GEF-6 REQUEST FOR PROJECT ENDORSEMENT/APPROVAL

PROJECT TYPE: Full-sized Project
TYPE OF TRUST FUND: GEFTF
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PART 1: PROJECT INFORMATION

Project Title: Building Resilience for Food Security and Nutrition in Chad's Rural Communities			
Country:	Chad	GEF Project ID:	9050
GEF Agency:	AfDB	GEF Agency Project ID:	
Other Executing Partner:	Ministère de l'Agriculture et de l'Environnement	Submission Date:	21.11.2016
GEF Focal Area:	Multi-focal Area	Project Duration (Months)	60
Integrated Approach Pilot	IAP- Cities ☐ IAP-Commodities ☐ IAP- Food Security ☐		Corporate Program: SGP ☐
Name of Parent Program	N/A	Agency Fee ($):	506,298

A. FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES

Focal Area Objectives/Programs	Focal Area Outputs	Trust Fund	(in $) GEF Project Financing	(in $) Co-financing
LD-1 Program 1	Agriculture and Rangeland Systems: Agro-ecological intensification	GEFTF	888,242	2,256,870
LD-3 Program 4	Integrated Landscapes: Scaling up SLM through the Landscape Approach	GEFTF	888,242	2,256,870
BD-4 Program 9	Mainstream biodiversity conservation and sustainable use into production landscapes/seascapes and sectors: Managing the human-biodiversity interface	GEFTF	1,776,484	5,266,030
SFM-2	Enhanced forest management: Maintain flows of forest ecosystem services & improve resilience to climate change through SFM	GEFTF	1,776,484	5,266,030
Total project costs			5,329,452	15,045,800

B. PROJECT DESCRIPTION SUMMARY

Project Obective: To enhance food security and nutrition through sustainable and resilient agro-sylvo-pastoral systems in the Sahelian regions of Chad

Project Components/Programs	Grant	Project Outcomes	Project Outputs	Trust Fund	(in $) GEF Project Financing	(in $) Co-financing
1. Enhancing agro-sylvo-pastoral productivity in drylands	TA	1.1 Improved agricultural, rangeland and pastoral production in support of food security and resilience	1.1.1 Reduced land degradation: 7,000 ha of degraded cropland under SLM and 3,000 ha under pastoral rangeland management 1.1.2 Five (5) micro-projects on site-appropriate soil conservation/ regeneration techniques and mixed cropping systems executed by farmers and herders 1.1.3 Improved capacities of agro-sylvo-pastoral actors: 11,000 land users trained on INRM and SLWM 1.1.4 150 trained local staff on sustainable INRM policies and practices through workshops	GEFTF	764,974	2,575,000

		1.2 Improved agro-pastoral technologies and access to production assets for enhanced livelihoods and reduced vulnerability	1.2.1 Investments in SLWM: rural hydro-agricultural infrastructure (30 ponds and boreholes; 20 village watering points; controlled irrigation on 345 ha in exposed sites) 1.2.2 Crop diversification and cultivation of appropriate species: resilient seed varieties identified, produced and distributed to 100 households and farmer organizations (FOs) 1.2.3 Six alternative income generating activities (3 agricultural and 3 livestock) identified and implemented with households 1.2.4 30 cereal banks, 20 agricultural input stores, and 30 livestock feed stores established	GEFTF	1,264,820	3,258,000
		1.3 Improved forest management and/or reforestation generate sustainable flows of agro- and forest ecosystem services	1.3.1 Increased land area under SFM: 5,000 ha of woodlots, community forestry plots, nurseries, agro-forestry, etc. 1.3.2 Training in SFM and cropland management at district and local level (farmers, land user groups, local authorities, etc.) 1.3.3 10 local producers groups (at least 5 women groups) diversify their revenue through agro-forestry and sylvo-pastoralism	GEFTF	495,206	1,167,000
2. Promoting integrated ecosystem management for enhanced resilience and biodiversity	TA	2.1 Enhanced integrated landscape planning for habitat resilience and preservation	2.1.1 Demonstration of participatory land-use planning: # of participatory restoration and land-use/NRM plans developed with local authorities and communities 2.1.2 Integrated land-use plans for priority agro-ecosystems: # of local land-use plans in targeted zones integrate INRM and conservation and sustainable use of biodiversity 2.1.3 ha of croplands under effective land use management with vegetative cover maintained or increased	GEFTF	633,186	1,809,103

		2.2 Enabling environment enhanced through mechanisms for the conservation of land, woody biomass and biodiversity	2.2.1 Scaled-up land management systems integrate SLFM practices, resulting in improved soil conditions and carbon sequestration (avoided deforestation and land degradation) 2.2.2 Support mechanisms for SLFM in wider landscapes established, including assessment and implementation of benefits sharing mechanisms to incentivize SLFM at community level, and 300 improved cooking stoves disseminated 2.2.3 Assess and introduce a Sustainable Forest Management certification system for forests, agro-forestry products or management systems with implementation by a third party 2.2.4 Assess the feasibility of establishing a protected area for the Sahelian acacia savanna or Lake Chad flooded savanna ecoregions	GEFTF	1,116,814	3,190,897
3. Knowledge Management and M&E	TA	3.1 Lessons learned captured and knowledge disseminated	3.1.1 Assessment of biodiversity and conservation needs in the ecoregions of Kanem and Bahr el Ghazal and possible response mechanisms 3.1.2 Framework developed for sensitization campaigns and training for enhancing awareness and enabling environment on ecosystem mangement 3.1.3 Development and dissemination of guides and toolkits on innovative INRM and BD conservation practices in drylands	GEFTF	462,514	1,210,000
		3.2 Project impact monitored and evaluated	3.2.1 Project monitoring system established providing systematic information on progress in meeting outcome and output targets 3.2.2 M&E system for analyzing land degradation trends and associated socio-economic and biodiversity impacts 3.2.3 Midterm and final evaluation conducted	GEFTF	338,154	885,800
Subtotal					5,075,668	14,095,800
Project Management Cost (PMC)				GEFTF	253,784	950,000
Total project costs					5,329,452	15,045,800

C. CONFIRMED SOURCES OF CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount ($)
GEF Agency	African Development Bank	Grants	15,045,800[1]
Total Co-financing			15,045,800

D. TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) FOCAL AREA AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country Name/ Global	Focal Area	Programming of Funds	(in $)		
					GEF Project Financing (a)	Agency Fee (b)	**Total** (c)=a+b
AfDB	GEFTF	Chad	Land Degradation		1,776,484	168,766	1,945,250
AfDB	GEFTF	Chad	Biodiversity		1,776,484	168,766	1,945,250
AfDB	GEFTF	Chad	Multi-focal Areas	SFM	1,776,484	168,766	1,945,250
Total Grant Resources					5,329,452	506,298	5,835,750

E. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS

Provide the expected project target as appropriate.

Corporate Results	**Replenishment Targets**	**Project Targets**
a. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society	Improved management of landscapes and seascapes covering 300 million hectares	*10,000 hectares*
b. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)	120 million hectares under sustainable land management	*15,000 hectares*
c. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services	Water-food-ecosystems security and conjunctive management of surface and groundwater in at least 10 freshwater basins;	*Number of freshwater basins*
	20% of globally over-exploited fisheries (by volume) moved to more sustainable levels	*Percent of fisheries, by volume*
d. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO_{2e} mitigated (include both direct and indirect)	*1,313,400 metric tons*
e. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern	Disposal of 80,000 tons of POPs (PCB, obsolete pesticides)	*metric tons*
	Reduction of 1000 tons of Mercury	*metric tons*
	Phase-out of 303.44 tons of ODP (HCFC)	ODP tons
f. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks	Development and sectoral planning frameworks integrate measurable targets drawn from the MEAs in at least 10 countries	*Number of Countries:*
	Functional environmental information systems are established to support decision-making in at least 10 countries	*Number of Countries:*

F. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? NO

[1] The AfDB Board approved a total amount of Unit of Account (UA) 9.77 million to Chad under the P2RS program (Program to Build Resilience to Food and Nutrition Insecurity in the Sahel). With an exchange rate of 1 UA = USD 1.54.

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF

1. The project has not changed direction from what was envisaged at PIF stage even after stakeholder consultations.

A.1 Project Description:

2. The proposed project fits well within Chad's national policies, GEF and AfDB strategies as described below.

1) Global Environmental and Adaptation Problems, Root Causes and Barriers:

3. Chad's economy and local livelihoods are heavily dependent on its natural resources and climate, especially in respect to rain-fed farming, which makes the country excessively vulnerable to degradation of its natural capital and adverse climatic conditions that it increasingly must deal with. Land degradation and desertification, deterioration of vegetation cover due to illegal and accelerated exploitation of forest resources, recurrent farmer-grazer conflicts, the decimation of wildlife (especially poaching of elephants), the drying up of Lake Chad, and food insecurity are all indicators of the growing deterioration of the country's natural capital. On the one hand, documented evidence shows that the Republic of Chad is increasingly faced with extreme climate events which, depending on the season and the bioclimatic zone, may take the form of increasingly severe droughts or increasingly devastating floods. Climate change impacts are chiefly felt in agriculture, livestock breeding, fisheries, and health, among others. On the other hand, the capacity to manage natural resources sustainably and climate change events in Chad is constrained within existing administrative structures (ministries, government agencies and local government) by lack of human and financial resources, capacities and means to respond.

Threats – Vulnerability to Climate Change and Environmental Degradation

4. Current and future climate-related risks to Chad and key areas of vulnerability have been analyzed in the country's National Communication (NC) to the United Nations Framework Convention on Climate Change (UNFCCC), the National Adaptation Program of Action (NAPA) and Chad's submission of its Intended Nationally Determined Contribution (INDC) to the UNFCCC. The impacts of environmental degradation caused by both climate change and human pressures on various sectors are briefly discussed below.

5. *Vulnerability of the Agricultural Sector:* Up to 80% of Chad's population depends on subsistence farming but poor farming practices and limited productive capacity make the population vulnerable to food insecurity (IFPRI, 2012). The majority of the land area within the project areas is characterized by low productivity sand dunes, and therefore dry farming activities form the basis of livelihoods. Low agricultural productivity, rare income-earning opportunities, and limited rural socio-economic infrastructure are the foremost causes of poverty in the areas. Weak community organization, combined with ineffective service delivery, lack of resources and limited decision-making power and information further exacerbate poverty and insecurity. Inappropriate farming practices, overgrazing, deforestation, and the pressures from a changing climate and growing population have caused extensive land degradation. Land degradation, and its extreme form desertification, have accelerated over the last thirty years. Continuous cropping, poor farming and land-husbandry practices, and wind and soil erosion are depleting the soil's native fertility and reducing crop yields.

6. *Water resources vulnerability:* Chad's most important inland water resources, especially the Chari River, Logone River and Lake Chad, have undergone significant desiccation over the past decades. Recurring droughts, declining vegetation surrounding watercourses, deforestation, and overgrazing are main contributors, drying up water courses and reducing the amount of quality pastureland. Lake Chad best embodies this loss: the lake has undergone one of the most dramatic shrinkages globally, losing approximately 90 percent of its surface area in the past 40 years. The Lake Chad Basin Commission (2015) reports that Lake Chad is faced with the challenges of poverty in a context of global warming and increasing population pressure. The entire Lake Chad basin includes an estimated 47 million people. The rich lake biodiversity has enabled riparian communities to develop productive activities based on fishing, agriculture, and livestock

farming. However, it is also a fragile and vulnerable socio-ecosystem, exposed to hydrological shifts (of which climate change is becoming a key parameter), high population growth, and political crises. Drought incidents in the basin are increasing in frequency and severity and in the coming decades are expected to negatively affect the livelihoods of tens of millions of people.

7. *Socio-economic vulnerability:* Despite its agricultural potential, Chad is experiencing a situation of almost chronic food insecurity, which in the regions of Kanem and Bahr el Ghazal is structural. The situation is particularly alarming considering the looming threat posed by climate change which threatens to exacerbate an already difficult situation and place an additional burden on an already vulnerable landscape and ecosystem. 80% of the country's workforce is dependent on agriculture and animal husbandry, making the Sahelian population critically vulnerable to climate shifts. Higher temperatures, decreased and more variable rain, and an altered temporal and spatial distribution of rainfall are expected and will together aggravate arid conditions, reduce vegetation cover, and further degrade soils, leading to failed harvests, livestock death, and lower yields especially of staple foods such as millet, sorghum, rice and maize, with clear consequent critical repercussions on food, health and nutrition.

Barriers to the Achievement of Chad's Long-term Development Vision

8. *Barrier 1:* Poor integration of climate change and environmental protection considerations into national and sectoral policies;

9. *Barrier 2:* Institutional - besides the Directorate-General of Meteorology and the Directorate leading the fight against Climate Change, there is no other climate governance structure;

10. *Barrier 3:* Poor livelihood capacity (physical, social, institutional, etc.) of communities;

11. *Barrier 4:* Slow implementation of measures, due also to lack of technical/human capacity and low funding;

12. *Barrier 5:* Lack of mainstreaming climate change in the general development budget;

13. *Barrier 6:* Insufficient international funding - Despite collaborating with global partners, and fulfilling its obligations under international environmental agreements, Chad is yet to fully benefit from available climate funds, including those specifically designed for impoverished countries.

14. In addition to these barriers, there are certain adaptive capacity gaps which must be overcome for successful implementation of climate change adaptation and environmental protection.

15. *Gap 1 – Technical and Human Capacity Gaps:* A significant part of the low adaptive capacity is due to lack of technical and human capacity, low level of funding for climate mitigation and adaptation, lack of inclusion of climate and environment in the national planning process, and the exclusion of key stakeholders, notably women and children, which is exacerbated by high illiteracy levels and general lack of awareness among the population.

16. *Gap 2 – Governance Gaps:* Poor coordination between the national level and local, community-level governance structures makes the already difficult situation worse. Notably, key challenges still exist for the realization of community-centered resilience programs, namely:

    - Insufficient coordination and communication across sectors as well as between central and local government entities;
    - Insufficient involvement of the key stakeholders at local level, including the private sector;
    - Mainstreaming cross cutting issues needs strengthening through, e.g., more tools and guidance on mainstreaming and specific disaggregated indicators;
    - Weak Monitoring and Evaluation (M&E) systems, specifically an integrated M&E system for District and National level;

- Large amounts of finance and human capacity are required to implement the Policies, Plans and Strategies, etc.;
- Need for increased capacity building in Government to meet the needs of the Policies, Plans and Strategies, etc.

17. *Gap 3 – Resource Gaps:* These include (a) data and information, (b) financial and (c) technical gaps. In this respect, several measures need to be taken to enhance resilience of the key sectors including water, agriculture, energy and physical infrastructure in Chad. This includes (i) improving access to finance for climate change mitigation/adaptation projects (finance), (ii) facilitate the transfer of sustainable technologies (technology) notably in agro-sylvo-pastoral systems, natural resource management and the management of human capital, (iii) strengthening policy and regulatory framework (policy), and (iv) raising awareness on threats and potential impacts of environmental degradation and climate change at all levels (knowledge).

2) The Baseline Scenario and Associated Projects

National Strategic Objectives:

18. Chad's National Adaptation Program of Action (NAPA, 2009) submitted to the UNFCCC provides a synthesis of the link between climate and the key development sectors in the country. According to the NAPA, the state of current and projected future climate vulnerability in Chad shows that the sectors which form the basis of its economy (water, agriculture and livestock) are all subject to the vagaries of climate variability and climate change. The socio-economic and environmental consequences are and will be disastrous especially for rural populations. The NAPA objectives are aligned with the national development policies typified by successive National Strategies for Poverty Reduction (NSPR) namely the first National Poverty Reduction Strategy (SNRP1) for 2003 to 2006, the second Growth and Poverty Reduction Strategy (SNRP2) from 2008 to 2011, and the National Development Plan 2013-2015 (PND 2013-2015), all of which strongly make a case for considering and taking into account the climatic conditions of Chad. The objectives of the PRSP in its initial release in 2003 related to: (i) promoting good governance, (ii) ensuring sustained economic growth, (iii) enhancing human capital, (iv) improving the living conditions of vulnerable groups, and (v) restoring and safeguarding ecosystems. Subsequent revisions give priority and special attention to agriculture and development of the rural sector aimed to increase food production and farmer incomes. The NAPA shows synergy with Chad's other Rio convention-related strategies including the United Nations Convention to Combat Desertification (UNCCD) National Action Program (NAP) and the Convention on Biological Diversity (CBD) National Biodiversity Strategy and Action Plan (NBSAP), which are key elements of the proposed GEF project.

19. The project fully aligns to priorities expressed in Chad's UNCCD NAP (one national and one sub-regional in this case: SRAP – West Africa, in which Chad was included) and NBSAP due to its targeting the reduction of desertification and land degradation and biodiversity loss. The SRAP/WA was developed for the adoption of the UNCCD's Ten-year Strategy (2008-2018) and addresses the concerns of the 17 ECOWAS and CILSS countries to improve implementation of the UNCCD and the sustainable management of shared resources. Chad's 2002 NAP centers on combatting desertification particularly in the Sahelian and Sudanian regions. The NBSAP aims to promote conservation and sustainable use of biodiversity, with integration into national plans and or cross-sectoral policies, and the fair and equitable use of biodiversity resources. The NBSAP has five axis: (a) improving knowledge and monitoring of biodiversity; (b) conservation and restoration of ecosystems and threatened species; (c) use of alternative resources to curb consumption of wood; (d) sustainable practices and a more sustainable exploitation of agriculture, fisheries, and forests in order to conserve biodiversity; and (e) fair and equitable use of biodiversity resources and community-based actions to promote biodiversity conservation. This project is in line with each objective through its integrated and multi-focal emphasis.

20. The project thus supports the country's NBSAP, NAP and NAPA but also implementation of food security and adaptation priorities in productive systems as identified by the Government in its national development policies and plans.

21. Chad adheres to several international agreements, treaties and conventions, though management legal tools are not yet well developed. Chad signed the UNFCCC in 1992 and ratified it on 30th June 1994. It signed the Kyoto Protocol in 2002 and ratified it in 2009. As per the requirements of all countries party to the UNFCCC, Chad consequently committed to establishing, among others, national inventories of GHG emissions, developing adaptation and mitigation strategies and measures to reduce the vulnerability of natural and human systems to climate change impacts, as well as assessing its capacity needs with regard to adaptation and mitigation technologies. Chad has submitted the first and second national communications to the UNFCCC, developed a NAPA, which was submitted to the UNFCCC secretariat in 2009. Chad also prepared and submitted a voluntary Nationally Appropriate Mitigation Action (NAMA) in 2010 covering the energy, forestry and agriculture sectors.

Baseline: Main environmental constraints

22. The Greater Kanem Region comprising Kanem and Bahr El Ghazal regions of Chad has one of the highest rates of food insecurity in Chad as a result of a combination of factors including climate change and widespread poverty. Despite its agricultural potential, the area is experiencing a situation of almost chronic food insecurity, which in Kanem and Bahr el Ghazal is structural. Economic needs and increasing demographic pressure are encouraging conversion of forests, woodlots, and pastureland into land for cultivation. The last available areas of natural vegetation (marshes, prairies, but particularly woodlands) are being cleared, precipitating widespread degradation of habitats with consequent loss of native plant and animal species. Poor knowledge on environmental threats and lack of livelihood options lead to short-term strategies of extensive farming with no investment in regeneration and preservation. In spite of these there is potential for increasing agro-ecosystem productivity through natural regeneration, irrigation, and land restoration alternatives such as crop diversification and agro-forestry. An approach is sought that addresses the functional integrity of ecosystems and spans the whole array of natural assets.

23. The four main environmental constraints which impact on the project area include: (1) the progression of desertification; (2) climatic deterioration and high anthropogenic pressure on the Lake Chad watershed natural resources (land, water, wildlife and forest); (3) decreased productivity due to unsustainable practices in production systems; and (4) overall fragile and further degrading ecosystems. Constraints 1, 3 and 4 are not only a result of climate variability and change exacerbated by anthropogenic pressures, but also provide continuous feedback loops that enhance each other. Erratic rains, cyclical droughts, locust infestations and poor farming practices are typical factors that negatively affect crop production in the project target areas.

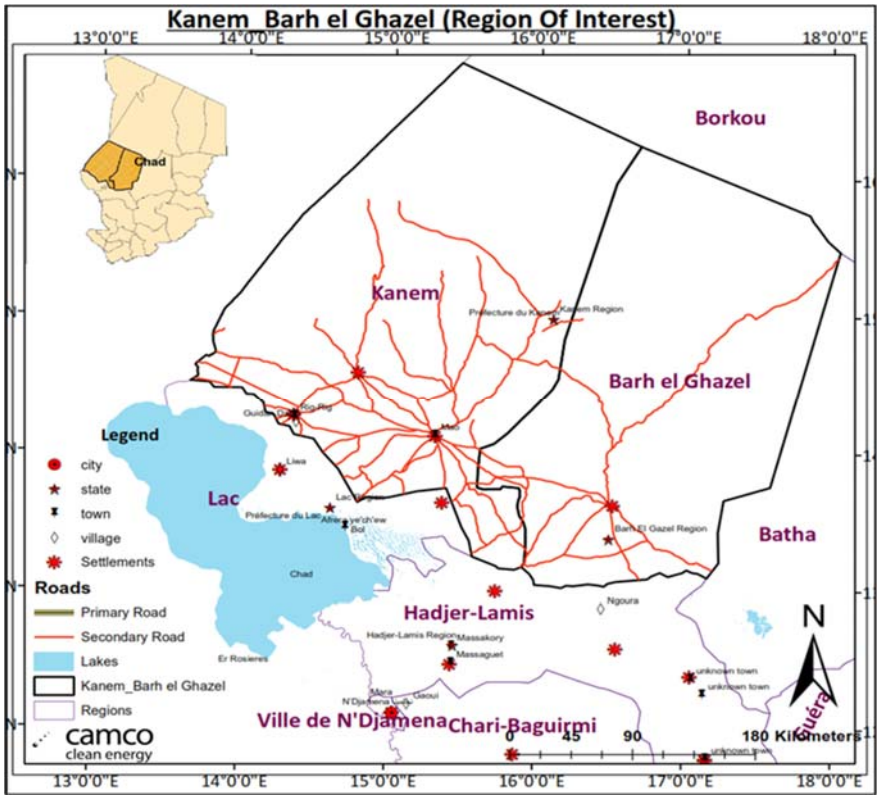


Figure 1: Project Area (Kanem & Bahr el Ghazal regions)

Policy Framework and Institutional Structure:

24. Environmental protection is enshrined in articles 47 and 52 of the Constitution of Chad, and Act N°014/PR/1998 defines the general principles for protecting the environment. Chad has also developed a number of policy and strategy documents and enacted some legislation to strengthen its legal and regulatory framework associated to the environment and climate change, including:

- Environmental Law N°014 / PR / 1998 defining the general principles of environmental protection;
- The National Strategy and Action Plan on Biological Diversity (SNPA - DB);
- Chad 2030 Vision which focuses on rural development and inclusive growth;
- Five-Year Plan for Agriculture in Chad (2013).

25. In support of the Lima summit's call for action on climate change (decision 1/CP.20), which called for each Party country to establish a nationally determined contribution in order to achieve the Convention's objective based on measures and results, Chad has prepared and submitted its Intended Nationally Determined Contribution (INDC), by which Chad intends "*to reaffirm its determination to contribute to the global effort to reduce GHG emissions and reinforce its resilience to climate change, implementing coherent programs which will enable it to become an emerging country by 2030, whilst favouring low-carbon development, as far as possible with the means available*."

26. Chad's development Vision 2030 is "*to become an emerging country with a middle-income economy, generated by diverse and sustainable growth sources and value adding activities by 2030*." Chad is therefore enhancing efforts to protect the environment through activities such as planting thousands of trees each year and implementing the national program for the development of green belts around Chadian cities. Additionally, ten million trees are being planted as part of the "African Great Green Wall initiative". In 2013, Chad established a Special Fund for the Environment, in order to mobilize its own resources through the establishment of specific taxes.

27. *National Adaptation Program of Action for Climate Change (NAPA):* this initiative to support adaptation was implemented with the support of the EU and adopted in 2009. The priority projects under the NAPA include:

    a. Development of intensive and diversified crops adapted to extreme climate risks
    b. Soil restoration and defense against degradation caused by climate change
    c. Improvement of intercommunity grassland areas, in order to reduce migratory movements due to climate change
    d. National Agency for the Great Green Wall

28. *National Biodiversity Strategy and Action Plan (NBSAP):* The development of the second edition of Chad's NBSAP (2014-2020) was based on the terms of the current global biodiversity agenda. The country's new Strategy focuses on 24 priority themes: energy resources; in situ and ex situ biodiversity conservation; faunal resources; forestry; fisheries; apiculture; agriculture; livestock breeding; modern and traditional industries; land management; biotechnology and biosafety; water resources; environmental emergencies; participation of the population, civil society and the private sector; environmental assessments; awareness-raising, information and education; training and research; institutional and legal aspects; traditional knowledge and spiritual values; invasive alien species; technology transfer; tourism; commerce; and fiscal and credit policies. A total of 125 actions have been defined to address these themes. All actions are costed, assigned lead implementation entities and partners, and distributed among the three specific objectives of the Action Plan aimed at: 1) strengthening the conservation of ecosystems, endangered species and/or species marked with importance; 2) promoting the sustainable use of biological resources of known or potential value; and 3) ensuring the fair and equitable sharing of benefits arising from the use of biological resources (primarily genetic).

29. *National Action Program (NAP):* Chad's 2002 NAP centers on combatting desertification particularly in the Sahelian and Sudanian regions. It aims to safeguard Chad's most important and threatened ecosystems while improving national policies and capacity to preserve the production potential of land and water and to mitigate the effects of drought.

Baseline and Associated projects

30. As described in the PIF, AfDB's Program to Build Resilience to Food and Nutrition Insecurity in the Sahel (P2RS) is the main baseline project and co-financing (no change from PIF). P2RS has been designed with a 20 year timeframe to increase, on a sustainable basis, agro-sylvo-pastoral and fishery productivity in the Sahel. In addition to a regional component, each country implements its own project. The baseline of the GEF project will be Project 1 of the P2RS which concerns seven countries of the Sahel most affected by food crises and, in particular, the Chadian component targeting Kanem and Bahr el Ghazal.

31. Other associated/relevant projects in the region include:

    a. The 11th European Development Fund support for the period 2014 up to 2020 focuses on "rural development, nutrition and food safety", and "sustainable management of natural resources".
    b. Project to Improve the Resilience of Agricultural Systems in Chad (PARSAT): The PARSAT, with total funding of 36.2 million USD, is co-funded by IFAD, GEF, ASAP and the Chadian government and was put in place in 2015 for a period of 7 years.
    c. The Lake Chad basin sustainable development program (PRODEBALT with funding from AfDB);
    d. The Great Green Wall for the Sahara and the Sahel Initiative, established in 2007, which has become Africa's flagship initiative to combat the effects of climate change and desertification and brings together more than 20 African countries, international organizations, research institutes, civil society and grassroots organizations.
    e. The Project in Support of the Lake Chad Basin initiative to reduce vulnerability and the risks associated with STIs/HIV/AIDS;
    f. The regional "Adaptation to climate change in the Lake Chad Basin" project (German Ministry for Economic Development and Cooperation/Federal Enterprise for International Cooperation cooperation) covering the period 2013-2018;

g. The Lake Chad preservation project: contribution to the Lake development strategy (GEF-ADF);
h. The Program for integrated management of cross-border basins in Africa including the Lake Chad project;
i. The regional program to reinforce the resilience of countries in the Sahel supported by the IDB.

3) Proposed Alternative Scenario, GEF focal area strategies, expected outcomes and components of the proposed project

32. The proposed GEF project's environmental objective is to help restore Chad's fragile ecosystems by enabling local communities and institutions to rehabilitate degraded lands and forests and to protect biodiversity. The project will generate environmental benefits through a number of GEF focal areas while simultaneously advancing the Chadian Government's main development objectives and its commitments under environmental conventions and poverty reduction strategies.

33. The main project objective is "To enhance food security and nutrition through sustainable and resilient agro-sylvo-pastoral systems in the Sahelian regions of Chad."

