le long terme. A cet effet, il est chargé :

- de suivre et d'évaluer tout le processus ;
- de valider le plan de travail ;
- d'aider les consultants pour l'accès aux structures et aux documents ;
- de prévalider les rapports et autres documents élaborés.

Le Comité Technique de Suivi est composé ainsi qu'il suit :

Président : le Secrétaire Permanent du CONEDD (SP-CONEDD)

Vice Président : le Directeur des Etudes et de la Planification du MEDD ;

Membres : - le Directeur des Etudes et de la Planification du MAH ;

- le Directeur des Etudes et de la Planification du MRA ;
- le Directeur des Etudes et de la Planification du MS;
- le Directeur des Etudes et de la Planification du MID ;
- le Directeur des Etudes et de la Planification du MHU ;
- le Directeur des Etudes et de la Planification du MRSI ;
- le Directeur des Etudes et de la Planification du MESS ;
- le Directeur des Etudes et de la Planification du MECM ;
- le Représentant du Département de l'Economie Rurale et de l'Environnement du PM ;
- le Représentant du Secrétaire Permanent du CPSA (SP-CPSA)
- le Représentant du Conseil National du Patronat Burkinabé (CNPB) ;
- le Représentant du PNUD ;

En cas de besoin, le Comité Technique de Suivi peut faire appel à d'autres personnes ressources.

P. le Ministre de l'Environnement et du Développement Durable et par délégation,
Le Secrétaire Général

Ministère de l'Environnement et du Développement Durable * Le Ministre *

Sambou COULIBALY
Chevalier de l'Ordre National

Ampliation :
- CAB/MEDD (ATCR)

Annex 3: Participants in training course on T21 model

1. Core team

No.	Surname and first name(s)	Structure	Telephone number	E-mail address
1	TRAORE Seydou Eric	University of Ouagadougou.	70.20.37.64	eric.seydou.traore@2ie-edu.org
2	BATHIEBO D. Joseph	University of Ouagadougou	76.65.09.42	jbathiebo@univ-ouaga.bf
3	NIANGAO Issaka	INSD [Institut national de la statistique et de la démographie, National Institute of Statistics and Demographics]	71.40.52.92	niangaoiss@yahoo.fr
4	ZOUGOURI Remi	SP/CONEDD/DCIME [Division du Développement des Compétences, de l'Information et du Monitoring en Environnement, Division for the Development of Environmental Competencies, Information and Monitoring]	70.16.82.65	zkremi@yahoo.fr
5	COMPAORE Halidou	INERA [Institut de l'Environnement et de Recherches Agricoles, Institute for the Environment and Agricultural Research]	70-32-97-89	halidou21@yahoo.fr
6	PARE Lassina	DGPER [Direction Générale de la Promotion de l'Economie Rurale, Directorate-General for Promotion of the Rural Economy]/DPSAA [Direction des Prévisions et des Statistiques Agricoles et Alimentaires, Directorate for Agricultural and Food Forecasts and Statistics]	70.28.80.26	parelas@yahoo.fr
7	YAKA Pascal	DGM [Direction Générale de la Météorologie, Directorate-General for Meteorology]/Météo	75-40-00-11	pascal_yaka@yahoo.fr
8	BAMOGO Célestin	MRA [Ministère des ressources animales, Ministry of Animal Resources/DGPSE [Direction Générale de la	70.56.65.97	bamocelest@yahoo.fr

		Prévision et des Statistiques de l'Elevage, Directorate-General for Livestock Farming Forecasts and Statistics]		
9	ZEBA Abdoulaye	DEP [Direction des études et de la planification, Directorate for Research and Planning]/MMCE [Ministère des Mines, des Carrières et de l'Energie, Ministry of Mines, Quarries and Energy]	70.09.90.41	abdallah_zeba@yahoo.fr
10	BAYILI Gilbert	UO [Université de Ouagadougou, University of Ouagadougou]/LAME [Laboratoire des Matériaux et Environnement, Laboratory of Materials and the Environment]	70-10-50-48	bgilbert8@yahoo.fr
11	ILBOUDO Pierre Claver	2iE	70-29-61-73	iclav@yahoo.fr
12	TELLIANO David	LAME/2iE	79-03-36-94	davtal181@gmail.com
13	KAM Sami	LAME/2iE	78-73-26-55	sami.kam@live.fr
14	SANKARA T. Bakari	University of Ouagadougou	78.24.74.93	sankbak82@yahoo.fr
15	BANI SAMARI Saïdou	University of Ouagadougou	78-05-77-27	Saidou.bani@yahoo.fr
16	TIMACK NGOM	CLUVA St-Louis		leontimack@yahoo.fr
17	Youssoufou OUEDRAOGO	University of Ouagadougou	75-97-81-22	yissfu@gmail.com
18	SEYDOU TOURE	LAME team (University of Ouagadougou)	70-25-42-93	seydout@yahoo.fr

