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USAID/Mali Environmental Threats and Opportunities Assessment

May 2015

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Report Authors:

Charles Hernick, Patrick Hall, Seydou Bouaré, Saliou Diallo, Sarah Haack, Dan Mahr, and Tara Fortier

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The Cadmus Group, Inc.

100 Fifth Avenue, Suite 100

Waltham, MA 02451

617-673-7000 Fax 617-673-7001

www.cadmusgroup.com

Cover Photo:

The Baoulé River on the east side of Parc National De La Boucle du Baoulé

Credit: Charles Hernick

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ACRONYMS

ADS	Automated Directives System
AEDD	Agence de l'Environnement et du Développement Durable
AEG	Accelerated Economic Growth
ARCC	African and Latin American Resilience to Climate Change
ASDI	Coopération Suédoise
AVSF	Agronomes et Vétérinaires Sans Frontières
CBD	Convention on Biological Diversity
CDCS	Country Development Cooperation Strategy (CDCS)
CNESOLER	Centre National de l'Energie Solaire et des Energies Renouvelables
CSA	Climate Smart Agriculture
D&G	Democracy and Governance
DNA	Direction Nationale Agriculture
DNACPN	Direction Nationale de l'Assainissement et du Contrôle des Pollutions et des Nuisances
DNCN	Direction Nationale de la Conservation de la Nature
DNE	Direction Nationale de l'Energie
DNEF	Direction Nationale des Eaux et Forêts
DNH	Direction Nationale Hydraulique
DNP	Direction Nationale de la Pêche
DNPIA	Direction Nationale des Productions et des Industries Animales
DO	Development Objective
DRCN	Direction Régionale de la Conservation de la Nature
ESIA	Environmental and Social Impact Assessment
ETOA	Environmental Threats and Opportunities Assessment
EU	European Union
FAA	Foreign Assistance Act
FAO	Food and Agriculture Organization
GCC	Global Climate Change
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoM	Government of Mali
IDP	Internally Displaced Persons
IER	Institut d'Economie Rurale
IR	Intermediate Result
IUCN	International Union for Conservation of Nature
MEEA	Ministère de l'Environnement, de l'Eau et de l'Assainissement
MFC	Mali-Folkecenter
MINUSMA	United Nations Multidimensional Integrated Stabilization Mission in Mali
NEF	Near East Foundation
NRM	Natural resource management
PA	Protected Area
PAD	Project Appraisal Document

PAGGEM	Plan d'Accompagnement de la Généralisation de l'Education Environnementale au Mali
PNCC	Politique Nationale Changements Climatiques
PNPE	Politique Nationale de Protection de l'Environnement
SNGIE	Système National de Gestion de l'Information Environnementale
SPRING	Strengthening Partnership in Nutrition Globally
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WWF	World Wildlife Fund

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EXECUTIVE SUMMARY

PURPOSE AND SCOPE

The USAID/Mali Environmental Threats and Opportunities Assessment (ETOA) has been developed to support sustainable development across current and planned projects in the Mission's democracy and governance, education, health, agriculture, trade, nutrition, and climate change adaptation portfolios. The assessment focuses on the role of institutions and partners in environmental protection and natural resource management (NRM).

Specifically, the assessment was developed to support preparation of the USAID/Mali Country Development Cooperation Strategy (CDCS), to be a resource for the development of Project Appraisal Documents (PADs), and to serve as a general resource for USAID and stakeholders in planning and implementation. This assessment meets the requirement to describe the status of and threats to biodiversity and tropical forestry conservation under Sections 118 and 119 of the Foreign Assistance Act (FAA) of 1961, as amended, and USAID guidance on country strategy development, under Automated Directives System (ADS) 201 and 204. As such, this assessment supersedes the USAID/Mali 118/119 Assessment completed in 2008.

This assessment summarizes the development context in Mali (see Section II)—including economic dependency on ecosystems and ecosystem services—and describes the state of the environment and NRM (see Section III) in that context. This includes a description of biodiversity, forests, and natural resource-based industries (i.e., agriculture, fisheries, and mining). Environmental threats (Section IV) are described in terms of direct threats (i.e., proximate threats) and indirect threats (i.e., root or ultimate causes).

This assessment also articulates opportunities to support environmental protection and NRM (Section V) through 39 recommendations intended to broadly address the indirect threats. This section also illustrates how these recommendations link to USAID program areas and describes the extent to which USAID is already working in these areas. USAID/Mali's decision to prepare a more expansive ETOA (versus a more narrowly focused 118/119 assessment) stems from the recognition that opportunities exist for USAID to collaborate with other donors, non-governmental organizations (NGOs), government actors, and the private sector to address these threats. The discussion of key recommendations and outcomes (Section VI), articulates how USAID can implement five key recommendations to enhance collaboration and achieve quantifiable results.

METHODOLOGY

A two-phase approach was taken to prepare the USAID/Mali ETOA to accommodate the mission's CDCS strategic planning process and logistical constraints. **Phase I** of the ETOA consisted of the preparation of a **draft tropical forestry and biodiversity conservation assessment** (as required by FAA 118/119), including preliminary GIS-based analysis and mapping. Phase I included a field mission in November 2014, which focused on interviews and stakeholder consultations with USAID and its partners in Bamako. Phase I also included a half-day workshop with stakeholders representing the Government of Mali (GoM), NGOs, and the private sector to identify and verify key issues and assumptions with regard to environmental threats and opportunities.

Phase II expanded the Phase I assessment into an **ETOA** suitable for use in **PAD development,** incorporating a broader spectrum of environmental considerations, including agriculture, industry, and water availability and quality. Phase II also included field visits in early 2015 to the areas surrounding Kita (notably Boucle du Baoulé National Park), the Morila Mine near Sanso, and Mopti and surrounding areas. A second stakeholder workshop

was held in Bamako to verify the draft findings and recommendations of the ETOA. The objective of the field visits was to "ground-truth" the draft report's preliminary findings and expand the scope of the analysis to that of a full ETOA. Phase II also included consultations with stakeholders in Washington, D.C and further GIS-based analysis and mapping.

This assessment incorporates results of all field work, stakeholder consultations, literature reviews, and GIS-based analysis. Annex A includes information on the consultative process. Maps supporting the analysis and shown in the report are available online at http://cadmusgroup.github.io/USAID-Mali-ETOA/.

STATE OF THE ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT

Mali has 19 Protected Areas (PAs) and four Ramsar sites to protect and maintain regions defined as highly diverse, vulnerable, or productive. These areas, located in each eco-region in Mali, make up nearly 15 million ha (12 percent) of total land area. Many of the PAs are subject to exploitation, overuse, and desertification.

According to the IUCN (International Union for Conservation of Nature) Red List, two species in Mali are critically endangered, 12 are endangered, 25 are vulnerable, and 26 are near threatened. Most of Mali's threatened species are located in the northern and Sahelian regions of the country, as well as in and along the Niger River. Most species decline can be attributed to decreased rainfall in northern regions as a result of climate change, agricultural expansion, overuse of natural resources, and human intrusion and exploitation of habitat.

Forests comprise roughly 10 percent of Mali's total land cover, although total forest area has been in decline since 1990 (down from 11 percent of total land area, or almost a 10 percent loss of the forested area). Mali's forests provide a number of environmental, economic, and sociocultural services, and contributed US $423 million to the GDP in 2011 (5 percent). These forests are located primarily in the southern Sudanian region of Mali, where rainfall is more frequent and less variable.

Agriculture accounts for 39 percent of GDP, with 80 percent of the population engaging in farming, raising livestock, or fishing (CIA, 2014). Mali's agricultural sector, largely based on the fertile floodplains of the Niger River, is highly dependent on rainfall. As climate change increases the variability of rainfall and weather patterns, uncertainty in the timing and level of rainfall can negatively affect volume and quality of agricultural output. Based on a recent climate vulnerability assessment, the southwest region of Mali, containing 75 percent of the population, is defined as medium to medium-high risk, warranting the attention of policymakers and development professionals (De Sherbinin, et al., 2014).

Mali has vast mineral resources, only some of which are under development. Gold is Mali's principal mineral commodity, accounting for 60 percent of total export value. Mali is the third largest gold producer in Africa, but as a result the country's fiscal status fluctuates with commodity prices.

Mali's is not water poor overall, but distribution varies greatly by region, with some areas experiencing a water surplus and others falling below the water poverty threshold. The expansion of irrigation, as well as investment in development of groundwater sources, has helped Mali achieve the objectives of the Mali National Plan and Millennium Development Goals for water supply, sanitation, and food self-sufficiency. Meeting these objectives, though, has created vulnerabilities in the future of the water supply, generating a greater demand for water that will likely exceed available supply in years of low rainfall, especially as a result of climate change. This may have serious implications for fisheries that are critical for food security. Fish and fish products contributing to 60 percent of total animal protein intake

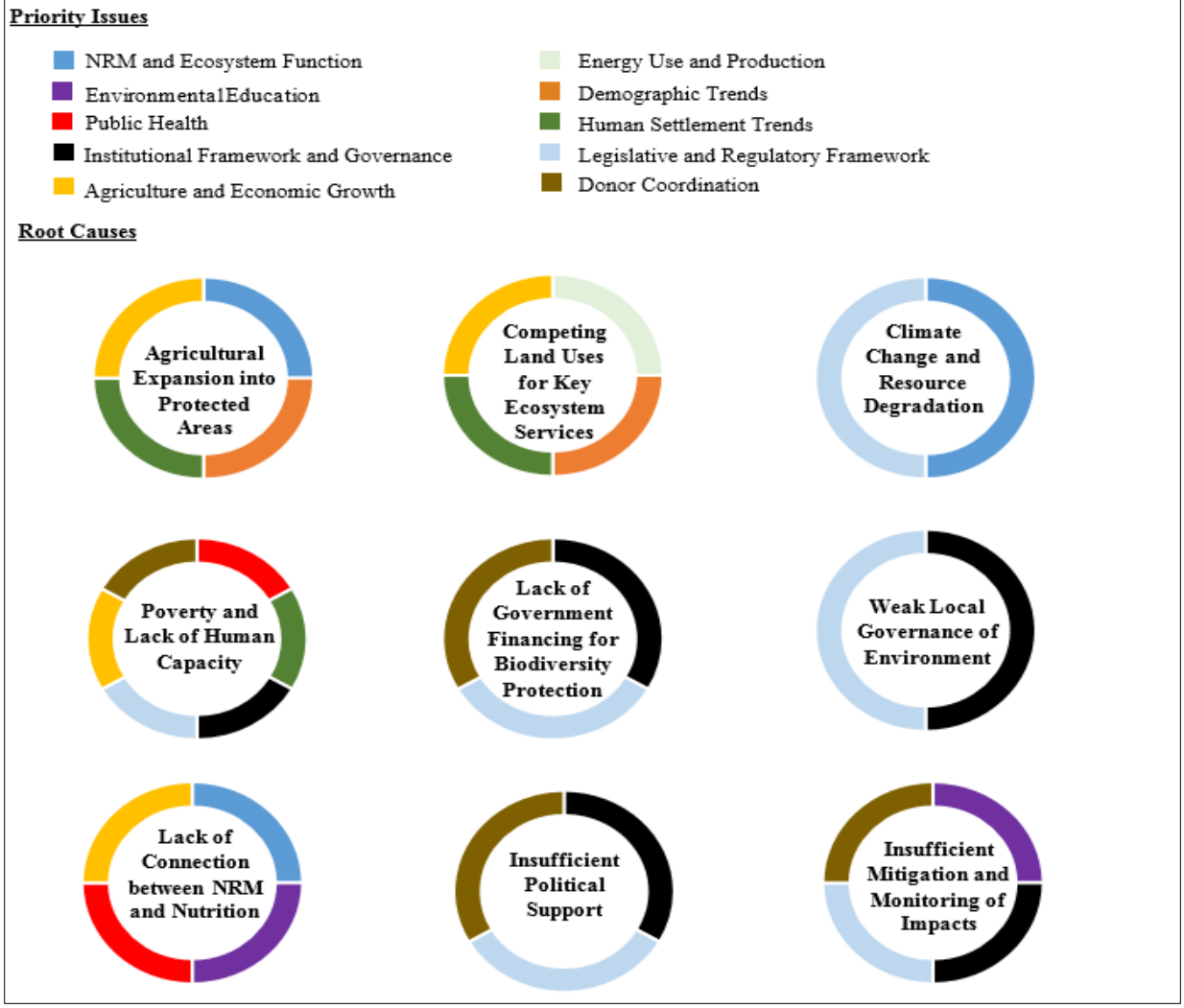
(World Wildlife Fund, 2014). Independent of anthropogenic factors, natural variability in rainfall and flooding significantly affects water levels and fishery productivity.

ROOT CAUSES OF ENVIRONMENTAL DEGRADATION

To identify the actions necessary to protect the environment and conserve natural resources, the root causes of the direct threats must be identified and addressed. The following figure shows root causes with stakeholder-identified priority issues, based on the overall analysis of threats, stakeholder consultations, and documents reviewed.

Root Causes of Threats to Biodiversity and Conservation in Mali and Contributing Priority Issues

The following figure illustrates the root causes of threats to biodiversity and conservation in Mali (center circles), developed based on an in-depth literature review, fieldwork observations, and validation by stakeholders at the January 2015 workshop. These root causes are defined by priority issues (colored rings) concerning the status of the environment in Mali, as identified in stakeholder interviews at the November 2014 workshop. This figure reconciles existing literature with on-the-ground expertise, and demonstrates the complexity and range of factors that must be considered in drafting recommended actions for environmental remediation and protection.



RECOMMENDATIONS TO ADDRESS ROOT CAUSES

To address each of the root causes, the assessment team identified the following recommendations and opportunities to enhance environmental protection and promote sustainable NRM. These recommended actions and opportunities were reviewed, discussed, and validated at the second stakeholder workshop in Bamako in early 2015.

ROOT CAUSES	RECOMMENDED ACTIONS AND OPPORTUNITIES
(1) Agricultural and pastoral expansion, including encroachment on forests and PAs	1. Bolster resiliency programs to promote sustainable development and climate-smart agriculture (CSA). 2. Diversify Malian economy to reduce economic dependence on the agricultural sector. 3. Strengthen industrial capacity for food processing, etc. 4. Improve oversight of forests and PAs, and increase capacity for management and enforcement by PA staff.
(2) Competing land uses for non-critical habitat and areas providing key ecosystem services	5. Strengthen local and regional collaboration and participation to develop land use guidance and apply regulations related to land use and occupation. 6. Increase capacity for renewable energy sources to decrease pressure on forest resources as fuel source. 7. Engage private industry in public-private partnerships to explore and secure renewable energy resources, specifically the development of small- and large-scale biofuel operations to improve energy security while utilizing non-arable lands.
(3) Global climate change leading to natural resources degradation (e.g., reduced water availability, soil depletion)	8. Develop regional and local GCC adaptation strategies to counter desertification and deforestation and related effects (e.g. water scarcity, soil erosion, migration) (e.g., implementation of an equitable and sustainable *Schéma d'Aménagement du Territoire* and *Schéma Régional d'Aménagement du Territoire)* 9. Support Malian and international environmental NGOs in generating policies and technologies encouraging growth of renewable energy sector and CSA.
(4) Poverty and lack of human capacity	10. Reduce economic, political, and social disparities through increased access to education, particularly for vulnerable people. 11. Identify and market economic opportunity alternatives to gold mining, and support industries that can promote sound NRM, long-term economic growth, and worker well-being, 12. Establish and emphasize programs and policies to rehabilitate the economic, environmental, and social status of northern regions most affected by the recent political conflict, including restoration of infrastructure and depleted resources, and creation of employment opportunities in the environmental sector.
(5) Weak local governance of environment	13. Increase political capacity/empowerment of communities and local groups through continued support for political and financial decentralization, specifically allowing for increased retention and control of funds by park rangers and local communities from locally collected. 14. Develop infrastructure to promote economic opportunities and growth in rural areas (that will contribute to the tax base). 15. Translate national laws into the dominant local languages. 16. Communicate results of socioeconomic and scientific studies to different segments of the Mali citizenry. 17. Support education programs that raise awareness of the impact of land-based activities (e.g. agriculture, deforestation, hunting) on biodiversity and conservation of tropical forests. 18. Enforce requirements for conducting Environmental and Social Impact Assessments (ESIAs) and clarify and reinforce the process of public consultations required as part of the preparation of ESIAs. 19. Incorporate cultural considerations into economic and conservation programs and policies to build capacity of communities.
(6) Lack of government **financing** for biodiversity protection and management	20. Ensure adequate funding for environmental programs in the national budget. 21. Implement a "trust fund for Protected Areas," paid into by natural resource-based industries, to establish resources for funding of the protection and management of natural resources, PAs, and biodiversity-related agencies; and environmental planning research and analysis. 22. Garner support from Malian and international NGOs for fair, equitable, and sustainable investments in PAs and biodiversity conservation efforts. 23. Utilize fully available funds and development finance sources for which Mali is eligible (e.g., Climate Fund, Clean Development Mechanism, Planet Finance, Natural Disaster Prevention Fund).

ROOT CAUSES	RECOMMENDED ACTIONS AND OPPORTUNITIES
(7) Insufficient top/national-level political support and resources for proper management of natural resources and biodiversity protection	24. Produce the necessary application text (i.e., directives) pertaining to existing environmental laws so that each respective Ministry can fully implement the laws. 25. Continue emphasis on natural resource protection in the context of UN peacekeeping and other conflict-management programs. 26. Strengthen capacity of Malian and international environmental NGOs to intervene in NRM and biodiversity protection efforts. 27. Support opportunities for economic, social, and political growth and inclusion to reduce instability in the country. 28. Support the implementation of the *Stratégie Nationale du Développement Durable*. 29. Engage private sector via public-private partnerships for the management of PAs and other natural resource-dense areas.
(8) Lack of connection between NRM and nutrition	30. Include agricultural considerations in decisions regarding NRM. 31. Support integration of environmental considerations into educational curricula. 32. Increase environmental education and awareness, particularly in communities reliant on the agricultural sector, for continued integration of NRM and health and nutrition programs. 33. Restart *Plan d'Accompagnement de la Généralisation de l'Education Environnementale au Mali* (PAGGEM) environmental education program and identify ways of sustaining funding for the program. 34. Develop resiliency programs to promote CSA, reduce detrimental agricultural inputs and outputs, and decrease food insecurity in Mali. 35. Embed food security programs with GCC-adaptive strategies and techniques (e.g., CSA practices).
(9) Insufficient mitigation and monitoring of foreseeable environmental impacts	36. Expand ESIAs and enforce consistent application of regulated evaluation practices. 37. Promote mechanisms for cooperation between the Ministère de l'Environnement, de l'Eau et de l'Assainissement (MEEA) and regional management offices. 38. Support economic and environmental modeling and analysis capabilities and capacity of MEEA, possibly within the structure of a SNGIE. 39. Implement a functional SNGIE including environmental, social, and economic baseline indicators and necessary resources for data collection and analysis. 40. Provide support for Agence de l'Environnement et du Développement Durable (AEDD) Climate Fund and Information Center, as well as the *Agence Nationale de la Météorologie*.