34. The project seeks an approach that addresses the underlying causes of resource degradation, the functional integrity of ecosystems, and spans the whole array of natural assets. It will provide support to subsistence farmers to implement low-tech methods that improve soils and conserve water and forests in addition to improving infrastructure, value chains and market linkages. By doing this, the project will add much needed considerations and activities on SLM, SFM and biodiversity conservation.

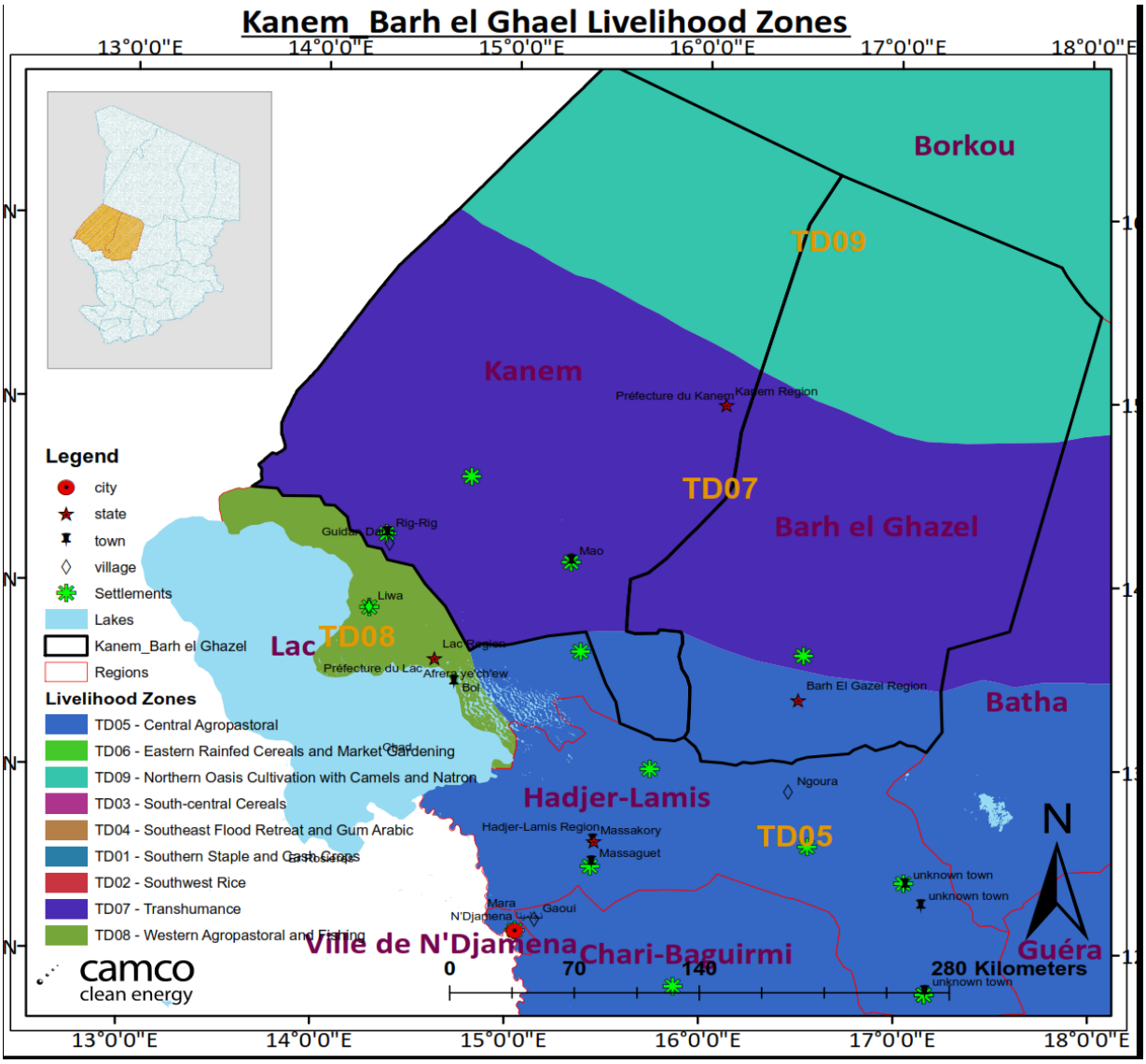


Figure 2: Livelihood Zones in the Republic of Chad

Outcomes and Components:

35. Despite agriculture being difficult in Chad's Sahelian regions, there is potential for increasing agro-ecosystem productivity through natural regeneration, irrigation, and land restoration alternatives such as crop diversification and agro-forestry. Building on Chad's potential, and in response to the drivers of environmental degradation, the objective of the GEF project is to better enable stakeholders to restore or maintain the productivity of natural assets and biodiversity within fragile ecosystems. Activities will aim to promote a cross-sectoral approach to local economic development, environmental management, and resilience that simultaneously addresses climatic challenges. Through interventions aimed at critically complementing the P2RS, the GEF project will assess, pilot, and sustain needed on-the-ground investments in INRM, capacity building, and knowledge. The outcome aims are to implement sustainable land and water management practices (SLWM) and resource conservation measures to reduce vulnerability at community level, to strengthen management and planning of natural resources for the consequent conservation of biodiversity, and to diversify livelihoods focusing on crop and agro-forestry systems, all underlined by a critical consideration for resilience of people and ecosystems. Three components are envisioned and described as follows:

Component 1: Enhancing agro-sylvo-pastoral productivity in drylands

36. The first component aims to sustainably intensify agro-sylvo-pastoral systems and resilient farming, spanning the entire array of resources needed in a Sahelian dryland landscape: land, water, and livestock. Agro-sylvo-pastoral systems will be enhanced through needed rural infrastructure and by investing in soil fertility and water conservation, so vital in drylands and critical to sustaining crop production and resilience. Activities will focus on promoting innovative and site-appropriate SLWM, improved agricultural technologies and inputs (e.g. crop diversification, drought and flood resistant crops and seeds), and the development of options aimed at ensuring food security while preserving the environment in a distinctive Sahelian ecosystem. Techniques for improving soil fertility and increasing woody biomass will be adopted more widely and consistently through SFM, agro-forestry, and dissemination of knowledge. Emphasis will be placed on the potential and difficulties of the targeted agro-ecological zone and the need to accelerate adoption of technology packages and diversification of livelihoods that build the resilience of ecosystems and livelihoods in the face of resource degradation and changing climatic patterns.

37. Agroforestry is an important tool both for the conservation of biological diversity and the improvement of ecosystem resilience. It constitutes an ideal land use approach that establishes synergistic links between the CBD, the UNCCD and the UNFCCC. The techniques used will have a positive impact on reducing carbon emissions and promoting carbon sequestration through sustainable land use, land-use change, and forestry, in addition to retarding desertification and helping to conserve biodiversity. Eleven outputs and associated activities have been planned for this component as shown in Table 1.

Table 1: Component 1 Outputs and Activities

Component 1: Enhancing agro-sylvo-pastoral productivity in drylands		
Outcome	**Output**	**Activity**
1.1 Improved agricultural, rangeland and pastoral production in support of food security and resilience	1.1.1 Reduced land degradation: 7,000 ha of degraded cropland under SLM and 3,000 ha under pastoral rangeland management	1.1.1.1 Delineate exact boundaries of the target areas
		1.1.1.2 Establish a multistakeholder structure to promote participation in the dialogue, decision making, and implementation of solutions to manage the agro-sylvo-pastoral measures
		1.1.1.3 Develop a collaboration framework with The Agency for the Great Green Wall and other stakeholders to enhance dune stabilization, protection of Ouadis and pastureland rehabilitation using appropriate grass and tree species
		1.1.1.4 Initiate a participatory multistakeholder process to identify and map transhumance routes so as to reduce conflict
		1.1.1.5 Develop a grazing plan to manage and guide seasonal movement of herds along mutually agreed routes between herders and farmers taking into account available pasture and water points
		1.1.1.6 Develop/update hydrological map to identify location of additional water points to be established based on the mapped transhumance routes
		1.1.1.7 Establish tree nurseries and/or increase capactiy of existing nurseries to produce appropriate planting stock for dune stabilization and Ouadi protection
		1.1.1.8 Increase productivity of pasture lands through reseeding

Component 1: Enhancing agro-sylvo-pastoral productivity in drylands		
Outcome	**Output**	**Activity**
		1.1.1.9 Introduce cost-effective and environmentally friendly fencing system to prevent crop damage from livestock and eliminate potential conflicts between farmers and herders
	1.1.2 5 micro-projects on site-appropriate soil conservation/ regeneration techniques and mixed cropping systems executed by farmers and herders	1.1.2.1 Set up pilot/learning sites to train and refine techniques for soil conservation/ regeneration and mixed cropping techniques to enable adoption and/or upscaling by farmers
		1.1.2.2 Identify and set up essential physical infrastructure to support operation of micro-project sites
		1.1.2.3 Conduct species trials for both livestock and crops and monitor performance to optimize potential productivity
		1.1.2.4 Establish extension service for both herders and farmers
	1.1.3 Improved capacities of agro-sylvo-pastoral actors: 11,000 land users trained on INRM and SLWM	1.1.3.1 Develop training program and materials
		1.1.3.2 Identify trainees
		1.1.3.3 Implement training program
	1.1.4 150 trained local staff on sustainable INRM policies and practices through workshops	1.1.4.1 Develop training program and materials
		1.1.4.2 Identify trainees
		1.1.4.3 Implement training program
1.2 Improved agro-pastoral technologies and access to production assets for enhanced livelihoods and reduced vulnerability	1.2.1 Investments in SLWM: rural hydro-agricultural infrastructure (30 ponds and boreholes; 20 village watering points; controlled irrigation on 345 ha in exposed sites)	1.2.1.1 Map the location of infrastructure
		1.2.1.2 Design the required infrastructure
		1.2.1.3 Develop bill of materials and quantities based on planned size and hydrological characteristics of selected sites
		1.2.1.4 Construction of the infrastructure
		1.2.1.5 Undertake inventory of exisiting infrastructure to know the number and status and identify those for rehabilitation
	1.2.2 Crop diversification and cultivation of appropriate species: resilient seed varieties identified, produced and distributed to 100 households and farmer organizations (FOs)	1.2.2.1 Sourcing of candidate seed varieties
		1.2.2.2 Conduct trials of selected varieties and monitor to identify the most suitable
		1.2.2.3 Distribution of selected seed varieties to selected households and Farmer Organizations, and training on proper planting and management
		1.2.2.4 Follow up/monitoring of planted varieties
	1.2.3 Six alternative income generating activities (3 agricultural and 3 livestock) identified and implemented with households	1.2.3.1 Initiate participatory process to identify and prioritise IGAs
		1.2.3.2 Identify and train pilot groups to implement selected IGAs
		1.2.3.2 Implement and monitor selected IGAs
	1.2.4 30 cereal banks, 20 agricultural input stores, and 30 livestock feed stores established	1.2.4.1 Conduct feasibility study to establish the size of individual cereal banks, agricultural input stores, and livestock feed stores
		1.2.4.2 Construction of cereal banks, agricultural input stores, and livestock feed stores as determioned in the feasibility study
		1.2.4.2 Train beneficiaries on proper use, maintenance and management of the structures

Component 1: Enhancing agro-sylvo-pastoral productivity in drylands		
Outcome	**Output**	**Activity**
1.3 Improved forest management and/or reforestation generate sustainable flows of agro- and forest ecosystem services	1.3.1 Increased land area under SFM: 5,000 ha of woodlots, community forestry plots, nurseries, agro-forestry, etc.	1.3.1.1 Inventory and mapping of suitable lands for regeneration process and suitable local species
		1.3.1.2 Develop a framework for partnership with the Ministry of Environment for a joint communal forest management, clearly outlining rights and duties of both parties and benefits accruing to each
		1.3.1.3 Establish nurseries of suitable species for enhancing the regeneration of natural woodlands and agroforesty applications
	1.3.2 Training in SFM and cropland management at district and local level (farmers, land user groups, local authorities, etc.)	1.3.2.1 Develop training materials and program
		1.3.2.2 Identify trainees
		1.3.2.3 Implement training program
	1.3.3 10 local producers groups (at least 5 women groups) diversify their revenue through agro-forestry and sylvo-pastoralism	1.3.3.1 Undertake detailed study of agro-sylvo-pastoral value chains and potential new opportunities
		1.3.3.2 Select through a participatory process the most viable value chains, and improve where necessary for enhanced efficiency
		1.3.3.3 Train beneficiaries on how to optimize the selected value chains

Output 1.1.1 Reduced land degradation: 7,000 ha of degraded cropland under SLM and 3,000 ha under pastoral rangeland management

38. This project will promote sharing and enhancing knowledge about sustainable land management practices and implementation processes and its use for informed decision making to prevent or reduce land degradation, through the conservation, management and restoration of soil, water and forest resources and maintenance of ecosystem services.

39. This output will: 1) demonstrate the multiple benefits that SLM measures generate including: productivity, food and livelihood security, biodiversity conservation, resilience to climate change (adaptation), carbon sequestration / reducing GHG emissions (mitigation) and risk aversion; and 2) support stakeholders in SLM adoption at individual and community level as well as for scaling up best practices and adapted land use systems across wider territories or landscapes. The activities envisaged include:

    (i) Establish demonstrations on conservation agriculture, minimum tillage, intercropping crops with trees to enhance soil moisture regime and fertility; and conduct training for the farmers and government technical staff.
    (ii) Facilitate community-based rangeland/grazing management with the help of customary resource governance institutions, and promote their integration with conventional institutions to allow enforcement of rangeland management regulations at local level.
    (iii) Conduct pasture reseeding trials and demonstrations using indigenous grass species such as C*enchrus ciliaris* and other species known to perform well in arid and semi-arid areas, e.g. *Eragrostis superba, Chloris roxburghiana, enteropogon macrostachyus.* Support replication through provision of grass seeds.
    (iv) Promote planting of multipurpose tree species such as *Balanites aegyptiaca*; *Acacia tortilis; Acacia seyal; Phoenix dactylifera; Zizyphus Mauritania and Zizyphus spina-christi* of known value to the communities.
    (v) Conduct exchange visits to successful land rehabilitation sites to allow cross learning amongst farmers.

Output 1.1.2: 5 micro-projects on site-appropriate soil conservation/ regeneration techniques and mixed cropping systems executed by farmers and herders

40. One way of demonstrating the benefits of SLM and getting stakeholders to participate is to pilot by facilitation a small group of willing farmers and herders to apply the SLM principles and specifically undertake activities like:

    (i) Supporting women groups in 5 ouadis to adopt mixed cropping of already familiar crops.
    (ii) Introducing appropriate soil conservation techonlogies that have been used elsewhere in drylands e.g. zai pits, negarims, rapezoidal bunds, range pits, terracing. Build capacity of the extension staff on soil conservation.
    (iii) Providing seeds and extension services to farmers (including training on agronomic practices), and facilitation of the government extension workers to provide technical backstopping on soil conservation.

Output 1.1.3: Improved capacities of agro-sylvo-pastoral actors: 11,000 land users trained on INRM and SLWM

41. In order to achieve local support for the proposed activities, the grassroots actors need to have a practical involvement so as to understand the principles of INRM and SLWM. This will be done chiefly through awareness creation as well as demonstration activities. This will involve massive mobilization of the key actors and organizing them into manageable groups undertaking specific activities. Some of the specific actions to be implemented in order to achieve this include:

    (i) Conducting needs/capacity assessment and develop training manuals and guidelines for training of trainers (TOT) on INRM and SLWM.
    (ii) Establishing demonstration plots for SLWM established in each project area.
    (iii) Conducting workshops and seminars for land users to create awareness, and train farmers on INRM and SLWM.

Output 1.1.4: 150 trained local staff on sustainable INRM policies and practices through workshops

42. To address institutional capacity needs, activities under Component 1 will also focus on creating an enabling environment for enhancing agro-sylvo-pastoral productivity in the Sahel. Given the serious capacity constraints and lack of existing institutional policies, regulations, plans and mechanisms to carry out basic functions at local level, the first activity will focus on training and building capacities in district institutions to plan, implement and monitor INRM and climate adaptation projects. This will include training of government officials from the key ministries on topics such as project planning, management and monitoring, performance monitoring systems, budget processes, accountability mechanisms, etc. A specialist experienced in reinforcing the capacities of multi-sectors will be hired to build institutional capacity on facilitating cross-sectoral management of GEF project activity planning, management, monitoring and accountability. The Specialist will develop a capacity building plan, which will include workshops, on-the-job training, and development of project management tools, development of HR policies, etc. related to GEF component of the P2RS project. This activity will enable these staff to rely less on donor management in the future and take the lead in the planning, implementation and monitoring of the project in the subsequent phases and future projects as well as other development projects.

43. It is important for all relevant ministries and other government, non-government institutions and key actors (i.e. the herders and farmers, etc.) in the project area and Chad in general to have a basic understanding of INRM, climate change and adaptation before further action can be taken. Under Component 1, all relevant actors will be invited to attend interactive training workshops to enhance their knowledge. This is a key activity to build the foundation for policy and implementation action on resilience measures.

44. One of the underlying causes for vulnerability in Chad is the lack of management of natural resources and ecosystem services, which stems from poor or non-existent land-use policies and strategies. Land degradation resulting from soil erosion, deterioration of physical and chemical properties of the soil, long-term loss of natural vegetation and conversion of forest to non-forest areas are pose major threats to pastoralist and agro-pastoralist livelihoods. The lack of institutional policies to deal with resource based challenges further exposes communities to climate change. Thus, building resilience of both human and ecological systems is an optimal way to deal with future uncertainties. Policies are required to institutionalize resiliency. Stakeholders in the

project at the grassroots level identified the need for an integrated policy which considers land and water resources as well as the various livelihood strategies that depend on the use of land, water and forestry resources. Thus, it is recommended that a land-use strategy be developed and implemented by a range of stakeholders (see component 2). Participatory land-use planning offers a no-regrets approach to resilience. The key to successful implementation will be a broad consultative design process for the policy, community mobilization and participation from the policy formulation stage, legal and regulatory frameworks, and clear roles and responsibilities. Each zone will have its own land-use strategy according to its peculiar circumstances.

45. Through this activity, a multi-sectoral capacity assessment will be carried out which will put forward clear measurable actions to strengthen and maintain disaster preparedness capacity. A systematically coordinated and comprehensive capacity analysis will be completed, focusing on high risk and climate vulnerable areas, which can then feed into the land-use plans. The assessment will include stakeholders from government, the donor community, civil society and local community. In order to build sustainability into the proposed intervention, the following actions are needed:

    (i) Review existing policies and institutional framework related to sustainable INRM in Chad
    (ii) Conduct needs/capacity assessment and develop training manuals/guidelines for the decision makers
    (iii) Conduct workshops to create awareness on sustainable INRM policies and practices in each project sites

Output 1.2.1: Investments in SLWM: rural hydro- agricultural infrastructure (30 ponds and boreholes; 20 village watering points; controlled irrigation on 345 ha in exposed sites)

46. Once enough capacity has been built at all levels and the support of all key actors obtained, the next step will involve making real investments that will put into practical use the capacity building . The following activities are important for this to be achieved:

    (i) Conduct feasibility study/ geo-hydrological survey & environmental impact assessment.
    (ii) Conduct needs/demand assessment, and consult the community on siting of the water points to inform the nature and capacity.
    (iii) Hire contractor to develop the water points and provide technical service on design of the irrigation schemes.
    (iv) Facilitate development of water management committees or water resource user associations to regulate use and reinforce the regulations.

Output 1.2.2: Crop diversification and cultivation of appropriate species: resilient seed varieties identified, produced and distributed to 100 households and farmer organizations (FOs)

47. Both as a means of risk management, resilience as well as identifying other varieties with productive and income-generation potential, crop diversification is important. This process needs to be undertaken in collaboration with technical partners including research institutions, the partner ministries as well as donor institutions such as the FAO. It is important to adhere to the following principles:

    (i) Involve the community in participatory identification of preferred drought and salt tolerant crops for promotion.
    (ii) Supply of certified seeds to farmers accompanied with technical services on agronomic practices & post-harvest handling and marketing.

Output 1.2.3: Six alternative income generating activities (3 agricultural and 3 livestock) identified and implemented with households

48. To successfully establish new IGAs, the following are needed:

    (i) Consult the communities on preferred value chains and assess financial and technical capacity and needs for the chosen activitties.
    (ii) Provide technical support in conjuction with the government and NGOs

(iii) Conduct training on production practices, post-harvest handling, processing and value addition, and link producers to reliable markets.

Output 1.2.4: 30 cereal banks, 20 agricultural input stores, and 30 livestock feed stores established

49. Cereal banks are an innovative approach to achieve resilience at community level. Through this initiative, community-led grain distribution enables the storage of grain after harvests, and then the same grain is loaned out when food is scarce during lean periods. By working with vulnerable social groups such as women, the cereal banks help ensure the availability of grain supplies year round. Similarly, livestock feed stores help optimize the livestock feed supply with the nutritional requirements of the animal taking into account environmental conditions. This improves the production sustainability by increasing feed efficiency, reducing the environmental impact of livestock rearing and improving resilience to fluctuating environments. This output will be preceded by the following processes:

    (i) Counduct a feasibility study and assess the capacity/demand and consult the communities on the type, design and siting of the facilities.
    (ii) Establish management boards, build capacity of the committees to ensure sustainability, and set up modes of operations.

Output 1.3.1: Increased land area under SFM: 5,000 ha of woodlots, community forestry plots, nurseries, agro-forestry, etc.

50. The benefits of investment in capacity building for all actors and infrastructure development will be seen in the form of increased land area under SFM. The targeted activities include woodlots, community forestry, nurseries and agroforestry. To maximize on this potential, the project will:

    (i) Provide seeds for multipurpose trees to farmer groups and facilitate (technical and financial) of establishment of tree nurseries in every *ouadi*.
    (ii) Establish group wooodlots of multipurpose trees around the *ouadis* for the purpose of provindg tree products as well as to protect the *ouadis*

Output 1.3.2: Training in SFM and cropland management at district and local level (farmers, land user groups, local authorities, etc.)

51. Continuous training is important in maintaining the tempo began at inception, as well as making further and sustainable gains. This training should not only focus on repeating the same subjects, but should also include new knowledge gained from similar projects elsewhere, as well as improved knowledge from the initial trials/pilots. At each capacity building even, it is important to:

    (i) Conduct needs/capacity assessment for SFM and development of training modules.
    (ii) Sensitize and pilot the modules and conduct TOT workshops and seminars aimed at buidling capacity of district, local authorities and farmer groups to support SFM.

Output 1.3.3: Local producer groups (at least 5 women groups) diversify their revenue through agro-forestry and sylvo-pastoralism

52. The sum of all activities ultimately is to see local groups exhibiting improved livelihoods as a result of diversified income sources which increases the resilience of not only individuals but also entire communities. The most cost-effective way to achieve these gains is to work through organized groups, especially working with vulnerable social segments including women groups. The strategy involves:

    (i) Work with women groups to identify priority activitiers. Participatory identification of forest products of value to the communities.
    (ii) Train and facilitate processing and value addition for agricultural products & link farmers to markets.

Component 2: Promoting integrated ecosystem management for enhanced resilience and biodiversity conservation

53. The second component will focus on scaling up an integrated landscape approach to the preservation of land, forests and biodiversity for enhanced resilience, well-being and conservation. Better planning will sustain the improved management of environmental resources and protection of locally unique ecosystems. Poor people in the target regions are rarely involved in decision-making, analyzing constraints and identifying possible solutions. Activities will thus additionally target informational needs and landscape planning support, in particular targeting community associations (such as the farmer organizations) and decentralized staff. Knowledge and capacity will be strengthened through targeted awareness-raising and outreach programs for the benefit of beneficiaries, NGOs and decentralized authorities.

54. A useful tool for promoting an integrated approach for resilience is the Resilience Adaptation Pathways and Transformation Assessment (RAPTA) which will be used to increase the participation of all relevant stakeholders (see Annex F for more information on the application of RAPTA in the project). The RAPTA is an iterative and participatory multi-stakeholder assessment that aims to maintain and improve the resilience of social-ecological systems, and assists in promoting multi-stakeholder engagement and governance, characterizing the system, identifying key controlling variables influencing food security in the project area, and guiding the development of a coordinated suite of activities that targets the most vulnerable aspects. For example, in Component 1, which seeks to enhance agro-sylvo-pastoral productivity, a key activity under Outcome 1.1 is the establishment of a multi-stakeholder structure to promote participation in the dialogue, decision making, and implementation of solutions to manage the agro-sylvo-pastoral value chains. In the same Outcome (1.1), the initiation of a participatory multi-stakeholder process to identify and map transhumance routes so as to reduce conflict is also proposed. Further, in Component 2, which seeks to promote integrated ecosystem management for enhanced resilience and biodiversity conservation, specifically under Outcome 2.1 (Output 2.1.1), engagement with local communities to develop participatory land use plans is proposed.

55. Knowledge and capacity strengthening, on the other hand, is demonstrated in Component 1 (Output 1.1.2), through the setting up of pilot/learning sites to train farmers and herders on soil conservation/ regeneration and mixed cropping systems. Extension services have been proposed to support the set-up of pilot/learning sites, as well as intensive training on INRM and SLWM (Output 1.1.3 & 1.1.4). Component 2 also encourages knowledge and capacity strengthening (Outcome 2.1) where the training of technical staff and selected community members is proposed, so as to enhance local capacity in sustainable land management, and promote participatory biodiversity conservation.

56. The following are general recommendations for action based on application of the RAPTA Framework guidelines:
    - Build general resilience for the agro-sylvo-pastoral ecosystem as a whole including the biophysical, social and institutional requirements to support enhancing pasture and water availability and recycling, crop-livestock interactions, agro-forestry in the ouadis.
    - For those with biophysically and economically sustainable livelihoods, invest in keeping away from identified thresholds.
    - For economically or biophysically unsustainable farmers and herders, invest in a system shift or transformation including diversification to reduce overdependence on livestock.
    - Invest in education and health and social services to enhance farmers' empowerment.

57. Consideration for biodiversity conservation is a prime issue in the project, with support given to strengthen and promote local actions in conservation and in the sustainable and integrated use of resources at the local level (getting the right people involved in the right way and at the right time – multi-stakeholder engagement and governance). To this end, biodiversity and conservation needs assessment in the project area is important, which includes the elaboration of possible response mechanisms. Simply put, three main steps characterize a biodiversity and conservation needs assessment:

    - Mapping of existing biodiversity for different ecological zones
    - Investigation/confirmation of ecosystem services provided by biodiversity
    - Response mechanisms to protect and improve biodiversity

58. The assessment begins with a mapping of existing biodiversity in the different landscapes, accompanied by an investigation/confirmation of ecosystem services provided by the said biodiversity. For example, agro-sylvo-pastoral practices in the project area are heavily dependent on environmental resources, yet an over-dependence on the same landscape results in the environment being unable to support these activities and loss of biodiversity. The first two steps would clearly demonstrate the direct linkages between existing local practices and the resources upon which they depend, thereby enabling concrete and specific actions (response mechanisms) to be taken towards biodiversity conservation, such as a framework for partnership with the Ministry of Environment for joint communal forest management).

59. Chad's high diversity of ecological zones is due to its large size and high latitudinal range. In the project target regions we find two ecoregions of interest: the Sahelian acacia savanna and Lake Chad flooded savanna. The lack of formal protection of the Lake Chad flooded savanna draws particular attention because of its international importance for certain species. Due to political instability, undeveloped civil society, limited national capacity and generally poor biodiversity data, implementing conservation plans at the national level remains a challenge in Chad. Efforts need to be undertaken to identify and develop more sustainable conservation schemes and piloting new community incentive mechanisms to manage and use biodiversity in a sustainable manner. There is also great need for better land-use planning.

60. The project will thus assess, identify and pilot a number of integrated biodiversity conservation activities in the project target regions. In particular, these will focus on the planned SLM and SFM areas and include a form of certification and community-based conservation. A regulatory system will be identified and implemented to support biodiversity conservation in the ecoregions of critical BD importance, including community based NRM plans that address biodiversity and an assessment of the feasibility of establishing a PA system for Chad's Sahelian acacia savanna or Lake Chad flooded savanna ecoregions. Even if it is considered to hold one of the highest levels of biological diversity of the Sahelo-Saharan countries, the national biological diversity of Chad has been poorly documented. Hence, enhanced information and data on biodiversity of global importance will be an additional activity (also linking component 1 and 2 with component 3 on knowledge).