2. Contact persons responsible for data collection

No.	Sector	Contact persons	Entity	Contact details	
				Telephone number	E-mail address
1.	ENERGY	COMPAORE K. Ablassé	DGM	78.82.24.20	ablasse_c@hotmail.com
2.		OUEDRAOGO Aimé Evariste	DGM	76.56.70.12	aimsonoued4@yahoo.fr
3.	HEALTHCARE	OUEDRAOGO Boureima	DGISS [Direction Générale de l'Information et des Statistiques Sanitaires, Directorate-General for Sanitary Information and Statistics]/Ministry of Health	70.35.46.16	boureimao-2001@yahoo.fr
		Abdoulaye Coulibaly	DGISS/Ministry of Health		banasira2006@yahoo.fr
4.	WATER	BIKIENGA Issa Martin	Ministry of Agriculture and Hydraulics	70.26.07.58	Issa_bikienga@yahoo.fr
5.	LAND AND INFRA-STRUCTURE	MIDIOUR Sami	SE/SG/MHU [Secrétariat du Secrétaire Général, Ministère de l'Habitat et de l'Urbanisme, Secretariat for the Secretary-General, Ministry of Housing and Urban Development]	78.81.65.35	mid_sami@yahoo.fr
6.					
7.	ENVIRONMENT	BOMBIRI Paul	DEES [Direction de l'économie de l'environnement et des statistiques, Directorate for the Economy, the Environment and Statistics]/MEDD [Ministère de l'environnement et du développement	70.25.45.62	pbombiri@yahoo.fr

			durable, Ministry of the Environment and Sustainable Development]		
8.		BELEMSOBGO Urbain	MEDD	50.30.77.51	ubelemsobgo@yahoo.fr
9.		SIDIBE Norbert	Environment – DCIME		norbertsidibe@yahoo.fr
10.	CLIMATE	Michel P. Nikiema	DGM	78.90.19.52	michel78us@yahoo.fr

3. Sectoral focal points

No.	Surname and first name(s)	Sector - Entity	Telephone number	E-mail address
1.	MIDJIOU Sami	Infrastructure - SE/SG/MHU	78.81.65.35	mid_sami@yahoo.fr
2.	Bikienga Issa Martin	Directorate-General for Water Resources		
3.	DIANE Aboubacar	Permanent Secretary of CONASUR [Conseil National de Secours d'Urgence et de Réhabilitation, National Council for Emergency Aid and Rehabilitation] within MASSN [Ministère de l'Action Sociale et de la Solidarité Nationale, Ministry of Social Action and National Solidarity]	70.32.37.79	bubazi@yahoo.fr
4.	KABORE Augustin	SP/CONEDD	70.12.44.85	kabaugustino@yahoo.fr

4. T21 Section/CEDEAO [Communauté économique des États de l'Afrique de l'Ouest, Economic Community of West African States]/Burkina Faso

No.	Surname and first name(s)	Sector - Entity	Contact details
1.	TASSIMBEDO Tapsoba M. Beatrice	Permanent Secretary of CNPE [Comité National de Politique Economique, National Committee for Economic Policy]/PCD [Programme communautaire de developpement, Community Development Programme]	MEF/CNPE CMS 912 Ouaga CMS11 Telephone number: +226 50 30 80 87 / +221 77 39 75 115 Fax: 226 50 30 80 84 E-mail: tasbea@yahoo.fr
2.	Mamoudou SEBEGO	Economist	Ministry of the Economy and Finance. Directorate-General for the Economy and Planning Telephone number and fax: +226 50 30 80 84 Seb_ahmed79@yahoo.fr
3.	Samuel T. KABORE	National Consultant for the Community Development Programme	University of Ouagadougou 03 BP 7021 Ouaga 01 Tel: +(226) 70 28 71 16 E-mail: stkabore@yahoo.fr / samuel.kabore@univ-ouaga.bf
4.	Seyni DA	Macroeconomist for the National Committee for Economic Policy	CNPE, MEF, 11 BP 912 CMS 11 Ouagadougou Telephone number: 226 50 30 80 87/ 50 30 58 34 / 70 42 09 16 Fax: +226 50 30 80 84 E-mail: dasseyni@yahoo.fr

5.	Salifou NABELEMA	Head of Economic Research	BCEAO [Banque Centrale des Etats de l'Afrique de l'Ouest, Central Bank of West African States] Ouaga, 01 BP 356 Ouaga 01 Telephone: +226 50 30 60 15 Fax: +226 50 31 01 22 E-mail: snabelema@bceao.int
6.	Issaka NIANGAO	Engineer, Statistician and Economist (INSD)	01 BP 374 Ouagadougou Telephone: +226 50 32 42 60 Fax: +226 50 32 61 59 E-mail: insdbf@yahoo.fr

Annex4: T21 model

DESCRIPTION OF THE T21 MODEL BY THE MILLENIUM INSTITUTE (WASHINGTON)

The Threshold 21 model (T21) is a system dynamics tool designed to support national development planning. It facilitates dynamic analysis of the impact of different structural policies and changes on various key development indicators, and, on this basis, an integrated assessment incorporating the interrelationships between economic, social and environmental sectors in the medium and long term.

The T21 model supports comprehensive and integrated analysis of development challenges, such as poverty reduction, economic growth and the monitoring and evaluation of policies and programmes adopted in response to these problems. The T21 model is particularly suitable for promoting the medium- and long-term analysis of development plans and the generation of projections for almost all the Millennium Development Goal (MDG) indicators.

The Threshold 21 model (T21) is a system dynamics tool for integrated and participatory development planning. This means that the model:

- incorporates economic, social and environmental factors;
- represents key complexities, including feedback relations, non-linearity and delay, which are vital for a proper understanding of development issues;
- uses transparent structures, hypotheses, equations and data sources, and acts as a participatory analysis tool for consensus in policy debates;
- is flexible enough to be tailored to different skilled users and specific national features;
- simulates alternative policy outcomes in the medium and long term;
- facilitates comparisons with a basic scenario and supports advanced analytical methods such as sensitivity analysis and optimisation.

TABLE OF CONTENTS