KEY RECOMMENDATIONS FOR USAID/MALI AND ANTICIPATED OUTCOMES

Based on the actions identified as necessary to address environmental threats and their root causes as listed above, this section identifies key recommendations and most appropriate for support from USAID/Mali. It also describes how they relate to the interim results in the USAID/Mali Results Framework Paper. These recommendations are intended to inform USAID/Mali in the preparation of PADs and project implementation. The recommendations reflect those areas where USAID support could significantly affect the protection of Mali's biodiversity and tropical forests.

1. **Support the development of application text (i.e., directives) to support the implementation of existing environmental laws so that each respective Ministry can fully carry out the laws**. The effective implementation of environmental laws means that the PAs would receive the full intended level of protection and that the areas surrounding, or adjacent to, PAs will be developed with environmental considerations in mind. Additionally, application of directives will empower local officials and park guards to fulfill national mandates, and will provide legal certainty for individuals, businesses, and NGOs pursuing economic development opportunities, investing in infrastructure, or expanding operations.

   Interim results: improved effectiveness of GoM oversight institutions (IR 1.1.2); strengthening of national, regional, district, and local public service delivery systems (IR 1.1.3); and improved linkages in formal rule of law systems (1.2.2).

2. **Support efforts to ensure adequate funding for the environment through the national budget and support the development of "trust fund for PAs" paid in to by natural resource-based industries**. With appropriate financial resources, GoM agencies and institutions can adequately oversee conservation activities and effectively implement environmental laws and programs. The establishment of independently held (e.g., third-party bank) trust funds can help support the polluter pays principle at specific project sites and could be utilized more broadly to support the management of key ecosystem services or PAs. These types of financial responsibility mechanisms are a well established means for environmental finance and the establishment of these types of mechanisms can be supported by USAID or NGOs either through enabling legistlation or on a voluntary/negotiated basis with the private sector.

   Interim results: improved effectiveness of GoM oversight institutions (IR 1.1.2); the strengthening of national, regional, district, and local public service delivery systems (IR 1.1.3); and the promotion of Rule of Law culture through funded civic education (IR 1.2.1).

3. **Develop regional and local GCC adaptation strategies that focus on promoting Climate Smart Agriculture (CSA) sustainable energy infrastructure**. Implementing CSA best practices will promote higher agricultural and economic productivity and will reduce vulnerability to climate change. Beyond agriculture, post-conflict job creation policies emphasizing development of alternative sectors can promote economic diversification and adaptation (e.g., support economic growth that does not further deplete already-scarce timber resources which are critical for maintaining the adaptive capacity of ecosystems and local communities). From a mitigation and enery infrastructure standpoint, USAID has a strong trackrecord of encouraging renewable energy infrastructure investments and supporting the development of reliable decentralized electricity sources. Consistent energy supply supports the development of industrial and commercial sectors and allows for economic diversification, which is critical for adapting to climate change.

   Interim results: improvement of nutrition and health (IR 2.4.1) from CSA, strengthening of strategies for climate change resilience and disaster risk reduction (IR 2.1), improvement and diversification of livelihoods (IR 2.3), inclusive agriculture sector economic growth (IR 3.2.1), and improved nutritional status of women and children (IR 3.2.2).

4. **Integrate ecosystem services concepts into education programs and land use planning**. In interviews with key stakeholders, participants noted a need for greater environmental education, and for increased awareness of the link between NRM and poverty. Environmental education promoting the economic value of ecosystem services and clarifying the link between availability of natural resources (e.g., soil and water) and food security can meet this need. Greater awareness of the role of ecosystem services in supporting agricultural systems can promote conservation and management of natural resources and will improve land use plans. This can help minimize trade-offs in ecosystem services resulting in land use change without expected economic benefits.

   Interim results: improved rule of law through civic education (IR 1.2.1), improvement of nutrition and health (IR 2.4.1), strengthening of strategies for climate change resilience and disaster risk reduction (IR 2.1), mitigation of conflict drivers (IR 2.2), improvement and diversification of livelihoods (IR 2.3), inclusive agriculture sector economic growth (IR 3.2.1) and improved nutritional status of women and children (IR 3.2.2).

5. **Engage in public-private partnerships to achieve scale economies and invest in infrastructure that maximizes social and environmental benefits with careful ESIA**. Public private partnerships in the mining industry and agriculture industries have demonstrated promise for environmentally responsible and socially inclusive economic growth. Given the scarcity of agricultural, water, and forest resources and arable land in Mali, achieving scale economies and large-scale interventions that can stimulate economic growth while minimizing environmental and social impacts is critical. The results associated with this recommendation include economic growth that leverages private sector capital, makes the most of scarce natural resources, and safeguards the environment. These results could be particularly important in the south where there is the greatest risk that resources will be underutilized, and in the north where the risk of conflict may be exacerbated by food insecurity and poverty.

   Interim results: diversification and improvement of livelihoods (IR 2.3) and inclusive agriculture sector economic growth (IR 3.2.1).

Extent to Which Proposed and Current USAID Program Actions Meet Identified Needs

Sections 118 and 119 of the FAA require an analysis of the extent to which the actions proposed for support by the Agency (i.e., recommendations) meet the needs identified. Considering that USAID environmental programming is relatively limited in Mali, **this ETOA focuses on identifying opportunities for the technical offices to contribute to environmental protection while achieving their core development objectives**. This approach is consistent with other ETOAs. Therefore, the following table identifies where contributions are being made or could be made by the USAID/Mali programs.

O = Opportunity for the program to contribute to the key recommendation **+ = Key Recommendation/Opportunity that USAID/Mali is already supporting**	**Accelerated Economic Growth (AEG)**	**Health**	**Education**	**Democracy and Governance**
1. Support the development of application text (i.e., directives) to support the implementation of existing environmental laws so that each respective Ministry can fully carry out the laws.				**O**
2. Support efforts to ensure adequate funding for the environment through the national budget and support the development of "trust fund for PAs" paid in to by natural resource-based industries.				**O**
3. Develop regional and local GCC adaptation strategies that focus on infrastructure and promote sustainable and CSA.	**+**	**O**		**O**
4. Integrate ecosystem services concepts into education programs and land use planning.			**O**	
5. Engage in public-private partnerships to achieve scale economies and invest in infrastructure that maximizes social and environmental benefits with careful ESIA.	**+**			

Geographic Target Areas for Implementing Recommendations

Limited Mission resources necessitate a geographic focus for the technical offices and their associated programs. For example, USAID's climate change resilience programs are focused in Mopti, and Feed the Future programs are focused in Sikasso and Mopti, and may

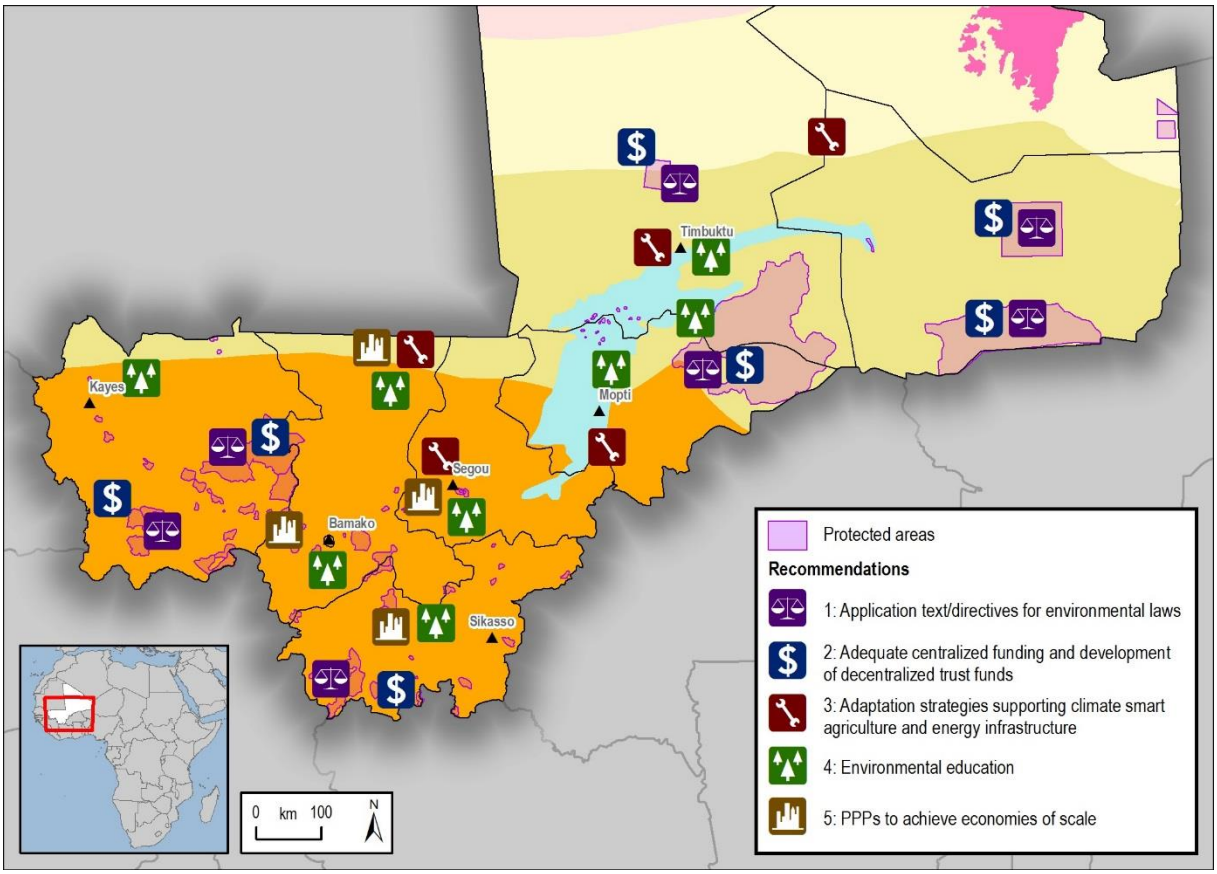
be focused in Timbuktu if conditions permit. The following figure illustrates the locations where each of the key recommendations are most relevant, and can be best implemented.

Recommendation #1 relates to application text/directives for environmental laws and has icons at every PA/PA region, since both directly pertain to policy or funding to strengthen protection of PAs. Recommendation #2 is also applicable to PA/PA regions as it relates to adequate centralized funding and development of decentralized trust funds for protection of PAs.

Recommendation #3 relates to adaptation strategies supporting CSA and energy infrastructure. For this recommendation, icons are near Kita, Segou (for cotton production), the lower band of the Sahel (agricultural production area that is vulnerable to GCC), and northern Mali (which is highly vulnerable to climate change).

Recommendation #4 relates to environmental education—specifically in terms of ecosystem services—and has icons near Timbuktu and near other major cities with large populations that could benefit from and have access to environmental education services, as well as greatest potential for good land use planning as populations shift toward urban areas. The Niger River Basin (biodiversity concerns), and lower Sahelian band (agricultural area with land use pressures) are also key locations for work related to Recommendation #4.

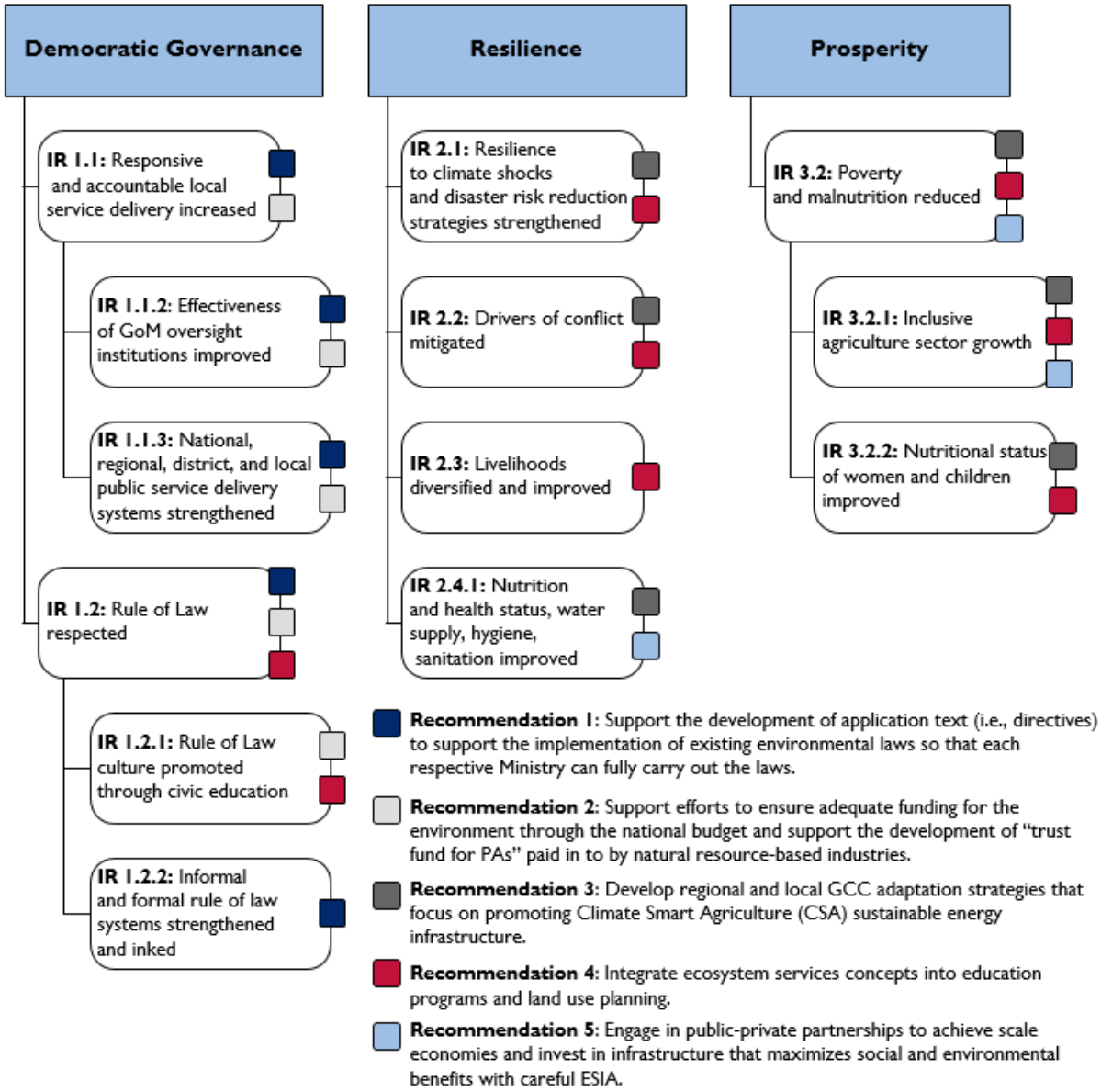
Recommendation #5 relates to PPPs to achieve economies of scale and has icons near Bamako (capital city and primary economic center), Segou (cotton production), lower Sahelian band (agriculturally important area), and Sikasso region (mining), key centers of economic growth.



Linkage to the USAID/Mali Results Framework

As outlined above, implementing these five key recommendations will have positive outcomes for the environment and thus support sustainable economic development by

addressing the root causes of environmental degradation. Implementation will also help achieve Interim Results as specified in the USAID/Mali Results Framework Paper. While none of the key recommendations support Interim Results in the Transition objective (not shown in the figure below), several of the recommendations, if implemented, would be supportive of more than one Interim Result. For example, producing the necessary application text to implement environmental laws would help increase the effectiveness of oversight by GoM institutions (IR 1.1.2) and strengthen formal rule of law (IR 1.2.2). The other recommendations cut across USAID/Mali's Development Objectives (DO). For example, the recommendation to pursue public-private partnerships to construct or manage public resources is supportive of both the Resilience and Prosperity DOs by supporting the diversification and improvement of livelihoods (IR 2.3) and by supporting inclusive agriculture sector growth (IR 3.2.1). Additional detail on these recommendations and the anticipated achievable results is in the Discussion of Key Recommendations and Outcomes section of the assessment.



RESUME

OBJET ET PORTEE

L'évaluation des menaces et des opportunités environnementales (ETOA) au Mali à la demande de l'USAID a été développée pour appuyer la prise en compte du développement durable dans les projets en cours et/ou prévus dans les portefeuilles de la Mission Démocratie et Gouvernance, Education, Santé, Agriculture, Commerce, Alimentation et Adaptation aux changements climatiques. Cette évaluation met l'accent sur le rôle des institutions et des partenaires dans la protection de l'environnement et la gestion des ressources naturelles (GRN).

Plus précisément, l'évaluation a été développée pour contribuer à la préparation de la Stratégie-Pays de Coopération au Développement de l'USAID au Mali (CDCS) , et pour être une ressource pour le développement des documents d'évaluation de projets (DPA), et aussi pour servir de ressource générale pour l'USAID et les parties prenantes dans la planification et la mise en oeuvre d'activités. Cette évaluation répond à l'exigence de décrire la situation et les menaces sur la biodiversité et la conservation des forêts tropicales en vertu des articles 118 et 119 du Foreign Assistance Act (FAA) de 1961, telle que modifiée, et du guide de l'USAID sur l'élaboration de la Stratégie-Pays, présenté dans le Système de Directives Automatisées (Automated Directives System), ADS 201 et 204. En tant que telle, cette évaluation supplante l'évaluation 118/119 de l'USAID / Mali réalisée en 2008.

Cette évaluation fait un résumé du contexte de développement au Mali (voir la section II), en prenant en compte la dépendance économique sur les écosystèmes et les services écosystémiques, et décrit l'état de l'environnement et des ressources naturelles (voir la section III) dans ce contexte. Cela comprend une description de la biodiversité, des forêts et des industries axées sur les ressources naturelles (par exemple, l'agriculture, la pêche et l'exploitation minière). Les menaces environnementales (section IV) sont décrites en termes de menaces directes et menaces indirectes (i.e. causes profondes ou causes fondamentales).