61. The specific activities of component 2 are as shown in Table 2.

Table 2: Component 2 Outputs and Activities

Component 2: Promoting integrated ecosystem management for enhanced resilience and biodiversity conservation		
Outcome	**Output**	**Activity**
2.1 Enhanced integrated landscape planning for habitat resilience and preservation	2.1.1 Demonstration of participatory land-use planning: # of participatory restoration and land-use/NRM plans developed with local authorities and communities	2.1.1.1 Engage with local communities to develop participatory land use plans including identification of lands in need of restoration
		2.1.1.2 Use remote sensing and GIS technology to identify and demarcate restoration areas; develop GIS-linked sustainable land use maps and create appropriate databases (including areas suitable for sustainable pasture management)
		2.1.1.3 Train technical staff and selected community members to enhance local capacity in sustainable land management
		2.1.1.4 Develop land use maps and facilitate local communities to sign participatory forest management agreements with the government
	2.1.2 Integrated land-use plans for priority agro-ecosystems: # of local land-use plans in targeted zones integrate INRM and conservation and sustainable use of biodiversity	2.1.2.1 Inventory of local biodiversity
		2.1.2.2 Identify and map areas of biodiveristy significance
		2.1.2.3 Develop biodiversity conservation guidelines in local language(s)
		2.1.2.4 Pilot integrated INRM plans which mainstream biodiversity protection

Component 2: Promoting integrated ecosystem management for enhanced resilience and biodiversity conservation		
Outcome	**Output**	**Activity**
	2.1.3 ha of croplands under effective land use management with vegetative cover maintained or increased	2.1.3.1 Implement the INRM plans
		2.1.3.2 Monitor the regeneration of national vegetation
2.2 Enabling environment enhanced through mechanisms for the conservation of land, woody biomass and biodiversity	2.2.1 Scaled-up land management systems integrate SLFM practices, resulting in improved soil conditions and carbon sequestration (avoided deforestation and land degradation)	2.2.1.1 Scaling up successful INRM plans outside the pilot areas with the project
		2.2.1.2 Extend training program outside the pilot areas
		2.2.1.3 Develop a landscape monitoring program
	2.2.2 Support mechanisms for SLFM in wider landscapes established, including assessment and implementation of benefits sharing mechanisms to incentivize SLFM at community level, and 300 improved cooking stoves disseminated	2.2.2.1 Review best practice mechanisms for incentivising SLFM to identify the most suitable measures
		2.2.2.2 Signing benefit sharing agreements between communities and the government
		2.2.2.4 Carry out awareness and training program on improved cookstoves
		2.2.2.5 Distribution of improved cookstoves
	2.2.3 Assess and introduce a certification system for forests, agro-forestry products or management systems with implementation by a third party	2.2.3.1 Assess the eligibility and requirements for a certification system: the project will use the plan vivo system and standard
		2.2.3.2 Once eligibility is established, develop the required documentation including monitoring plan in line with the selected certification scheme
		2.2.3.3 Applyfor third-party validation
	2.2.4 Assess the feasibility of establishing a protected area for the Sahelian acacia savanna or Lake Chad flooded savanna ecoregions	2.2.4.1 Carry out an enviromental and socio-economic impact assessment and conduct a feasibility study for establishing such a protected area
		2.2.4.2 Undertake Cost-Benefit-Analysis of establishing a protected area vis-à-vis expected longterm benefits to communities and nationally (in line with the BD assessment conducted)
		2.2.4.3 Once feasibility done, establish a dialogue with government through a participatory process to discuss PA establishment and management arrangements

Output 2.1.1: Demonstration of participatory land-use planning: # of participatory restoration and land-use/NRM plans developed with local authorities and communities

62. The process shall identify all (spatial) development potentials and issues of importance including land use potentials, land-related conflicts, environmental problems and structural deficits, and address them in an integrative way, by incorporating all national, regional, local (i.e. cultural) and sectoral plans. The outcome shall be local land use plans with realistic action plans to improve land use and resource management at the local level. The process is development-oriented and participatory and based on direct coordination and joint-decision-making with all stakeholders. The main underlying principles for this process are:

(i) Involvement of all sectors (water, livestock, agriculture, environment, etc.)
(ii) Use of Geographical Information Systems (GIS) for spatial mapping
(iii) Participatory decision-making
(iv) Immediate implementation
(v) The resulting land use plan is subject to a Strategic Environmental Assessment (SEA)

63. Key issues will be analyzed in participatory planning workshops and future land use plans and action plans will subsequently be drawn up whenever agreements are achieved by all stakeholders.

Output 2.1.2: Integrated land-use plans for priority agro-ecosystems: # of local land-use plans in targeted zones integrate INRM and conservation and sustainable use of biodiversity

64. The process of developing integrated land use plans will involve four main aspects:

65. *Spatial development potential:* Spatial development potentials, such as underutilized land potential, opportunities to optimize land use through intensification, diversification or land use changes as well as capital investment projects such as agricultural developments, mining developments, infrastructure developments, etc. which are planned in the region will be identified and mapped.

66. *Addressing spatial deficits:* Spatial deficits include non-spatial factors that may impact negatively on optimal land use. Unfavorable marketing conditions (long distances to markets, unfavorable transport conditions, etc.), for example, may discourage farmers to grow crops on their land, although it may be very well suited for horticulture. Tenure insecurity may hold people back from making investments on their land and in their agricultural enterprises. The structural deficits will be identified and referred to a higher strategic/political level for action.

67. *Resolving land use conflicts:* Existing and/or possible future conflicts regarding land use will need to be resolved before land use plans can be developed and adopted. These can be caused by uncoordinated sectoral planning, by uncontrolled expansion of urban areas into farmlands, by ethnic conflicts or by the fact that different land users of a particular area are having different interests in land use. These will be addressed at local level (in the case of competing uses) or at higher policy level where the conflicts relate to policy failures.

68. *Environmental problems (including disasters):* This aspect involves dealing with severe environmental issues (e.g. soil degradation in the ouadis, advancing of the desert/sand dunes, etc.) and pollution (natural or environmental disasters), which may already be present in sub-regions or which could possibly occur in the near future.

Output 2.1.3: Ha of croplands under effective land use management with vegetative cover maintained or increased

69. Developing the actual integrated land use plans is an analytical process that integrates the spatial information obtained through participatory mapping tools into a Geographical Information System. A resources map will then be drawn with the local community and other stakeholders involved in the planning process. The steps involved include:
    (i) Identifying all present resources of the planning area and their spatial distribution (i.e. water resources, soils, different vegetation types, minerals or other materials which can be made use of for activities like small-mining, biodiversity-rich areas or areas with scenic beauty with tourism potential, etc.);
    (ii) Identifying and interpreting the present forms of land use, to identify and discuss problems and conflicts in land use (for example areas with high erosion levels, areas in which conflicts arise between user groups, areas where human-wildlife or livestock-wildlife conflicts occur, etc.);
    (iii) Discussing issues pertaining to land tenure, access and control over land and resources, and
    (iv) Identifying areas with potential for alternative uses, intensification or diversification.

70. It is important to apply "ground-truthing methods", where important features, sites and areas are visited in reality and surveyed with a Global Positioning System (GPS) device in order to optimally geo-reference the map. The process aims at the development of a future land use map which is agreed upon by all stakeholders. The future land use maps shall:

    - ✓ show the future allocation of different land uses (zonation);
    - ✓ show ha covered by vegetation;
    - ✓ point out clearly the identified future location of different development projects.

71. The agreed activities (agriculture, agroforestry, pastures management, biodiversity conservation, etc.) will then be piloted and a monitoring plan put in place for future monitoring.

Output 2.2.1: Scaled-up land management systems integrate SLFM practices, resulting in improved soil conditions and carbon sequestration (avoided deforestation and land degradation)

72. Once the integrated land use plans are in place and agreed activities piloted, a feasibility study will be undertaken to evaluate the scope for a forest certification system for sustainable forest management at local level. The benefit of this is two-fold:

    (i) It helps to plan for, manage and monitor sustainable natural resource management;
    (ii) It motivates local communities to actively participate in sustainability and conservation activities by compensating them for their participation. This compensation can be in the form of support to improved productivity or diversified incomes.

73. This output is linked to outputs 2.2.2 and 2.2.3.

Output 2.2.2: Support mechanisms for SLFM in wider landscapes established, including assessment and implementation of benefits sharing mechanisms to incentivize SLFM at community level, and 300 improved cooking stoves disseminated

74. As one incentive mechanism to enhance sustainable NRM (especially forests) and improve carbon stock, improved cookstoves will be introduced in the project area linked to the Gold Standard Simplified Methodology for Quantification of Carbon Benefits. The objective of this methodology is to reduce overall project costs without compromising the integrity of activities that generate less than 10,000 tCO2 per year per activity. The methodology provides several innovative alternatives for estimation of fuel consumption and emission reductions, along with default factors for several monitoring parameters to further reduce transaction costs. This methodology is applicable to project activities that introduce efficient cookstoves to reduce usage of non-renewable firewood or switch from non-renewable to renewable firewood for household cooking. The methodology is only applicable if: 1) the baseline fuel is firewood and 2) the baseline cookstove is a three-stone fire or a traditional cooking device without a grate or a chimney. Typical examples are the replacement of three-stone cookstoves with Improved Cookstoves (ICS) or switching from non-renewable to renewable fuel with or without replacing the baseline cookstoves. All these conditions are applicable in the project area. The carbon benefits will be quantified as part of project monitoring.

Output 2.2.3: Assess and introduce a certification system for forests, agro-forestry products or management systems with implementation by a third party

75. The Plan Vivo System and Standard will be used for this task. A Plan Vivo involves a method of working with rural communities to improve their management of natural resources. The project must be registered with the Plan Vivo Foundation, following independent validation against the Plan Vivo Standard. The Plan Vivo Standard is based on a land management planning and a community-based Payments for Ecosystem Services (PES) type approach. The standard is designed to ensure that Plan Vivo projects benefit livelihoods, enhance ecosystems and protect biodiversity.

76. The Plan Vivo System is very versatile and can be applied at both small and large scales and works well with rural communities. Under the Plan Vivo System, each project participant creates a sustainable land-management plan called a plan vivo. Through plan vivos, participants combine existing land uses and livelihood activities with improved land and forest use activities and practices.

77. Activities under the system include:
    - Afforestation and reforestation (using native or naturalized species)
    - Agroforestry (inter-planting trees with crops or livestock)
    - Forest restoration or rehabilitation (re-establishing the structure, productivity and species diversity of forest originally present, or re-establishing the productivity and some, but not all, of the species originally present)
    - Avoided deforestation and forest conservation

- Other land-use activities with quantifiable carbon benefits (e.g. improved agricultural systems)

78. The Plan Vivo Standard is developed exclusively for use in community-based projects using a "PES"-type approach, meaning that activities are undertaken directly by smallholders and community groups who then receive staged incentives and support. Participants in communities sign long-term 'sale agreements' committing them to their plan vivo (management plan). The agreements lay out a monitoring schedule where staged payments are received in return for meeting certain performance targets. Each participant has a management objective, e.g. sustainable fuelwood production, agroforestry or non-timber forest product production (e.g. fruits or honey), to ensure they benefit from the activity and the activity becomes embedded in the landscape area (i.e. it would not be economically rational for participants to discontinue the activity). Such a standard and certification system will improve, sustain and help monitor the sustainable land and forest management objectives and activities of the project. Plan Vivo Certificates are environmental service certificates which represent the reduction or avoidance of one metric tonne of carbon dioxide, plus livelihood and ecosystem benefits. The plan vivos will link up to the land-use plans under output 2.1.1.

79. The project will take the following steps for conducting the aforementioned reforestation, forest conservation and revegetation activities in line with the Plan Vivo Standard:
    - Assess current crop and livestock production and landscape management practices and systems for subsistence and market.
    - Identify and analyze alternative production and landscape management practices and systems that are strategic for existing vegetation types and estimate amount of CO_2 they can capture.
    - Identify, value and prioritize the role of women in implementing activities that contribute to carbon capture and climate change mitigation.
    - Building on previous activities, develop *Plan Vivos* with communities, working groups and individual farmers (key members of community).
    - Validate community *Plan Vivo* in community assembly with the participation of community members.
    - Establish alternative production and landscape management practices and systems in the field.
    - Operate and provide technical assistance for managing alternative production practices and systems.
    - Apply monitoring principles to plan implementation.

80. **Calculation of CO_2 Mitigation:** Different certification systems prescribe different approaches for calculating the CO_2 mitigation efforts. These methods range from indirect methods (e.g. using IPCC defaults or from measurement of tree diameter and height and correlating then with standard parameters), to direct ones like destructive sampling or soil sampling and testing in the lab. However, for the purpose of project preparation these approaches are considered too costly and involving. A simpler, more generalized approach has therefore been adopted based on research produced with the support of the World Initiative for Sustainable Pastoralism (WISP), the GEF, UNDP and IUCN for rangelands (the main land use type in the project area). The work provides the carbon sequestration effects of various land management practices in diverse rangelands globally, and which are considered applicable for this project. The management practices are shown below, indicating the sequestration effects for each applicable activity.

Management practice	No. of data points*	Mean change in tCO2e/ha/yr or total change in %C
Vegetation cultivation	c: 31 %: 7	9.39 tCO2e/ha 0.56%
Avoided land cover / land use change	c: 65 %: 22	0.40 tCO2e/ha 0.87%
Grazing management	c: 55 %: 21	2.16 t CO2e/ha 0.13%
Fertilization	c: 27 %: 68	1.76 t CO2e/ha 0.47%
Fire control	c: 2 %: 1	2.68 t CO2e/ha 0%

***(c = no. of studies reporting in C content,**

% = no. of studies reporting in %C)

81. The carbon sequestration is then estimated by multiplying the sequestration effect of each management practice by the number of hectares estimated to be eligible under the project (based on the PIF). I.e.,

$$C = s_m * A$$

Where:

C = the total CO_2 equivalent sequestration over the project lifetime
S_m = the annual sequestration effect due to management practice '*m*' per hectare
A = the area in hectares over which the management practice is undertaken

82. It should be noted that these estimates are merely indicative for the generalized case for the purpose of project preparation, and will be calculated accurately during project implementation as per the prescriptions of the selected methodology. A preliminary calculation has been done in the SFM tracking tool.

Output 2.2.4: Assess the feasibility of establishing a protected area for the Sahelian acacia savanna or Lake Chad flooded savanna ecoregions

83. Lying at the convergence of four major continental ecological zones (West African Sahara, the Sahel, the Sudanian zone, and the Central African Forest), Chadian ecosystems are globally significant, providing critical environmental services to the country and the region. Chad is relatively rich in biodiversity although ecosystems that comprise permanent habitats, safe migration harbours, and assimilation zones for a multitude of unique species are highly fragile, ineffectively protected and risk serious and irreversible loss of biodiversity. Biodiversity is mainly concentrated in the more forested and resource rich southern Sudanic zone.

84. This task will involve conducting a feasibility study for establishing a PA system for Chad's globally important Sahelian acacia savanna or Lake Chad flooded savanna ecoregions. Even if it is considered to hold one of the highest levels of biological diversity of the Sahelo-saharian countries, the national biological diversity of Chad has been poorly documented. Hence, enhanced information and data on biodiversity of global importance in the area will be an additional activity covering the region.

85. The study will then determine if a PA is feasible and can be beneficial to the communities and country as a whole. This output will be linked to the assessment of biodiversity (valuation) and conservations needs (output 3.1.1) which will help determine whether a PA can and should be established. Indeed, ecosystems provide a huge range of services to communities and countries on a whole, including provisioning services such as supplying food and water; regulating services such as climate regulation, flood and disease control; cultural services such as spiritual, recreational, and other; and supporting services, such as nutrient cycling that maintains the conditions for soils. Valuating such services will go a long way in determining the monetary and other values of biodiversity which can then inform decision-making and conservation activities.

Component 3: Knowledge Management and Monitoring & Evaluation (M&E)

Knowledge Management:

86. The GEF project will support targeted environmental knowledge focused on enhancing integrated landscape management and agro-sylvo-pastoral planning. Different assessments will directly feed into the design, development, and monitoring of SLFM activities and micro-projects under Components 1 and 2. The component 3 will have a strong emphasis on M&E, thereby also taking stock of innovative SLFM technologies and the dissemination of best practices on improved Sahelian farming and biodiversity conservation to stakeholders. Through participatory processes, facilitators and project implementers will better assess community capacities and design specific training and outreach programs with greatest effectiveness. Training will allow beneficiaries to gradually take on more responsibilities and will increase ownership over micro-projects. Due to the fragile nature of its resource base, a better understanding of the region's ecological biodiversity and conditions is also needed. The technical analyses will feed into the design of the site-specific technology packages and measures to ensure biodiversity conservation and sustainable resource use are integrated into planning.

87. Existing barriers to sustainable NRM and agro-sylvo-pastoral production will be overcome by enhancing awareness and capacity building, by improving knowledge of critical natural systems, by testing solutions and new participatory approaches to resource management through on the ground demonstrations, and by preserving biodiversity that sustains the ecological integrity and services of the Lake Chad basin.

88. Table 3 summarizes the outputs and activities needed to achieve the outcomes of component 3.

Table 3: Component 3 Outputs and Activities

Component 3: Knowledge Management and M&E		
Outcome	**Output**	**Activity**
3.1 Lessons learned captured and knowledge disseminated	3.1.1 Assessment of biodiversity and conservation needs in the ecoregions of Kanem and Bahr el Ghazal and possible response mechanisms	3.1.1.1 Conduct an assessment of biodiversity and its value based on an accepted best practice tool
	3.1.2 Framework developed for sensitization campaigns and training for enhancing awareness and enabling environment on ecosystem management	3.1.2.1 Establish a training strategy and a knowledge management strategy for the project
		3.1.2.2 Development of print and electronic knowledge products
	3.1.3 Development and dissemination of guides and toolkits on innovative INRM and BD conservation practices in drylands	3.1.3.1 Project team develops and presents knowledge products from the project in various forums 3.1.3.2 Facilitate seminars and workshops
3.2 Project impact monitored and evaluated	3.2.1 Project monitoring system established providing systematic information on progress in meeting outcome and output targets	3.2.1.1 Develop a project M&E framework, including gender indicators and impact assessment
	3.2.2 M&E system for analyzing land degradation trends and associated socio-economic and biodiversity impacts	3.2.2.1 Develop a Participatory M&E system
	3.2.3 Midterm and final evaluation conducted	3.2.3.1 Produce monitoring reports per component and as a project
		3.2.3.2 Develop TORs for mid and end of project reviews

Output 3.1.1: Assessment of biodiversity and conservation needs in the ecoregions of Kanem and Bahr el Ghazal and possible response mechanisms

89. The GEF project will establish a strategy for the management of knowledge which will serve to enhance integrated landscape management and agro-sylvo-pastoral planning. Enhancing knowledge for improved decision-making will include an assessment of biodiversity and conservation needs in the ecoregions of the project area.

90. *To note*, the assessment of biodiversity and conservation needs will be developed as an activity/output of the project itself. However, below is preliminary information on the methods that will be used and some basic data considerations. Knowledge about ecosystems is the strongest tool in supporting planning and action in conservation.

Approach to Biodiversity Assessment:

91. A vulnerability and climate risk assessment has been prepared during PPG that lays the groundwork for this output. The assessment stands on four main components: 1) Livelihood security (Climate Resilient Livelihoods); 2) Climate Impacts and Disaster Risks; 3) Existing Coping Strategies and Adaptation Potential (Capacity Development); and 4) Addressing underlying causes of vulnerability. The risk assessment provides preliminary information that will inform the subsequent output related to biodiversity vulnerability, assessment and needs.

92. Biodiversity conservation is a key consideration of the project, with much support given to strengthening and promoting local actions in conservation and in the sustainable and integrated use of resources at the local level (as exemplified through components 1 and 2). To this end, a biodiversity and conservation needs assessment in the target regions is critical, along with the elaboration of possible response mechanisms to better improve conservation efforts. The purpose of such an assessment is to better clarify the value of local biodiversity to the local communities, local economy and possibly the country as a whole, and can then be used to integrate biodiversity concerns into, for example, the land-use plans and the feasibility study for developing a protected area (e.g. whether a PA can and should be established). Three main steps are envisioned:

    i. Mapping of existing biodiversity in different ecological zones
    ii. Investigation/confirmation of ecosystem services provided by biodiversity (its value locally and globally)
    iii. Assessment of potential response mechanisms to protect and improve biodiversity

93. Such an assessment begins with mapping existing biodiversity in the targeted landscapes (Kanem and Bahr el Ghazal regions), accompanied by an investigation/confirmation of the ecosystem services provided by the said biodiversity (a valuation of that biodiversity). For example, agro-sylvo-pastoral practices in the project area are heavily dependent on natural resources, yet an overexploitation of the same landscape results in the environment being unable to support these activities. The first two steps would clearly demonstrate the direct linkages between existing local practices and the resources upon which they depend, thereby enabling concrete and specific actions (response mechanisms) to be taken towards biodiversity conservation, such as a framework for partnership with the Ministry of Environment for joint forest management.

94. The assessment will draw from the ecosystem-based management approach given it recognizes the array of interactions, issues and actors within an ecosystem, including humans, species, and overall ecosystem services. The assessment can thus consider issues across sectors to manage species and habitats, economic activities, conflicting uses of land, and the sustainability of resources. It will also consider trade-offs and opportunities to then determine response mechanisms that are applicable locally, based on livelihood needs and economic realities, which can then better protect and sustain diverse and productive ecosystems and the services they provide. Such an assessment can help incorporate biodiversity considerations into key project planning and management decisions and provides information that can guide effective decision-making about conservation and NRM.

95. The preliminary steps in a biodiversity assessment involve evaluating the state of a region's biodiversity, the health of its ecosystems, and the multiple benefits that nature provides to people and other. Steps include:

96. **Assessment and valuation of ecosystem services and biodiversity:** An essential first step to protecting ecosystems and biodiversity linked to human and habitat well-being is knowing and understanding the role that these systems play and how they interact with each other. The assessment and valuation of natural habitats, agriculture, livestock, forestry and fisheries helps to identify how these sectors benefit from and supply ecosystem services and vice versa. Knowing these values provides greater incentive for investing in improved management of ecosystems and natural resources.

97. **Development of a biodiversity baseline:** Baselines are useful snapshots in time against which a change in status can be compared. To save time and other resources, the use of existing literature is recommended as a first step (such as IUCN lists, National/Local Action Plans, BD Hotspots, Endemic/important Bird Areas, Centers of Plant Diversity, and nationally designated protected areas) can assist in identifying key habitats/species in the target ecoregions that may be at risk and their current condition. If this preliminary assessment does not yield enough information, these findings will be considered as context for a more detailed localized biodiversity assessment which must then be undertaken on the ground. Following this localized biodiversity assessment, site-specific indicators will be developed which will be the basis for establishment of restoration targets and subsequent monitoring. The establishment of baselines should be as participatory as possible.

98. **Risk screening:** Conduct a basic risk screening on biodiversity, drawing together information on globally recognized biodiversity information and databases. This information can be drawn from, for example, the following knowledge portals (e.g. IUCN Red List of Threatened Species and Key Biodiversity Areas, databases on Protected Areas, Ramsar Wetlands sites). Using such up-to-date information can help identify biodiversity risks and opportunities within or close to a target boundary.

99. **Development of biodiversity monitoring framework:** The CBD calls specifically for identification and monitoring in Article 7 - in particular to determine progress with in situ conservation [Article 8], ex situ conservation [Article 9], and sustainable use of components of biodiversity [Article 10]. The monitoring framework will consist of the following basic elements:

    a. Compiling and analyzing a meta-database (database overview) for each important biodiversity element.
    b. Defining, reviewing and choosing indicators for all elements and sub-elements in the ecosystem and choosing performance criteria for each indicator.
    c. Setting up a database for the indicators and organizing monitoring systems and surveys to obtain new data. A score will be calculated for each indicator.
    d. Combining all the indicators into indices to simplify the process of future monitoring.
    e. Mapping indices and assessing implications. Mapping is an efficient and effective way of recording, analyzing and communicating spatial indicators. All ecosystem indicators and most human indicators can be expressed spatially. Mapping greatly supports an ecosystem approach to assessment, by showing the distribution of ecosystems, changes in their size, composition and condition, and the effects of human decisions and actions. Maps tie the measured data to specific locations, thus highlighting where information gaps lie and stimulating participants to seek further information for the whole area rather than only a few locations. Maps can show how indicators are linked, and they aid data interpretation by revealing patterns of performance.

100. **Skills development for monitoring ecosystem services and biodiversity:** This involves understanding how to monitor ecosystem services and biodiversity, which as a prerequisite requires understanding the trade-offs and synergies across sectors/actors and draws on skill sets that include identifying and undertaking measures that enhance biological functions underpinning production. Local capacity must be developed.

101. The assessment will use as indicators those proposed in 2010 by the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC), the biodiversity assessment and policy implementation arm of UNEP. They are shown in Table 4:

Table 4: Proposed Biodiversity Assessment and Monitoring Indicators

Focal area	Indicators
Status and trends of the components of biological diversity	Trends in extent of selected biomes, ecosystems and habitats
	Trends in abundance and distribution of selected species
	Coverage of protected areas
	Change in status of threatened species
	Trends in genetic diversity of domesticated animals, cultivated plants, and fish species of major socio-economic importance
Sustainable use	Area of forest, agriculture and aquaculture ecosystems under sustainable management
	Proportion of products derived from sustainable sources
	Ecological footprint and related concepts
Threats to biodiversity	Nitrogen deposition
	Trends in invasive alien species
Ecosystem integrity and ecosystem goods and services	Marine trophic index
	Water quality in aquatic ecosystems
	Trophic integrity of other ecosystems
	Connectivity and fragmentation of ecosystems
	Incidence of human-induced ecosystem failure
	Health and well-being of communities who depend directly on local ecosystem goods and services
	Biodiversity for food and medicine
Status of traditional knowledge, innovations and practices	Status and trends of linguistic diversity and numbers of speakers of indigenous languages
	Other indicator of the status of indigenous and traditional knowledge
Status of access and benefits sharing	Indicator of access and benefit-sharing

102. Such assessment provides the scientific foundation to, inter alia,:
- Plan for, design and establish protected areas;
- Develop conservation initiatives within communities;
- Assess ecosystem vulnerability to climate change;
- Assess, monitor, and mitigate negative environmental and social impacts of projects;
- Support sustainable management of natural resources;
- Monitor the health of landscapes, habitats and species.

103. Each of these are very useful to the project activities in components 1 and 2.

Output 3.1.2: Framework developed for sensitization campaigns and training for enhancing awareness and enabling environment on ecosystem management

104. A framework that encourages team participation and sharing of knowledge will be developed that will involve sensitization campaigns and training, through, for example, seminars and workshops. The emphasis/ main content of the said framework will be the sustainable management of dryland ecosystems.

Output 3.1.3: Development and dissemination of guides and toolkits on innovative INRM and BD conservation practices in drylands

105. A variety of knowledge products aimed at sensitizing and training stakeholders on innovative INRM and BD conservation practices will be developed and disseminated through various fora and means. The products will include but not be limited to guidelines and toolkits.

Output 3.2.1: Project monitoring system established providing systematic information on progress in meeting outcome and output targets

106. An M&E framework that incorporates critical stakeholders, particularly P2RS, national and local partners, and AfDB will be developed to ensure that results-based M&E is carried out to internationally recognized

standards. This framework should facilitate both internal and external monitoring, and encourage participation from stakeholders, especially the community and vulnerable persons, specifically through Participatory Monitoring, Evaluation, Reflection and Learning (PMERL). Gender analysis will also be undertaken and incorporated into the monitoring system.

Output 3.2.2: M&E system for analyzing land degradation trends and associated socio-economic and biodiversity impacts

107. PMERL, by its participatory nature, will encourage the participation of communities and stakeholders in providing information related to land degradation, and socio-economic and biodiversity impacts. The main advantage of training and utilizing information provided by the community is its comprehensiveness and real-time nature, if effectively captured.