Cette évaluation présente également dans sa Section V les possibilités de renforcer la protection de l'environnement et des ressources naturelles à travers 39 recommandations visant à aborder globalement les menaces indirectes. Cette section illustre aussi le lien entre ces recommandations et les secteurs de programme de l'USAID et décrit dans quelle mesure l'USAID travaille déjà dans ces domaines. La décision de la Mission USAID/Mali de préparer un ETOA plus large que l'évaluation 118/119 découle de la reconnaissance qu'il existe des possibilités pour l'USAID de collaborer avec d'autres donateurs ainsi qu'avec des organisations non-gouvernementales (ONG), des acteurs gouvernementaux et le secteur privé pour répondre à ces menaces. La discussion des recommandations clés et des résultats (article VI), expose la manière dont l'USAID peut mettre en œuvre cinq recommandations clés pour améliorer la collaboration et obtenir des résultats quantifiables.

METHODOLOGIE

Une approche en deux phases a été prise pour faire en sorte que l'ETOA de l'USAID/Mali s'accorde avec le processus de planification stratégique du CDCS que la Mission est en train de mener, d'une part, et des contraintes logistiques, d'autre part. La **Phase I** de l'ETOA a consisté en la préparation d'un **draft d'évaluation de la conservation des forêts et de la biodiversité tropicale** (tel que requis par la FAA 118 / 119), y compris l'analyse préliminaire basée sur le SIG et la cartographie. Cette Phase I a aussi comporté une mission de terrain effectuée en Novembre 2014, qui a porté sur des entrevues et des consultations de parties prenantes avec l'USAID et ses partenaires à Bamako. Cette Phase I comprenait également un atelier d'une demi-journée avec les intervenants représentant le Gouvernement du Mali

(GdM), les ONG et le secteur privé pour identifier et vérifier les questions clés et les hypothèses à l'égard des menaces et des opportunités environnementales.

La **Phase II** a élargi l'évaluation de la phase I en ETOA approprié dans le développement de PAD, incorporant un éventail plus large de considérations environnementales, y compris l'agriculture, l'industrie, et la disponibilité de l'eau en quantité et en qualité. La Phase II comprenait également des visites de terrain au début de 2015 dans les zones environnantes de Kita (notamment le Parc National de la Boucle du Baoulé), la mine de Morila à Sanso et Mopti et régions avoisinantes. Un deuxième atelier des parties prenantes a eu lieu à Bamako pour soumettre à discussion les propositions de conclusions et de recommandations de l'ETOA. L'objectif des visites de terrain était de confronter aux réalités les conclusions préliminaires du projet de rapport et d'élargir la portée de l'analyse à celle d'une ETOA complète. La Phase II comprenait aussi des consultations avec les parties prenantes à Washington, DC et une analyse plus approfondie basée sur le SIG et la cartographie.

Cette évaluation intègre les résultats de tous les travaux sur le terrain, des consultations avec les parties prenantes, revues de la littérature, et l'analyse basée sur le SIG. L'Annexe A contient des informations sur le processus de consultation. Des cartes venant en appui de l'analyse et présentés dans le rapport sont disponibles en ligne à http://cadmusgroup.github.io/USAID-Mali-ETOA/.

ETAT DE L'ENVIRONNEMENT ET GESTION DES RESSOURCES NATURELLES

Le Mali dispose de 19 aires protégées (AP) et de quatre sites Ramsar pour protéger et maintenir des régions définies comme hautement diversifiées, vulnérables, ou productives. Ces zones, situées dans chaque éco-région du Mali représentent près de 15 millions d'hectares (12 pour cent) de la superficie totale du pays. Bon nombre de ces aires protégées sont soumises à l'exploitation, la surexploitation, et la désertification.

Selon la Liste Rouge de l'UICN (Union Internationale pour la Conservation de la Nature), au Mali, deux espèces sont en danger critique d'extinction, 12 sont en voie de disparition, 25 sont vulnérables, et 26 sont quasi menacées. La plupart des espèces menacées du Mali sont situés dans le Nord et régions sahéliennes du pays, ainsi que dans et le long du fleuve Niger. Le déclin de la plupart des espèces peut être attribuée à la diminution des précipitations dans les régions du nord en raison du changement climatique, l'expansion agricole, la surexploitation des ressources naturelles, l'intrusion humaine et l'exploitation de l'habitat.

Les forêts représentent environ 10 pour cent de la couverture totale du territoire du Mali. Bien que la superficie forestière est en baisse depuis 1990 (baisse de 11 pour cent de la superficie totale du pays, soit près de 10 pour cent de la zone boisée), les forêts du Mali fournissent un certain nombre de services environnementaux, économiques et socioculturels, et ont contribué à hauteur de 423 000 000 US $ au PIB en 2011 (5 pour cent). Ces forêts sont situées principalement dans la région soudanienne sud du Mali, où les précipitations sont plus fréquentes et moins variable.

L'agriculture représente 39 pour cent du PIB, avec 80 pour cent de la population occupée dans l'agriculture, l'élevage ou la pêche (CIA, 2014). Le secteur agricole du Mali, largement basée sur les plaines inondables fertiles du fleuve Niger, est fortement dépendant de la pluviométrie. Comme le changement climatique augmente la variabilité des régimes de précipitations et les conditions météorologiques, l'incertitude dans le calendrier et le niveau des précipitations peut affecter négativement le volume et la qualité de la production agricole.

Le Mali dispose de vastes ressources minérales, dont seulement certaines d'entre elles sont en cours de développement. L'or est le principal produit minéral du Mali, comptant pour 60 pour cent de la valeur totale des exportations. Le Mali est le troisième plus grand producteur d'or en Afrique, mais comme résultante, le statut fiscal du pays fluctue en fonction des prix des produits de base.

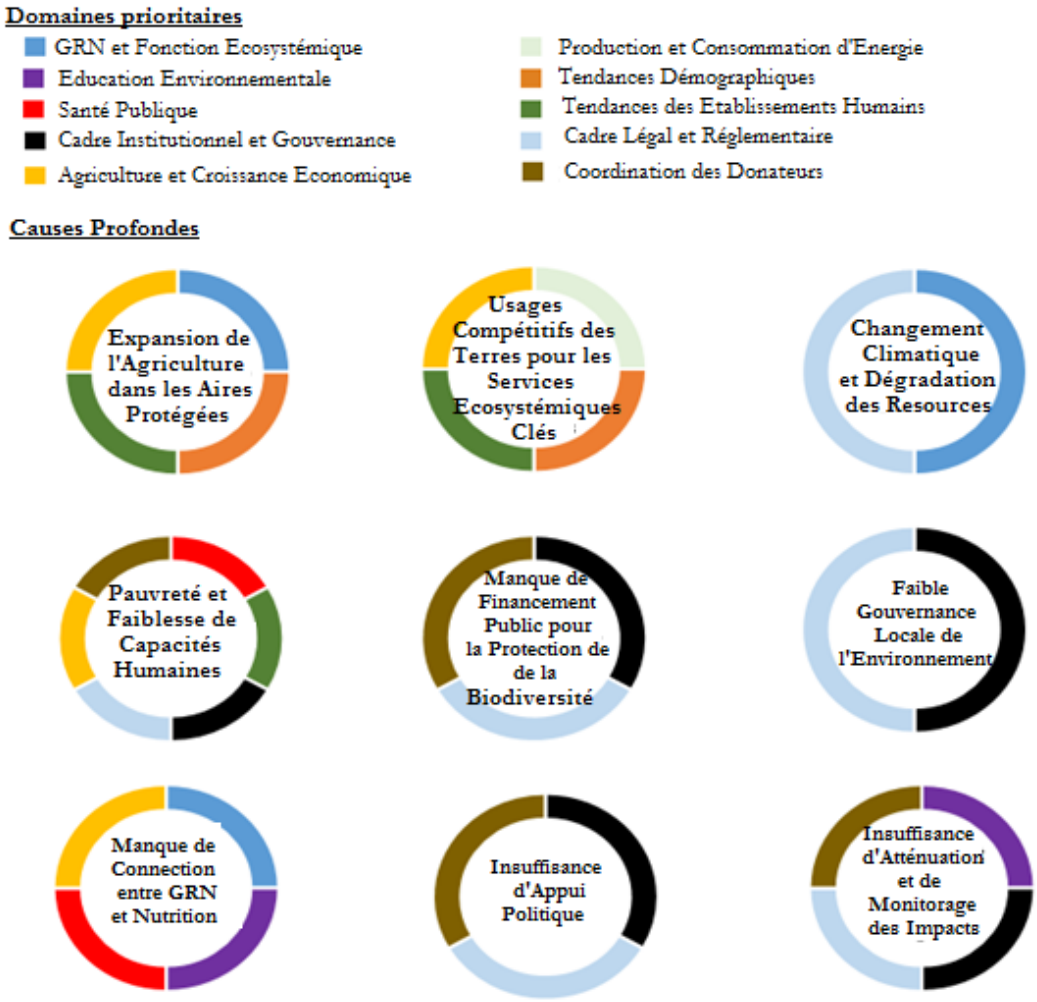
L'état des ressources en eau du Mali n'est pas globalement mauvais, mais la répartition varie considérablement par région, avec quelques zones qui connaissent un excédent d'eau et d'autres se trouvant en dessous du seuil de pauvreté en eau. L'expansion de l'irrigation, ainsi que l'investissement dans le développement des sources d'eau souterraine a aidé le Mali à atteindre les Objectifs du Plan national du Mali et du Millénaire pour le développement pour l'approvisionnement en eau, l'assainissement, et l'auto-suffisance alimentaire. Le respect de ces objectifs, cependant, a créé des vulnérabilités dans l'avenir de l'approvisionnement en eau, générant une plus grande demande pour l'eau qui va probablement dépasser l'offre disponible dans les années de faibles précipitations, surtout en raison du changement climatique. Ce qui pourrait avoir de graves conséquences pour les pêcheries qui sont essentiels pour la sécurité alimentaire, le poisson et les produits de pêche contribuant à 60 pour cent de l'apport total en protéines animales (World Wildlife Fund, 2014). Indépendamment des facteurs anthropiques, la variabilité naturelle dans les précipitations et les inondations affectent de manière significative les niveaux d'eau et la productivité de la pêche.

CAUSES PROFONDES DE LA DEGRADATION DE L'ENVIRONNEMENT

Pour identifier les actions nécessaires en vue de protéger l'environnement et conserver les ressources naturelles, les causes profondes des menaces directes doivent être identifiés et traitées. La figure ci-après montre les causes profondes en liaison avec les domaines prioritaires identifiés par les parties prenantes, basées sur une analyse globales des menaces, les consultations des parties prenantes et la revue documentaire.

Causes Profondes des Menaces sur la Biodiversité et la Conservation au Mali et Domaines Prioritaires Afférents

La figure ci-dessous présente les causes profondes des menaces sur la biodiversité et la conservation au Mali (disques centraux) développée à partir d'une revue détaillée de litérature, des observations de terrain, et une validation par les parties prenantes lors de l'Atelier de Janvier 2015. Ces causes profondes sont définies par domaines prioritaires (bagues en couleur) concernant le statut de l'environnement au Mali, tel qu'identifiées lors des interviews des parties prenantes au cours de l'Atelier tenu en Novembre 2014. Cette figure reconcilie la litérature existante avec l'expertise de terrain, et démontre la complexité et l'éventail des facteurs qui doivent être pris en compte dans la préparation des actions recommandées pour dews mesures correctives et la protection de l'environnement.



RECOMMANDATIONS POUR S'ATTAQUER AUX CAUSES PROFONDES

Pour s'attaquer à chacune des causes profondes, l'équipe d'évaluation a identifié les recommandations et les possibilités suivantes en vue d'améliorer la protection de l'environnement et de promouvoir la gestion durable des ressources naturelles. Ces actions et ces opportunités recommandées ont été examinées, discutées et validées lors du deuxième atelier des parties prenantes tenu à Bamako au début de 2015.

CAUSES PROFONDES	ACTIONS RECOMMANDEES ET OPPORTUNITES
(1) Agriculture et expansion de l'élevage, y compris l'empiètement sur des forêts et des aires protégées.	1. Soutenir les programmes de résilience pour promouvoir l'agriculture durable et proactive face au climat. 2. Diversifier l'économie du Mali pour réduire la dépendance économique du secteur agricole. 3. Renforcer la capacité industrielle pour la transformation des produits alimentaires, etc. 4. Améliorer la surveillance des forêts et des aires protégées, et augmenter la capacité en gestion et application des lois par le personnel des aires protégées.
(2) Compétition dans l'utilisation des terres des habitats non-critiques et des aires fournissant des services écosystémiques clés	5. Renforcer la collaboration et la participation régionales et locales pour développer les conseils en aménagement des terroirs et appliquer ces règles de l'aménagement et l'occupation des terroirs. 6. Augmenter la capacité en énergie renouvelable pour baisser la pression sur les ressources forestières comme source de combustible. 7. Engager l'industrie privée dans le partenariat public-privé pour explorer et favoriser l'accès aux sources d'énergies renouvelables.*
(3) Le changement climatique comme moteur de la dégradation des ressources naturelles (e.g., la disponibilité réduite de l'eau, l'épuisement des sols)	8. Développer les stratégies régionales et locales d'adaptation au changement climatique pour freiner la désertification, la déforestation et les effets qui leur sontliés (e.g. le manque d'eau, l'érosion de sol, l'émigration) (e.g., la mise en œuvre d'un *Schéma d'Aménagement du Territoire* et*Schéma Régional d'Aménagement du Territoire* durable et juste).** 9. Soutenir les ONG maliennes et internationales par la mise en place de politiques et de technologies permettant la croissance du secteur des ressources d'énergie renouvelables et de l'agriculture durable et proactive face au climat.
(4) Pauvreté et faiblesse des ressources humaines.	10. Réduire les disparités économiques, politiques, et sociales par un accès plus élevé à l'éducation, particulièrement pour les femmes, et aux opportunités d'emploi hors du secteur agricole. 11. Identifier et lancer les opportunités économiques qui sont les alternatives à l'extraction minière de l'or, et soutenir les industries qui peuvent promouvoir la gestion durables des ressources naturelles, la croissance économique à long-terme, et le bien-être des ouvriers. 12. Établir et renforcer des programmes et des politiques qui aident à l'amélioration de la situation économique, environnemental, et social des régions du nord Mali qui sont les plus affectées par le conflit politique, y compris la restauration d'infrastructures et des ressources dégradées, et la création d'emplois dans le secteur de l'environnement.*
(5) Faiblesse de la gouvernance locale de l'environnement.	13. Développer l'implication et l'engagement politique des communautés locales à travers l'appui continu de la décentralisation. 14. Développer des infrastructures pour promouvoir les opportunités économiques et la croissance en milieu rural (ce qui aurait pour effet de contribuer à renforcer les bases de taxation). 15. Traduire dans les langues nationales dominantes les textes des lois.* 16. Communiquer les résultats des études socioéconomiques et scientifiques aux segments différents de la population de Mali. 17. Soutenir les programmes d'éducation qui sensibilisent l'impact des activités terrestres (par exemple l'agriculture, la déforestation, la chasse) sur la biodiversité et la conservation des forêts tropicales. 18. Renforcer les consultations publiques durant le processus de préparation des Etudes d'Impact Environnemental et Social (EIES) et des Plans de Gestion Environnementale et Sociale (PGES).* 19. Prendre en compte les considérations culturelles dans les politiques et programmes de croissance économiques et de conservation pour renforcer les capacités des communautés.

CAUSES PROFONDES	ACTIONS RECOMMANDEES ET OPPORTUNITES
(6)Faiblesse du **financement** public pour la protection et la gestion des ressources naturelles	20. Assurer un financement suffisant dans le budget national 21. Mettre en œuvre un « fonds fiduciaire pour les AP,» payées par les industries des ressources naturels, pour financer la protection et la gestion des ressources naturelles, aires protégées et agences liées à la biodiversité, y compris le financement de la recherche pour la planification et l'analyse environnementale. 22. Obtenir le soutien d'ONG maliennes et internationales pour des investissements justes, équitables et durables dans les AP et les efforts de conservation de la biodiversité. 23. Utiliser les fonds entièrement disponibles et les sources de financement du développement pour lesquels le Mali est éligible (e.g. ClimateFund, Clean DevelopmentMechanism, Planet Finance, Natural DisasterPreventionFund).
(7) Faible appui politique des décideurs centraux et des ressources pour une gestion appropriée des ressources naturelles et la protection de la biodiversité.	24. Produire les textes d'application nécessaires (e.g., directives) concernant les lois environnementales existantes pour permettre à chaque ministère concerné d'appliquer pleinement les lois. 25. Continuer à souligner l'importance de la protection des ressources naturelles dans le cadre du programme de maintien de la paix de l'ONU et d'autres programmes de gestion des conflits. 26. Renforcer les capacités des ONG environnementales maliennes et internationales à mieux intervenir dans la gestion des ressources naturelles et dans leurs efforts de protection de la biodiversité. 27. Soutenir les opportunités pour la croissance et l'intégration économique, sociale, et politique pour réduire l'instabilité nationale. 28. Pousser le gouvernement du Mali à mettre en œuvre la Stratégie Nationale de Développement Durable. 29. Faire participer le secteur privé via des partenariats public-privé dans la gestion des aires protégées et d'autres zones de ressources naturelles denses.
(8) Absence de connexion entre GRN et nutrition	30. Inclure les considérations agricoles dans la prise de décisions sur la gestion des ressources naturelles. 31. Soutenir l'intégration des considérations environnementales dans les contenus des programmes d'enseignement 32. Renforcer l'éducation environnementale et la sensibilisation, particulièrement au sein des communautés qui dépendent du secteur agricole, pour souligner l'intégration continue de la gestiondes ressources naturelles et des programmes de santé et nutrition. 33. Redémarrer le Plan d'Accompagnement de la Généralisation de l'Education Environnementale au Mali (PAGGEM) et identifier les démarches nécessaires pour subvenir au financement durable de ce programme.* 34. Développer des programmes de résilience pour promouvoir l'agriculture durable et proactive face au climat, en réduisant l'utilisation des intrants et extrants agricoles nuisibles, et en améliorant la sécurité alimentaire au Mali. 35. Relier les programmes de sécurité alimentaire aux stratégies et techniques d'adaptation au changement climatique (e.g., pratiques agricoles durables et proactives).
(9) Insuffisance de mesures d'atténuation et de suivi des impacts environnementaux prévisibles.	36. Renforcer les Etudes d'Impact Environnemental et Social (EIES) et les dispositions de suivi-évaluation de la mise en œuvre des conclusions et recommandations de ces études.* 37. Promouvoir des mécanismes de coopération entre le MAEE et les bureaux régionaux de gestion. 38. Soutenir les capacités de modélisation et d'analyse économique et environnementale du MEEA, éventuellement dans la forme d'un SNGIE.* 39. Mettre en œuvre un SNGIE fonctionnel incluant des indicateurs environnementaux, sociaux, et économiques et les ressources nécessaires pour la collecte et l'analyse des données. 40. Apporter un soutien au Fonds Climat et au Centre d'Information de l'AEDD, ainsi qu'à l'Agence Nationale de la Météorologie.*

PRINCIPALES RECOMMANDATIONS POUR L'USAID / MALI ET RESULTATS ESCOMPTES

Basé sur les actions jugées nécessaires pour répondre aux menaces environnementales et leurs causes profondes énumérés ci-dessus, cette section identifie les recommandations clés les plus pertinentes pour un soutien de l'USAID / Mali. Elle décrit également comment elles se rapportent aux résultats intermédiaires dans le Document-Cadre de Résultats de l'USAID / Mali. Ces recommandations visent à informer l'USAID / Mali dans la préparation des DPA et la mise en œuvre du projet. Les recommandations reflètent les domaines où le soutien de l'USAID pourrait significativement aider à la protection de la biodiversité et des forêts tropicales du Mali.

1. **Soutenir la production des textes d'application nécessaires (c'est-à-dire des directives) se rapportant aux lois environnementales existantes de sorte que chaque Ministère respectif puisse pleinement mettre en œuvre les lois.** La mise en œuvre efficace des lois environnementales signifie que les aires protégées recevraient la protection à la hauteur complète prévue et que les zones environnantes, ou à proximité des APs seront développées avec à l'esprit les considérations environnementales. En outre, l'application des directives permettra aux responsables locaux et aux gardes des parcs de remplir pleinement leurs mandats nationaux, et d'assurer la sécurité juridique pour les individus, les entreprises et les ONG qui saisissent des opportunités de développement économique, en investissant dans les infrastructures, ou dans l'expansion d'opérations.

   Résultats intermédiaires: amélioration de l'efficacité des institutions de surveillance du GdM (IR 1.1.2); renforcement des capacités locales des systèmes de prestation de service public au niveau national, régional, de district et local (IR 1.1.3); et liens formels de règlementation des systèmes de droit renforcés (1.2.2).

2. **Soutenir les efforts d'assurer un financement adéquat de l'environnement à travers le budget national et soutenir le développement d'un «Fonds Fiduciaire pour les APs» à constituer avec des apports des industries extractives des ressources naturelles.** Avec des ressources financières appropriées, les organismes et institutions du GdM peuvent superviser adéquatement les activités de conservation et de mise en œuvre des lois et des programmes environnementaux de manière efficace. La mise en place de façon indépendante (par exemple, banque tierce) de fonds d'affectation peut aider à soutenir le principe pollueur-payeur dans des sites spécifiques d'un projet et pourrait être utilisé plus largement pour soutenir la gestion des principaux services écosystémiques ou AP. Ces types de mécanismes de responsabilité financière sont un moyen bien établi pour le financement de l'environnement, et leur mise en place peut être pris en charge par l'USAID ou des ONG soit par une législation habilitante ou sur une base volontaire / négociée avec le secteur privé.

   Résultats intermédiaires: amélioration de l'efficacité des institutions de surveillance du GdM (IR 1.1.2); renforcement des capacités locales des systèmes de prestation de service public au niveau national, régional, de district et local (IR 1.1.3); et la promotion de la culture du respect de la loi par l'éducation civique, financé (IR 1.2.1).

3. **Élaborer des stratégies régionales et locales d'adaptation au CCG qui mettent l'accent sur les infrastructures et la promotion d'une agriculture durable adaptée au climat (CSA)**. L'USAID dispose d'un important dossier de suivi pouvant servir à encourager les investissements dans les infrastructures d'énergies renouvelables et de

soutenir le développement de sources d'électricité décentralisées fiables. Un approvisionnement énergétique cohérent soutient le développement des secteurs industriels et commerciaux et permet la diversification économique, ce qui est essentiel pour l'adaptation au changement climatique. En outre, la mise en œuvre de meilleures pratiques d'agriculture durable et adaptée au climat (Climate Smart Agriculture - CSA) fera la promotion d'une productivité agricole et économique plus forte et permettra de réduire la vulnérabilité au changement climatique. Au-delà de l'agriculture, les politiques de création d'emplois post-conflit en insistant particulièrement sur le développement de secteurs alternatifs peuvent promouvoir la diversification économique et l'adaptation (par exemple, soutenir la croissance économique qui ne détruit plus encore les ressources en bois déjà rares et qui sont essentiels pour le maintien de la capacité d'adaptation des écosystèmes et des communautés locales).

Résultats intermédiaires: amélioration de la nutrition et de la santé (IR 2.4.1) de la CSA, renforcement des stratégies de résilience au changement climatique et réduction des risques de catastrophes (IR 2.1), amélioration et diversification des moyens de subsistance (IR 2.3), croissance économique du secteur agricole inclusive (IR 3.2.1), et amélioration de l'état nutritionnel des femmes et des enfants (IR 3.2.2).

4. **Intégrer les concepts de services écosystémiques dans les programmes d'éducation et de planification de l'utilisation des terres**. Dans les entrevues avec les principaux intervenants, les participants ont souligné la nécessité d'une plus grande sensibilisation à l'environnement, et d'une sensibilisation accrue sur le lien entre gestion des ressources naturelles et pauvreté. L'éducation environnementale promouvant la valeur économique des services écosystémiques et clarifiant le lien entre la disponibilité des ressources naturelles (par exemple, le sol et l'eau) et la sécurité alimentaire peut répondre à ce besoin. Une plus grande sensibilisation sur le rôle des services écosystémiques dans l'appui qu'ils apportent aux systèmes agricoles peut promouvoir la conservation et la gestion des ressources naturelles et permettre d'améliorer la planification de l'utilisation des terres. Cela peut aider à minimiser les compromis dans les services écosystémiques résultant de changements d'utilisation des terres sans les avantages économiques attendus.

   Résultats intermédiaires: amélioration du respect du régime de la loi par l'éducation civique (IR 1.2.1), amélioration de la nutrition et de la santé (IR 2.4.1),renforcement des stratégies de résilience au changement climatique et réduction des risques de catastrophes (IR 2.1), atténuation des sources de conflit (RI 2.2), amélioration et diversification des moyens de subsistance (IR 2.3), croissance du secteur de l'agriculture économique inclusive (IR 3.2.1) et amélioration de l'état nutritionnel des femmes et des enfants (IR 3.2.2).

5. **S'engager dans des partenariats public-privés pour réaliser des économies d'échelle et investir dans des infrastructures qui maximisent les avantages sociaux et environnementaux avec une attention particulière pour les EIES**. Les partenariats public-privés dans les industries minières et l'agriculture ont démontré la promesse d'une croissance économique respectueuse de l'environnement et socialement inclusive. Compte tenu de la pénurie en ressources agricoles, hydriques, forestières et terres arables au Mali, réaliser des économies d'échelle et des interventions de grande taille pouvant stimuler la croissance économique tout en minimisant les impacts environnementaux et sociaux est critique. Les résultats associés à cette recommandation comprennent la croissance économique qui tire partie de capitaux du secteur privé, fait le mieux avec les ressources naturelles rares, et préserve

l'environnement. Ces résultats pourraient être particulièrement importants dans le sud où il y a le plus grand risque que les ressources soient sous-utilisées, et dans le nord, où le risque de conflit peut être exacerbé par l'insécurité alimentaire et la pauvreté.

Résultats intermédiaires: diversification et amélioration des moyens de subsistance (IR 2.3) et croissance économique du secteur agricole inclusive (IR 3.2.1).

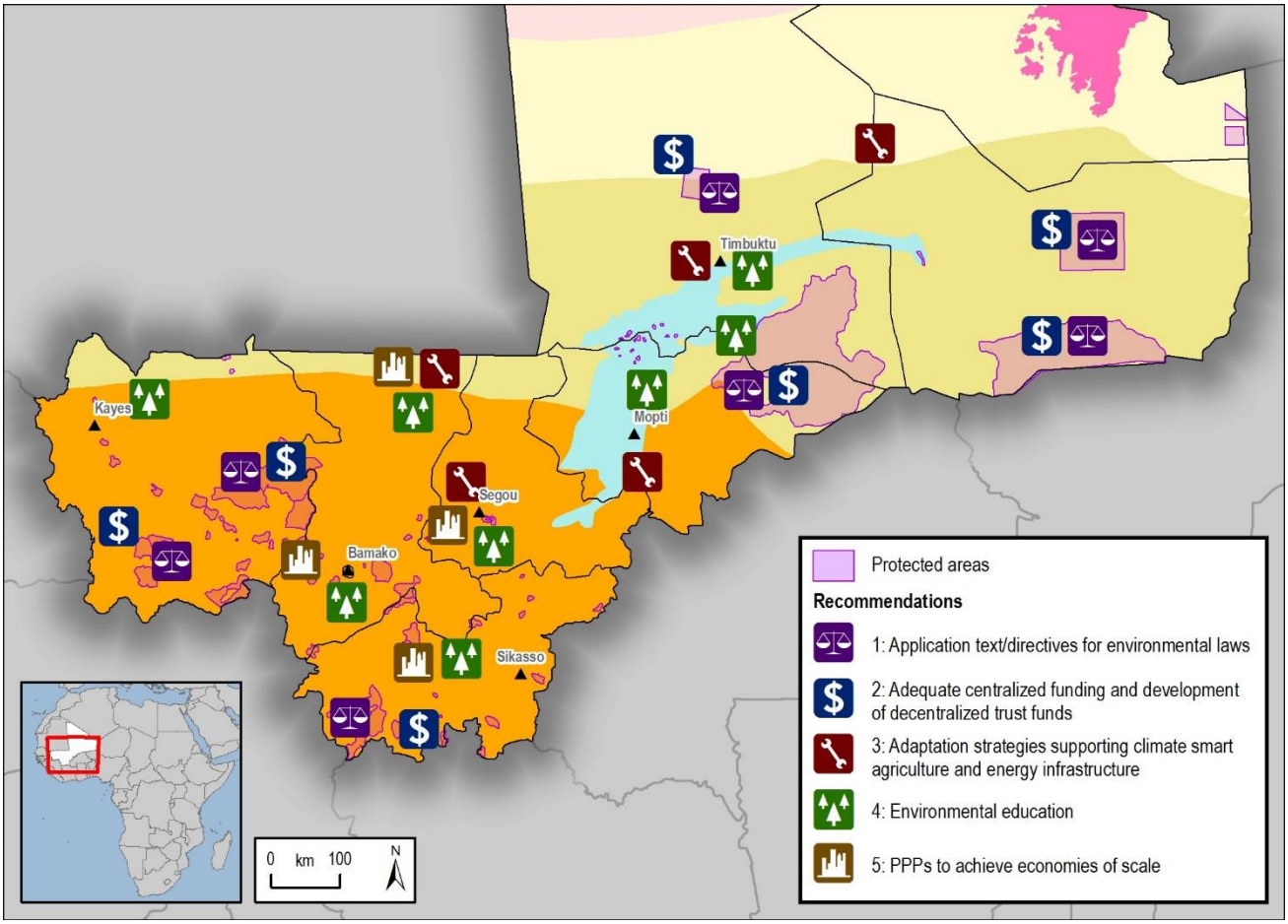
Dans Quelle Mesure Les Actions Courantes Et Proposées Du Programme De L'usaid Répondent-Elles Aux Besoins Identifiés

Les sections 118 et 119 de la FAA exigent une analyse de la mesure précisant si les actions proposées demandant un appui de l'Agence (i.e. recommandations) répondent bien aux besoins identifiés. Considérant que la programmation de l'environnement de l'USAID est relativement limité au Mali, **cette ETOA se concentre sur l'identification des opportunités permettant aux bureaux techniques de contribuer à la protection de l'environnement tout en réalisant leurs objectifs spéciifiques de développement**. Cette approche est cohérente avec d'autres ETOAs. Par conséquent, le tableau ci-dessous identifie là où des contributions sont prises ou pourraient être prises par les programmes de l'USAID / Mali.

O = Opportunité pour le programme de contribuer à la recommandation clé **+ = Recommandation Clé/Opportunité que l'USAID/Mali supporte déjà.**	**Croissancee Economique Accélérée (AEG)**	**Santé**	**Education**	**Democratie et Gouvernance**
1. Produire le texte d'application nécessaire (i.e. directives) concernant les lois environnementales existantes de sorte que chaque ministère concerné puisse appliquer pleinement les lois.				**O**
2. Assurer un financement adéquat pour l'environnement par le budget national et un "fonds fiduciaire" pour les APs constitué par des apports des industries extractives des ressources naturelles.				**O**
3. Élaborer des stratégies régionales et locales d'adaptation au CCG qui mettent l'accent sur les infrastructures et la promotion d'une agriculture durable adaptée au climat (CSA).	**+**	**O**		**O**
4. Intégrer les concepts de services écosystémiques dans les programmes d'éducation et de planification de l'utilisation des terres.			**O**	
5. S'engager dans des partenariats public-privés pour réaliser des économies d'échelle et investir dans des infrastructures qui maximisent les avantages sociaux et environnementaux avec une attention particulière pour les EIES.	**+**			

Zones Géographiques Cibles Pour L'application Des Recommandations

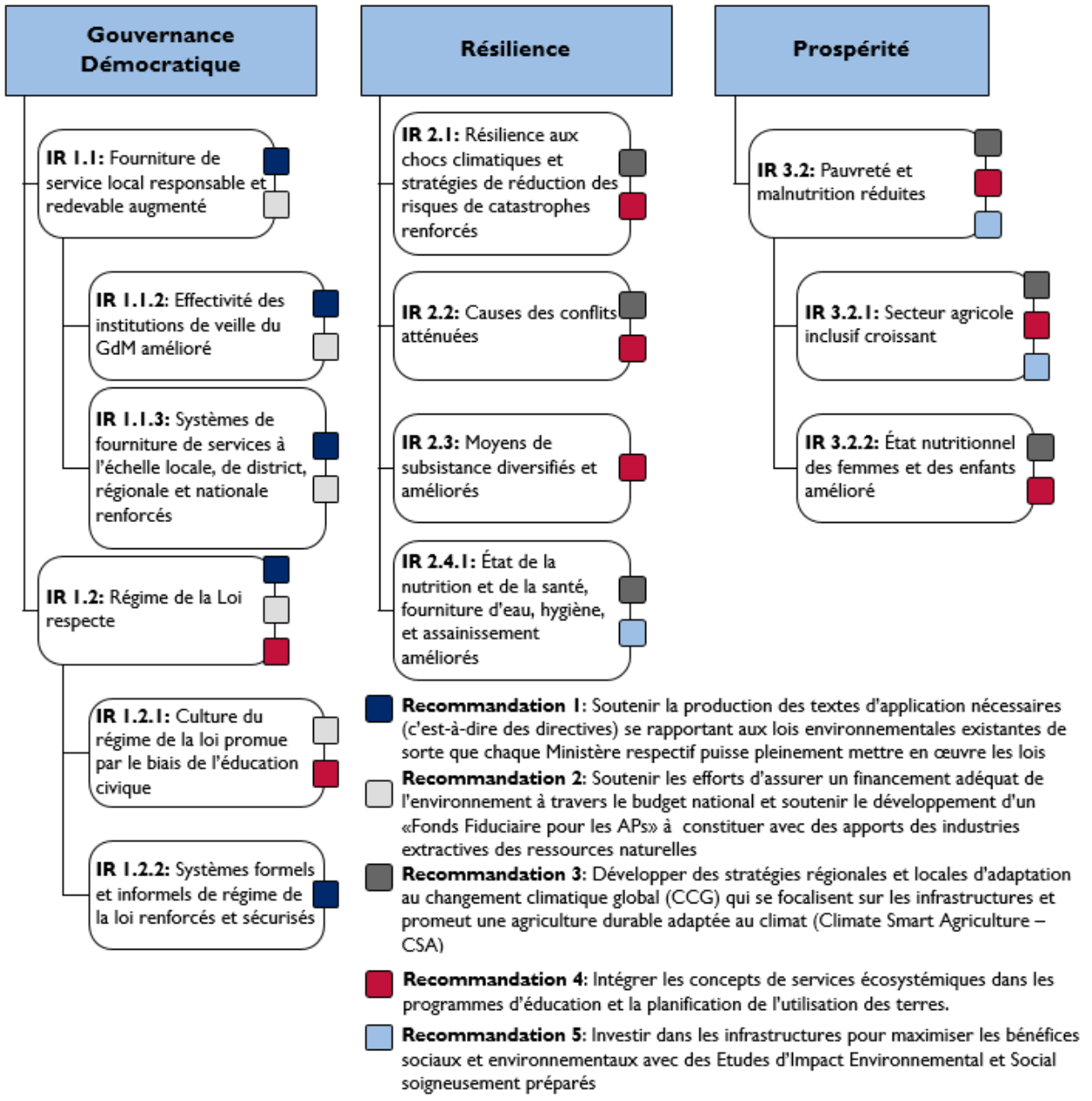
Les ressources limitées de la Mission nécessitent une concentration géographique pour les bureaux techniques et leurs programmes associés. Par exemple, les programmes de résilience au changement climatique de l'USAID sont focalisés sur. Mopti tandis que les programmes “Nourrir le Futur” sont eux axés sur Mopti et Sikasso, et pourraient aussi être déployés à Tombouctou si possible. La figure suivante illustre là où chacune des recommandations clés peut se concentrer à partir d'un point de vue géographique.



Lien Avec Le Cadre De Résultats De L’USAID/Mali

Comme indiqué ci-dessus, la mise en œuvre de ces cinq recommandations clés auront des résultats positifs pour l'environnement et contribueront à soutenir un développement économique durable en traitant les causes profondes de la dégradation de l'environnement. La mise en œuvre pourra également contribuer à atteindre les résultats intermédiaires comme spécifié dans le Document-Cadre de Résultats de l'USAID / Mali. Bien qu'aucune des recommandations clés ne soutienne les résultats intermédiaires de l'objectif de transition (non représenté sur la figure ci-dessous), plusieurs des recommandations, si appliquées, serait favorable à plus d'un résultat intermédiaire. Par exemple, la production des textes d'application nécessaires pour la mise en œuvre des lois sur l'environnement aiderait à accroître l'efficacité de la surveillance par les institutions du GdM (IR 1.1.2) et à renforcer le respect du régime de la loi (IR 1.2.2). Les autres recommandations se recoupent avec les Objectifs de Développement de l'USAID / Mali (DO). Par exemple, la recommandation de poursuivre les partenariats public-

privés pour construire ou gérer les ressources publiques est favorable à la fois aux Dos Résilience et Prospérité en soutenant la diversification et l'amélioration des moyens de subsistance (IR 2.3) et en soutenant la croissance du secteur de l'agriculture inclusive (IR 3.2.1). Des détails supplémentaires sur ces recommandations et les résultats attendus se trouvent dans la section de l'évaluation portant sur la Discussion des Recommandations Clés et Résultats.