Output 3.2.3: Midterm and final evaluation conducted

108. At least two monitoring visits per year are envisaged for all the experts involved in the project, namely: rural development expert, environmental and biodiversity expert, climate change adaptation and vulnerability expert, financial/procurement expert, M&E expert, rural infrastructure expert, and social development expert. Each of the experts will be required to produce monitoring reports for the activities, and for the overall project given its integrated nature. ToRs to be followed for the monitoring visits and reporting will be included in the M&E Framework. A final evaluation will be conducted at the end-life of the project, to confirm whether work done and other activities related to the implementation of the project have been implemented as planned.

Monitoring and Evaluation

109. It is of utmost importance for the project to make use of internationally recognized results-based monitoring and evaluation frameworks during the implementation of the entire project. AfDB will be responsible for the monitoring. This will be in collaboration with the AfDB's country office in Chad and the project teams. The project will also document all problems and lessons encountered during implementation as a way of knowledge management. This will ensure that successes are replicated while hindrances avoided early for similar future projects or even other current projects.

110. *Internal monitoring:* Internal monitoring will serve the purpose of ensuring that the proposed Knowledge management and M&E framework is adhered to using appropriate means and approaches. Monitoring and evaluation personnel from P2RS, other national and local partners, and the Bank's Country Office team will be in charge of the internal monitoring and evaluation of the project.

111. The proposed monitoring parameters, frequency and time schedule should be followed to the letter to ensure effective implementation of proposed intervention measures. All experts involved in the project are expected to make at least two monitoring visits yearly per project activity to observe pre-project situation, middle of activity and end of project status. Progress reports will be prepared for each visit by the experts in collaboration with the implementing agency (ies) to give finer details of the project at the time of evaluation. The progress reports will be submitted to the implementing agencies of P2RS, and the Bank's Country Office Team.

112. *Participatory M&E:* Participatory Monitoring, Evaluation, Reflection and Learning (PMERL) formulated and information gathered used in adaptive management and shared widely: The project will facilitate the design and use of PMERL for community-based plans. The formulation and implementation of this system will enhance participation of the communities in learning about the effectiveness of the measures proposed by the project and the continuous modification of those measures as the circumstances change, to continually improve their efficacy and resilience. Under this output, the project staff will monitor the climate / environment / development indicators on yearly basis, and prepare annual plans based on these indicators and also facilitate the publication of annual district report which at present is not produced by any district in Chad.

113. *External monitoring:* External monitoring will be executed by an independent monitoring expert who will review the progress reports prepared by the internal monitoring process vis-à-vis the actual situation on

the ground. The external monitoring expert will evaluate reports, data, work and other activities related to implementation of the project with the aim of ensuring that the proposed intervention measures are implemented as planned in the Knowledge management and monitoring & evaluation (M&E) framework. The independent monitoring expert will submit progress reports to the AfDB, Government of Chad, GEF and will be contracted by AfDB.

4) Incremental/Additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF/SCCF, CBIT and co-financing

114. The GEF Alternative builds on the baseline scenario (P2RS) and makes possible activities that would not otherwise be undertaken under that scenario. The objective of the GEF component is to better enable stakeholders to restore or maintain the productivity of natural assets and biodiversity within fragile ecosystems. Activities will aim to promote a cross-sectoral approach to local economic development, environmental management, and resilience that simultaneously addresses climatic challenges. Through interventions aimed at critically complementing the P2RS, the GEF project will assess, pilot, and sustain needed on-the-ground investments in INRM, capacity building, and knowledge. The outcome aims are to implement sustainable land and water management practices (SLWM) and resource conservation measures to reduce vulnerability at community level, to strengthen management and planning of natural resources for the consequent conservation of biodiversity, and to diversify livelihoods focusing on crop and agro-forestry systems, all underlined by a critical consideration for resilience of people and ecosystems.

115. The project is in line with the targeted GEF-6 focal area strategies (LD, BD, SFM)and contributes directly to objective LD-1: Maintain or improve flow of agro-ecosystem services to sustain food production and livelihoods. Under this objective the project contributes to GEF Outcome 1.1 (Improved agricultural, rangeland and pastoral production in support of food security and resilience), Outcome 1.2 (Improved agro-pastoral technologies and access to production assets for enhanced livelihoods and reduced vulnerability) and Outcome 1.3 (Improved forest management and/or reforestation generate sustainable flows of agro- and forest ecosystem services). The second is GEF objective LD-3: Reduce pressures on natural resources by managing competing land uses in broader landscapes through GEF outcomes Outcome 2.1 (Increased awareness of climate change impacts, vulnerability and adaptation) and Outcome 2.4 (Institutional and technical capacities and human skills strengthened to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures). Under GEF objective BD 4: Mainstream Biodiversity Conservation and Sustainable Use into Production Landscapes/Seascapes and Sectors, the project will manage the human-biodiversity interface. The fourth GEF objective is SFM-2: Enhanced Forest Management: Maintain flows of forest ecosystem services and improve resilience to climate change through SFM. The project also has many additional benefits for climate change adaptation and mitigation given its integrated nature.

116. The GEF project's development objective is to help restore Chad's fragile ecosystems by enabling local communities and institutions to rehabilitate degraded lands and forests and protect biodiversity. The project will generate environmental benefits through a number of GEF focal areas while simultaneously advancing the Government's main development objectives and its commitments under environmental conventions and poverty reduction strategies. It will also look to past initiatives in the region, including the World Bank/UNDP GEF project "Reversal of Land and Water Degradation Trends in the Lake Chad Basin". The project will build on this project's Chad target areas (Lake Chad shoreline, Lake Fitri and Chari river), selecting additional areas within which biodiversity must be mainstreamed and enhanced action/management plans for sustainable NRM and conservation. In order to ensure continuity of critical activities in highly vulnerable areas and to make sure these are sustained over time for enhanced productivity, food security, and biodiversity protection, enhanced investments need to be made, given also the increased impact expected by climate change and refugee influxes.

117. At the local level there will be a number of expected positive socio-economic impacts and numerous impacts on the biophysical and human environment, including: (i) improved availability of water for crops, livestock and trees; (ii) improved and diversified agro-forest productivity and reduced post-harvest losses; (iii) reduced vulnerability to climatic and other shocks; (iv) diversification of activities, income generation and job

creation; (v) preservation of natural resources and improved resource management; (vi) better access to basic socio-economic services; and (vii) secured food production. The project aims to strengthen a trend towards sustainable management, regeneration and protection of Sahelian ecosystems. An increase in the population's resilience resulting from facilities and technologies will enable beneficiaries, especially women, to better their socio-economic status. Improved provision of ecosystem goods and services and enhanced resilience will have the overall effect of securing food and nutrition.

118. Project activities will have major positive impacts on the natural environment, biodiversity, but also adaptation and mitigation. The expected regeneration of vegetation cover from GEF activities through harnessing of surface water, actions to protect woody resources, soil preservation and the rational management of agro-sylvo-pastoral lands will contribute to safeguarding the services provided by production systems and generating intertwined global and local environmental benefits. Global benefits will cut across different GEF focal areas to result in: (i) a reduction in the negative trends in land degradation, specifically desertification and deforestation, through adoption of better SLFM and INRM practices in the targeted zones; (ii) conservation and sustainable use of biodiversity and the maintenance of habitats in Chad's unique Sahelian regions through enhanced awareness and landscape planning; (iii) reduced GHGs and increase in carbon stocks, over time, through restored vegetation as a result of better managed forest, improved soil conservation and avoided deforestation; and (iv) increased adaptation to climate change as a knock-off effect of enhanced resilience. Furthermore, the project will contribute in one way or another to Aichi targets 1, 2, 5, 7, 14, 15, and 19.

119. In terms of quantifiable global environmental benefits, the project will specifically result in: 7,000 ha of degraded cropland under SLM and 3,000 ha under pastoral rangeland management; avoided deforestation and forest degradation (% reduction lost); enhanced carbon stock through SFM, restoration, agro-forestry, etc. (on 5,000 ha) with a cumulative avoided GHG emissions of 15,000 metric tons; and number of ha of production landscapes (TBD) that include biodiversity conservation and sustainable use. The benefits and impacts will be measured against the target indicator values Progress as per the Corporate Results Framework in the GEF-6 Programming Directions, and will be aggregated and reported during mid-term and at the conclusion of the project period.

120. With reference to the three important areas for action to enhance resilience of people and ecosystems, the alternative scenario with the benefits of incremental GEF funding is expected to be as follows:

121. With respect to **Enhancing agro-sylvo-pastoral productivity in drylands**, GEF funding will provide much needed financial support to sustainably intensify agro-sylvo-pastoral systems and resilient farming, spanning the entire array of resources needed in a Sahelian dryland landscape: land, water, and livestock. Agro-sylvo-pastoral systems will be enhanced through needed rural infrastructure and by investing in soil fertility and water conservation, so vital in drylands and critical to sustaining crop production and resilience. Activities will focus on promoting innovative and site-appropriate SLWM, improved agricultural technologies and inputs (e.g. crop diversification, drought and flood resistant crops and seeds), and the development of options aimed at ensuring food security while preserving the environment in a distinctive Sahelian ecosystem. Techniques for improving soil fertility and increasing woody biomass will be adopted more widely and consistently through SFM, agro-forestry, and dissemination of knowledge. GEF funding will be used to reduce land degradation by putting at least 7,000 ha of degraded cropland under SLM and 3,000 ha under pastoral rangeland management. Micro-projects will be established on site-appropriate soil conservation/ regeneration techniques and mixed cropping systems executed by farmers and herders. This will be a substantial increase from the existing but limited funding under the P2RS project. The incremental financing will allow for effective management practices to be demonstrated within the area project directly influence, as well as resulting in better management of these areas will contribute to better buffering, enhanced resilience and increased ecological sustainability of vulnerable areas. There is expected to be improved capacities of agro-sylvo-pastoral actors, with an estimated 11,000 land users trained on INRM and SLWM. A further 150 local staff will be trained on sustainable INRM policies and practices. Investments in SLWM targets building of rural hydro-agricultural infrastructure (30 ponds and boreholes; 20 village watering points; and controlled irrigation on 345 ha in exposed sites. Towards enhanced resilience, crop diversification and cultivation of appropriate species resilient seed varieties will be identified, produced and distributed to 100 households and

farmer organizations. Alternative income generating activities (6 of them) will be introduced, in addition to establishment of cereal banks and 5,000 ha of woodlots, community forestry plots, nurseries, agro-forestry, etc.

122. Regarding **Promoting integrated ecosystem management for enhanced resilience and biodiversity conservation**, GEF funding will support the scaling up of an integrated landscape approach to the preservation of land, forests and biodiversity for enhanced resilience, well-being and conservation. Better planning will sustain the improved management of environmental resources and protection of locally unique ecosystems. Considerations for biodiversity conservation will be a prime component, with support given to strengthen and promote local actions in conservation and in the sustainable and integrated use of resources at the local level (getting the right people involved in the right way and at the right time – multi-stakeholder engagement and governance). A biodiversity and conservation needs assessment will be undertaken in three main steps: 1) Mapping of existing biodiversity for different ecological zones, 2) Investigation/ confirmation of ecosystem services provided by biodiversity, and 3) Response mechanisms to protect and improve biodiversity. This support will provide increased and strategic knowledge products that will be disseminated and utilized for management of the rangelands and mainstreaming biodiversity in general. Additional GEF financing will support the development of a more systematic and widely applicable approach to defining sustainable management of rangelands and establishment of protected areas. Collecting stakeholder inputs will result in more useful knowledge products that fills the existing information gaps and that raise the national and regional profile of the P2RS project as an effective framework for conservation strategies. Through capacity building and support for collaboration, the project seeks to influence government plans with knowledge from the project.

123. In the area of **Knowledge, Monitoring & Evaluation,** GEF funding will give opportunities to stakeholders—including key decision makers, private sector and practitioners—at national and local levels to increase their knowledge of, and abilities to apply at site level, effective tools and best practices for mainstreaming sustainable NRM and biodiversity in their respective landscapes and seascapes. The GEF funding will support targeted environmental knowledge focused on enhancing integrated landscape management and agro-sylvo-pastoral planning. Assessments will directly feed into the design, development, and monitoring of SLFM activities and micro-projects under Component 1 and 2. The component will have a strong emphasis on M&E, thereby also taking stock of innovative SLFM technologies and the dissemination of best practices on improved Sahelian farming and biodiversity conservation to stakeholders. Through participatory processes, facilitators and project implementers will better assess community capacities and design specific training and outreach programs with greatest effectiveness. Training will allow beneficiaries to gradually take on more responsibilities and will increase ownership over micro-projects. The GEF project will establish a strategy for the management of knowledge related to enhancing integrated landscape management and agro-sylvo-pastoral planning. Content for the development of such strategy will be obtained following an assessment of biodiversity and conservation needs in the ecoregions of the project area. Specific products in print and electronic media will also be developed.

124. Finally, the project will promote a crosscutting capacity development and M&E strategy through which lessons learned will be captured and knowledge disseminated and the project activities effectively monitored and evaluated. The contributions of the project to GEF strategies are indicated in Table 5 below.

Table 5: Project Contribution to GEF Indicators and Outcomes

GEF Focal Area Objectives	GEF Program	GEF Indicators/Outcomes	Project Contribution
LD-1: Maintain or improve flow of agro-ecosystem services to sustain food production and livelihoods	Program 1: Agro-ecological Intensification	1.1 Improved agricultural, rangeland and pastoral production in support of food security and resilience	1.1.1 Reduced land degradation: 7,000 ha of degraded cropland under SLM and 3,000 ha under pastoral rangeland management 1.1.2 5 micro-projects on site-appropriate soil

GEF Focal Area Objectives	GEF Program	GEF Indicators/Outcomes	Project Contribution
			conservation/ regeneration techniques and mixed cropping systems executed by farmers and herders 1.1.3 Improved capacities of agro-sylvo-pastoral actors: 11,000 land users trained on INRM and SLWM 1.1.4 150 trained local staff on sustainable INRM policies and practices through workshop
		1.2 Improved agro-pastoral technologies and access to production assets for enhanced livelihoods and reduced vulnerability	1.2.1 Investments in SLWM: rural hydro-agricultural infrastructure (30 ponds and boreholes; 20 village watering points; controlled irrigation on 345 ha in exposed sites) 1.2.2 Crop diversification and cultivation of appropriate species: resilient seed varieties identified, produced and distributed to 100 households and farmer organizations (FOs) 1.2.3 Six alternative income generating activities (3 agricultural and 3 livestock) identified and implemented with households 1.2.4 30 cereal banks, 20 agricultural input stores, and 30 livestock feed stores established
		1.3 Improved forest management and/or reforestation generate sustainable flows of agro- and forest ecosystem services	1.3.1 Increased land area under SFM: 5,000 ha of woodlots, community forestry plots, nurseries, agro-forestry, etc. 1.3.2 Training in SFM and cropland management at district and local level (farmers, land user groups, local authorities, etc.) 1.3.3 10 local producers groups (at least 5 women groups) diversify their revenue through agro-forestry and sylvo-pastoralism

GEF Focal Area Objectives	GEF Program	GEF Indicators/Outcomes	Project Contribution
LD-3: Reduce pressures on natural resources by managing competing land uses in broader landscapes	Program 4: Scaling-up sustainable land management through the Landscape Approach	2.1 Enhanced integrated landscape planning for habitat resilience and preservation	2.1.1 Demonstration of participatory land-use planning: # of participatory restoration and land-use/NRM plans developed with local authorities and communities 2.1.2 Integrated land-use plans for priority agro-ecosystems: # of local land-use plans in targeted zones integrate INRM and conservation and sustainable use of biodiversity 2.1.3 ha of croplands under effective land use management with vegetative cover maintained or increased
BD 4: Mainstream Biodiversity Conservation and Sustainable Use into Production Landscapes/Seascapes and Sectors SFM-2: Enhanced Forest Management: Maintain flows of forest ecosystem services and improve resilience to climate change through SFM.	Program 9: Managing the Human-Biodiversity Interface	2.2 Enabling environment enhanced through mechanisms for the conservation of land, woody biomass and biodiversity	2.2.1 Scaled-up land management systems integrate SLFM practices, resulting in improved soil conditions and carbon sequestration (avoided deforestation and land degradation) 2.2.2 Support mechanisms for SLFM in wider landscapes established, including assessment and implementation of benefits sharing mechanisms to incentivize SLFM at community level, and 300 improved cooking stoves disseminated 2.2.3 Assess and introduce a certification system for forests, agro-forestry products or management systems with implementation by a third party 2.2.4 Assess the feasibility of establishing a protected area for the Sahelian acacia savanna or Lake Chad flooded savanna ecoregions 3.1.1 Assessment of biodiversity and conservation needs in the ecoregions of Kanem and Bahr el Ghazal and possible

GEF Focal Area Objectives	GEF Program	GEF Indicators/Outcomes	Project Contribution
			response mechanisms
	Cross-Cutting Capacity Development and M&E	3.1 Lessons learned captured and knowledge disseminated	3.1.2 Framework developed for sensitization campaigns and training for enhancing awareness and enabling environment on ecosystem management 3.1.3 Development and dissemination of guides and toolkits on innovative INRM and BD conservation practices in drylands
		3.2 Project impact monitored and evaluated	3.2.1 Project monitoring system established providing systematic information on progress in meeting outcome and output targets 3.2.2 M&E system for analyzing land degradation trends and associated socio-economic and biodiversity impacts 3.2.3 Midterm and final evaluation conducted

Incremental Cost Reasoning:

125. Overall, the key value-addition of the GEF contribution is to shape the project into a land degradation, INRM, biodiversity and climate change multi-focal initiative, ensuring environmental sustainability and enhanced resilience through conservation, adaptation and mitigation. The GEF incremental value will enhance ecosystem productivity and promote integrated ecosystem management which will deliver global environmental benefits that would not normally have been the primary focus of a solely AfDB-financed project

126. ***Without GEF:*** The risks of reducing agricultural, rangeland and pastoral productivity in the Sahelian regions of Chad are substantial. Current practices, from land-use planning to production, are failing to maintain ecosystem functions and cannot support livelihoods or facilitate sustainable development. Without the GEF funds, the current unplanned, uncoordinated, unsustainable overexploitation of land for agro-pastoral uses and misuse of wood resources without adequate consideration for sustainability or adaptation will continue to have damaging impacts on biodiversity, carbon sequestration, and people's livelihoods, resulting in increased vulnerability and poverty, and reduced resilience. Whereas the baseline P2RS project supports investments in sustainable agriculture and socio-economic infrastructure, it does not propose a comprehensive approach to INRM in the regions of Kanem and Bahr el Ghazal.

127. **Incremental Costs Analysis.** The Program to Build Resilience to Food and Nutrition Insecurity in the Sahel (P2RS) has been designed with a 20-year timeframe to increase, on a sustainable basis, agro-sylvo-pastoral and fishery productivity in the Sahel. In addition to a regional component, select countries will implement their own national project. The baseline of the GEF project is Project 1 of the P2RS which concerns seven countries of the Sahel most affected by food crises and, in particular, the Chadian component targeting Bahr el Ghazal and Kanem. The AfDB baseline project seeks to eliminate structural causes of acute and chronic food and nutrition crises by helping vulnerable households to increase production and incomes; gain access to infrastructure and basic social services; and strengthen livelihood options. The strategy will be based on the development of stock breeding, irrigation schemes, markets for inputs, and agricultural and livestock products as well as enhancing the capacity of agricultural sector private, public and community institutions. The total cost of the baseline P2RS Project 1 is a Bank grant of USD 15 million and expected combined contributions from the government and beneficiaries of USD 2.6 million. Under the GEF Alternative, the project builds on

the baseline to conduct activities that bring additional co-financing to USD 17.6 million. Financing type can be either investment or technical assistance. The GEF grant is USD 5.329 million to complement the AfDB project and strengthen on-the-ground activities in target regions based on securing environmental benefits at local and global scales. GEF funding will be multi-focal from the land degradation, biodiversity and sustainable forest management (SFM) focal areas. The total cost of the GEF Alternative is USD 22,929,452. Thus, the incremental cost of the project is USD 5,329,452.

Table 6: Incremental Assessment Summary of the GEF Component within the P2RS project

Baseline (P2RS Chad project)	GEF Alternative	Incremental activity
Rural Infrastructure Development: aims to improve the necessary production, processing and agricultural marketing infrastructure to increase the competitiveness of promising agricultural products and to strengthen the resilience of agricultural holdings in the Sahel. Limited funds focus on promising small-scale initiatives generating local and national benefits, not necessarily aiming at generating global environmental benefits. Limited possibilities of mainstreaming biodiversity conservation and ecosystem services.	GEF grants and assistance focused on enhanced agro-sylvo-pastoral productivity in drylands. Support will be provided to subsistence farmers to implement low-tech methods that improve soils and conserve water and forests. Agro-sylvo-pastoral systems will be enhanced through needed rural infrastructure and by investing in soil fertility and water conservation, so vital in drylands and critical to sustaining crop production and resilience.	Demonstration of role enhanced agro-sylvo-pastoral productivity in drylands of the Sahel Reduced land degradation: 7,000 ha of degraded cropland under SLM and 3,000 ha under pastoral rangeland management Five (5) micro-projects on site-appropriate soil conservation/ regeneration techniques and mixed cropping systems executed by farmers and herders Improved capacities of agro-sylvo-pastoral actors: 11,000 land users trained on INRM and SLWM 150 trained local staff on sustainable INRM policies and practices through workshops Investments in SLWM: rural hydro-agricultural infrastructure (30 ponds and boreholes; 20 village watering points; controlled irrigation on 345 ha in exposed sites) Crop diversification and cultivation of appropriate species: resilient seed varieties identified, produced and distributed to 100 households and farmer organizations (FOs) Six alternative income generating activities (3 agricultural and 3 livestock) identified and implemented with households 30 cereal banks, 20 agricultural input stores, and 30 livestock feed stores established Increased land area under SFM: 5,000 ha of woodlots, community forestry plots, nurseries, agro-forestry, etc. Training in SFM and cropland management at district and local level (farmers, land user groups, local authorities, etc.) 10 local producers groups (at least 5 women groups) diversify their revenue through agro-forestry and sylvo-pastoralism
USD 8.5 million [2]	**USD 11.025 million[3]**	**USD 2.525 million**
Development of Value Chains and Markets: targets a	Grant support will go towards promoting integrated	New tools to assist stakeholders in mainstreaming and planning

[2] Confirmed co-financing
[3] Includes GEF Grant and confirmed co-financing

sustainable increase in production, the productivity of the major agro-sylvo-pastoral systems and the strengthening of nutrition. Limited technical and training content, and scope for influencing stakeholders to mainstream and improve the sustainable management of the landscape in an integrated manner (land, forests, biodiversity, etc.)	ecosystem management for enhanced resilience of people and the landscape and biodiversity conservation, as well as improving infrastructure and value chains. Analytical work and knowledge products to define larger-scale biodiversity conservation approaches and mainstreaming. Comprehensive analyses of key environmental and climate change issues facing the agro-sylvo-pastoral systems. Best practices, guidelines and other tools based on synthesis of broader experiences from the project and elsewhere will be developed and implemented.	Information, techniques and tools for stakeholders to enhance and mainstream conservation into agro-sylvo-pastoral systems and broader national development agenda Demonstration of participatory land-use planning: # of participatory restoration and land-use/NRM plans developed with local authorities and communities Integrated land-use plans for priority agro-ecosystems: # of local land-use plans in targeted zones integrate INRM and conservation and sustainable use of biodiversity Hectares of croplands under effective land use management with vegetative cover maintained or increased Scaled-up land management systems integrate SLFM practices, resulting in improved soil conditions and carbon sequestration (avoided deforestation and land degradation) Support mechanisms for SLFM in wider landscapes established, including assessment and implementation of benefits sharing mechanisms to incentivize SLFM at community level, and 300 improved cooking stoves disseminated Assess and introduce a Sustainable Forest Management certification system for forests, agro-forestry products or management systems with implementation by a third party Feasibility of establishing a protected area for the Sahelian acacia savanna or Lake Chad flooded savanna ecoregions assessed, piloted and implemented once proof of concept is achieved.
USD 5.0 million	**USD 6.75million**	**USD 1.75 million**
Program Management: aims to define and implement an institutional structure for management and coordination of all aspects of the project, including procurement, monitoring and evaluation, and communication. Limited technical and training content, and scope for influencing stakeholders to mainstream and improve sustainable landscape and biodiversity management	GEF grant will support targeted environmental knowledge focused on enhancing integrated landscape management and agro-sylvo-pastoral planning. Assessments will directly feed into the design, development, and monitoring of SLFM activities and micro-projects Knowledge generation and management to increase understanding, raise awareness of and promote mainstreaming biodiversity in agro-sylvo-pastoral landscapes. Inter-sectoral collaborations and capacities to maintain,	New tools to assist stakeholders in mainstreaming and planning Development and dissemination of guides and toolkits on innovative INRM and BD conservation practices in drylands Information, techniques and tools for stakeholders to enhance and mainstream conservation into integrated natural resource management Mainstreaming of conservation and sustainable use of biodiversity into plans/polices, with strengthened traditional knowledge systems Stakeholders with improved skills and knowledge for mainstreaming biodiversity. Enhanced collaboration among stakeholders

	restore and revitalize social and ecological values will be piloted and implemented Multi-sector stakeholder engagement at regional and national levels on mainstreaming in the project area. Training for integrating sustainable management in production landscapes	Recognition of values of INRM in government leading to national polices fostering sustainable land and resource use. Assessment of biodiversity and conservation needs in the ecoregions of Kanem and Bahr el Ghazal and possible response mechanisms Framework developed for sensitization campaigns and training for enhancing awareness and enabling environment on ecosystem management Project monitoring system established providing systematic information on progress in meeting outcome and output targets M&E system for analyzing land degradation trends and associated socio-economic and biodiversity impacts Midterm and final evaluation conducted
USD 3.15 million	**USD 3.800 668 million**	**USD 0.800 668 million**
TOTAL USD 16.65 million	**USD 21.725 668 million**	**USD 5.075 668 million**[4]
Global Environmental Benefits		
On-the-ground impacts, as well as uptake of lessons learned and best practice from INRM, SFM, and SLM exist marginally, but are limited due to size and scope of project. Knowledge capture and generation is constrained by limited strategic and analytical frameworks and resources, which affect efforts to build capacity and foster collaboration. Promotion of INRM, SFM, and SLM continues but lacks focus and strong "proof of concept" limiting replication and adoption.	Demonstrated roles and values of INRM, SFM, and SLM in conservation and development strategies Improved knowledge products and management based on global learning in production landscapes and seascapes Increased capacities and intersectoral collaboration for mainstreaming biodiversity conservation and sustainable forest, water and land management in agro-sylvo-pastoral landscapes.	Improved conservation of up to 10,000 ha, in addition to assessment of biodiversity, new protected area potential, and globally threatened species in biodiversity hotspots Replication and adoption of INRM approaches with stronger and more strategic "proof of concept" Broader and strengthened support for, plus contributions to achieving Aichi Biodiversity Targets.

5) Innovativeness, sustainability and potential for scaling up

a. Innovativeness:

128. The transition to the oil era in Chad has brought major revenues to the economy. As the underlying basis and outlook for growth in Chad continues to improve, it becomes ever more important that conservation and sound natural resource use be integrated effectively into development planning. Adopting these at an early stage will be pivotal to precluding irreversible environmental damage. The interconnection of environmental and socio-economic threats in Chad demands holistic approaches that balance the ecological, economic, social, and financial needs of communities. These approaches have heretofore been limited or lacking. The project will thus be innovative in addressing such an approach and techniques that both change landscapes and breathe new life into soils long depleted of their nutrients. The innovative aspects of the GEF project are related to: (i) the impact of interventions based on the elimination of production and human-induced constraints; (ii) technical innovations for drylands; and (iii) enhanced institutional and community awareness and capacity to sustainably manage biodiversity and resources together. As it is also the aim of the project to ensure

[4] Excluding Project Management Cost (PMC) = 253,784, which brings total GEF Grant to USD 5,329,452

sustainability and replicability, GEF activities will promote and scale up project results and activities to other areas in the country via knowledge sharing and to the region via the AfDB regional program. CILSS will help ensure the scale up of interventions at regional level emerging from national level activities and sustainability of project achievements and objectives.

b. Sustainability:

129. The establishment of activities and infrastructure that are economically, financially and technically viable will help ensure the sustainability of project interventions. Sustainability hinges on: careful sizing and targeting of infrastructure; stakeholder participation and ownership (men and women) and involvement of beneficiaries in all stages of planning and implementation; quality of facilities and equipment; and the viability of production activities suitable to the agro-ecological zone. To ensure post-project sustainability, for each operation the project will give preference to time-tested and low-tech but resilient mechanisms, thereby furthering the scope and consistency of the actions undertaken.