I. INTRODUCTION

PURPOSE AND SCOPE

The USAID/Mali ETOA has been developed to support sustainable development across current and planned projects in the Mission's democracy and governance, education, health, agriculture, trade, nutrition, and climate change adaptation portfolios. The assessment focuses on the role of institutions and partners in environmental protection and NRM.

Specifically, the assessment was developed to support preparation of the USAID/Mali CDCS, to be a resource for the development of PADs, and to serve as a general resource for USAID and stakeholders in planning and implementation. This assessment meets the requirement to describe the status of and threats to biodiversity and tropical forestry conservation under Sections 117, 118, and 119 of the FAA of 1961, as amended, and USAID guidance on country strategy development, under ADS 201 and 204. It expands upon the 118/119 assessment by examining issues beyond the scope of tropical forests and biodiversity conservation, providing a broader analysis of Mali's environmental, social, and economic state. As such, this assessment supersedes the USAID/Mali 118/119 Assessment completed in 2008.

This assessment summarizes the current state of development in Mali (see Section II)—including economic dependency on ecosystems and ecosystem services—and describes the state of the environment and NRM (see Section III) in that context. This includes a description of biodiversity, forests, and natural resource-based industries (i.e., agriculture, fisheries, and mining). Environmental threats (Section IV) are described in terms of direct threats (i.e., priority issues) that contribute to root or ultimate causes.

This assessment also articulates opportunities to support environmental protection and NRM (Section V) through 40 recommendations (Section V) and five resulting key recommendations intended to broadly address the indirect threats. Section V also illustrates how these recommendations link to USAID program areas and describes the extent to which USAID current and planned actions meet these needs for programming identified by the recommendations. USAID/Mali's decision to prepare a more expansive ETOA (versus a more narrowly focused 118/119 assessment) stems from the recognition that opportunities exist for USAID to collaborate with other donors, non-governmental organizations (NGOs), government actors, and the private sector to address these threats. The discussion of key recommendations and outcomes (Section VI), based on review of the USAID/Mali Results Framework Paper, articulates how USAID can implement five key recommendations to enhance collaboration and achieve quantifiable results.

METHODOLOGY

The preparation of the USAID/Mali ETOA followed a two-staged approach. **Phase I** of the ETOA consisted of the preparation of a **draft tropical forestry and biodiversity assessment** (as required by FAA 118/119) to meet the timeline and needs of USAID/Mali's **CDCS development**. Phase I included a one-week desk review of available information on socioeconomic issues, ecology and conservation, and environmental management in Mali. This desk review was completed concurrent with preparations for the first of two one-week field missions. The first field mission, conducted the week of 17 November 2014, focused on interviews and stakeholder consultations with USAID and its partners in Bamako. The majority of meetings were held with

GoM entities, such as the AEDD and *Direction Nationale des Eaux et Forêts* (DNEF). A complete list of meetings held is provided as Annex A. Interviews with the USAID sector teams also provided an overview of mission programming.

While in Bamako, the ETOA team (see Annex A) facilitated a half-day stakeholder workshop on 20 November with more than 30 participants representing GoM, NGOs and the private sector. The workshop was convened to verify key issues and assumptions with regard to environmental threats and opportunities. During the workshop, the ETOA team also solicited input on the need to consider additional environmental issues in preparing the ETOA. The results of the workshop's small-group exercise generally validated the assumptions and key environmental threats identified through the desk review and initial stakeholder interviews.

Following conclusion of the November field work the ETOA team finalized the draft tropical forestry and biodiversity assessment for USAID review. The draft report did not reflect the full range of environmental issues typically addressed in an ETOA but instead served to enable USAID/Mali to proceed with the CDCS process. The draft integrated results of the initial and subsequent desk-–based research and analysis, stakeholder input, and GIS data collected from USAID and other publicly available sources.

Based on USAID feedback on the draft report and the specification of the Scope of Work, the ETOA team completed **Phase II**, the expansion of the tropical forestry and biodiversity assessment into an **ETOA** for use in **PAD development** that included a broader spectrum of environmental considerations including agriculture, industry, and water availability and quality.

Phase II began in early 2015 with an expansion of the literature review and additional research to address USAID comments on the draft forestry and biodiversity assessment. Phase II included field visits outside of Bamako the week of 25 February 2015 to the areas surrounding Kita (notably Boucle du Baoulé National Park) and the Morila Mine near Sanso. Phase II also included a visit to Mopti and surrounding areas the week of 16 February 2015. The objective of the field visits was to "ground-truth" the draft report's preliminary findings and appropriately expand the scope of assessment to that of a full ETOA. The second stakeholder workshop in Bamako also coincided with the field work. The workshop's objective was to verify the findings and recommendations of the ETOA and to foster a consensus among USAID and other environmental management actors.

This ETOA was finalized based on the additional field work, literature reviewed, GIS analysis, stakeholder consultations (Annex A), and USAID comments and feedback on the Phase II draft consistent with the approved Scope of Work.

II. BACKGROUND / DEVELOPMENT CONTEXT

SOCIETY

The land-locked West African country of Mali is bordered to the west by Mauritania and Senegal, to the north by Algeria, to the east by Niger, and to the south by Guinea, Côte d'Ivoire, and Burkina Faso. The most productive agricultural area lies along the banks of the Niger River between Bamako and Mopti and extends south to the borders of Guinea, Côte d'Ivoire, and Burkina Faso.

Mali is ranked 176 out of 187 countries on the 2014 Human Development Index.[1] More than half the Malian population lives on less than US $1.25 a day.[2] The country's agriculturally based economy remains underdiversified and susceptible to external shocks.[3]

With an estimated population of 16.5 million, nearly half of all Malians are less than 15 years old. Life expectancy at birth is 55 years and overall population growth is three percent. In 2012, Mali had a literacy rate of roughly 33 percent.[4] Recent data indicate the HIV/AIDS adult prevalence rate is approximately one percent, with 100,000 people living with the virus.[5]

The Mande people (Bambara, Malinke, and Soninke ethnicities) comprise 50 percent of the population; the Peul represent 16 percent; and the Voltaic, Songhai, Tuareg, Moor, and others represent the remaining 34 percent. All but five percent of Malians are Muslim; two percent are Christian and two percent are animists.[6]

POPULATION TRENDS

Mali's population growth rate has increased from one to three percent in recent decades.[7] Eight of Mali's 10 most populated cities are located on the Niger and Senegal Rivers, and much of the population growth has occurred in these areas following the *Grande Secheresse*, a drought in the late 1980s and early 1990s that forced migration to regions with more reliable access to water.[8] Today, these areas—surrounding Bamako and along the Niger Delta—have a population density almost three times that of more arid regions.[9]

Population shifts have also altered land and resource use in Mali. As the urban migration rate nears 6 percent, compared to a rural migration rate of 1 percent, demand for and use of water has increased, with water quality declining downstream of densely populated urban areas. Similarly, in the Niger Basin, population growth has led to increased cultivation in the area, supporting rice production and food security but contributing to degradation of downstream water quality from increased application of fertilizers, herbicides, and pesticides.[10]

Following the 2012 political conflict, 353,000 internally displaced persons (IDP) were reported in Mali, with most IDPs relocating to the urban areas of Bamako, Koulikoro, and Ségou. As of April 2014, 137,000 are still internally displaced, and lack of housing, food insecurity, and political instability deter this population's return to northern regions of Mali. Despite ratification of the Kampala Convention in 2012, Mali has not yet taken steps to implement the Convention's provisions and has not established a designated authority for overseeing assistance programs for IDPs.[11]

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[1] United Nations Development Program. (2014).
[2] The World Bank. (2014).
[3] U.S. Department of State. (2014).
[4] UNICEF. (2013).
[5] U.S. Department of State. (2014).
[6] Ibid.
[7] UNICEF. (2013)
[8] USAID. (2013).
[9] World Wildlife Fund. (Accessed November 2014).
[10] USAID. (2013).
[11] Rushing, E.J., & Foster, F. (2014).

ECONOMY

Mali's economy is largely based on the fertile floodplains of the Niger River. Agriculture accounts for 39 percent of gross domestic product (GDP), with 80 percent of the population engaging in farming, raising livestock, or fishing. Services (37 percent) and industries (24 percent), including gold and oil mining, represent the remaining 61 percent of GDP.[12] The country's fiscal status fluctuates with gold and agricultural commodity prices and the harvest; cotton and gold exports make up around 80 percent of export earnings.[13] The agricultural and fishing sectors are threatened by unsustainable practices such as overfishing, expansion of monoculture, and application of improper inputs and fertilizers. Over time, monocultures can deplete soil nutrients and contribute to soil alkalinity, decrease resilience to external shocks, and increase vulnerability to pests.[14] These impacts reduce agricultural productivity, and sorghum, cotton, rice, and pearl millet have all demonstrated decreased yields when grown in monoculture versus intercropping.[15,16,17] Periodic drops in gold and oil prices also adversely impact economic output. Although cotton, Mali's main export, is subject to low commodity prices, the gold market is especially sensitive to fluctuation. The country's continued dependence on foreign aid exacerbates fragile economic conditions.[18]

Ecosystem Services

The Sahel, savannah, forest, and riverine ecosystems of Mali provide an array of ecosystem services to surrounding communities. The value of provisioning services for crops, livestock, and fisheries can be monetized and is reported in GDP. However, many other services are not monetized. For example, the value of forest provisioning services like wild foods and bush meat—important for nutrition—and regulating services such as water regulation, air quality regulation (keeping down dust), and local climate regulation is not monetized. The degradation and depletion of these ecosystem services may pose a threat to Mali's economy in general, but may pose a disproportionate threat to subsistence-level households that rely on non-market benefits., These households cannot cost-effectively substitute for the services they receive (e.g.. substituting fuelwood for fossil fuels may be expensive, overexploitation of bush meat can deplete the resource and decrease food security). While poverty often underlies natural resource exploitation for food security and income, overuse of these resources can perpetuate the cycle of poverty as available agricultural inputs and outputs are reduced. Misuse and exploitation of agricultural and energy resources cost Mali almost US $2 billion in 2008, diverting resources from more proactive uses.[19] Further, with 80 percent of the population engaged in some form of farming or fishing, and the agricultural sector representing 39 percent of GDP, loss of natural resources would negatively affect job security, international trade, and economic growth.

Biodiversity in Mali presents opportunities for sustainable economic and agricultural growth, with many species utilized by local communities. For example, many of the country's plant species, such as marula, moringa, and safou, are used by indigenous populations for medicinal

[12] CIA (2014).
[13] Ibid.
[14] McNeil, D., Nesheim, I., & Brouwer, F. (2012).
[15] Kouyaté, Z., Diallo, D., N'Diaye, K., & Ayemou, A. (2012).
[16] Theriault, V. (2011, July).
[17] Samba, T., Coulibaly, B. S., Koné, A., Bagayoko, M., & Kouyaté, Z. (2007).
[18] U.S. Department of State. (2014).
[19] Consortium AGRECO. (2014).

purposes, alleviating dysentery, diarrhea, rheumatism, insect bites, and joint pain.[20, 21] For indigenous populations and communities, the sustainable use of natural resources has great economic and sociopolitical potential, both in creating a stable local economy and developing opportunities for community engagement, resilience, and autonomy in NRM.[22]

While sustainable use of natural resources can contribute to economic growth and sociopolitical empowerment, overexploitation poses a threat to the biodiversity of Mali. Hunting and poaching threaten many species—which contribute to the overall health of the ecosystem and its services—with extinction, including the African elephant, the chimpanzee, the hippopotamus, the Dama gazelle, and the cheetah.[23] Additionally, while hunting and poaching reduce the value of ecosystem services, lack of infrastructure may limit a community from fully benefiting from ecosystem services, and limiting full economic potential. At the same time, increased urbanization, infrastructure development, and urban population growth may exacerbate degradation of natural resources already affected by manmade and natural stressors.[24,25] The loss of biodiversity most threatens the highly diverse and productive areas of Plateau Mandingue, the Haut Bani Niger, the Delta Central du Niger, the Gourma, and the Adrar des Ifoghas.[26]

Ecosystem Services

Ecosystem services are the benefits provided by ecosystems to humans. The types of services generated by ecosystems include:

- Supporting (e.g. soil formation, nutrient cycling, primary production);
- Provisioning (e.g. food, fresh water, fuelwood, fiber, genetic resources);
- Regulating (e.g. climate regulation, disease regulation, water purification, pollination);
- Cultural (e.g. spiritual and religious, recreation, sense of place, cultural heritage).

Biodiversity is a valuable ecosystem service. A wide range of genetic materials increases the resiliency of an ecosystem and its inhabitants, and interaction between species generates vital regulatory functions. As the effects of climate change are more profoundly felt, the conservation of healthy ecosystems can help to mitigate the associated environmental stressors.

Source: FAO. (2014). AGP - Biodiversity and

GEOGRAPHY

Mali has a land area of 1,241,000 km^2 (about the size of Texas and California combined) and is subdivided into five main ecosystems:

- The Saharan zone is a desert ecosystem, and covers roughly 51 percent of Mali's land area. This zone has little to no forest production, with vegetation limited to thorny shrubs that depend on runoff as a water source.

- The Sahelian zone is a semi-desert ecosystem, and covers roughly 26 percent of Mali's land area. The Sahelian zone is defined by grassy steppes with less than 10 m^3/ha of forest production, with vegetation varying depending on elevation, topography, and soil quality.

[20] Worldwatch Institute. (2011)..
[21] Ministère de l'Environnement et de l'Assainissement du Mali. (Accessed November 2014).
[22] Ibid.
[23] IUCN. (2014a).
[24] Ministère de l'Environnement et de l'Assainissement du Mali. (Accessed November 2014).
[25] USAID. (2013).
[26] Convention on Biological Diversity. (Accessed November 2014).

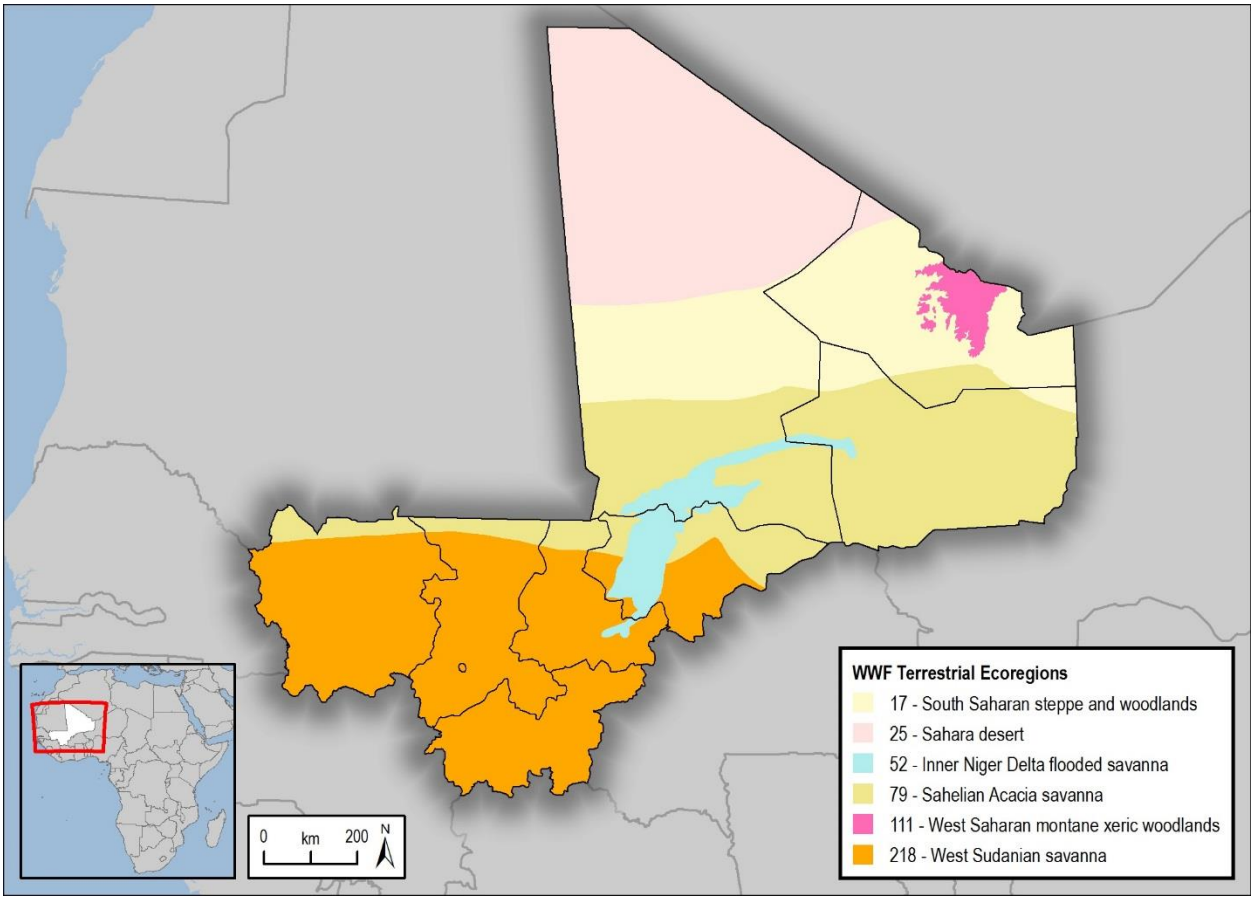
- The Sudanian zone is a savanna ecosystem, and covers roughly 17 percent of Mali's land area. The zone supports shrubbery and gallery forests and contains Baoulé National Park and Reserve.
- The Guinean zone (West Saharan) is a moist/humid forest ecosystem, and covers roughly 6 percent of Mali's total land area. The zone supports woodlands and open forests, with vegetation density ranging from 40 to 80 m^3/ha.
- The Niger Delta is a freshwater wetland covering about 64,000 km^2. This zone, which is the most heavily populated ecosystem in Mali, supports many plant and animal species and provides ecosystem services and natural resources to more than 1.5 million people.[27, 28]

Although nomenclature differs somewhat, these ecosystems align generally with the ecoregion classifications established by the World Wildlife Fund (WWF) for Mali. Those ecoregions are shown in Figure 1.

[27] Government of Mali. (2001).
[28] Consortium AGRECO. (2014).

Figure 1: Ecoregions of Mali

(Source: WWF (2012), Terrestrial Ecosystems of the World)



CONFLICT

Mali experienced a recent political conflict and humanitarian disaster, beginning with a rebellion in January 2012 that followed the return of Malians from Libya, exacerbating ethnic tensions with Tuareg groups in northern Mali. On 22 March 2012, a military group led a coup d'état, overthrowing President Touré. Interventions by the Economic Community of West African States (ECOWAS) supported the appointment of interim President Dioncounda Traoré, although instability continued as rebels established a stronghold in the northern regions, leading to the displacement of hundreds of thousands of people. In early 2013, Operation Serval, led by French troops and supported by the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA), removed rebels from major towns of northern Mali, and in August 2013, Ibrahim Boubacar Keita was elected president.[29] Legislative elections were held 24 November 2013, with President Keita's party gaining the large majority of seats in the national assembly.[30] The elections were considered by the United States to be free and fair.[31] Mali has

[29] U.S. Department of State. (2014).
[30] BBC. (2013).
[31] U.S. Department of State (2013).

since signed the Roadmap for Mali Peace Talks, moving towards a dialogue with northern groups.[32]

The crisis has negatively affected political, social, institutional, and economic conditions in Mali and has destabilized the security of both people and goods. The withholding of international assistance and decreased trade reduced the economic growth rate from 4 percent in 2011 to just over 1 percent in 2012. The migration of displaced persons from the northern regions of Mali also increased food insecurity and political instability in Mali's southern regions and neighboring countries.[33]

BIODIVERSITY

Mali supports numerous, diverse ecosystems and plant and animal species, with more than 1,739 identified species in the country, including the following endemic species:

- Eight endemic plant species (*Maerua de waillyi, Elatine fauquei, Pteleopsis habeensis, Hibiscus pseudohirtus, Acridocarpus monodii, Gilletiodendron glandulosum, Brachystelma medusanthemum, and Pandanus raynalii*);
- One endemic bird species (*Lagonistica virata*);
- Two endemic amphibian species (*Tomopterna milletihorsini* and *Amietophrynus chudeaui*); and
- Twenty-four endemic fish species (most notably *Syndodontis gobroni* and *Gobiocichla wonderi*).

Endemic fish and bird species are located primarily along the Niger River Basin, where aquatic ecosystems and Ramsar sites are found. Mali's endemic plant species are concentrated in areas surrounding the Mopti region—the Dogon Plateau and Bandiagara Escarpment—and the Mandingue Plateau of southwest Mali. Amphibian species are located in the northern Sudanian and western Sahelian ecoregions along the Bata Marsh.[34]

Ecoregion Biodiversity

Varied ecosystems, from the arid Saharan region in the North to the tropical forests of the South, create a range of habitats for flora and fauna, including many rare species. These fauna include 143 fish species, 640 bird species, and 136 mammal species, 70 of which are large mammals.[35]

Saharan

Woody plants and spiny shrubs dominate this region, and have been supported by *Direction Nationale de la Conservation de la Nature* (DNCN) dune stabilization projects that aim to reduce sedimentation and dune shifting due to drought-related loss of vegetation. Common flora species in this region include the *Cornulaca monocantha, Panicum turgidum, Aristida pungens,*

[32] U.S. Department of State (2014b).
[33] Consortium AGRECO. (2014).
[34] IUCN Red List. (Accessed 2015).
[35] Ministère de l'Environnement et de l'Assainissement du Mali. (2014).

A. longiflora, Calligonum comosum, Capparis decidua, Leptadenia spartium, Acacia raddiana, Cenchrus biflorus, and the eight endemic species listed above.

Fauna species of the Saharan include the dama and dorca gazelles, red-fronted gazelle, oryx, giraffe, desert hedgehog, Libyan cat, sand fox, sand cat, grass snake, horned viper, whiptail lizard, monitor gecko, and desert locust. These species are highly tolerant of hot, arid conditions, and are primarily nocturnal.[36]

Sahelian

Primarily comprised of grassy and shrubby steppe, cliffs, and sand dunes, the most common plant species of the Sahelian region include the *Acacia, Combretum,* and *Boscia* species, as well as *Guirea senegalensis, Balanites aegyptiaca,* and *Borassus aethiopium*.

Climate change has affected not only flora species in the Sahelian region, but fauna species as well. Many species common to the area—the dorca gazelle, rammed gazelle, red-fronted gazelle, antelope, oryx, elephant, rammed gazelle, mottled and striped hyenas, jackals, grass snakes, vipers, cobras, pythons, monitors, and tortoises—are in decline.[37] The biodiversity of the Sahel, a semi-arid region, is highly dependent on the region's rainfall, the variability of which is predicted to increase as a result of climate change. Increased frequency, variability, and intensity of droughts also increase the rates of desertification and deforestation, shifting ecoregions southward and altering habitats. Lastly, climate change has affected aquatic biodiversity. As agricultural productivity decreases due to climate change, intensification of irrigation and dam projects divert water resources and decrease availability of habitats.[38]

Inner Niger Delta

The Inner Niger Delta is considered Mali's most fertile zone, with flora characterized by grasses along the floodplains of the Niger River and trees in the southern gallery forests. Prominent plant species include *Acroceras amplectens, Echinochloa pyramidalis, E. stagnina, Eragrostis atroviriens, Andropogon gayanus, Cynodon dactylon, Hyparrhenia dissoluta, Mimosa asperata, Salix chevalieri, Cyperus maculatus, Kigelia africana, Hyphaene thebaica, Borassus aethiopum, Acacia nilotica, Guarea senegalensis, Mimosa asperata,* and *Ziziphus mauritiana*.

The Inner Niger Delta is also home to a number of bird species, including garganey, pintail, ferruginous duck, white-winged tern, ruff, black-tailed godwit, African spoonbills, purple swamp-hens, black-crowned crane, and river prinia. A diversity of mammals are also supported, including the striped weasel, African civet, caracal, serval, striped hyena, patas monkey, sand fox, African wild cat, West African manatee, roan antelope, bohor reedbuck, waterbuck, red-fronted gazelle, dorcas gazelle, dama gazelle, warthog, cape clawless otter, and spotted-neck otter.[39]

Guinean

The Guinean zone, a sub-humid region with readily accessible water resources, has 40 to 90 percent vegetation coverage, from savannahs to gallery forests.[40] Key plant species in this area

[36] U.S. Agency for International Development. (November 2008).
[37] Ibid.
[38] WWF. (Accessed November 2014).
[39] World Wildlife Fund. (Accessed November 2014).
[40] Ibid.

include *Khaya senegalensis*, *Sterculia setigera*, *Daniellia oliveri*, and *Afzelia africana*, with maize, yams, rice, millet, sorghum, groundnuts, cotton, and sugar cane cultivated as crops.[41]

The Guinean climate supports a number of species, including the hippopotamus, Buffon kob, python, baboon, green and red monkeys, cobra, green mamba, ground squirrel, Gambian rat, antelope, lion, Grand Calao/hornbill, crocodile, vulture, common jackal, turtle, tortoise, leopard, manatee, chimpanzee, derby eland, and giant Pangolin. While many species thrive in this region, large mammals are largely endangered or near extinction.[42]

Sudanian

The Sudanian region, primarily savannah and gallery forest, hosts a number of flora species, including *Vittelaria paradoxa* and *Khaya senegalensis* and the rare species *Bombax costatum and Isoberlinia doka*. Biodiversity in this region has shifted, though, as the timber industry has converted forest area to scrubland.

More fertile than the more northern ecoregions of Mali, the Sudanian region is diverse in its fauna species, including the baboon, red monkey, green monkey, antelope, impala, lion, striped hyena, jackal, civet, hippopotamus, manatee, porcupines, hare, ground squirrel, Gambian rat, grass snake, viper, cobra, python, lizard, crocodile, tortoise, locust, and tsetse fly.[43]

POLICY AND INSTITUTIONAL FRAMEWORKS

[See Annex B for Legislation]

[See Annex C for Institutional Stakeholders and Partners]

III. STATE OF THE ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT

PROTECTED AREAS AND ENDANGERED SPECIES

PAs have been established in Mali to protect and maintain regions defined as highly diverse, vulnerable, or productive, although these areas are also subject to exploitation, overuse, and desertification.[44] While acceptable activities in PAs differ by IUCN Protected Areas Category System classification (see below), nearby populations rely heavily on the natural resources of PAs, and preservation of these water, soil, and wildlife resources serves as a means of community empowerment and mobilization.[45] In addition to providing designated conservation regions, PAs present additional opportunities for sustainable development and economic growth in a country where more than half of the population lives in extreme poverty. Community-based development and management of hunting zones in the Gourma and Bafoulé reserves, for example, promotes intraregional cooperation, and stimulates economic growth through

[41] U.S. Agency for International Development. (2014a).
[42] U.S. Agency for International Development. (November 2008).
[43] Ibid.
[44] Convention on Biological Diversity. (2012).
[45] IUCN. (2008).

recreation and tourism. These areas also provide opportunities for scientific education and outreach and promotion of environmental and conservation ideals.[46]

Protected Areas and Ramsar Sites

Protected Areas

In preserving its biodiversity and natural resources, the GoM has established the following PAs to safeguard biodiversity and promote conservation efforts (see Figure 2):

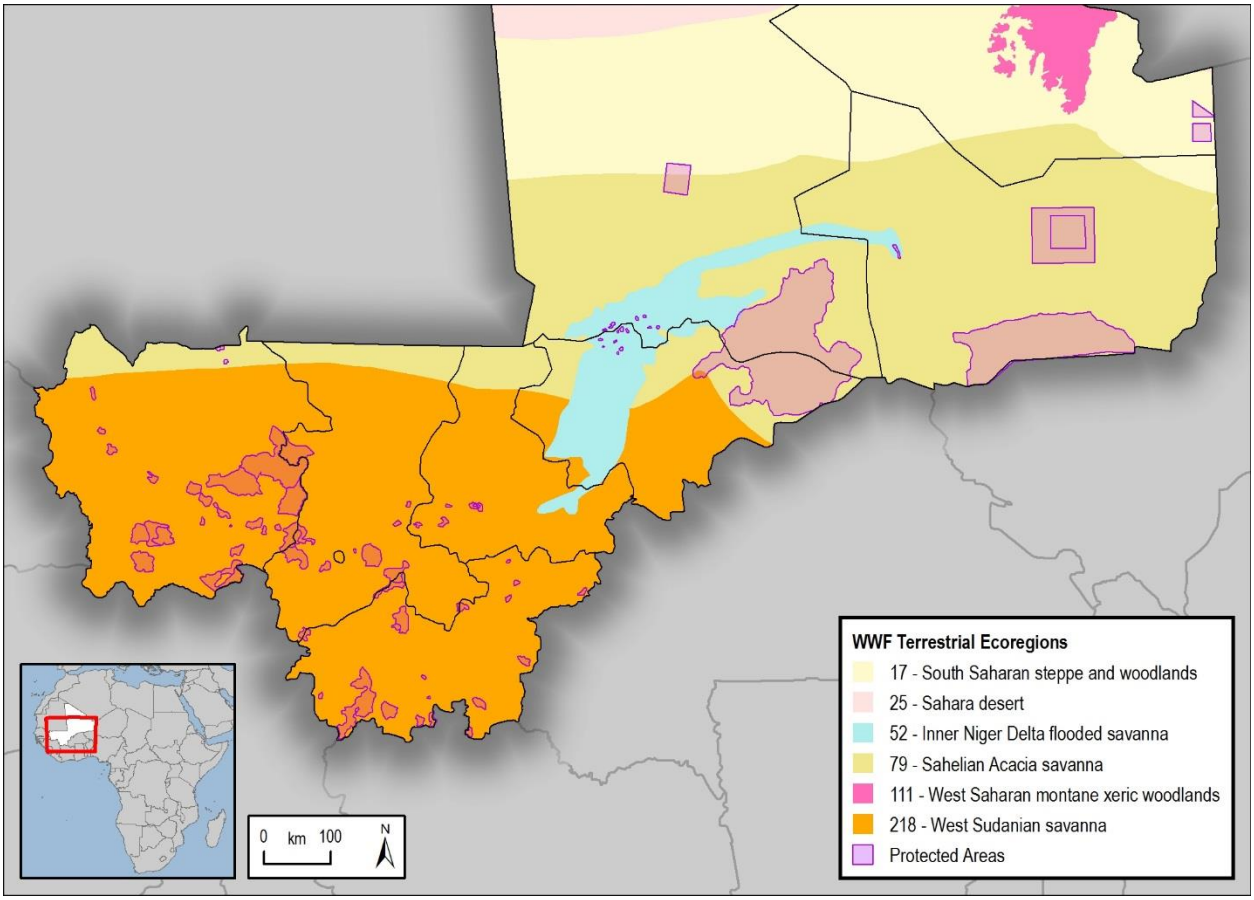
- Two biosphere reserves (Boucle du Bauolé, Bafing Falémé);
- Two national parks (Kouroufing, Wongo);
- Six nature reserves (Kéniébaoulé, Talikourou, Nienendougou, Sousan, Banifing-Baoulé, Siankadougou);
- Two partial reserves (Ansongo-Ménaka, Gourma);
- One chimpanzee sanctuary;
- Six hunting zones (Tidermène Alata, Inekar, Nienendougou, Banzana, Flawa).[47]

These areas reflect the IUCN Protected Areas Category System, an internationally recognized method of PA classification based on management objectives. Most PAs in Mali are considered to be Habitat/Species Management Areas. Mali also supports several UNESCO Biosphere Reserves and World Heritage sites:

- Category II: National Park – PAs are large natural or near-natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.
- Category IV: Habitat/Species Management Area – PAs aim to protect particular species or habitats and management reflects this priority.
- Category VI: PA with sustainable use of natural resources – PAs conserve ecosystems and habitats together with associated cultural values and traditional NRM systems.[48]
- UNESCO Biosphere Reserve – sites established by countries and recognized under UNESCO's Man and the Biosphere Programme to promote sustainable development and provide a site to test new sustainability and development practices.[49]
- UNESCO World Heritage Site – sites, monuments, and/or groups of buildings with significant cultural value.[50]

[46] Ibid.
[47] IUCN. (2008).
[48] IUCN. (2014b). *IUCN Protected areas categories system*.
[49] UNESCO. (2014).
[50] UNESCO. (Accessed January 2015).

Figure 2: Distribution of Protected Areas of Mali (2014) by Ecoregion
(Source: Government of Mali Protected Areas with WWF (2012), Terrestrial Ecoregions of the World; USAID, 2015)

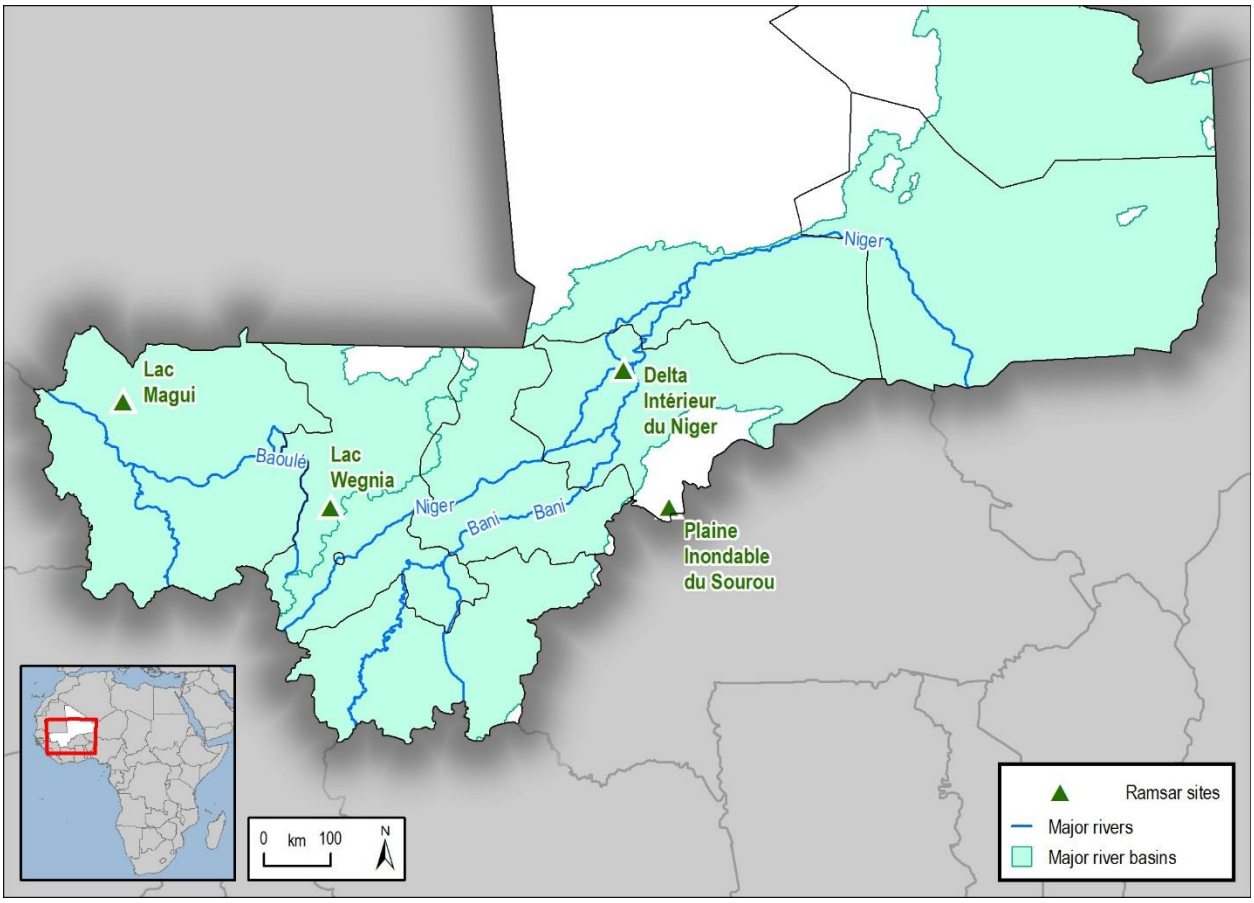


Ramsar Sites

Mali is home to four Ramsar sites covering more than four million hectares (see Figure 3).[51] Ramsar sites signify designated wetlands of importance, as guided by the Ramsar Convention. In helping to maintain and preserve the biodiversity and productivity of wetlands, countries party to the Ramsar Convention must work to identify wetland areas—lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made sites such as fish ponds, rice paddies, reservoirs and salt pans—to protect while pledging support for transnational wetlands.[52]

[51] Ramsar Convention. (2013).
[52] Ramsar Convention. (Accessed November 2014).