130. Taking into account replicability and scale up, the design of the project is articulated around the following principles and strategies: giving priority to facilities that can adapt to the conditions of the target areas; complementarity with other interventions; developing synergies with actors in the rural sector; promotion of rural employment; and implementation through a results-oriented approach including M&E and participatory management based on relevant indicators of achievement and impact. The regional approach chosen for the bigger AfDB program is justified because countries of the Sahel share difficulties related to that particular agro-ecological zone and significant trans-border issues, such as migration, drought, and disease. As agro-ecological zones transcend political boundaries, the technologies successful in one country of the Sahel will benefit other countries too. The activities planned in Chad will become lessons learned for regional up-take and will have an effective avenue for knowledge sharing and replicability. At the same time, the regional dimension of the AfDB program can feed new ideas into Chad's activities and contribute to developing synergy with interventions of governments and partners on food security and resilience.

131. The sustainability of the project will be in its ability to continue functioning at the end of the project and learn from the lessons learnt and practices employed; the project can then be replicated across other districts, and eventually the whole country. The project proposed is integral for the environmental, social, institutional and financial sustainability of the not just the three Districts but for the whole of Chad. Without this GEF intervention, environmental degradation and climate vulnerability will erode local economic development and resilient livelihoods.

132. *Environmental Sustainability:* The project will enhance food security and nutrition through sustainable and resilient agro-sylvo-pastoral systems in the Sahelian regions of Chad. The GEF component's environmental objective is to help restore Chad's fragile ecosystems by enabling local communities and institutions to rehabilitate degraded lands and forests and to protect biodiversity. The project will also generate environmental benefits through a number of GEF focal areas while simultaneously advancing the Government's main development objectives and its commitments under environmental conventions and poverty reduction strategies.

133. A Strategic Environmental Assessment (SEA) for the baseline P2RS project classified it in Category 2, according to AfDB's environmental and social safeguard procedures. The Environmental and Social Management Framework Plan (ESMFP) developed during the SEA study outlined several mitigation measures, including but not limited to compliance with clauses in DAO and hygiene and safety measures; involvement of various stakeholders; and the implementation of good practices and strict control.

134. The ESMP was prepared during the project formulation stage. Activities to be undertaken during the project were classified into the following main categories: project preparatory activities; project infrastructure development; and project operation and maintenance activities. Each of the above categories were aligned with the anticipated project components. Further, an assessment of environmental conditions during the field mission (September – October 2016) confirmed that adverse impacts arising from the project would be limited.

135. Overall, the GEF-funded project is expected to have positive impacts, with negative impacts (minor to moderate) occurring during construction and operation of works, and being limited, reversible or controllable. Environmental impact mitigation measures include the preparation and validation of a sub-project selection procedure which complies with Chad's regulations; the preparation and monitoring of land use plans in each impact municipal council or area; the preparation of sub-project environmental and social management guides; and the promotion of good farming and natural resources management practices.

136. *Financial and Economic Sustainability:* The financial sustainability of this project rests in part on the improvement of economic capabilities for the local communities. The program design has several built-in options for scaling up program interventions to ensure financial sustainability. The project will introduce measures to expand economic opportunities for women and youth and promote their participation in the labor force as this will reduce poverty, foster faster growth and increase resilience. To address specific gender inequalities that impede women's participation in enterprise development and the jobs market, the project will identify gaps in gender equality by consulting with men and women and developing skills and strategies to address these gaps. The project will specifically target vulnerable youths (aged 15 to 21 years) from unstable family backgrounds for vocational training and other support needed to enable them to get productive employment and reduce youth disaffection and delinquency. The project is designed to use staff and national institutions for capacity building activities. This will permit scalable investments from the project budgets.

137. *Sustainability of Capacities Developed:* The purpose of the program is to promote resilient development. In this regard, one component focuses on development of manpower in agro-sylvo-pastoral management, land, water, forestry, food security and nutrition in climate resilient technologies. The program will sensitize the planners and policy makers to incorporate climate resilience in development. An aggressive advocacy campaign in this regard will be launched through print and electronic media to influence the policy and development process. Thus the motivated and technically strong manpower in teaching and extension institutions will sustain and disseminate the resilient programs at a larger scale. This will ensure sustainability and up scaling of the present and future interventions. Policing to implement policies is not a solution; therefore, the community members will be sensitized and trained in participatory approaches to discourage negative environmental approaches and promote eco-friendly approaches. This will also ensure sustainability of the program interventions. In addition the project will rely on existing national, regional and local institutions as a sustainable mechanism.

138. Specific measures to ensure sustainability of the project include:

1. Involvement of communities in conception and implementation of the activities creates a sense of ownership and responsibility that enhances sustainability beyond the project period.
2. Building on the existing efforts of the government agencies in the project area. This will ensure future budget/resource allocation, and recruitment of staff by the government to sustain the project.
3. Recognition and building on local knowledge that the communities can easily identify with for acceptability & sustainability e.g. strengthening of the customary NRM institutions; re-introducing/protecting the crop landraces; indigenous trees and grasses; and traditional practices.
4. Linkages with the on-going projects e.g. the great green wall project, and co-financing ensures complementarity and future financial, institutional and policy support.
5. Knowledge and M&E component not only help to monitor progress on the set objectives but also generate information that guides implementation, future activities & exit strategy.
6. Proposed activities based on the felt needs of the stakeholders (communities, government and non-governmental development agencies).

c. Replicability and Potential for Scaling up:

139. The outcomes of this project are designed to strengthen the foundational capacities required to continue implementing INRM measures and for the ongoing replication of adaptation strategies country-wide. This project is therefore, expected to make a lasting contribution not only to the sustainability of all related projects in the country but also to Chad's broader National Development Plan objectives. The participatory

approach will root ownership of the project interventions firmly in the local communities. By engaging communities in the design and implementation of the project and creating local employment and enterprise development schemes, the project will empower and build capacity of local people to continue adapting to climate change risks. Land-use plans will be incorporated into Regional Performance Contracts to institutionalize and sustain community interventions.

140. Scaling up will be an integral consideration of the project planning process. During the design phase, key actors were identified as those who will have to be convinced of the value of the planned concept and approach. These include the actors who are important for scaling up such as key ministries, local authorities, communities as well as the private sector. The strategy is to involve them in planning, implementation and evaluation processes at an early stage and build a working relationship with them. Getting their support will be crucial in ensuring the interventions have the necessary political backing for scaling up (including incorporating the concept into their own sector programs or policies). During the design phase, the project will develop an effective communications strategy and invest specifically in disseminating information and in awareness programs to ensure that major stakeholders and population groups are informed, convinced and involved. This will include the production of briefing notes for policy makers to create a positive environment for scaling up utilizing websites, site visits, and the print and radio media to broadly advertise project results and foster replication and scaling up of successful interventions, provide updates on the progress and project activities, disseminate case studies and comments from the project participants, and communicate lessons learned from project activities. To make the (baseline plus GEF) project even more sustainable, partnerships with the private sector will have to be fostered to ensure continuity, for example, by encouraging a close exchange between businesses and vocational training centres.

A.2 Child Project?

141. N/A

A.3 <u>Stakeholders</u>

142. The preparation of this project was pursued with a comprehensive and extensive participatory process involving all stakeholders, including local communities, a multidisciplinary approach (professionals from different sectors participated); and a complementary approach, building upon existing plans and programs, including national action plans and national sectoral policies.

143. A stakeholder (and gender) analysis was undertaken as part of the PPG (see separate report submission) based on a review of documents and secondary literature, and a field mission carried out between 20 September and 5 October 2016. The Stakeholder Circle Methodology (Bourne and Walker 2006) was used to map stakeholder power and influence within the project, thereby enabling the establishment of stakeholder expectations and needs. It recommended that such a method be incorporated into the project design, through a stakeholder engagement strategy.

144. Six main categories of stakeholders were identified, namely:

- Government institutions
- Development partners (including multi-lateral agencies)
- Civil society and initiatives (NGOs/ CBOs/ CSOs)
- Academia
- Private sector, and
- Local communities.

145. Stakeholder prioritization involved the establishment of stakeholders' proximity (stakeholder's association with the project), power (the ability to 'kill' the project) and urgency (stakeholder's willingness to achieve outcomes). The Government of the Republic of Chad, and the local communities were seen to have the highest proximity to the project, while the same two aforementioned, in addition to the Ministries, GEF/ AfDB, and NGOs/ CBOs/ CSOs, were seen to have the highest power. The local community, including vulnerable persons, was seen to have the highest urgency. An engagement strategy was thereafter developed, where recommended engagement ranged from 'staggered', 'regular' to 'continuous'. An abbreviated

communication strategy was also developed, outlining how the message should be delivered, who should deliver it, and how often (frequency) it should be delivered.

A.4 Gender Equality and Women's Empowerment

146. To assure that alternative livelihood and resilience options meet equality and equity criteria, with special attention given to women and youth, a gender impact assessment methodology was used to complement the climate vulnerability and capacity assessment. This assessment reviewed the impact of alternative adaptation options on women and men as well as on gender relations in the project area.

147. For people who live in the central Sahelian regions, livelihoods are extremely precarious. The most vulnerable, however, are those who are socially disadvantaged, including women. Twenty-three percent of Chadian households are headed by women and 54% of these live on less than USD 1/day. Restrictive social practices limit women's access to education, information, technology and training, and to resources such as land and rural finance. Most women lack access to fertile land and live off minor food-processing activities, the sale of firewood, and informal sector jobs. Women also form the backbone of the rural economy, working in the fields, tending livestock, and bearing responsible for most household chores, such as caring for children, cooking, and fetching water and firewood. As a result of mortality and male migration, women now outnumber men, and female headed households are growing in Chad. These households are particularly vulnerable to poverty and environmental degradation.

148. In general, gender inequality indices in Sahelian societies are among the lowest. Social indicators of women's status in terms of literacy rates, access to the job market, life expectancy and maternal and infant mortality are disquieting. In these countries, poverty has a female face. Women however have the potential to significantly contribute to strengthening resilience to food insecurity as they carry out more than 65% of agricultural activities in the entire Sahel region. With growing resource degradation, women's workload, responsibilities and risks have increased considerably as they try to cope with harsh and changing realities.

149. Given that food and nutrition security are the project goals and that women and children are affected most, the project will tackle the gender and socio-economic dimensions of these realities and take into account the gender dimension in all its components. It will ensure the construction of gender-sensitive infrastructure and technologies to foster economic empowerment and the development of income sources. It will contribute to strengthening the position of women in production systems by enhancing income-generating activities such as the processing of agricultural products and the strengthening of capacities of groups or associations of women. The project will also focus on rural activities in which women have a recognized know-how (market gardening, rice, small livestock, poultry, processing activities, marketing of dairy products) and from which they can draw income.

150. At the local level there will be a number of expected positive socio-economic impacts and numerous impacts on the biophysical and human environment, including: (i) improved availability of water for crops, livestock and trees; (ii) improved and diversified agro-forest productivity and reduced post-harvest losses; (iii) reduced vulnerability to climatic and other shocks; (iv) diversification of activities, income generation and job creation; (v) preservation of natural resources and improved resource management; (vi) better access to basic socio-economic services; and (vii) secured food production. The project aims to strengthen a trend towards sustainable management, regeneration and protection of Sahelian ecosystems. An increase in the population's resilience resulting from facilities and technologies will enable beneficiaries, especially women, to better their socio-economic status. Improved provision of ecosystem goods and services and enhanced resilience will have the overall effect of securing food and nutrition.

151. *Specific gender promotion activities will include:* producing and analysing gender-disaggregated data throughout project implementation; strengthening the position of women's groups in the area of agricultural and forestry product processing; facilitating women's access to factors of production; promoting gender-sensitive infrastructure (micro-irrigation areas, upgraded rural roads, etc.); ensuring equal access by men and women to information, capacity building trainings and awareness campaigns; and hiring a gender expert for the national PMU.

A.5 Risk

152. An identification and ranking of risks has been conducted as well as identification of mitigation measures. The risks identified in relation to the effective execution and sustainability of project activities are related to project implementation and exogenous constraints. Overall, the risks are not exceptionally high and should be manageable. Identified risks, their ranking (1=low; 2=moderate; 3=high) and mitigation measures are presented in Table 7 below.

Table 7: Risk and Mitigation Factors

Description	Ranking	Mitigation measures
Climate hazards, as experienced through increased frequency of droughts and floods, rainfall shortages, extreme heat, make Chad excessively exposed to the degradation of its natural capital. Indicators of this degradation of natural capital include land degradation, desertification, deterioration of vegetation cover, recurrent farmer-grazer conflicts, the decimation of wildlife, the drying up of Lake Chad, and food insecurity. Climate hazards are most intensively experienced in the agriculture, livestock breeding, fisheries, health, and housing sectors.	2 (moderate)	Direct focus by the project on resilience, e.g. enhanced agricultural practices, crop diversification, heat resistant species, water management, etc. This will gradually contribute to lessening the impacts of climate variability. Activities planned under the project will help rural communities to better cope with shocks and enhance their resilience.
Institutional and organizational weaknesses: evidenced by poor coordination between the national, local and community-level governance structures.	2 (moderate)	Strengthening of existing structures, notably those of CILSS, and national project executing agencies; encouraging cooperation and communication between structures for smooth project implementation
Agriculture, livestock and fisheries – reduced productivity in these sectors results of the risk of people falling into poverty and suffering from food insecurity. In agriculture, for example, continuous cropping, poor farming and land husbandry practices have resulted in lower soil fertility, dwindling crop yields, and wind/ soil erosion. Fisheries, on the other hand, are threatened by significant desiccation of important water resources, which has been attributed to frequently recurring droughts, declining vegetation surrounding watercourses, deforestation, and overgrazing.	2 (moderate)	Improved crop varieties & hardy livestock; control of stock levels to match carrying capacity; training on improved land use practices; diversification of livelihoods and the building of transport infrastructure
Farmer/ breeder conflicts: the project area has been identified as a transhumance zone although agriculture still takes place in the ouadis. Conflicts primarily arise due to increased competition for land and natural resources (pasture and water) because of more frequent droughts and rainfall shortages.	2 (moderate)	Mediation efforts; tailor-made activities for each group that take into account their separate yet interlinked realities and needs

Description	Ranking	Mitigation measures
Project/ community conflicts: Weak community organization, combined with ineffective service delivery, lack of resources and limited decision-making power and information exacerbate poverty and insecurity.	2 (moderate)	The establishment of mechanisms for intensive consultation & awareness raising programs, including a communication plan; the development of capacity building/ training programs and undertaking of workshops
Environmental impacts – natural resources & biodiversity. The baseline P2RS 1 project is classified under Environmental Category 2 (AfDB's environmental and social safeguard procedures).	1 (low)	Project activities are likely to produce low to moderate negative impacts, which are expected to be less than the overall environmental benefits. Compliance with Chad's regulations; preparation and monitoring of land use plans, preparation of sub-project ESMPs; promotion of good farming practices and NRM practices
Health, nutrition and sanitation – characterized by epidemics, poor nutrition & sanitation	2 (moderate)	Early warning mechanisms; sanitation programs; improved nutrition programs, improvement of and increase in rural communities' livelihoods and assets
Energy and transport infrastructure will include, among others, irrigation infrastructure, boreholes, and socio-economic infrastructure. This infrastructure is expected to reduce the effects experienced from extreme droughts & flooding	2 (moderate)	Development of climate resilient energy sources; diversification of energy sources; building of climate-proof infrastructure

A.6 Institutional Arrangements and Coordination

153. A PMU responsible for implementation and supervision will be composed of representatives of the array of actors in the rural sphere, including local authorities, decentralized technical service departments, representatives of beneficiaries, CSOs, etc. By encouraging beneficiary participation and access to decision-making processes, the project will play a strategic role in the development of social capital and in ensuring a sustainable process for meeting the economic needs of the rural populations in the target areas. By closely involving farm and village councils (choice of sites, allocation of land, organization of agricultural and pastoral space, etc.), it will also contribute to significantly consolidating the local development process and the promotion of good governance. Figure 3 depicts the implementation and management arrangements of the project.

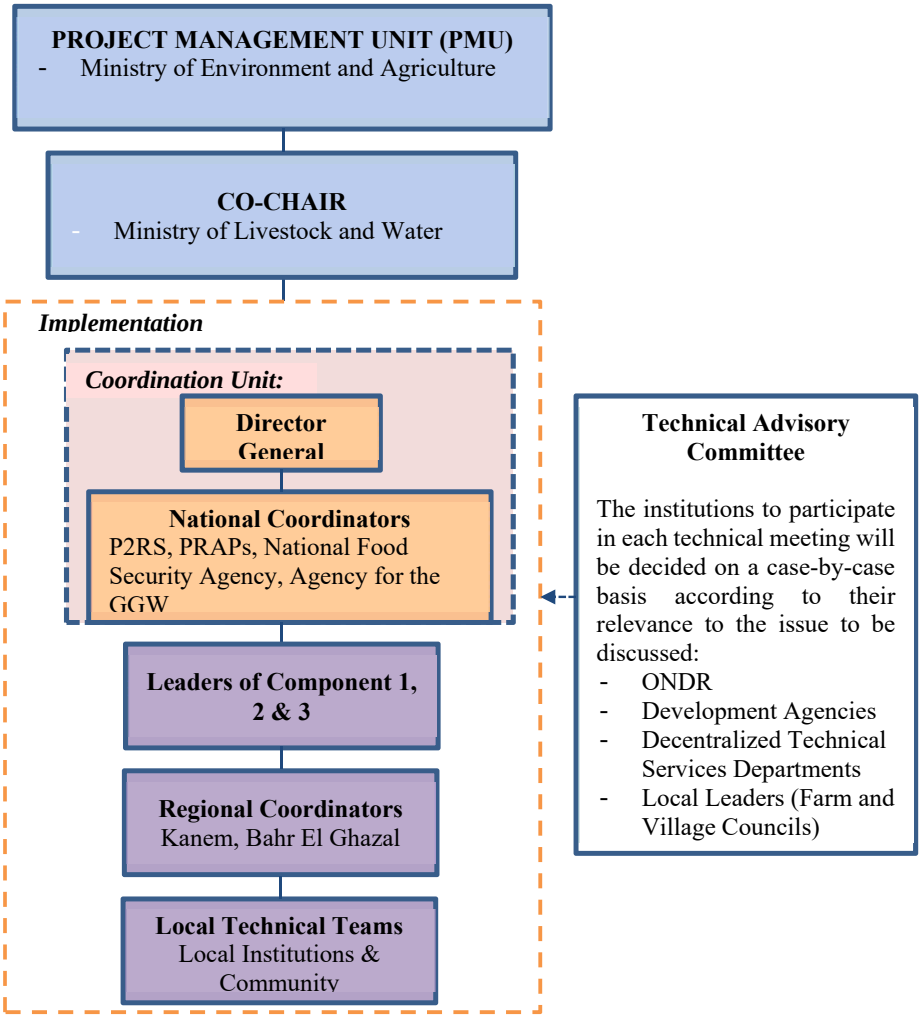


Figure 3: Proposed Implementation and Management Arrangements

Additional Information not well elaborated at PIF Stage:

A.7 Benefits

154. The project will address the problems of food insecurity and malnutrition, environmental degradation and climate-led disasters in the project area and will serve as a model for scaling up in neighboring regions facing similar problems. The project will ensure that integrated management of agro-sylvo-pastoral systems provides resilience of local economies and livelihoods and form the basis of community based adaptation. Assisting the decentralized units to mainstream climate risk considerations in the management of natural resources will further contribute to the target of mainstreaming sustainable development principles in national development policies.

155. An integrated and multi-sectoral approach is key to addressing underlying issues and causes of food deficit and malnutrition. The project will lead to development of a resilience framework that can assist to characterize the system, identify key controlling variables influencing food security in Chad, and develop a coordinated suite of activities that targets the most vulnerable aspects. In addition, it will provide an iterative and participatory multi-stakeholder assessment tool that is applicable across scales (e.g. field level, sub-national level) and agro-ecosystems. The benefits and impacts of such an approach are summarized under each component in Table 8 below.

Table 8: Project Benefits and Impacts

Component	Benefits and Impacts
Component 1: Enhancing agro-sylvo-pastoral productivity in drylands	**Benefits:** • Improved food security • Better health and nutrition • Reduced social inequity • Reduced poverty **Impacts:** • Reduced land conflicts • Improved land productivity • Improved gender equity
Component 2: Promoting integrated ecosystem management for enhanced resilience and biodiversity conservation	**Benefits:** • Conservation of natural resources • Soil restoration and conservation • Improved agro-pastoral productions **Impacts:** • Regeneration of endangered species
Component 3: Knowledge Management and M&E	**Benefits:** • Effective knowledge management • Information for feedback and improvement available **Impacts:** • Continuous improvement of the project • Build on knowledge & experience acquired

A.8 Knowledge Management

156. Joint missions of supervision, monitoring and review will be organized during the execution of the project. A framework for monitoring and evaluation (M&E) will be developed early in the implementation of the project to identify relevant indicators and monitoring procedures. The information collected in the context of M&E will feed into activities for knowledge management, identify and share good practices, identify problems and constraints and promote the continuous improvement of the project and its contribution to the implementation of national and regional strategies on food security and rural development.

157. The GEF project will help to train and consolidate the knowledge of stakeholders, particularly farmers and staff at decentralized levels. A system for managing and sharing lessons on project activities will be established by setting up a portal with other related services (electronic document management, work platform, etc.) to build on and manage the knowledge and experience acquired. The evaluation of program outcomes and impacts will be conducted at the national and regional levels under the supervision of M&E experts.

158. In addition, a harmonized gender-sensitive M&E mechanism and implementation manual will be prepared to operationalize the indicators of the logical framework and lay down a collection, feedback, processing and reporting channel. Special emphasis will be laid on targeting the most relevant parameters that can be monitored and collected internally, and on defining those relating specifically to women. Monitoring and knowledge management will notably cover, inter alia: (i) the rate of reduction of acute and chronic malnutrition and underweight; (ii) the rate of improvement of food insecurity; (iii) the rate of reduction in the number of persons vulnerable to food and nutrition insecurity; (iv) the level of additional production (tons) and crop yield (t/ha); (v) the rate of increase in the income of project target population; (vi) rural infrastructure construction rate (surface areas developed, number of pastoral facilities, number of preservation, processing and marketing facilities, number of rural roads, number of socio-economic facilities, etc.); (vii) agricultural produce processing rate and type and number of agro-industrial units set up; (viii) farmer supervision rate; (ix) quantity of training and number of men and women trainers; (x) percentage of increase in resources allocated

to women; (xi) level of involvement of women in decision-making bodies (percentage); and (xii) number of youths trained and established.

A.9 Cost-Effectiveness

159. Basic assumptions of the project are that it seeks an approach that addresses the underlying causes of resource degradation, the functional integrity of ecosystems, and spans the whole array of natural assets by providing support to subsistence farmers to implement low-tech methods that improve soils and conserve water and forests in addition to improving infrastructure, value chains and market linkages. The activities needed to achieve these are grouped within three main components namely 1) Enhancing agro-sylvo-pastoral productivity in drylands, 2) Promoting integrated ecosystem management for enhanced resilience and biodiversity, 3) and Knowledge Management and Development of an effective M&E Framework.

160. In the first component, options considered included intensifying agricultural, silvicultural or pastoral practices in isolation of each other, maintaining the status quo or encouraging more diverse practices in each of the areas. However, by reducing dependency on livestock and diversifying livelihoods, the project will increase the capacity of the target communities to withstand adverse situations due to a reduced reliance on either pastoralism or agriculture only. The improved post-harvest facilities proposed, as compared to increasing the number of existing facilities, will also secure and enhance agricultural output and hence increase food security. Similarly, the proposed pasture land management and hay storage, as compared to maintaining the status quo, will reduce fluctuations in livestock productivity during periods of scarcity.

161. The project is also designed to use existing institutions, like farmers' and herders' associations, women groups and cooperatives (as compared to the creation of new ones) where the community is already organized and have some equipment for value addition. The existing institutions also have long-term experience, and infrastructure for capacity building.

162. In the second component, the options considered included sole institutional versus sole community land use planning, or an extreme of ad hoc land use. Participatory and integrated ecosystem management as proposed brings together the expertise of various stakeholders, resulting in a more thorough approach to ecosystem management. Participatory ecosystem management further creates ownership of proposed interventions, thereby providing a sustainable solution.

163. Of the different ecosystem management and certification approaches proposed, the plan vivo system was chosen over other options because it is very flexible, with a strong community focus and can be easily implemented in small, rural communities. While Plan Vivo certificates are measured and can be sold in terms of the carbon fixed or emissions avoided, this by no means captures their entire value. In addition to numerous environmental co-benefits there is also a strong climate justice aspect by addressing the disproportionate vulnerability of poorer countries and communities to the effects of climate change. Plan Vivo projects can help counteract these increasing insecurities through restoring, protecting and establishing the ecosystems which can provide a buffer against increasing climatic volatility.

164. The project's model of transfer of technical capacity to the communities will eventually reduce the government's involvement to an advisory role thus making the project cost effective. This is unlike the business-as-usual scenario in which knowledge and technical capacity is limited to a few public and private sector players.

165. The project aims to increase the benefits from off-farm through diversification of enterprises and products and the equitable sharing of these benefits. The alternative livelihoods proposed offer some solutions for generating suitable revenues that are sustainable. The project will use the Public Private Partnership model will be used, with project facilitating a feasibility studies and linkages for all enterprises and value chains. The project puts emphasis on the inclusion of women in the implementation of these economic activities to reduce vulnerability to environmental risk such as droughts and floods.

166. Cost-effectiveness is reflected in the project design in a number of ways. A number of alternatives were considered for project interventions which are described below along with the reasons they were not chosen.

167. Technical solutions retained are based on existing options for improving food security and nutrition through sustainable and resilient practices (agro-sylvo-pastoral) and are known and implemented within Chad. A list of the technical solutions, primary alternatives explored, and the reasons for rejection of those alternatives are as follows:

Table 9: Cost Effectiveness

Technical solution retained	**Alternative explored**	**Reasons for rejection**
Small-scale rural hydro-agricultural infrastructures for irrigation (boreholes and ponds)	Large scale investments for irrigations	• Investment cost too expensive • Size of land/famer (max 2ha) does not suit big infrastructure (irrigation schemes) • Lack of local institution to manage such infrastructure
Micro-projects – soil conservation, regeneration and mixed cropping systems	Large regeneration and soil conservation program Introduction of new crops versus mixing of existing	• Insufficient budget • Existing cropping systems need to be improved for better production • SLWM optimizes current land us
Crop diversification – resilient seeds	Single crop production	• Hydrologic conditions allow crop diversification • Single crop agriculture does not improve nutrition • Diversification of crops helps improve income generation and resilience
Reforestation of encroached/ degraded forest through *Acacia tortilis* and *Boscia senegalensis* planting	Introduction of new species for forest generation and restoration	• New species not yet tried in Chad (i.e. risk) • Proposed specifies have already achieved high target for restoration in other Sahel countries • Existing local capacity to manage *Acacia tortilis planting*
Use of efficient stoves for cooking	Business as usual - Continued inefficient stoves or charcoal for cooking	• Cutting fuelwood is one of the main drivers of deforestation inside and outside the project area • Current cook stoves used or charcoal impacts famer incomes as they are very expensive (fuel for cook stove or charcoal)
Certification mechanism - Plan vivo system	Payment for Ecosystem Services (PES)	• No policy and regulation to support PES system and

	VCS Methodology VM0026 Sustainable Grassland Management VCS Methodology VM0017 Climate, Community & Biodiversity Alliance Standards (CCBA)	other certification mechanisms identified • Plan vivo adapted to local context and does not require significant investment • Plan vivo already tested under GEF projects with important lessons learned • The Plan Vivo System is a very simple system that can be applied at both small and large-scale
Toolkit on innovative INRM and BD practices	On-site training	• Toolkit distribution with sensitization workshop allows large public cover • On-site training can be expensive given large project area

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1 <u>Consistency with National Priorities</u>

168. The project is aligned with several national and local strategies related to environmental management and builds on existing activities.

169. Chad's development Vision 2030 is "*to become an emerging country with a middle-income economy, generated by diverse and sustainable growth sources and value adding activities by 2030*." Chad is therefore enhancing efforts to protect the environment through activities such as planting thousands of trees each year and implementing the national program for the development of green belts around Chadian cities. Additionally, ten million trees are being planted as part of the "African Great Green Wall initiative". In 2013, Chad established a Special Fund for the Environment (FSE), in order to mobilize its own resources through the establishment of specific taxes.

170. In support of the Lima summit's call for action on climate change (decision 1/CP.20), which called for each Party country to establish a nationally determined contribution in order to achieve the Convention's objective based on measures and results, Chad has prepared and submitted its Intended Nationally Determined Contribution (INDC), by which Chad intends "*to reaffirm its determination to contribute to the global effort to reduce GHG emissions and reinforce its resilience to climate change, implementing coherent programs which will enable it to become an emerging country by 2030, whilst favouring low carbon development, as far as possible with the means available*."

171. Chad's National Adaptation program of Action (NAPA, 2009) provides a synthesis of the link between climate and the key development sectors in the country. According to the NAPA, the state of current and projected future climate vulnerability in Chad shows that the sectors which form the basis of its economy (water, agriculture and livestock) are all subject to the vagaries of climate variability and climate change. The socio-economic and environmental consequences are and will be disastrous especially for rural populations. The NAPA objectives are aligned with the national development policies typified by successive National Strategies for Poverty Reduction (NSPR) namely the first National Poverty Reduction Strategy (SNRP1) for 2003 to 2006, the second Growth and Poverty Reduction Strategy (SNRP2) from 2008 to 2011 and the National Development Plan 2013-2015 (PND 2013-2015), all of which strongly make a case for considering and taking into account the climatic conditions of Chad. The objectives of the PRSP in its initial release in 2003 related to (i) promoting good governance, (ii) ensuring sustained economic growth and, (iii) enhancing human capital, (iv) improving the living conditions of vulnerable groups and (v) restoring and safeguarding

ecosystems. Subsequent revisions give priority and special attention to agriculture and development of the sector rural aimed to increase hand food production and farmers' incomes. The NAPA shows synergy with other Rio conventions including the United Nations Convention to Combat Desertification (UNCCD) and the Convention on Biological Diversity (CBD), which are key elements of the proposed GEF project.

172. Chad's Intended Nationally Determined Contribution (INDC) towards reduction of global GHG emissions reinforces the framework for management of climate change and its impacts through an action-based approach that is linked to the implementation of current national policies, awareness of good practice, with the overall scope for intervention Energy, Agriculture/Livestock, Land use and forestry, and Waste Management. The implementation process highlights reinforcement of human, institutional and technological capacities, as well as financial support and technology transfers as the main activities. The priority sectors for adaptation include water, agriculture/agroforestry, livestock and fishing, which as quite in line with the project activities. Similarly, the priority zones are aligned with those identified in the NAPA of 2009, including Kanem and Bahr el Ghazal.

173. Agricultural development is a leading priority in the Chadian Government's poverty reduction strategy. Agriculture, the main livelihood source for most Chadians, has considerable potential and is expected to continue being a major engine of growth and poverty reduction. This is reflected in the second and third pillars of NPRS-II, which emphasize the importance of agriculture for food security, growth, and diversification. The Government's main framework for promoting growth, poverty reduction, and food security is the National Food Security Program (Program National de Sécurité Alimentaire) Second Phase, 2011-15 (NFSP-II); this is complemented by sectoral strategies for agriculture, livestock, water, and environment.

174. Agriculture in Chad is currently performing far below its potential. Crop productivity is very low, and average crop yields lag far behind the average yields achieved in neighboring countries. Only about 6 percent of the land area is cultivated, and water resources remain largely untapped (only 9 percent of the potential is used). Livestock productivity also is very low, reflecting the widespread use of traditional extensive management practices and limited use of improved genetics and purchased veterinary inputs. The poor performance of the agricultural sector depresses rural incomes and limits export earnings. Endemic food insecurity and recurring tension between farmers and pastoralists over access to land and water resources remain major challenges. The country frequently faces severe food shortages whenever prolonged droughts lead to widespread crop failures and the loss of large numbers of livestock.

175. Agricultural growth is constrained by many factors. The poor performance of Chad's agricultural sector is attributable in part to challenging agro-climatic factors. Chadian farmers face "extreme risk" as rated under the Climate Change Vulnerability Index. Natural disasters related to erratic climate conditions (e.g., alternating periods of droughts and floods) represent a strong handicap to the development of the sector. These natural challenges are compounded by a wide range of technical and institutional constraints, including: inadequate infrastructure, limited access to markets, market uncertainty, weak capacity of producer organizations, and lack of financing for private investments, poor sectoral coordination, and political instability.

176. Action is urgently needed to address the constraints that are limiting agricultural growth and undermining food security. Priority actions mentioned in the NRSP-II include: (i) improvement of land and water management, and (ii) diversification and intensification of agricultural production by improving access of rural households to factors of production (land, water, inputs, machinery, and finance) and to improved technologies. The high level of risk is associated mainly with weather shocks (resulting from the unstable rainfall regime) and is compounded by poorly functioning markets characterized by high transaction costs and missing markets (credit, technical advice, insurance). Based on stakeholder consultations, a number of possible interventions to improve food security and accelerate agricultural growth were identified: (i) development of small scale irrigation, (ii) watershed management, (iii) development of rain-fed rice production systems, (iv) development of production systems based on recession cropping "culture de décrue," (v) management of transhumance, (vi) development of basic infrastructure including roads, (vii) capacity building for communities and producers, and (viii) provision of packages of improved technology.

C. DESCRIBE THE BUDGETED M&E PLAN:

177. **Project Oversight:** The PMU, P2RS and AfDB will carry out Project oversight. Project oversight will be facilitated by: (i) documenting project transactions and results through traceability of related documents throughout the implementation of the project; (ii) ensuring that the project is implemented within the planned activities applying established standards and guidelines; (iii) continuous identification and monitoring of project risks and risk mitigation strategies; and (iv) ensuring project outputs are produced in accordance with the project results framework. At any time during project execution, underperforming components may be required to undergo additional assessments, implementation changes to improve performance or be halted until remedies have been identified and implemented.

178. **Project revisions:** The following types of revisions may be made to this project document with no-objection from the PMU and the approval of AfDB-GEF Coordination Unit in consultation with the LTO, SPIU and BH:

- Minor revisions that do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of inputs already agreed to or by cost increases due to inflation. These minor amendments are changes in the project design or implementation that could include, *inter alia*, changes in the specification of project outputs that do not have significant impact on the project objectives or scope, changes in the work plan or specific implementation targets or dates, renaming of implementing entities.
- Revisions in, or addition of, any of the annexes of the project document.
- Mandatory annual revisions which re-phase the delivery of agreed project outputs or take into account expenditure flexibility.

179. All minor revisions shall be reported in the annual Project Implementation Reviews (PIRs) submitted by AfDB to the GEF Secretariat and Evaluation Office.

Monitoring responsibilities:

180. Monitoring and evaluation (M&E) of progress in achieving project results and objectives will be done based on the targets and results indicators established in the project results framework and annual work plans and budgets. M&E activities will follow AfDB and GEF M&E policies and guidelines. The M&E plan will be reviewed and updated, as necessary, during the project inception phase. This will involve: (i) review of the project's results framework; (ii) refining of outcome indicators; (iii) identification of missing baseline information and actions to be taken to collect the information; and (iv) clarification of M&E roles and responsibilities of project stakeholders. The project's M&E system will be established within the first 6 months of project implementation.

181. The day-to-day monitoring of the project implementation will be the responsibility of the PMU led by the Project Manager and driven by the preparation and implementation of annual work plans and budgets (AWP/B) and six-monthly project progress reports (PPRs). The preparation of the AWP/B and six-monthly PPRs will represent the product of a unified planning process between main project partners. As tools for results-based-management (RBM), the AWP/B will define activities proposed for the coming project year and provide the necessary details on output targets to be achieved, and the PPRs will report on the achievement of the output and outcome targets. An annual project progress review and planning meeting should be organized by the SPIU with the participation of representatives from key executing partners prior to the Project Steering Committee Meeting. The AWP/B will be submitted to AfDB and to the PMU for approval. The AWP/B will be developed in such a way that it is always linked to the project's Results Framework to ensure the achievement of outputs and outcomes.

Indicators and information sources:

182. To monitor project outputs and outcomes including contributions to global environmental benefits, specific indicators have been developed in the Results Framework (see Annex A). Output target indicators will be monitored on a six-monthly basis and outcome target indicators will be monitored on an annual basis if possible or as part of the mid-term and final evaluations.

Reports and their schedule:

183. The specific reports that will be prepared under the M&E program are: project inception report; Annual Work Plan and Budget (AWP/B); Project Progress Reports (PPRs); annual project implementation review (PIR); technical reports; co-financing reports; and a terminal report. In addition, GEF tracking tools for LD, BD and SFM will be updated after the baseline and completed by the project team at mid-term and final evaluation.

184. **Project Inception Report:** After GEF approval of the project and signature of the AfDB/Government Cooperative Program (GCP) Agreement, the project will initiate with a six-month inception period. An inception workshop will be held and immediately after the workshop, the Project Manager will prepare a project inception report in consultation with the AfDB LTO and other project partners. The report will include a narrative on the institutional roles and responsibilities and coordinating action of project partners, progress to date on project establishment and start-up activities and an update of any changed external conditions that may affect project implementation. It will also include a detailed First Year Annual Work Plan and Budget (AWP/B) and supervision plan with all monitoring and supervision requirements. The draft report will be circulated to AfDB and the Project Steering Committee for review and comments before its finalization. The report should be cleared by the AfDB BH (AfDB Chad) in consultation with the LTO, P2RS and the AfDB GEF Coordination Unit and uploaded in FPMIS by the BH.

185. **Annual Work Plan and Budget (AWP/B):** The National Project Coordinator will submit to the AfDB Budget Holder an Annual Work Plan and Budget for clearance. The AWP/B, divided into monthly timeframes, should include detailed activities to be implemented and outputs (targets and milestones for output indicators) to be achieved during the year. A detailed project budget for the activities to be implemented during the year should also be included together with all monitoring and supervision activities required during the year. The draft AWP/B is circulated to and reviewed by the AfDB Project Task Force (LTO, LTU, GEF Coordination Unit and others), the Project Coordinator incorporates eventual comments and the final AWP/B is sent to the PSC for approval. The AfDB Budget Holder will upload the final AWP/B in FPMIS.

186. **Project Progress Reports:** One month before the end of each project year, the Project Manager will prepare an annual Project Progress Report (PPR). The report will contain the following: (i) an account of actual implementation of project activities compared to those scheduled in the AWP/B; (ii) an account of the achievement of outputs and progress towards achieving project objectives and outcomes (based on the indicators contained in the results framework); (iii) identification of any problems and constraints (technical, human, financial, etc.) encountered in project implementation and the reasons for these constraints; (iv) clear recommendations for corrective actions in addressing key problems resulting in lack of progress in achieving results; (iv) lessons learned; and (v) a revised work plan for the final six months of the project year. The report will also include an estimate of co-financing received from all co-financing partners.

187. The **Project Manager** will submit the PPR to AfDB no later than one month after the end of each reporting period (31 December). The draft PPR will be reviewed and cleared by AfDB (BH and LTO). The LTO will submit the PPR to the GEF Coordination Unit for final clearance. The BH will circulate the final cleared PPR to the PSC.

188. **Project Implementation Review:** The LTO supported by the AfDB LTU, with inputs from the Project Manager will prepare an annual Project Implementation Review (PIR) covering the period July (the previous year) through June (current year). The PIR will be submitted to the GEF Coordination in TCI for review and approval no later than 15 July. The GEF Coordination Unit will submit the final report to the GEF Secretariat and Evaluation Office as part of the Annual Monitoring Review report of the AfDB-GEF portfolio.

189. **Technical Reports:** Technical reports will be prepared and share project outcomes and lessons learned. The drafts of any technical reports must be submitted by the Project Manager to the AfDB Budget Holder in Chad who will share it with the LTO for review and clearance, prior to finalization and publication. Copies of the technical reports will be distributed to the Project Steering Committee and other project partners as appropriate. These will be posted on the AfDB FPMIS by the LTO.

190. **Co-financing Reports:** The Project Manager will be responsible for collecting the required information and reporting on in-kind and cash co-financing provided by all co-financing partners. The National Project Coordinator will provide the information in a timely manner and will transmit such information to AfDB. The co-financing reports should be completed as part of the semi-annual PPRs and annual PIRs.

191. **GEF-6 Tracking Tools:** Following the GEF policies and procedures, the tracking tools for agriculture and rangeland systems (agro-ecological intensification) (LD1), capacity building (LD3), biodiversity conservation and sustainable use of landscapes (BD3) and reduced pressure on forest resources (SFM2) will be submitted at three moments: (i) with the project document at CEO endorsement; (ii) at project mid-term evaluation; and (iii) at final evaluation. The Project Manager is responsible for completing these reports with support from the LTO at mid-term and final evaluation.

192. **Terminal Report:** Within two months before project completion, the Project Manager will submit to AfDB a draft Terminal Report, including a list of outputs detailing the activities taken under the Project, "lessons learned" and any recommendations to improve the efficiency of similar activities in the future. This report will specifically include the findings of the final evaluation as described above.

Monitoring and evaluation plan summary:

193. Monitoring of project progress will be against indicators identified in the project results framework. These indicators will be further refined, as necessary, in consultation with project stakeholders during the project inception phase. This process of further collaborative refinement of project indicators will facilitate greater stakeholder engagement with the project and support broader monitoring and reporting of project achievements and challenges. The monitoring and evaluation plan is summarized in Table 10 below.

Table 10: Monitoring and Evaluation Plan

Type of monitoring and evaluation activity	Responsible parties	Time frame	Budget (USD)
Inception Workshop	Project Manager leads the organization, in close consultation with P2RS and AfDB.	Within first two months of project inception	10,000
Inception report	Project Manager with inputs from project partners. Cleared by AfDB and the Project Management Unit.	Immediately after the project inception workshop	
Design and implementation of monitoring and evaluation system	Project Manager with support from the AfDB Lead Technical Officer	Within the first six months after the project inception	15,000
Field-based impact monitoring	Project Manager with support from other project partners	Continually	Project Team
Supervision missions	AfDB LTO/LTU and AfDB Chad	Annual or as required.	AfDB Team
Project progress reports (PPRs)	Project Manager. Submitted to AfDB Chad (Budget Holder). Finalized reports submitted to the AFDB GEF Unit by the LTO, and to the PMU by the Project Manager	Annually	25,000
Project Implementation Review (PIR)	AfDB LTO with inputs from the Project Manager and AfDB Budget Holder. Submitted by the AFDB GEF Coordination Unit to the GEF Secretariat. Final report also submitted to the PMU and the GEF Operational Focal Point by the Project Manager.	Annually	50,000

Type of monitoring and evaluation activity	Responsible parties	Time frame	Budget (USD)
Reports on co-financing	Project Manager with information from all co-financing partners.	Six monthly and annually as part of PPR and PIR.	AfDB Team
PSC meetings	Project Manager, PSC Chair, AfDB Budget Holder	At least once a year	50,000
Technical reports	Project Manager, Consultants, AfDB	As appropriate	Project Team
Mid- term evaluation	External Consultant, AfDB independent evaluation unit in consultation with the project team and other partners	At mid-point of project implementation	50,000
Final evaluation	External Consultant, AfDB independent evaluation unit in consultation with the project team and other partners	At the end of project implementation	50,000
Terminal report	Project Manager	At least one month before end of project	80,000
NPC, CTA and project admin assistance estimate total cost for all M&E activities			

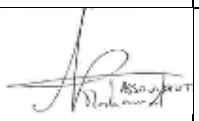
PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT[5] OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the **Operational Focal Point endorsement letter**(s) with this template. For SGP, use this **SGP OFP endorsement letter**).

NAME	POSITION	MINISTRY	DATE *(MM/dd/yyyy)*
Mr. Hakim DJIBRIL	Advisor	MINISTRY OF ENVIRONMENT AND AGRICULTURE	10/03/2015

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies[6] and procedures and meets the GEF criteria for project identification and preparation under GEF-6.

Agency Coordinator, Agency name	Signature	Date *(MM/dd/yyyy)*	Project Contact Person	Telephone	Email
Mahamat ASSOUYOUTI African Development Bank		01/20/2017	Laokole Dedjoguere Antoinette	+23522524778	D.LAOKOLE@AFDB.ORG

[5] For regional and/or global projects in which participating countries are identified, OFP endorsement letters from these countries are required even though there may not be a STAR allocation associated with the project.

[6] GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, and SCCF

ANNEX A: PROJECT RESULTS FRAMEWORK

Results Chain	Performance Indicators			Means of verification	Risks/Mitigation Measures
	Indicator (Including CSI[7])	**Baseline**	**Target**		
Outcome 1.1: ***Improved agricultural, rangeland and pastoral production in support of food security and resilience***	% decrease in land degradation	No specific/ formal SLM plans/ activities	• 7,000 ha of degraded cropland placed under SLM	Project monitoring systems, Reports from local monitoring teams, P2RS, Project Joint monitoring reports, mid and end of project reviews	**Risk**: People may fail to use the new technologies correctly, despite the knowledge of the advantages to be accrued from adopting Various groups with competing interests (e.g. herders – pasture versus farmers – crop production) may interfere with implementation in order to gain advantage **Mitigation Measures:** Continuous awareness targeting local communities to embrace the correct use of land and natural resource management technologies. Emphasize at every stage the complementarity of project activities and overall benefit of integrated management
	% improvement in rangeland pasture production	No formal pastoral rangeland management plans	• 3,000 ha under pastoral rangeland management	Project monitoring systems, Reports from local monitoring teams, P2RS, Project Joint monitoring reports, mid and end of project reviews	
	% increase in agricultural harvest and livestock production from improved land and ecosystem management	None	• 5 micro-projects on site-appropriate soil conservation/ regeneration techniques and mixed cropping systems executed by farmers and herders	Project monitoring systems, Reports from local monitoring teams, P2RS, Project Joint monitoring reports, mid and end of project reviews	
	% increase in knowledge of INRM/SLWM practices	None	• 11,000 land users trained on INRM and SLWM	Project monitoring systems, Reports from local monitoring teams, P2RS, Project Joint monitoring reports, mid and end of project reviews	
	% increase in knowledge of INRM/SLWM policies	None	• 150 trained local staff on sustainable INRM policies and practices	Project monitoring systems, Reports from local monitoring teams, P2RS, Project Joint monitoring	

[7] CSI – Core Sector Indicators

Results Chain	Performance Indicators			Means of verification	Risks/Mitigation Measures
	Indicator (Including CSI[7])	**Baseline**	**Target**		
				reports, mid and end of project reviews.	
Outcome 1.2: ***Improved agro-pastoral technologies and access to production assets for enhanced livelihoods and reduced vulnerability***	No. of ponds and boreholes sunk	Numerous traditional/ shallow ponds and boreholes	• 30 ponds and boreholes	Project monitoring systems, regional reports, consultation reports Allocation minutes Designs reports	**Risks**: Unwillingness of herders and farmers to agree on location of water points. Unwillingness of engineers to embrace new guidelines and designs. **Mitigation Measures:** Ensure inclusive participation from inception to implementation Timely implementation of the Training, implementation of activities and timely generation of lessons
	No. of water points established	Numerous seasonal traditional watering points	• 20 village watering points	Project monitoring systems, regional reports, consultation reports Allocation minutes Designs reports	
	Hectares of land placed under irrigation	Informal irrigation in ouadis within project area	• Controlled irrigation on 345 ha in exposed site	Project monitoring systems, regional reports, consultation reports Allocation minutes Designs reports	
	Increase in no. of seed varieties available for planting and % increase in crop productivity	None formally identified specifically for resilience	• Resilient seed varieties identified, produced and distributed to 100 households and farmer organizations	Project monitoring systems, regional reports, consultation reports, field extension reports Allocation minutes Distribution records	

Results Chain	Performance Indicators			Means of verification	Risks/Mitigation Measures
	Indicator (Including CSI[7])	**Baseline**	**Target**		
	Increase in income generation alternatives and % increase in income	Informal and ad hoc depending on product availability/ surplus	• 6 alternative income generating activities (3 agricultural and 3 livestock)	Project monitoring systems, regional reports, consultation reports	
	No. of cereal banks established	None	• 30 cereal banks	Project monitoring systems, regional reports, consultation reports Allocation minutes Designs reports	
	No. of input stores constructed	None	• 20 agricultural input stores	Project monitoring systems, regional reports, consultation reports Allocation minutes Designs reports	
	No. of livestock feed stores established	None	• 30 livestock feed stores established	Project monitoring systems, regional reports, consultation reports Allocation minutes Designs reports	
Outcome: *1.3 Improved forest management and/or reforestation generate sustainable*	No. of hectares under woodlots, community forests, no. of nurseries, no. of farmers practicing agroforestry	None	• 5,000 ha of woodlots, community forestry plots, nurseries, and agro-forestry	Project monitoring systems, regional reports, consultation reports, field extension reports	**Risk**: That the current policy prohibiting tree felling for any purposes disincentives tree planting activities.

Results Chain	Performance Indicators			Means of verification	Risks/Mitigation Measures
	Indicator (Including CSI[7])	**Baseline**	**Target**		
flows of agro- and forest ecosystem services	No. of producer groups	A few farmers (including women) and livestock (herders, butchers, tanners) groups exist under the P2RS project	• 10 local producers groups (including at least 5 women groups)	Project monitoring systems, regional reports, consultation reports, field extension reports	That competition for water diverts the resources to 'priority areas' i.e. livestock and food crops **Mitigation Measures:** Dialogue between farmers and government to agree on how farmers may benefit from tree planting Provision of water precedes, or is done concurrently with other project activities to ensure adequate supply for all needs
Outcome 2.1: ***Enhanced integrated landscape planning for habitat resilience and preservation***	No. of integrated land use plans	No specific integrated land use plans for project area	• Integrated land use plan in each project site	Project monitoring systems, regional reports, consultation reports, field extension reports	**Risk**: That the current political support for mainstreaming climate change and integrated natural resource considerations into the development processes, especially in order to secure current development gains of the baseline programs ceases **Mitigation Measures:** Timely implementation of the Training, implementation of activities and timely generation of lessons to demonstrate the benefits
		No specific land use management plans for project area	• All croplands within the project area under effective land use management with vegetative cover maintained or increased	Project monitoring systems, regional reports, consultation reports, integrated land use plans	
Outcome 2.2: ***Enabling environment enhanced through mechanisms for the conservation of land, woody biomass and biodiversity***	No. of SFLM plans	No specific SFLM plans for project area	• SLFM implemented in all sections of the project area	Project monitoring systems, regional reports, consultation reports, field extension reports, SFLM plans	**Risk**: That the current political support for mainstreaming climate change, integrated natural resource and environmental considerations into the development processes, especially in order to secure current development gains of the baseline programs ceases **Mitigation Measures:** That the project can identify and secure the services of a consultant with technical expertise, interest, availability and willingness to work with communities and the government in participatory
	Certification system in place	None	• Certification system (plan vivos) in place	Project monitoring systems, regional reports, consultation reports, documentation developed for certification	
	No. of areas and hectares demarcated and placed under protection	Lack of formal protection, although the following	• Protected area assessment for the Sahelian acacia savanna or Lake Chad flooded savanna ecoregions	Project monitoring systems, regional reports, consultation reports, demarcation maps	

Results Chain	Performance Indicators			Means of verification	Risks/Mitigation Measures
	Indicator (Including CSI[7])	**Baseline**	**Target**		
		programs/ projects are underway: Lake Chad basin sustainable development program (PRODEBALT); Lake Chad preservation project (GEF-AfDB)			monitoring, while simultaneously building local capacity for sustainability
Outcome 3.1: ***Lessons learned captured and knowledge disseminated***	Quality knowledge products available, shared and being used	No knowledge products	• At least 10 main knowledge products acceptable for international publishing standards and information adapted to local needs evidently being used in training • Indicators for BD assessment and monitoring	Project monitoring reports, Project Implementation Reports (PIRs), publications	
Outcome 3.2: ***Project impact monitored and evaluated***	Community involvement in monitoring vulnerability	No indicators for monitoring community vulnerability and resilience	• Set of indicators for monitoring community vulnerability and resilience agreed and being actively used	Community monitoring reports; Project monitoring systems, district reports, Participatory Monitoring, Evaluation, Reflection and Learning (PMERL) reports	

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

AfDB Responses to GEF SEC, Council and STAP reviews:

AfDB Responses to GEF SEC Review

Questions	GEF Secretariat Comment at CEO Endorsement	AfDB Responses
GEF SEC	During the PPG, please pay a particular attention to the following points: - Develop the incentive and certification mechanisms to mainstream BD into productive landscapes. - Develop a comprehensive risk assessment, including mitigation and monitoring measures. - Include a stakeholder analysis and adjust implementation arrangements. - Include a Monitoring and Environment/assessment plan, that includes the analysis of land degradation trends and associated socio-economic and biodiversity impacts. - Include gender analysis in the M&E. - Develop in the project document the way you will assess biodiversity and conservation needs in the regions of Kanem and Bahr el Ghazal and the possible response mechanisms.	Please see review sheet attached

AfDB Responses to Council

Comments from Germany:
Suggestions for improvements to be made during the drafting of the final project proposal:

Since decentralisation is still relatively weak in Chad, interaction between national and regional / local level is often not effective. Germany suggests to ensure the active involvement and ownership of decentralised administrative and traditional structures as well as the target group. The role and the responsibilities of all involved parties should be clearly defined on a participatory basis.

AfDB response: The lack of coordination between the Central Government and the regional/local level came out strongly as one of the key impediments to the successful implementation of intervention programs. It is proposed that the Implementation Unit for the project first undertake a detailed value chain study to identify all the stakeholders, and thereafter work closely with groupings that represent various players along the agro-sylo-pastoral value chain including pastoralists, farmers, butchers and tanners as part of local outreach as well as capcity building. These representative groups wil be actively invovled in the identificaiton of priorities as well as implementation of the agreed interventions.

Women bear a lot of responsibility especially regarding food security, but their power to take decisions is relatively weak. Therefore, it is recommended to strengthen the role of women in rural regions.

AfDB response: A detailed Gender Analysis was undertaken as part of the stakeholder mapping for the proposal development. The analysis identified the role of women, the barriers to their involvement as well as the issues that women identify as pertinent to their effective participation in the project. These findings informed the design of a gender mainstreaming strategy for the project.

Comments from the USA: *The United States supports this proposal. The PIF articulates well how the GEF will complement AfDB food security funding, and we look forward to additional details regarding how global environmental benefits will be measured. As the full project proposal is developed, we encourage the AfDB to incorporate the comments below, in addition to those provided by the STAP:*

This proposal for Chad includes many elements that relate to those being proposed as a part of the Food Security IAP. Although this project will be implemented outside of the IAP framework, we hope that the AfDB will apply lessons-learned from the IAP experience, particularly how indicators and technologies and approaches to stakeholder engagement, can help enhance the outcomes of this project.

AfDB response: The lessons to be learned and experiences from the Food Security program in Chad are acknowledged as valuable resources in the successful implementation of the GEF project. The implementation arrangement proposes including personnel from the food security program in a standing Technical Advisory Committee that will advise the Implementing Unit on issues of food security.

The PIF incorrectly identifies the "Ministére de l'Agriculture et de l'Environnement." Also, the separate Ministére de l'Elevage et de l'Hydraulique, which is responsible for water and livestock, should be identified as a stakeholder/partner.