Figure 3: Distribution of Ramsar Wetlands Sites in Mali
(Sources: Natural Earth, 2015; Ramsar Sites Information Service, 2015; USGS HydroSHEDS, 2014)



Delta Intérieur Du Niger

Designated 1 February 2004, the *Delta Intérieur Du Niger* Ramsar site incorporates three previous Ramsar sites—Lac Horo, Séri, and Walado Debo—all designated 25 May 1987. This floodplain is located in the Sahelian region, and is the second largest wetland in West Africa, supporting a number of plant, bird, and fish species. The site provides opportunities for agriculture and fishing for the one million people who rely on the wetland's natural resources, and generates revenue through tourism.[53]

Plaine Inondable du Sourou

The *Plaine Inondable du Sourou* freshwater marsh was designated on 22 March 2013, and is located in the southern Mopti region. This site supports dozens of species, including two IUCN Red-Listed large mammals, the hippopotamus (*Hippopotamus amphibious)* and African elephant (*Loxodonta africana)*. This Ramsar site provides agricultural services and maintains hydrological balance in the region.[54]

[53] Ramsar Convention. (Accessed November 2014).
[54] Ibid.

Lac Wegnia

Lac Wegnia was designated a Ramsar site on 22 March 2013. Comprised of permanent freshwater lakes and marshes, it is home to diverse plant and animal species, including the *Crocodylus niloticus*. The site serves as a tourist destination, supporting local tourism and economic development. Exploitation of its flora resources, however, has led to rampant deforestation.[55]

Lac Magui

This freshwater lake was designated a Ramsar site on 22 March 2013. It provides several geological and regulatory services, including water retention, groundwater recharge, flood control, and shoreline stabilization. Its diversity of plant species also supports the area's animal population, particularly migrating bird species that use the site as a resting ground. Nearby communities rely on Lac Wegnia for agricultural and aquaculture resources.[56]

Given the recent establishment of three of Mali's four Ramsar sites, limited information is available regarding the state of biodiversity protection and conservation efforts at these sites. In a report preceding the 2015 Ramsar Convention, however, 10 ha of *Lac Wegnia* and *Lac Magui* had already been reforested.[57] The GoM and the United Nations Environment Programme continue to monitor the status of these sites and their natural resources in accordance with the Convention on Biological Diversity (CBD).

Status and Management

According to estimates from CBD, PAs in Mali, including Ramsar sites, hunting zones, and Biosphere Reserves, comprise 12 percent of total land area (see Table 1).[58] While efforts have been made to meet the CBD target of 15 percent terrestrial protection by 2010, these targets have not been reached.[59] With more than half of Mali's population living in poverty, natural resources are likely to be used illegally for agricultural or commercial purposes, with clearing, overgrazing, poaching, illegal fishing, and localized overuse of pesticides and other agro-inputs common in these areas. Further, given the current conflict and political unrest, the GoM is challenged to allocate the resources and support needed to adequately govern PAs and intervene in illegal activities. Lastly, climate change has affected the biodiversity and available natural resources of these areas by contributing to more frequent, prolonged droughts, floods, and other natural disasters.[60]

[55] Ibid.
[56] Ibid.
[57] Ramsar Convention. (2014).
[58] Convention on Biological Diversity. (2012).
[59] Convention on Biological Diversity. (2014).
[60] Convention on Biological Diversity. (2012).

Table 1: Protected Areas in Mali (as of 2012) [61]

Protected Areas in Mali	Area (ha)
National Parks and Biosphere Reserves (*Parcs Nationaux et Réseaux de Biosphère*)	2,832,639
Boucle du Bauolé Biosphere	*2,500,000*
Bafing Falémé Biosphere	*332,639*
Nature Reserves and Sanctuaries (*Réserves de Faunes et Sanctuaires*)	778,640
Partially Protected Nature Reserves and Sanctuaries (*Réserves Partielles de Faunes*)	3,000,000
Forest Reserves (*Forêts Classées*)	951,021
Hunting Zones (*Zones d'Intérêt Cynégétique*)	3,071,749
Wetlands of International Importance (Ramsar sites) (Zones Humides)*	4,119,500
Total Land Area	**14,886,188**

*Does not include Ramsar sites designated in 2013

PAs are managed through the DNCN, while regional management of PAs falls under the jurisdiction of the *Direction Régionale de la Conservation de la Nature* (DRCN), the regional branch of the DNCN. DNCN is a centrally organized agency, with staff operating at individual parks on a territorial level. While no official state-directed regional or local PAs exist, oversight for PAs is performed by offices on the Region, Circle, and Commune level. Nine regional directors operate under DRCN, 49 *services de la conservation* (SNC) operate at the Circle level, and 236 *antennes de la conservation de la nature* (ACN) operate at the Commune level. The complete decentralization and/or privatization of PA management is not yet fully established, but DRCN has jurisdiction to establish and manage local hunting areas for tourism and recreation. Actors such as World Bank and United Nations Development Programme (UNDP) have developed programs to implement regional integration of conservation activities.[62] For example, the World Bank Gourma Biodiversity Conservation project was designed to strengthen local conservation efforts through:

[61] Convention on Biological Diversity. (2012).

[62] IUCN. (2009).

- Local capacity building (communications, creation of Conservation Area Management Organizations, and training);
- Study development (ecological diagnostics and applied research);
- Creation and management of conservation areas (negotiation of conservation areas, preparation of management plans); and
- Implementation of conservation area management plans (construction of small infrastructure, surveillance of conservation areas).[63]

Threatened and Endangered Species

Mali is a signatory to all international biodiversity conventions, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora,[64] as well as a signatory to the Cartagena Protocol as of 2003.[65] Although NGOs and other institutions maintain records of vulnerable, endangered, and extinct species, Malian biodiversity inventories are outdated, and are neither adequately managed nor accessible to be considered accurate.[66]

According to the IUCN Red List, two species in Mali are critically endangered, 12 are endangered, 25 are vulnerable, and 26 are near threatened (see Table 2). The full list is in **Annex D**.[67]

Table 2: Threatened and Near-threatened Plant and Animal Species in Mali by Red List Category, 2014

Red List Category	Number of Species (Plants)	Number of Species (Animals)
Extinct	0	0
Extinct in the Wild	0	1
Critically Endangered	0	2
Endangered	3	9
Vulnerable	5	20
Near Threatened	3	23
Total	**11**	**55**

[63] World Bank. (2013).
[64] Convention on International Trade in Endangered Species of Wild Fauna and Flora. (Accessed November 2014).
[65] Convention on Biological Diversity. (2014).
[66] IUCN. (2008).
[67] IUCN Red List. (2014).

Figure 4 shows the geographic distribution and concentration of species in the IUCN Red List threatened categories (critically endangered + endangered + vulnerable). Areas with more threatened species appear darker red. Figure 5 shows the habitat areas of species classified as endangered or critically endangered with known geographic distributions. The location of endangered and critically endangered species tends to overlap with areas high in concentration of threatened species, suggesting environmental degradation or conditions contributing to poor biodiversity management in certain regions. Most of Mali's threatened species are located in the northern regions of the country, with the highest concentrations of threatened species clustered along the Algerian border in the West and South Sahara woodlands, including the critically endangered Dama gazelle (*Nanger dama*). The Sahelian region, which stretches across central Mali, also supports a high concentration of threatened species, including the endangered *Philochortus zolii,* a lizard species. Threatened species are also found in and along the Niger River, and the *Mecistops cataphractus* (slender-snouted crocodile), native to the southern Sudanian region, has declined in population due to human disturbance and habitat degradation. Most of the decline of these species can be attributed to decreased rainfall in northern regions as a result of climate change, agricultural destruction, overuse of natural resources, and human intrusion and exploitation of habitat.[68]

[68] IUCN. (2014a).

Figure 4. Number of Threatened Species

(Sources: The Cadmus Group, Inc., using the following published research UNEP (2006), Sahelo-Saharan Antelopes Status and Perspectives; Kingdon, Happold, Butynski, Hoffmann, Happold, & Kalina (2013), Mammals of Africa Volumes 1-6; IUCN (1998), Crocodiles; Ray, Hunter, & Zigouris (2005), Setting conservation and research priorities for larger African carnivores; Brochu et al. (2002), A Dyrosaurid Crocodyliform Braincase from Mali; Ultimate Ungulate (2013), Eudorcas rufifrons; Encyclopedia of Life (2015), Gazella dorcas; Convention on International Trade in Endangered Species (2008), The Status of Africa's Elephants: Emerging Challenges and Opportunities for Their Conservation and Management; Bergmans (1990), Taxonomy and biogeography of African fruit bats (Mammalia Megachiroptera).; Wagner (2006), Behavioral Ecology of the Striped Hyena (Hyaena hyaena))

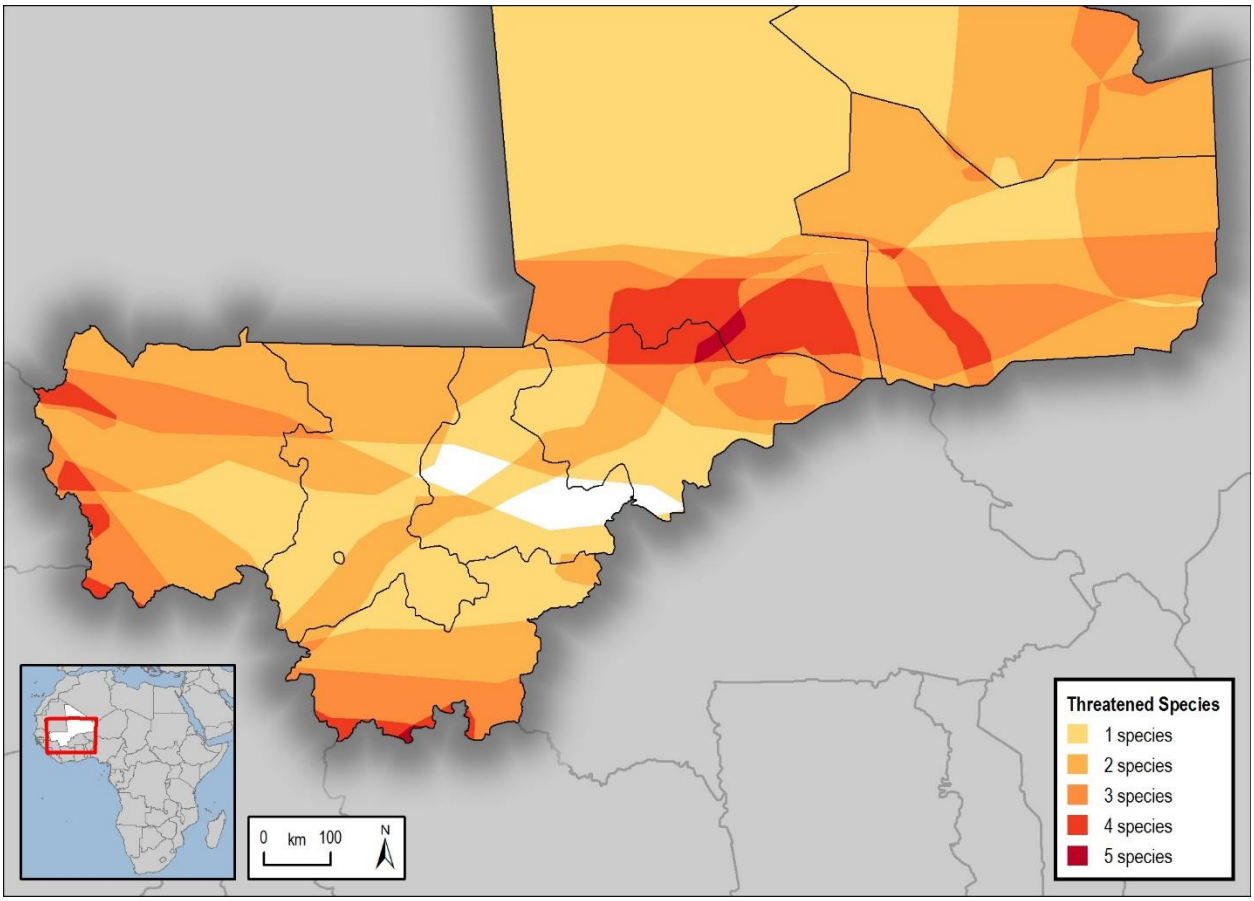
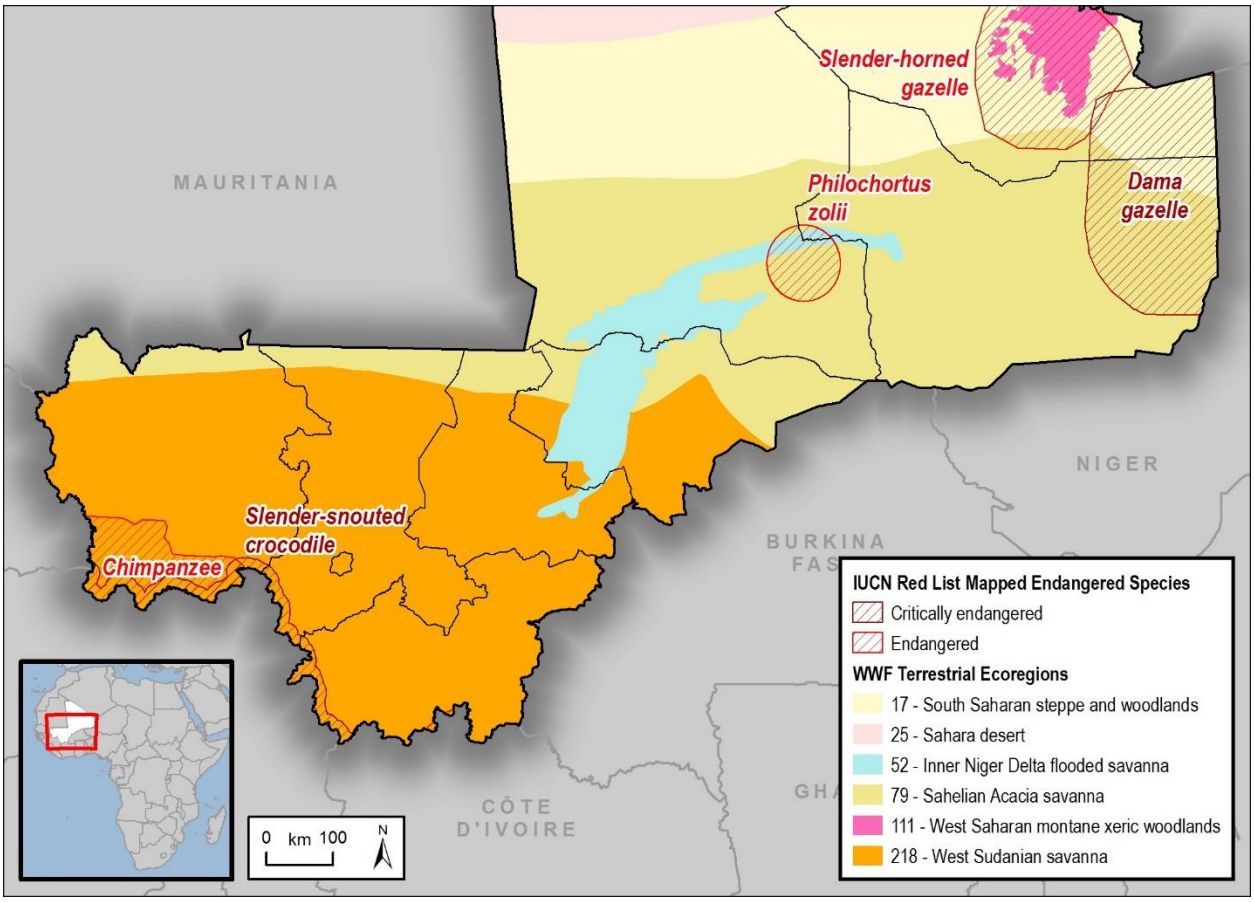


Figure 5. Endangered Species with Known Geographic Distributions and WWF Terrestrial Ecoregions

(Sources: The Cadmus Group, Inc., using WWF (2012), Terrestrial Ecoregions of the World; UNEP (2006), Sahelo-Saharan Antelopes Status and Perspectives; Kingdon, Happold, Butynski, Hoffmann, Happold, & Kalina (2013), Mammals of Africa Volumes 1-6; IUCN (1998), Crocodiles; Ray, Hunter, & Zigouris (2005), Setting conservation and research priorities for larger African carnivores; Brochu et al. (2002), A Dyrosaurid Crocodyliform Braincase from Mali; Ultimate Ungulate (2013), Eudorcas rufifrons; Encyclopedia of Life (2015), Gazella dorcas)



Protection of endangered species has typically been governed by local communities, with village elders overseeing NRM and imposing and enforcing rules in adherence to religious and spiritual considerations. As Islam has become more influential in Mali, however, decentralized governance has decreased, with regulations and attitudes towards conservation, hunting, and land use shifting away from traditional Malian norms.[69] External actors have led successful programs to support regional management of conservation efforts (see Section V for case studies, and Annex F for a full list of environmental activities).[70]

[69] Robertson, P. (2001).
[70] The World Bank. (2013).