AfDB response: The *Ministére de l'Agriculture et de l'Environnement* is now correctly identified, and the *Ministére de l'Elevage et de l'Hydraulique* is identifed as a key stakeholder and proposed as an implementing partner following intensive consultations which showed significant overlap in the functions and development missions of the two ministries. The consulation highlighted the complementary nature ot the two ministries in relation to the project.

Page 8 refers to "…dry farming activities [which] form the basis of their livelihoods." The FEWS Net classification of livelihood zones shows Kanem and Bahr el Gazal as mostly falling within the "Transhumant Livestock Zone." Dry farming activities (understood to mean rain-fed agriculture) may not figure as prominently as suggested by this characterization on page 8. We believe this is worth reflecting more accurately in the full project proposal.

AfDB response: This has been confirmed during the additional field missions, i.e. the project area is a transhumance livestock zone and agriculture activities are concentrated in the Ouadis relying on the underground acquifers and irrigation. Hence going forward, proposed interventions take this finding into account.

Further guidance from STAP:
STAP acknowledges the African Development Bank's (AfDB) proposal "Building resilience for food security and nutrition in Chad's rural communities". The project aims to improve food security and nutrition by strengthening the resilience of agro and sylvo-pastoral systems in the Sahelian regions of Chad. STAP believes this objective illustrates well the important relationships between global environmental benefits and sustainable development, two reinforcing topics the AfDB is well-placed to address given its work on environmental sustainability and poverty reduction. To strengthen the project, STAP recommends for the AfDB to address the following points as it develops the proposal:

1. *STAP appreciates the maps in the project justification (section II) used to illustrate land use and land cover, the eco-regions of the country and the relevant ecosystems for biodiversity conservation. This information is valuable for contextualizing the project. To further strengthen this section, STAP recommends describing in more detail the land degradation issues and other threats to food security and nutrition.*

   AfDB response: It is proposed that as part of the preparatory activities, a detailed mapping of the project area be undertaken. This mapping will involve an inventory of the key natural reosurces, biodiversity, the main livelihood activities, as well as the major land degradation issues including key hotspots.

2. *Currently, the proposal suggests the GEF grant will be used to implement an integrated approach that addresses the multiple drivers of environmental degradation, food insecurity and poverty by applying sustainable land management, sustainable forest management and biodiversity conservation approaches and techniques. STAP recommends that the project defines this integrated approach, specifying what are the global environmental benefits and socio-economic benefits, and how the approach will contribute to achieving these benefits.*

   AfDB response: This has been done and the CEO Endorsement document presents the global environmental benefits, socio-economic benefits and how these benefits will be realized.

   When considering an integrated approach for resilience, the AfDB may wish to consider the Resilience, Adaptation Pathways and Transformation Assessment (RAPTA) Framework developed by STAP and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The resilience framework will assist the proponent to characterize the system, identify key controlling variables influencing food security in the Sahelian region of Chad, and develop a coordinated suite of activities that targets the most vulnerable aspects. The RAPTA is an iterative and participatory multi-stakeholder assessment that aims to maintain and improve the resilience of social-ecological systems. The framework is applicable across scales (e.g. field level, sub-national level), and agro-ecosystems (e.g. agriculture, livestock, mixed crop and livestock systems). It will be applied in the integrated approach program "Fostering sustainability and resilience for food security in sub-Saharan Africa," an initiative that shares common traits with this project. STAP and CSIRO will be happy to advise the AfDB on the application of the resilience framework. The technical report on the resilience framework can be downloaded at: http://www.stapgef.org/the-resilience-adaptation-and-transformation-assessment-framework/

   AfDB response: This has been done and the CEO Endorsement document presents the global environmental benefits, socio-economic benefits and how these benefits will be realized. It is confirmed that the RAPTA Framework has been considered in defining the resilience and adaptation indicators. An annex report of the proess is provided.

3. *As aforementioned, STAP believes a conceptual framework, such as the RAPTA, is needed to strengthen the logic of the proposal. For example, the RAPTA approach could be particularly useful in revising the activities planned in Component 2. Currently, the activities on ecosystem management appear to be primarily focused on biodiversity conservation, and it is not clear how these actions will contribute to the objective on "enhancing food security and nutrition through sustainable resilient agro-sylvo-pastoral systems". The RAPTA will be helpful in strengthening the reasoning between defining the driving variables and identifying responses targeting food security and the resilience of mixed agriculture and pastoral systems.*

   Additionally, STAP has argued that biodiversity conservation needs to be mainstreamed into policies and programs on development. It would be desirable to frame the proposed biodiversity activities as such, proposing links between biodiversity enhancement and food security. For further information on mainstreaming biodiversity, the AfDB could consult B. Huntley and K. Redford "Mainstreaming Biodiversity in Practice: A STAP advisory document". (2014). The Global Environment Facility.

   AfDB response: The field mission established that under the baseline scenario, the local community has little motivation to conserve biodiversity for a variety of reasons; 1) the tough environmental laws that emphasize conservation at the expense of meeting livelihood needs, e.g. tree cutting is strictly forbidden including those planted by individuals; 2) issues of land access and resource use rights by local communities in general, and women in particular; 3) constant conflicts between herders and farmers including damage of planted trees by livestock; and 4) competing uses for resources especially water and pasture against limited supply, i.e. when water supply is limited, priority is given to human and livestock use, followed by agriculture and little is left to support tree planting. Similarly, priority is given to pasture land as opposed to conservation of biodiversity. It is proposed that the issues enumerated be addressed in a participatory manner by for example clarifying resource user rights prior to any meaningful intervention.

4. *To further strengthen the incremental reasoning, STAP recommends defining the indicators for each global environmental benefit. For example, how will carbon stocks be estimated and monitored that result from sustainable forest management, how will improvements to biodiversity conservation be measured, and what measurements will be used to assess sustainable land management and pastoral management?*

   AfDB response: The details requested are provided in Component 2 and further elaborated in the Technical Annex D.

5. *The project developers also may wish to consult M. van Ginkel et al. (2012) in defining an integrated systems approach. The paper outlines the steps needed for a community participatory approach for managing crop and pastoral systems in drylands. (van Ginkel, M. et al. "An integrated agro-ecosystem and livelihood systems approach for the poor and vulnerable in dry areas" Food Security 5(6): 751-767.).*

   AfDB response: Agro-silvopastoral production systems comprise complex combination of components that include staple crops, vegetables, livestock and trees interacting principally with grazing lands, cultivated areas and watercourses. Managing risk and enhancing productivity through a balanced diversification and sustainable intensification is critical to securing and improving rural livelihoods in such environments. Involving multiple stakeholders is therefore key to delivering large-scale impacts in integrated agro-and pastoral-ecosystems. This implies participation of the end-users (farming communities), national research and extension systems, policy makers, international and regional organizations, civil society and non-governmental organizations, the private sector, and development agencies. The stakeholders will take a central role both in knowledge generation to inform implementation of the project and guide policy interventions. Iterative and participatory design and implementation through innovation platforms will ensure that the priorities of proposed project match those of stakeholders and encourage buy in and support by policy makers, which will lead to strong local and national support, sustainable activities and high impact on livelihoods and the environment. The integrated approach will put emphasis on managing risk and on making efficient use of land and water resources. This will focus on maintaining natural capital, making use of renewable sources of inputs where possible.

   The process will involve characterization of selected communities, development of negotiated community action plans and involvement of the farming communities in continuous knowledge generation to enable evidence-based decision making in project implementation, as well as policy formulations.

6. *Furthermore, STAP suggests describing how the project will strengthen cross-sector planning between different government ministries, community-based organizations and stakeholders groups that are integral to the application of an integrated approach. Additionally, it will be important to specify the different roles of the stakeholders, and how their combined roles will contribute to reporting on multiple global environmental outcomes, and knowledge management.*

   AfDB response: This is well elaborated in the CEO Endorsement request under "Implementation arrangements" as well as " Stakeholder Analysis" section of the document. The Monitoring plan also describes the roles of each key stakeholder.

7. *Furthermore, in component 1 and 2, STAP recommends detailing land users' knowledge and approaches on agro-sylvo-pastoral systems, and ecosystem management. The proposed activities in these components can be understood and reasoned further by describing the characteristics, the strengths, and limitations of local approaches and technologies, and how the interventions seek to complement this local knowledge. This information also will be useful for identifying scaling-up opportunities based on local capacity.*

   AfDB response: The proposed project will seek to develop approaches that successfully integrate the comparative strengths of both local and modern or scientific knowledge systems. We provide answers to three main questions: i) what are the existing local knowledge and practices on agro-silvo-pastoralism and natural resource management in the proposed project area? Ii) what challenges exist in application of these practices and knowledge systems? Iii) How can the traditional management systems be enhanced to ensure sustainable production and use of the drylands?

This approach is founded on the fact that local knowledge is generated in specific practical relationships of different actors with the ecosystem and the land, water or biological resources that are contained therein. It is important to note that there is often a convergence of customary institutions for the management of natural resources, which hold most of its associated knowledge, and customary institutions with other social, economic and political functions. And therefore to safeguard the continuation of the specific relationships between people and their environment there is need to safeguard the existing knowledge systems and their ongoing evolutions, as well.

Some of the local knowledge and practices, constraints to their application, as well as suggestions on their integration and improvements are given below:

Local knowledge/practices	**Characteristics**	**Strengths**	**Limitations**	**Suggested intervention**
Customary governance institutions	Comprised of council of elders that enforce regulations aimed at controlling access to resources and resource rights to ensure sustainable use of resources	Enable participatory land use planning; control grazing pattern; negotiate for sharing of resources during times of scarcity; resolve conflict over resources.	• Most of the traditional institutions are not recognized by the decision makers and therefore not mainstreamed in the conventional governance system • Statutory land tenure undermines communal access rights, herd mobility, and therefore the much needed reciprocity at times of scarcity	Recognition and use of such institutions as entry points for engaging the communities in participatory natural resource management (NRM)
Traditional irrigation system	Surface irrigation systems consisting of open canals, and basins (basin irrigation), which are sustained by hand dug shallow wells	Ensures crop/food production where rainfed agriculture is not feasible	• Low water levels in the wells and high cost of pumping water • Loss of water through evaporation and ground seepage • Salinization	• Sinking of boreholes and use of solar energy to pump water • Use of pipes (California system) • Correction of sodic soils through use of acidic fertilizers
Protection of *ouadi*s	The *ouadis* are fenced using thorny tree branches to keep away grazing animals. The date palm fronds are used as well to provide protection from the sand dunes	• The *ouadis* are used for crop production, which complements food and income sources from livestock • Besides food production, protection of *ouadis* environmental protection and enhanced ground water recharge	• Cutting of trees is prohibited • Poor fences that can't keep away livestock	• Support the farmers to establish wire fences

Local knowledge/practices	Characteristics	Strengths	Limitations	Suggested intervention
Indigenous crop production	Crop production is mostly restricted to the landraces that are well adapted to the dryland environments	The crops complement food and income from livestock and ensure nutrition	• Low productivity of the indigenous crop varieties • Poor quality of produce that does not meet external market standards	• Evaluation of the existing and trials of new crops varieties to determine most suited and productive varieties • Use mobile applications to link farmers to reliable market outlets for their produce
Traditional meat and milk processing	Involves rudimentary processes aimed at increasing shelf life of meat and milk either for later domestic use or for sale	Allows households to preserve meat and milk for future use when there is scarcity	• The processing facilities are obsolete • Poor hygiene and standards deny farmers access to external markets	• Upgrading of the existing meat and milk processing facilities • Capacity building on processing and value addition to meet standards of external markets • Use mobile applications to link farmers to reliable market outlets for their produce
Pasture reservation through rotational and deferral grazing system	Involves traditional system governed by sound knowledge of the environment, and resource access and right regulations enforced by a council of elders	Ensures that there is reserve forage/ pasture for the bad years	• Breakdown of customary institutions that regulate access of pasture resources • Increasing frequency of droughts that make it difficult to reserve pasture • Changing land tenure system – little recognition of the traditional common property regime	• Use the pastoralists groups and associations as platforms for reviving and strengthening such practices • Trials to determine the feasibility of range reseeding to provide pasture during dry spells • Awareness creation among the decision makers of the importance of such traditional practices for secure agro-pastoral livelihoods in the drylands

Further recommendations on scaling up include: 1) identifying indicators that measure scaling-up activities; and, defining opportunities for learning across sectors in order to encourage a systematized process for scaling-up. The AfDB may wish to refer to the following source on scaling-up: Gundel, S. et al. "Scaling-up

strategies for research in natural resource management: A comparative review". (2003). UK Department for International Development (DFID).

AfDB response: Some indicators for agro-pastoral systems:

- Number of active agro-pastoralists and pastoralist groups that are engaged in sustainable pasture management and range reseeding e.g. improved memebership of the federatio of pastoralist groups
- Records of membership (number of members) and meetings of such groups and their participation in decision making following intervention
- Records of customary institution involement in negotiated pasture access and conflict
- Evidence of reduced reduced conflicts between farmers and herders as a result of intervention or use of traditional mechanisms
- Evidence of reciprocity-harmonious sharing of grazing resources amongst different comunities groups
- Functional livestock routes with mobile veterinary serivices, water, supplementary feed supplies, and other social services and amenities

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. Provide detailed funding of the PPG activities financing status in the table below:

PPG Grant Approved at PIF:			
Project Preparation Activities Implemented	GEF/LDCF/NPIF Amount ($)		
	Budgeted Amount	Amount Spent to date	Amount Committed
Stakeholders consultation meetings	10,000	10,000	10,000
Consultancy contract	123,000	70,000	123,000
Field visit and surveys	10,000	10,000	10,000
Validation meeting	7,000	10,000	7,000
Total	150,000	100,000	150,000

ANNEX D: MEASURING CARBON BENEFITS FROM SUSTAINABLE FOREST AND LAND MANAGEMENT, PASTORAL MANAGEMENT, BIODIVERSITY CONSERVATION AND ECOSYSTEM MANAGEMENT

General approach

The proposed integrated landscape approach to the preservation of land, forests and biodiversity for enhanced resilience, well-being and conservation presents immense opportunities for improving the overall wellbeing of the landscape while simultaneously improving the socioeconomic status of the local communities and the entire country at large, in addition to ensuring carbon benefits.

However, the requirements for implementation present significant technical challenges which must be carefully evaluated before a specific approach is selected. Hence it is proposed that the first step involve a detailed technical assessment of the scope and applicability of available options, the technical capacity of the implementing team, the duration versus the anticipated benefits (social, economic, and environmental). In order for an accurate evaluation of the cost-benefit matrix, part of the preparatory activities should also involve developing an acceptable methodology for valuing the environmental services that is consistent with global best practice.

Generally, two intervention options are envisaged:

1. Developing separately a methodology for carbon accounting and monitoring as result of sustainable forest management (SFM), crop production systems, another one for sustainable land and/pastoral management, and biodiversity conservation under a certification scheme. These separate initiatives can be implemented within the same geographical area provided certain eligibility criteria are satisfied, or they could separately be applied in difference zones that best meet the criteria.
2. An integrated approach where a consolidated methodology is established for simultaneously measuring the carbon and biodiversity baseline and monitoring future changes in both, for purposes of determining how the project developers including the local communities can benefit financially for their support in the implementation. Plan Vivo provides one such integrated approach.

The choice of approach will largely be guided by the technical complexity as well as eligibility of each option under consideration for specific landscapes. Whichever approach will be selected, the 6 steps in Table 1 below can guide the process.

Table 1: Generic steps for measuring environmental and carbon benefits for the project

Step/Activity	Significance	Issues to be Addressed
STEP 1: Feasibility Assessment	To establish the financial viability of the proposed scheme (certification)	• Is there a viable market for the products under the systems (agriculture, livestock, wood product, tourism, etc.)? • What is the current baseline for these products? • What is the production or supply pattern? • Is there a sufficient amount of emissions reductions for which the beneficiaries could receive carbon finance? • What is the difference between the present and expected situations?
Step 2: Baseline study and methodology	To establish the baseline scenario (current crop and livestock production technologies, biodiversity, etc.) represent an undesirable outcome in the long run if no remedial action is undertaken	• How much emissions result from unsustainable agricultural or livestock production? • How much emissions result from these practices? • What is the outlook in the without-project scenario? • What is the state of biodiversity? • What is the outlook for with-project scenario? • What is the best methodology (carbon standard or PES scheme) to use to account for all these?
Step 3: Monitoring Plan	Develop a framework for monitoring the emissions	• What system works best?

Step/Activity	Significance	Issues to be Addressed
	reductions and the social, economic and environmental benefits	• What data needs to be collected and how will this is done? • How frequent is the data collection? • Who will collect the data?
Step 4: Project Documentation	The data collected will be consolidated in line with the certification standard, and which includes all calculations and their references. This document is also the basis of independent validation and if successfully granted registration, subsequent verification before carbon credits or other payments can be awarded	• Can all the data required be obtained and presented in the correct format? • What is the crediting period (payment for ecosystem services)? • Is there project Additionality (i.e. a benefit that would not have been achievable without the proposed certification scheme)?
Step 5: Independent validation of calculations and registration	The assessments, the estimated GHG (CO_2, N_2O, CH_4) savings and the monitoring plan will need to be checked and approved by an independent validator to establish conformity with the requirements of the selected carbon standard/certification standard (Gold Standard, Plan Vivo)	• The project developer (or consultant hired for that purpose) will need to work with the independent validator/verifier, helping clarify issues and effecting changes in design as advised by the validator.
Step 6: Implementation, ongoing monitoring and verifications	Good record keeping is crucial to ensure compliance with the approved PDD and as proof during verification before carbon payments can be made.	• Have the projected emissions reductions been achieved? • Is there need to adjust any aspects of the project based on the monitoring data?

Opportunities for Carbon benefits under Sylvo-pastoral and Rangeland Management:

Sylvo-pastoral and rangeland management represent land use in which livestock economy has close linkages with grassland ecosystems in the Sahel. These systems focus on integration of annual and perennial biomass, and/or livestock management through improvement of forage quality and/or management of frequency, seasonality, intensity, and rotation of grazing. Improved rangeland management contributes to livelihood improvements in addition to contributing to sustainable land use and climate change mitigation and adaptation. Improved sylvo-pastoral and rangeland management activities enhance GHG removals by sinks; enhance forage quality and animal nutrition through introduction of legumes translating in lower methane (CH_4) emissions from enteric fermentation. Reducing frequency or intensity of fires lowers CH_4 emissions and increases tree and shrub growth translating in increased net GHG removals by sinks in soil and biomass.

Potential – Sylvo-pastoral and rangeland activities cover grassland ecosystems in the Sahel, supporting extensive and intensive livestock systems and have major significance to enhancing soil carbon sequestration and reduction of methane emissions. Socio-economic and climate mitigation benefits of sylvo-pastoral and rangeland systems have been widely documented.

Crop Production Systems:

Crop production activities cover annual and perennial crops, and temporary fallows. Considering the importance of crop production to food security and the general economy in the project area, climate change mitigation and adaptation contexts, it is relevant to consider the inclusion of crop production activities under Component 2 of the project. Adoption of improved crop production methods that enhance GHG removals by sinks and avoid or reduce GHG

emissions is both a mitigation and adaptation priority. Soil carbon sequestration has the most mitigation potential in croplands. Enhancing soil organic carbon status under crop production systems has been assessed as an activity with the greatest potential.

Technologies and management practices that enhance GHG removals by sinks in biomass and soils through residue management, tillage, cover crops, nutrient management, and other agronomic measures not only enhance GHG removals by sinks and crop productivity; but also facilitate efficient management of fossil fuel inputs in crop production translating in lower GHG emissions. Crop production activities influence both GHG removals by sinks and emissions. Crop production is a major source of N_2O and CH_4 emissions. Adoption of improved technologies and management practices enhances GHG removals by sinks and reduces N_2O and CH_4 emissions per unit of food produced.

Typical carbon stock values for rangelands:

Rangelands vary greatly in their climatic characteristics, vegetation and soil types. Research has established that some types of rangeland may respond positively to a certain practice, while the same practice may reduce sequestration rates elsewhere. Site-specific rangeland soil carbon management practices must therefore be designed.

In grassland ecosystems, the majority of carbon is stored in soils, so soil carbon sequestration is the main potential. Where shrubs and trees are present, they make a large contribution to total carbon stocks. Management practices that increase organic matter inputs to soils or that decrease losses from soil respiration and erosion can sequester additional carbon, while actions that decrease carbon inputs or increase losses should be avoided.

There is scant documentation of the costs versus benefit of implementing improved rangeland carbon management practices. However, generalized data may be used based on research findings. A seminal publication in 2008 produced with the support of the World Initiative for Sustainable Pastoralism (WISP), The GEF, UNDP and IUCN provides such data that may be used for this project in the absence of site-specific data. For example, the Table to the right summarizes published reports of the carbon sequestration effects of various management practices in diverse rangelands globally.

Table 2: Carbon sequestration potential of rangeland management practices

Management practice	No. of data points*	Mean change in tCO2e/ha/yr or total change in %C
Vegetation cultivation	c: 31 %: 7	9.39 tCO2e/ha 0.56%
Avoided land cover / land use change	c: 65 %: 22	0.40 tCO2e/ha 0.87%
Grazing management	c: 55 %: 21	2.16 t CO2e/ha 0.13%
Fertilization	c: 27 %: 68	1.76 t CO2e/ha 0.47%
Fire control	c: 2 %: 1	2.68 t CO2e/ha 0%

***(c = no. of studies reporting in C content, % = no. of studies reporting in %C)**

Applicable methodologies for consideration:

The following methodologies are applicable but detailed assessment during project implementation will be required before a specific methodology is selected.

a. **The Plan Vivo System** is a very versatile system that can be applied at both small and large-scale. Under the Plan Vivo System, each project participant creates a sustainable land-management plan called a *plan vivo*. Through *plan vivos,* participants combine existing land-uses and livelihood activities with improved land-use activities and practices. The Plan Vivo Standard is a certification framework that also covers community-based Payments for Ecosystem Services (PES)-type programs supporting rural smallholders and community groups with improved natural resource management. The standard is designed to ensure that Plan Vivo projects benefit livelihoods, enhance ecosystems and protect biodiversity.

   Eligible activities under the system include:
   - Afforestation and reforestation (using native or naturalised species)
   - Agroforestry (inter-planting trees with crops)

- Forest restoration or rehabilitation (Re-establishing the structure, productivity and species diversity of forest originally present, or re-establishing the productivity and some, but not all, of the species originally present)
- Avoided deforestation and forest conservation
- Other land-use activities with quantifiable carbon benefits (e.g. improved agricultural systems)

Under the Plan Vivo framework, participants typically enter into 'agreements' with the project coordinator, agreeing to follow their plan vivo in return for staged payments. The project coordinator carries out monitoring, and payments are made to participants meeting agreed targets. Ecosystem services are normally quantified and transacted using carbon as a metric. The project coordinator aggregates ecosystem services from participants and transacts to a PES funder, through the sale of Plan Vivo Certificates.

Plan Vivo provides a framework for the equitable transaction of ecosystem services with communities and enables access to a range of funding sources and markets for ecosystem services, including voluntary carbon credits. Ecosystem services covered by the systems include provisioning services such as supply of food and water; regulating services such as climate regulation, flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.

Projects are normally encouraged to adopt or develop metrics to fit their circumstances, within the boundaries set by the standard, building on existing methods and approaches where appropriate.

b. **The Gold Standard Simplified Methodology for Quantification of Carbon Benefits from Introduction of Improved Cookstoves**. The objective of this methodology is to reduce overall project development costs without compromising the integrity for activities that generates less than 10,000 tCO_2 per year per activity. The methodology provides several innovative alternatives for estimation of fuel consumption and emission reductions, along with default factors for several monitoring parameters to further reduce transaction costs. This methodology is applicable to project activities1 that introduce efficient cookstoves to reduce usage of non-renewable firewood or switch from non-renewable to renewable firewood for household cooking. The methodology is only applicable if 1) the baseline fuel is firewood and 2) the baseline cookstove is a three-stone fire or a traditional cooking device without a grate or a chimney. Typical examples are the replacement of three-stone cookstove with Improved Cookstove (ICS) or switching from non-renewable to renewable fuel with or without replacing the baseline cookstoves. All these conditions are applicable in the project area. The Gold Standard may be used in combination with the Plan Vivo System in order to capture all the environmental benefits under this project. .

Other methodologies that are were considered for this project are:

c. **Approved VCS Methodology VM0026 Sustainable Grassland Management:** This methodology was developed by the Food and Agriculture Organization of the United Nations and prepared by the Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences. The methodology provides procedures to estimate the GHG emissions reductions and removals from the adoption of sustainable grassland management practices, such as improving the rotation of grazing animals between summer and winter pastures, limiting the timing and number of grazing animals on degraded pastures, and restoration of severely degraded land by replanting with perennial grasses and ensuring appropriate management over the long-term. The methodology quantifies emissions reductions and removals from increases in soil organic carbon (SOC) stocks and reduction of non-CO_2 GHG emissions. Where biogeochemical models can be demonstrated to be applicable in the project region, they may be used in estimation of soil carbon pool changes. Where such models are not applicable, the methodology provides guidance for estimation of SOC pool changes using direct measurement methods. The methodology uses a project method to determine additionality and the crediting baseline. The methodology borrows several tools form Approved CDM methodologies for AFOLU.

d. **Approved VCS Methodology VM0017 Adoption of Sustainable Agricultural Land Management:** This methodology was developed by the BioCarbon Fund and proposes to estimate and monitor greenhouse gas emissions of project activities that reduce emissions in agriculture through adoption of sustainable land management practices (SALM) in the agricultural landscape. In this methodology, SALM is defined as any practice that increases the carbon stocks on the land. Examples of SALM are (but are not limited to) manure management, use of cover corps, and returning composted crop residuals to the field and the introduction of trees into the landscape. The methodology is applicable to areas where the soil organic carbon would remain constant or decrease in the absence of the project.

e. **The Climate, Community & Biodiversity Alliance Standards (CCBA):** The CCBA is a partnership of international NGOs that was founded in 2003 with a mission to stimulate and promote land management activities that credibly mitigate global climate change, improve the well-being and reduce the poverty of local communities, and conserve biodiversity. The Climate, Community and Biodiversity Standards (CCB Standards) evaluate land management projects from the early stages of development through implementation. The CCB Standards were developed by the CCBA and have been managed by the VCS since November 2014. The CCB Standards foster the integration of best-practice and multiple-benefit approaches into project design and implementation. The CCB Standards:

- Identify projects that simultaneously address climate change, support local communities and smallholders, and conserve biodiversity.
- Promote excellence and innovation in project design and implementation.
- Mitigate risk for investors and offset buyers and increase funding opportunities for project developers.

The CCB Standards identify land management projects that deliver net positive benefits for climate change mitigation, for local communities and for biodiversity. The CCB Standards can be applied to any land management project, including projects that reduce greenhouse gas emissions from deforestation and forest degradation or from avoided degradation of other ecosystems, and projects that remove carbon dioxide by sequestering carbon (e.g., reforestation, afforestation, revegetation, forest restoration, agroforestry and sustainable agriculture) or other land management, from design through implementation and monitoring.

The CCBA is an example of a certification standard that can be used either as a stand-alone or simultaneously in combination with any of the above two standards (VM0017 and VM0017) as applicable.

(i) Ecosystem-based Adaptation (EbA): The Ecosystem-based Adaptation (EbA) approach relates to the management of ecosystems within interlinked social-ecological systems to enhance ecological processes and services that are essential for resilience to multiple pressures, including climate change (Devisscher, 2010). In other words, EbA integrates the management of ecosystems and biodiversity into an overall strategy to help people and ecosystems adapt to the adverse impacts of global change, such as changing climate conditions. Ecosystem-based approaches can be applied to virtually all types of ecosystems and at different scales from local to continental and international. EbA has the potential to generate multiple environmental and societal benefits, while reconciling short and long-term priorities.

As already pointed out, it is complicated to measure the benefits and costs of EbA, as this assessment is constrained by a series of uncertainties. Measuring the benefits requires, among other things, economic valuation of ecosystem services, but research on the monetary value of ecosystem services is still in its infancy. If this approach is to be applied for this project therefore, as part of the baseline, it is necessary to undertake an economic valuation of the ecosystem benefits including biodiversity. However, the wide scope of EbA makes it an attractive option for adoption in this project.

(ii) Sustainable Forest Management certification:

The dividing line between carbon finance schemes through the compliance or voluntary mechanisms, PES schemes and forest certification is often difficult to discern as they may each contain elements of the other. Perhaps the distinction is on the emphasis implied by their name. For example, the focus of carbon finance projects is to achieve carbon sequestration or emission reductions through forest conservation/protection (REDD+) or

establishment or replenishment (which ultimately results in biodiversity conservation as well for example), whereas in PES the focus is on the ecosystem and biodiversity conservation without necessarily the generation of carbon credits, although the latter may also be incorporated into the project. Sustainable Forest Management certification on the other hand provides forest owners and managers with independent recognition of their responsible management practices, but it may also be combined with issuance of carbon credits. There are many forest certification schemes although the Forest Stewardship Council (FSC) is the most well-known. Each certification scheme has specific criteria. Perhaps the main difference between forest certification and forest carbon project is that forest certification enables one to access certain privileges such are restricted markets as a result of undertaking SFM practices. Forest certification may be implemented as a stand-alone or combined with PES or carbon credits schemes.

Implementation Strategy

Whichever approach is selected after feasibility study, it is noted that there are key scientific and process-based knowledge gaps and methodological challenges in understanding carbon storage and biodiversity/ecosystem management across dryland sub-Saharan Africa in general. These gaps must be identified at an early stage and a capacity building program developed to address them. These evidence gaps need to be filled using new and integrated methodological approaches within the context of growing political and economic opportunities for carbon sequestration and biodiversity management to deliver ecosystem service and poverty alleviation benefits in the project area. An approach such as "**the key steps towards climate-smart pro-poor investments in carbon sequestration**" recommended by Stringer et al (2012) needs to be applied as illustrated in the adjacent Figure. The approach recognizes the need for both policy and scientific (technical) support.

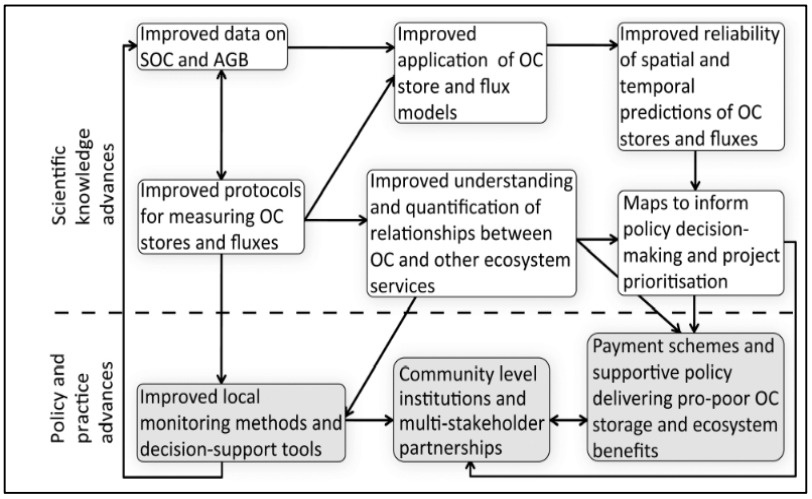
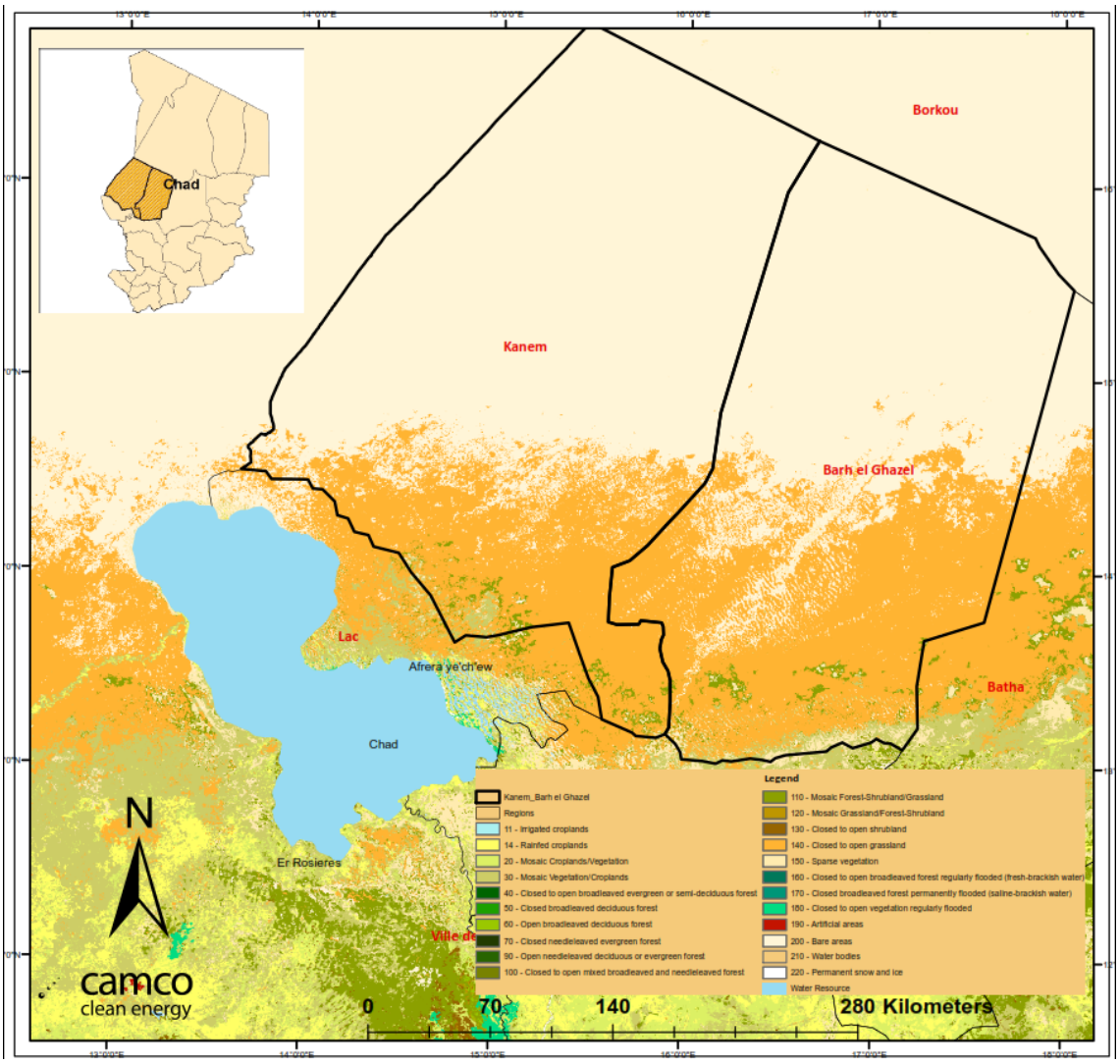


Figure: Possible route to delivering pro-poor carbon storage and ecosystem service benefits based on an improved scientific evidence base

ANNEX E: KANEM_BAHR EL GHAZEL LAND COVER MAP



ANNEX F: APPLICATION OF THE RAPTA FRAMEWORK FOR ASSESSING RESILIENCE

The Resilience, Adaptation Pathways and Transformation Assessment (RAPTA) framework is an approach to embed resilience concepts in development projects so they can better achieve their goals, and deliver durable outcomes in the face of socio-economic uncertainty and rapid environmental change. It is a useful approach for promoting an integrated approach for resilience and was used to increase the participation of all relevant stakeholders. The RAPTA is an iterative and participatory multi-stakeholder assessment that aims to maintain and improve the resilience of social-ecological systems, and will assist in promoting multi-stakeholder engagement and governance, characterizing the system, identifying key controlling variables influencing food security in the project area, and guiding the development of a coordinated suite of activities that targets the most vulnerable aspects.

Theory of Change for the P2RS Project within the RAPTA Framework

O'Connel et al. (2015) emphasize the benefit of building resilience of systems that are in a 'desirable state' to enhance their ability to cope with shocks and continue to maintain the well-being of humans that depend on that system for food and other valued outputs. If an agroecosystem is in an undesirable state, for example, as is the case with the project areas of Kanem and Bahr-El-Ghazal, which is affected by a combination of land degradation, poverty and insecure land access, resilience is a disadvantage. In such cases, the appropriate goal is transition, through adaptation or transformation, to a desired state. The stated objective of the P2RS Project is "to enhance food security and nutrition through sustainable and resilient agro-sylvo-pastoral systems in the Sahelian regions of Chad", making it fit perfectly within this RAPTA Framework.

Component 1 for example, seeks to enhance agro-sylvo-pastoral productivity. A key activity under Outcome 1.1 is the establishment of a multi-stakeholder structure to promote participation in the dialogue, decision making, and implementation of solutions to manage the agro-sylvo-pastoral value chains. In the same Outcome (1.1), the initiation of a participatory multi-stakeholder process to identify and map transhumance routes so as to reduce conflict is also proposed. Further, Component 2, seeks to promote integrated ecosystem management for enhanced resilience and biodiversity conservation, specifically under Outcome 2.1 (Output 2.1.1) engagement with local communities to develop participatory land use plans is proposed. These examples illustrate two key elements of the RAPTA framework applied for the design of interventions under P2RS.

Knowledge and capacity strengthening is demonstrated in Component 1 (Output 1.1.2), through the setting up of pilot/ learning sites to train farmers and herders on soil conservation/ regeneration and mixed cropping systems. Extension services have been proposed to support the set-up of pilot/ learning sites, as well as intensive training on INRM and SLWM (Output 1.1.3 & 1.1.4). Component 2 also encourages knowledge and capacity strengthening (Outcome 2.1) where the training of technical staff and selected community members is proposed, so as to enhance local capacity in sustainable land management, and the development of a participatory biodiversity restoration plan (Output 2.1.2)

Considerations for biodiversity conservation will be a prime component, with support given to strengthen and promote local actions in conservation and in the sustainable and integrated use of resources at the local level (getting the right people involved in the right way and at the right time – multi-stakeholder engagement and governance). To this end, the biodiversity and conservation needs assessment in the project area is important, which includes the elaboration of possible response mechanisms. Simply put, three main steps characterize a biodiversity and conservation needs assessment:

- Mapping of existing biodiversity for different ecological zones
- Investigation/ confirmation of ecosystem services provided by biodiversity
- Response mechanisms to protect and improve biodiversity

The assessment begins with the mapping of existing biodiversity for the different landscapes (Outcome 1.3), accompanied by an investigation/ confirmation of ecosystem services provided by the said biodiversity (detailed study of agro-sylvo-pastoral value chains – Output 1.3.3). For example, agro-sylvo-pastoral practices in the

project area (Kanem and Bahr el Ghazal regions) are heavily dependent on environmental resources, yet an over-dependence on the same landscape results in the environment being unable to support these activities (for this a participatory process whereby the most viable value chains are selected is proposed in output 1.3.3). The first two steps would clearly demonstrate the direct linkages between existing local practices and the resources upon which they depend, thereby enabling concrete and specific actions (response mechanisms) to be taken towards biodiversity conservation, such as a framework for partnership with the Ministry of Environment for a joint communal forest management (Component 1.3, Output 1.3.1).

Chad's high diversity of ecological zones is due to its large size and high latitudinal range. In the project target regions we find two ecoregions of interest: the Sahelian acacia savanna and Lake Chad flooded savanna. The lack of formal protection of the Lake Chad flooded savanna draws particular attention because of its international importance for certain species. Due to political instability, undeveloped civil society, limited national capacity and generally poor biodiversity data, implementing conservation plans at the national level remains a challenge in Chad. Efforts need to be undertaken to identify and develop more sustainable conservation schemes and piloting new community incentive mechanisms to manage and use biodiversity in a sustainable manner. There is also great need for better land-use planning.

The project will thus assess, identify and pilot a number of integrated biodiversity conservation activities in the project target regions. In particular, these will focus on the planned SLM and SFM areas and include product certification and community-based conservation. A regulatory system will be identified and implemented to support biodiversity conservation in the ecoregions of critical BD importance, including community based NRM plans that address biodiversity and an assessment of the feasibility of establishing a PA system for Chad's Sahelian acacia savanna or Lake Chad flooded savanna ecoregions. Even if it is considered to hold one of the highest levels of biological diversity of the Sahelo-Saharan countries, the national biological diversity of Chad has been poorly documented. Hence, enhanced information and data on biodiversity of global importance will be an additional activity covering the Sahelian region.

A. Description of the System

a. Scope and Overview: The Project Identification Form (PIF) identifies four main environmental constraints in the regions targeted by the project: (1) the progression of desertification; (2) climatic deterioration and high anthropogenic pressure on the Lake Chad watershed natural resources (land, water, wildlife and forest); (3) decreased productivity due to unsustainable practices in production systems; and (4) overall fragile and further degrading ecosystems. Constraints 1, 3 and 4 are not only a result of climate variability and change exacerbated by anthropogenic pressures, but also provide continuous feedback loops that enhance each other. Erratic rains, cyclical droughts, locust infestations and poor farming practices are typical factors that negatively affect crop production in the project target areas. According to the International Food Policy Research Institute (IFPRI), "Malnutrition is one of the main problems faced by the local population with an alarming prevalence, especially in the Kanem region (20 percent of global acute malnutrition rate in 2008). More than 8 percent of infants do not survive their first year, while 20 % of children die before reaching the age of five".

2: Biophysical System: A number of biophysical factors make the project area vulnerable to changes or significant variabilities of climate. Land degradation, with consequent loss of soil fertility, biodiversity and forest cover, is a major environmental challenge. Vegetation removal is a direct consequence of human-induced actions, from commercial logging and tree cutting for fuel to clearance of forests for commercial or agricultural use, which result in extensive soil depletion and desertification. The rate of land degradation in Chad's Sahelian belt is of high concern given impacts on biodiversity, hydrological processes, and soil erosion which undermine the very resources upon which rural communities depend. This results in a damaging cycle of habitat loss, poverty and food insecurity which lies at the root of the region's vulnerability.

The land in central Sahel area which marks the point where rain-fed agriculture ends and rainfall becomes insufficient to cultivate crops without irrigation is marginal and the populations of these districts face critical difficulties for agro-sylvo-pastoral production. Due to the nature of the rains,

human modification of the natural soil cover, and little investment in adaptive solutions, soil erosion and resource degradation are widespread and spreading, key factors underling deforestation, biodiversity loss, desertification, declining crop yields and enhanced poverty.

3. The Agro-Sylvo-Pastoral System: The ouadis found in Kanem and Bahr el Ghazal are associated with productive flood-plains, temporary pools and inundation zones, which greatly enhance the topographical and biological diversity of the ecoregion. The population is typically smallholders engaged in subsistence cultivation and livestock on marginal land, thus depending on farming, herding or gathering woody products. The majority of the land area is however characterized by low productivity sand dunes, and therefore dry farming activities form the basis of their livelihood. Low agricultural productivity, rare income-earning opportunities, and limited rural socio-economic infrastructure are the foremost causes of poverty in the areas. Weak community organization, combined with ineffective service delivery, lack of resources and limited decision-making power and information further exacerbate poverty and insecurity.

Pastoralists and farmers in Chad's Sahelian regions are competing for land and access to water which are putting increasing pressure on natural resources. The increased competition over progressively scarce resources creates both social land-use conflict and an endemic vicious cycle of environmental degradation and poverty.

Inappropriate farming practices, overgrazing, deforestation, and the pressures from a changing climate and growing population have caused extensive land degradation. Land degradation, and its extreme form desertification, have accelerated over the last thirty years. Continuous cropping, poor farming and land-husbandry practices, and wind and soil erosion are depleting the soil's native fertility and reducing crop yields. Due to growing population needs, fallow periods have significantly shortened resulting in degraded soil nutrient quality and natural regeneration is disturbed. Activities connected with mixed farming (bushfires, slash and burn cultivation, biomass burning) are additionally responsible for the emission of greenhouse gases (GHGs). In the past decades there has been a progressive expansion of the Sahelian climatic zone with a concurrent reduction of the Sudanian zone, resulting in greater aridity.

Ninety-five percent of the population relies on woodlands and forest resources for fuelwood to meet basic energy needs. High population density and pressure on resources have caused significant forest degradation, yielding an estimated 0.6% annual deforestation rate. Specific causes include illegal clearing of forest land for crops, expansion of land under cultivation, unauthorized tree-cutting, expansion of farming and livestock herding, poaching, and uncontrolled bushfires. These practices add to Chad's net GHG emissions, reduce the fertility and carbon storage capacity of its soils, and lead to desertification. The unsustainable use of woody species, exploitation of cultivable lands and wasting of pastoral spaces have critically endangered Chad's Sahelian tree steppe ecosystem and pose concerns for the sustainability of forests and pastureland.

4. Water Resources Availability: inland water resources have undergone significant desiccation over the past decades. Recurring droughts, declining vegetation surrounding watercourses, deforestation, and overgrazing are main contributors, drying up water courses and reducing the amount of quality pastureland.

5. Socio-Economic Interactions: the chronic food insecurity in Kanem and Bahr el Ghazal is structural. The situation is particularly alarming considering the looming threat posed by climate change which exacerbates an already difficult situation and place an additional burden on an already vulnerable landscape and ecosystem. Higher temperatures, decreased and more variable rain, and an altered temporal and spatial distribution of rainfall are expected and will together aggravate arid conditions, reduce vegetation cover, and further degrade soils, leading to failed harvests, livestock death, and lower yields especially of staple foods such as millet, sorghum, rice and maize, with clear consequent critical repercussions on food, health and nutrition.

B. Assessing the System

1. Alternative regimes: The P2RS project seeks an approach that addresses the underlying causes of resource degradation, the functional integrity of ecosystems, and spans the whole array of natural assets. It will provide support to subsistence farmers to implement low-tech methods that improve soils and conserve water and forests in addition to improving infrastructure, value chains and market linkages. By doing this, the project will add the much needed considerations and activities on Sustainable Land Management, Sustainable Forest Management and biodiversity conservation. These identified alternative states and associated thresholds suggest the following indicators as elucidated in the results framework:

i % increase in knowledge of INRM/SLWM policies
ii No. of ponds and boreholes sunk
iii No. of water points established
iv Hectares of land placed under irrigation
v Increase in no. of seed varieties available for planting and % increase in crop productivity
vi Increase in income generation alternatives and % increase in income
vii No. of cereal banks established
viii No. of input stores constructed
ix No. of livestock feed stores established
x No. of hectares under woodlots, community forests, no. of nurseries, no. of farmers practicing agroforestry
xi No. of producer groups established
xii No. of integrated land use plans in place and put to use
xiii No. of SFLM plans
xiv Certification system in place
xv No. of areas and hectares demarcated and placed under protection
xvi Quality knowledge products available, shared and being used
xvii Community involvement in monitoring vulnerability

2. General Resilience: Drawing on the theory of change it is proposed that the project consider looking at the following for indicators of general resilience of desirable system properties:

- **Ecological diversity and variability.** The rate of land degradation in Chad's Sahelian belt is of high concern given impacts on biodiversity, hydrological processes, and soil. Although Chad is amongst the richest countries in terms of biodiversity in Sahelo-Sudanian Africa, there are few existing and/or successful conservation initiatives. Furthermore, diminishing rainfall is particularly affecting the Sahelian wooded grasslands where the effects are exacerbated by human pressure for fuelwood and grazing pasture. The opening of new, deep wells has increased accessibility and, therefore, also grazing and hunting pressures. Intensification and diversification of agrarian system has the potential to improve the resilience of the system.
- **Connectivity** is key in this system in the following ways:
    - Connectivity enables livestock mobility at critical times of the year (drought). Fragmentation is leading to loss of that connectivity, so decreasing livestock productivity and so general resilience.
    - Access to seasonal migration activities builds options for off-farm income, and so contributes to general resilience for families (e.g. increased access to income, health and education services), but with uncertain implications for ecosystem resilience.
- **Reserves**: The primary form of wealth, and wealth reserves, in Bahr-el-Ghazal are in land, pasture and water access, livestock and labor force. These are vulnerable in times of drought and when land scarcity pressures build, suggesting that other forms of wealth would be beneficial for building general resilience. Human and social capital reserves are vital, yet

access to education, health and communication services is mixed and unequal during such times.

- **Social capital and cohesion**: Social norms, particularly those around family structure, inheritance mode, marriage and religious celebrations, shape the conditions under which men and women have access to resources and activities. These norms are changing rapidly, and that adaptability contributes to general resilience. Good health, access to education and opportunities underpin these aspects of general resilience, yet HDI and gender inequality indices in Chad are amongst the worst in the world; trends in these indicators would be instructive for informing this dimension of general resilience.
- **Governance:** Governance of crop-livestock interactions at multiple scales, and in particular the governance instruments for ensuring access to communal resources that enable herd mobility including water points, pasture and livestock paths.

Based on the above considerations, the following set of indicators is proposed in Table 1. The indicators are borrowed with slight modifications, from Grigg et al. (2015), as, based on a field mission to Bahr-el-Ghazal and Kanem, the conditions were found to be very similar to the case study described in the publication.

Table 1: Potential indicators of general resilience at the focal scale – current levels and trends

Indicator	**Rationale and assumptions**	**Potential sources of information on levels and trends**
Ecosystem diversity and productivity of native vegetation rangelands	Natural ecosystem enhances this agroecosystem's general resilience, and degradation trends are eroding that general resilience	Remote sensing, field measurements
Connectivity of transhumance routes	Loss of options for seasonal transhumance places more pressure on rangelands in the wet season, so reducing quality forage productivity and so general resilience. It also leads to conflicts between sedentary communities and itinerant herders	Household surveys, land use maps
Seasonal migration opportunities	Options to for dry-season migration relieve pressure on household food stores and bring in additional household income	Household surveys
Participation in farmer-led institutions	Farmer empowerment (for both men and women) is a key way to strengthen the sharing of conceptual models (between farmers/herders, and between farmers/herders, researchers and development agencies), learning and experimentation, so building general resilience.	Household and institutional surveys, statistics on membership of associations
Human Development Indicators and Gender Inequality Indices	These indicators are extremely poor at present, and improvements would indicate some lifting of human and social capital, which is a necessary underpinning for general resilience	UNDP, access to education, health, communication services
Capital reserves (per capita)	Human, natural, social and built capital reserves all build options, and so general resilience	National accounts, availability of insurance, banking, grain stores, livestock census
Institutions governing access to shared resources	Good stewardship of shared resources increases general resilience	Household surveys, National laws, local policies

2. Specified Resilience: Assessment of specified resilience is based on the identified main shocks anticipated for the system performed during a climate and vulnerability risk assessment for the project.

Table 2: Specified resilience indicators to reflect the regimes identified during climate risk and vulnerability assessment of the project area

Sector	Hazard	Indicators
Water	Prolonged rainfall shortages	Reduced water supply leading to crop loss, stunting, livestock death, threat to human health, poor sanitation
	Floods	Destruction of infrastructure, loss of life, crop damage, death of livestock
	Extreme heat	Loss of water
Agriculture and Livestock and Fisheries	Reduced productivity	Reduced food security
	Animal and crop diseases	Reduced food security, health risk
Energy and Transport Infrastructure	Extreme and continuous droughts	Unreliable and insufficient energy
		Cracking/buckling of transport infrastructure, dust storms impacting on visibility, Temperatures affect car heating systems, durability of tires.
	Emergence of flooding corridors	Accidents from floods (drawn/slippery)
		Stress of water cause damage
		Road/bridge damage or out of service, Disrupt traffic and weaken or wash out the soil and culverts that support roads, tunnels, and bridges.
Health, Nutrition and Sanitation	Epidemics	Loss of lives
	Recurring illnesses	Weakened immune systems
	Poor sanitation	Waterborne diseases proliferation
	Poor nutrition	Compromised health, high child mortality rates
Natural Resources and Biodiversity	Destruction of flora and fauna	Loss of biodiversity
	Soil erosion	Loss of valuable soil resource
Socio-economic	Destruction of social infrastructure	Reduced or no access to social infrastructure
	Loss/ destruction/ damage to property	Displacement

Sector	Hazard	Indicators
	Disasters	Loss of lives
		Migration to safer or less-affected areas

Source: Climate risk and vulnerability assessment report (Camco, 2016).

3. Need for Adaptation or Transformation: Land degradation risks in the agro-sylvopastoral ecosystems are clear, with unwanted outcomes for both ecosystems identified during climate risk and vulnerability assessment. The table below summarizes the adaptation and transportation needs in the project area.

Table 3: Matrix of Climate Change Adaptation and Response Interventions for the most vulnerable sectors in Chad

	Address drivers of Vulnerability	Build and reinforce individual and institutional response capacity to react	Manage climate risk	Plan for extreme events
Cross Sector	• Accelerate basic development (access to water, sustainable livelihood, health, basic infrastructure, reliable and affordable energy and food security) • Reduce natural resource degradation and unsustainable use • Manage population growth	• Strengthen policy and institutional frameworks in water, agriculture/ livestock and energy including climate change policy in general • Management of planning data and information (weather monitoring, mapping resources and climate risk) • Inform, educate and communicate information regarding climate risks and adaptation technologies • Promote cross-ministerial cooperation Reinforce stakeholder attitudes, (in particular in relation to women and farmers), with regards to new techniques in terms of intensive and sustainable methods of production • Support research and encourage the	• Promote research and development, innovation and technology adoption • Climate-proof development projects and programs	Consider impacts of extreme and continuous droughts, emergence of flooding corridors

		transfer of technology between research bodies and agro-sylvo-pastoral stakeholders • Support institutions in defining adaptation priorities, for each socio-economic sector, based on the needs of the population and favouring coherence between sectors, in particular during the preparation		
Agriculture/ Livestock and Biodiversity Sector Specific	• Intensification and diversification of agrarian system • Increase productivity (access to fertilizers, training on improved land-use practices, enhancing soil resources) • Improve access to end-markets (value addition) • Improve transport infrastructure • Reduce land degradation • Implement sector-specific recommendations in the INDC submission	• Open new frontiers for crop and livestock by rehabilitating marginal areas through irrigation and soil nutrient enhancement • Cultivation of new and alternative crops • Promote "orphan" crops	• Develop drought-tolerant, pest resistant, fast-maturing crop varieties • Strengthen research in vaccine and inoculants • Advance weather index insurance • Understand and properly exploit the link between sustainable natural resource use and food security	• Possibility of a complete collapse of the agrarian and livestock sectors • Possible extinction of certain species
Water Sector Specific	• Improve management of the Lake Chad drainage basin • Accelerate efforts toward universal access to improved water sources • Improve water capture and distribution infrastructure • Reduce water resource pollution and unsustainable extraction • Implement sector-specific recommendations in the INDC submission	• Reduce dependency on climate-sensitive water sources • Promote sustainable ground water use • Increase capture and retention of rainwater	• Strategic water harvesting in areas prone to receiving excess rainfall • Management of flooding corridors to reduce risk to populations and livelihoods while taking advantage of the excess water	Consider impacts of extreme and continuous droughts, emergence of flooding corridors

Energy and Physical Infrastructure Sector Specific	• Advancing energy efficiency • Expanding access to modern energy • Promote indigenous energy sources • Promote the use of sustainable renewable especially wind and solar	• Improve electricity infrastructure including interconnectivity both nationally and regionally • Develop policy to enable private sector participation in transmission and distribution of electricity • Diversify energy sources for household use	• Diversify energy sources further • Develop climate-resilient energy resources • Develop hydropower resources • Develop drought-tolerant, fast-growing bioenergy crops • Promote regional power trade	Consider impacts of extreme and continuous droughts, emergence of flooding corridors

4. Summary of Action Indicators: The following are general recommendations for action based on application of the RAPTA Framework guidelines:

- Build general resilience for the agro-sylvo-pastoral ecosystem as a whole including the biophysical, social and institutional requirements to support enhancing pasture and water availability and recycling, crop-livestock interactions, agro-forestry in the ouadis.
- For those with biophysically and economically sustainable livelihoods invest in keeping away from identified thresholds.
- For economically or biophysically unsustainable farmers and herders invest in a regime shift or transformation including diversification to reduce overdependence on livestock;
- Invest in education and health and social services to enhance farmers' empowerment.