FOREST RESOURCES

Status of Forests

Forests comprise roughly 10 percent of Mali's total land cover as of 2014 (see Table 3 for breakdown by forest stand type),[71] a number that has been declining since 1990.[72,73] Mali's forests provide a number of environmental, economic, and sociocultural services, and contributed US $423 million to the GDP in 2011, approximately five percent.[74] These forests are located primarily in the southern Sudanian region of Mali, where rainfall is more frequent and less variable, although these areas are rapidly undergoing development (Figures 6 and 7). Among these services is the production of woody and non-woody forest products for commercial use, including heating wood, charcoal, construction wood and timber, tamarind, shea, nere, and Arabic gum.[75]

Table 3: Area of Forest Stands (2006)[76]

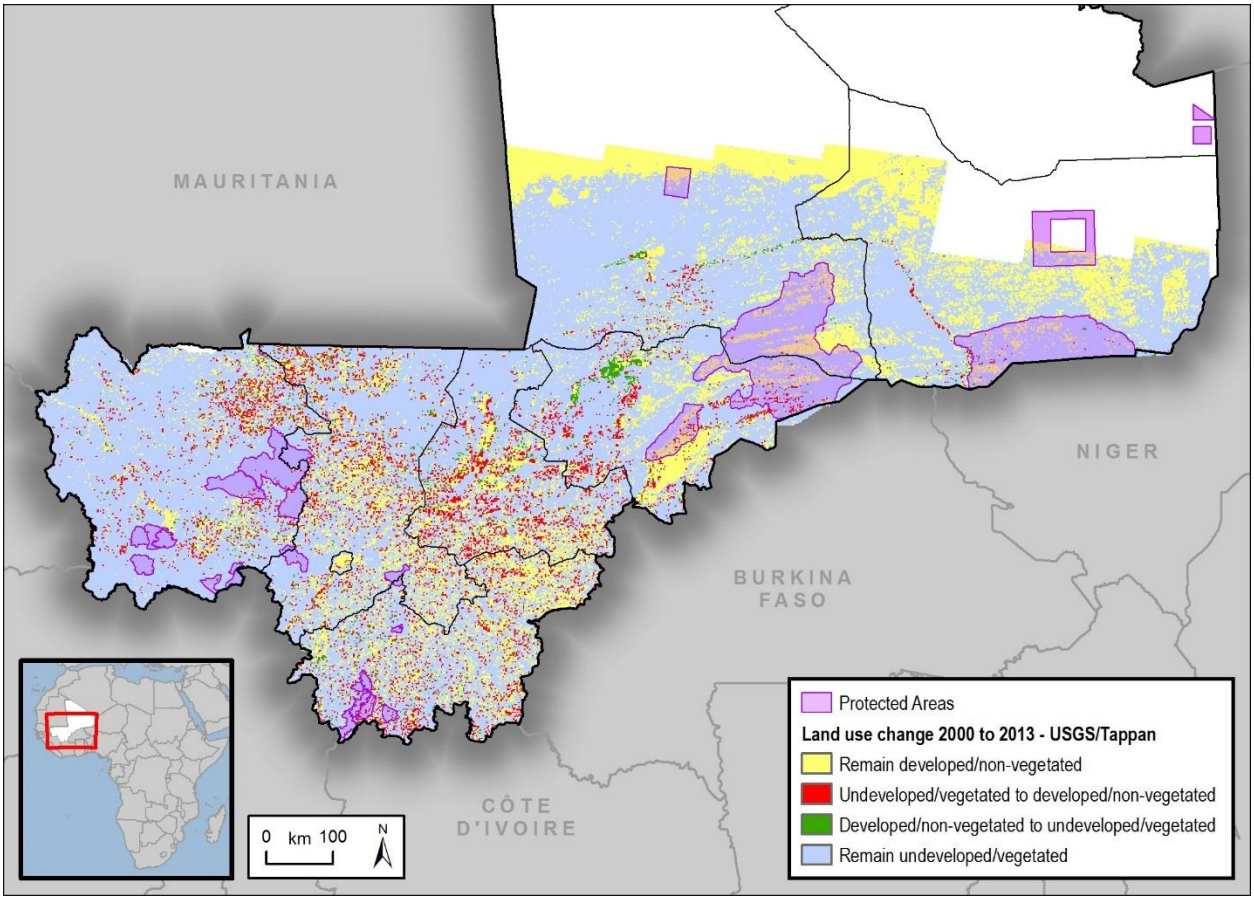
Category	Ground Cover (%)	Average Volume (m^3/ha)	Area (thousands of ha)
Dense shrubby savannah (thicket)	15-20	11-15	9,808
Sparse savannah	5-10	5-10	9,888
Tree-planted savannah	15-20	15-20	1,123
Wooded savannah and gallery forests	20-60	20-30	701
Fallow land		8-10	633
Shrubby steppe	2-3	0.5-2	1,870
Tree-planted steppe	3-4	2-3	92
Orchards and parks		8-14	6,381
Clear forests	60-80	60-90	1,174
Total			**31,670**

[71] The World Bank (2014b).
[72] United Nations Development Group. (2004).
[73] Global Forest Watch. (2014).
[74] Ibid.
[75] United Nations Development Group. (2004).
[76] Kanouté, S. (2010).

Besides direct economic benefits, forests also serve as wildlife habitats, supporting biodiversity in Mali. The plant and animal species, including endemic species, found in Mali's forests provide nutritional and medicinal resources for rural populations and local communities as well as places of worship and spiritual and cultural importance.[77] The future of these resources, however, is uncertain due to degradation of forests, exploitation of resources, and the expanding needs of a growing population.[78] The depletion and degradation of forest cover in Mali is three-fold, with loss of commercial, ecological, and nutrition services. Further, in 2011, forestry-based land-use change contributed to approximately 20 percent of greenhouse gas (GHG) emissions in Mali, according to the FAO (Food and Agriculture Organization).[79]

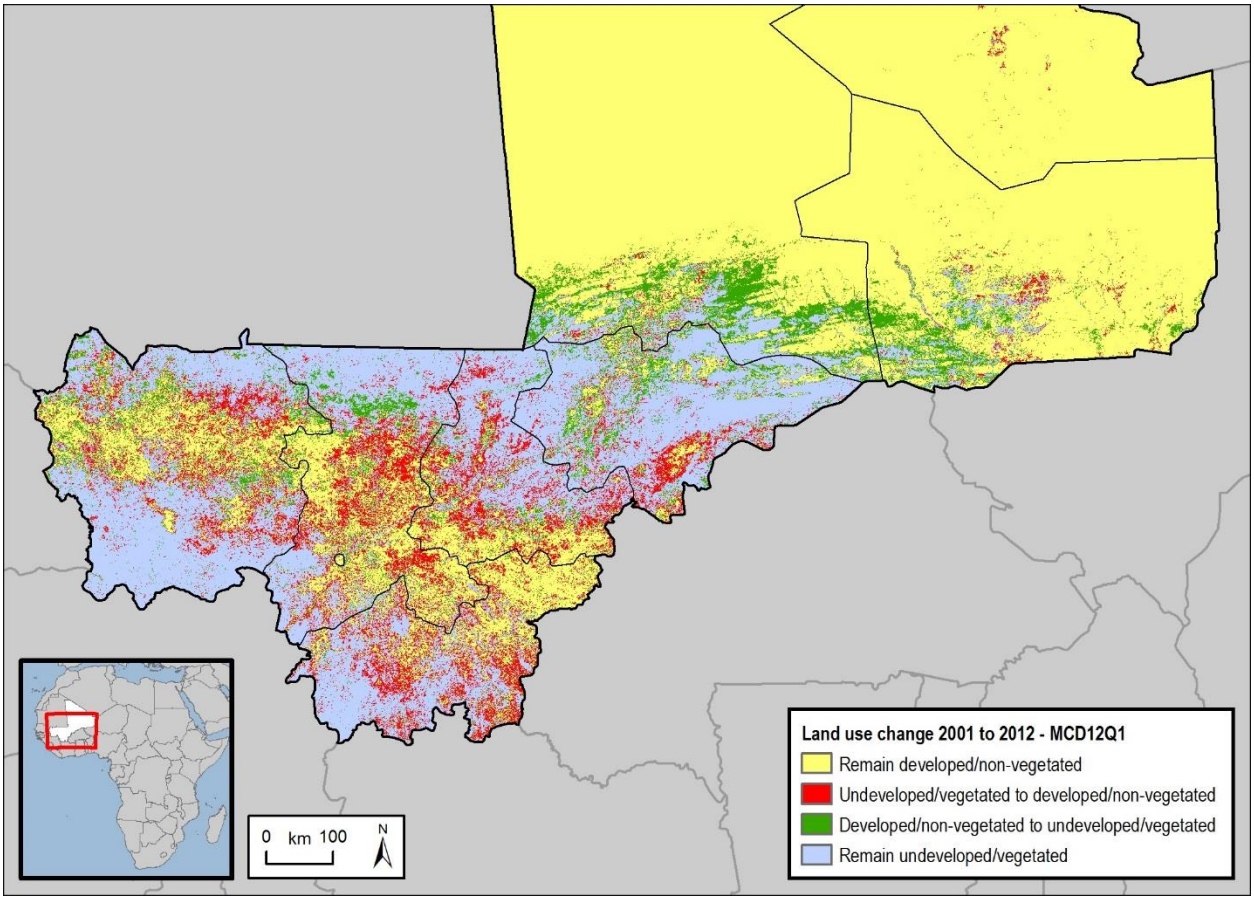
Figure 6: Land Use Change in Mali, 2000-2013

(Source: The Cadmus Group, Inc., using U.S. Geological Survey data)



[77] Ibid.
[78] International Fund for Agricultural Development (2011).
[79] Global Forest Watch. (2014).

Figure 7: Land Use Change in Mali, 2001-2012
(Source: Cadmus, using U.S. Geological Survey data)



Forest Management and Policy

Forest management in Mali is split between the Ministry of Environment and MEA. These governing bodies delegate responsibility to regional and sub-regional departments and local authorities for a decentralized system of governance, although coordination between these entities is often precarious.[80] The United Nations Millennium Development Goals also guide forest management strategy in Mali, although achievement of 2015 goals for sustainable development and status of natural resources is unlikely given the current rate of deforestation.[81] Additionally, the adoption of the National Environmental Protection Policy (PNPE) in 1998 has guided sustainable management programs, known as National Action Programs (PAN): [82, 83]

- The *Programme d'Aménagement du Territoire* (National Development Program);
- The *Programme de Gestion des Ressources Naturelles* (NRM Program);
- The *Programme de Maîtrise des Ressources en Eau* (Water Resource Control Program);

[80] Ibid.
[81] Ibid.
[82] Diakite, I. (2007).
[83] Kanouté, S. (2010).

- The *Programme d'Amélioration du Cadre de Vie* (Lifestyle Improvement Program);
- The *Programme de Développement des Ressources en Energie Nouvelles et Renouvelables* (New and Renewable Energy Resource Development Program);
- The *Programme de Gestion de l'Information sur l'Environnement* (Environmental Information Management Program);
- The *Programme d'Information, d'Education, et de Communication en Environnement* (Environmental Information, Education, and Communication Program);
- The *Programme de Suivi de la Mise en Oeuvre des Conventions* (Convention Implementation and Monitoring Program); and
- The *Programme de Recherche sur la Lutte Contre la Désertification et la Protection de l'Environnement* (Environmental Protection and Anti-Desertification Research Program).

Internationally, Mali maintains an active role in policies, conventions, and treaties related to forest management, and it is party to the following conventions:

- Convention on Biological Diversity (Ratification),
- United Nations Framework Convention on Climate Change (Non-annex I Party),
- Kyoto Protocol (Ratification),
- United Nations Convention to Combat Desertification (Ratification)
- International Tropical Timber Agreement (Producing Member),
- Convention on International Trade in Endangered Species (Accession),
- Ramsar Convention (Contracting Party),
- World Heritage Convention (Acceptance),
- Non-legally Binding Instrument on All Types of Forests (Member State).

AGRICULTURE

As stated earlier, agriculture accounts for 39 percent of GDP, with 80 percent of the population engaging in farming, raising livestock, or fishing.[84] Agricultural production indices have risen steadily since 2002, from 82.2 to 151.0 in 2012.[85] With millions of livelihoods dependent on agricultural production, which is determined by highly variable climactic conditions, the GoM has provided strong support for programs and policies that bolster agriculture, increasing funding for the agricultural sector by approximately 80 percent from 2004 to 2010 in an effort to improve food security and foreign trade relations.[86]

Development of the Cotton Sector

While Mali relies heavily on small-scale agriculture for food security of households and communities, the Rice Initiative, established in 2008, has promoted the production of wheat, maize, sorghum, cowpea, millet, and, most prominently, cotton.[87] Mali is the top cotton producer in West Africa,[88] and cotton production contributes to 25 percent of the country's total exports, 8

[84] U.S. Department of State. (2014).
[85] Food and Agriculture Organization. (2014).
[86] Food and Agriculture Organization. (2013).
[87] Ibid.
[88] Russell, K., & Sylla, F. (2012).

percent of GDP, and 6 percent of government tax revenues. Cotton is grown primarily in southern Mali, in the Kayes, Koulikoro, Segou, and Sikasso regions along the Niger River.[89]

The value of cotton exports has increased significantly, from US $170 million in 2010 to US $275 million in 2013.[90] Total production of cotton also increased from 2011 to 2012, despite lack of rainfall, with production totaling 445,000 tons, an 83 percent increase from previous years. Much of the success of the cotton sector in Mali is owed to an aggressive campaign by the GoM and the *Campagnie Malienne pour le Développement des Textiles* (CMDT), a semi-public company. In 2011, CMDT launched a national campaign to increase farmer awareness of cotton production potential, and to encourage farmers to return to cotton production despite less-than-ideal agricultural conditions. The campaign also included subsidies for agricultural inputs, as well as loan forgiveness for all cotton-related debts incurred in 2010–2011. The campaign was deemed successful, with the price of cotton increasing from US $0.37/kg to US $0.51/kg.[91]

Threats to Agriculture

Mali's agricultural sector faces environmental, political, and economic challenges that threaten its productivity. Agricultural production is highly dependent on rainfall, and as climate change increases the variability of rainfall and weather patterns, uncertainty in the timing and level of rainfall can negatively affect agricultural output both in volume and quality.[92] Further, the most common agricultural pests in Mali, particularly those that threaten cotton crops, thrive under hot and dry conditions. As average temperatures increase and rainfall fluctuates, pests and diseases— cotton leaf roller, Egyptian cotton leafworm, spiny bollworm, cotton aphid, cotton bollworm, pink bollworm, red bollworm, and cotton virescence disease—will pose threats to agricultural productivity.[93] Additionally, as agricultural programs and practices are expanded, degradation of soil quality and arable land reduce output and quality of crops.[94]

Structural inefficiencies in policy also limit the growth potential and capacity of Mali's agricultural sector. A weak marketing infrastructure for crops inhibits full economic development, and excessive trade margins from brokers, as well as prohibitive illegal trade route taxes, discourage small-scale farmers from selling their products beyond their communities. Government programs to assist farmers, while successful in the short term, have been deemed unsustainable, with CMDT incurring debt to bolster cotton production activities. The recent political conflict has also shifted attention and resources away from agriculture and has generated concern among foreign investors and stakeholders, decreasing exports, weakening trade relations, and destabilizing prices.[95]

Farmers often lack the knowledge, resources, and support necessary to sustain viable crop production. While GoM and CMDT have committed to providing low-cost, subsidized agricultural inputs and fertilizers, farmers often lack access to these resources. Conversely, when government-supported agriculture programs are successful (e.g., promotion of cotton production), lack of crop diversification can degrade soils and create economic risks in case of crop failure. Although the GoM has shown strong support for agricultural programs and

[89] TAP for Cotton. (2012).
[90] United Nations. (2012).
[91] Russell, K., & Sylla, F. (2012).
[92] Food and Agriculture Organization. (2013).
[93] USAID. (2014).
[94] Food and Agriculture Organization. (2013).
[95] Ibid.

activities, farmers often do not have adequate access to credit or knowledge of best practices to implement these ideas. Lastly, inadequate production and storage facilities reduce the potential for value chain enhancement and increase waste costs.[96]

Agriculture and Environment

With heavy reliance on production and strong government support for growth and development, Mali's agricultural sector is vital to its economy, but it also places pressure on the environment and local ecosystems. Overuse and exploitation of resources have led to degradation, erosion, and silting of soil, as poverty drives overharvesting and unsustainable use of agricultural land. Soil depletion can further reduce crop volume and quality, creating challenges in promoting economic development and poverty reduction through agricultural activities. Additionally, expansion of agricultural activity, conversion of land, and depletion of soils contribute to desertification, an issue further exacerbated by climate change. Desertification has resulted in loss of water points, fish ponds, farmland, and pasture, altering ecosystems, disrupting local agriculture industries, and creating conflicts between groups and sectors that rely on limited resources and arable land for nutritional and economic resources. Further, current agricultural practices have resulted in extensive deforestation in Mali. At a rate of 6 percent forest loss annually, deforestation accounts for a 4 to 6 percent loss in GDP.[97]

FISHERIES

Status

Fisheries in Mali contribute greatly to nutritional and economic security in the country. The population of Mali relies heavily on fisheries for food security, with fish and fish products contributing to 60 percent of total animal protein intake.[98] About 100,000 tons of fish are caught annually in Mali, with 80 percent of the catch used for processed fish products such as dried or smoked fish.[99] While imports exceed exports, the trade of fish is vital to Mali's economy, providing 120,000 primary and 500,000 secondary jobs. Imports have increased steadily since 2002 from 2.5 million kg to 19.0 million kg in 2012,[100] with main trading partners including Spain, Poland, the United States, China, the Netherlands, Germany, and South Africa.[101]

The two main fishing zones of Mali are the lake zones (Selingue and Manantali) and flood zones (Central Niger Delta).[102] The Selingue reservoir is particularly productive due to its proximity to Bamako, with the two areas linked by high quality roads, encouraging trade and economic development.[103] About 40 percent of fishing sites are located in the Timbuktu area, 20 percent in Mopti, and 15 percent in Ségou. Médine, the central market in Bamako, is the major fresh fish marketing center, and the Mopti fishing port is the major port and fish production center in

[96] Ibid.
[97] Ibid.
[98] World Wildlife Fund. (Accessed January 2014).
[99] Consortium AGRECO. (2014).
[100] United Nations. (2014).
[101] Nosis. (2014)..
[102] Embassy of Mali. (Accessed January 2015).
[103] USAID. (2014).

Mali.[104] The Niger River also supports fisheries in countries downstream of Mali, mandating transboundary cooperation.[105]

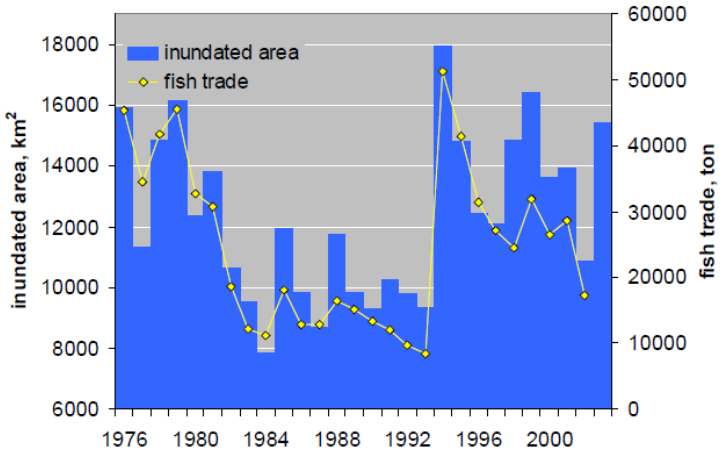
Mali supports 130 fish species, two of which—*Syndodontis gobroni* and *Gobiocichla wonderi*—are endemic to the country. Fifteen of these species, however, have disappeared due to overfishing, with 10 more severely threatened.[106] Catch volume has decreased steadily over the past 20 to 30 years due to unsustainable practices, and most fisheries in Mali have reached their maximum capacity as signaled by the relatively young age of the fish population less than one year).[107]

Threats and Issues

Many of Mali's primary fishing sites have reached maximum capacity, and sustaining current levels of harvesting and production of fish and fish products will depend on effective NRM policies and programs, as well as mitigation and adaptation to climate change effects.

Independent of anthropogenic factors, natural variability in rainfall and flooding affects water levels and availability, with fishery capacity increasing with increased rainfall and flooding (see Figure 8). Decreased flooding can significantly reduce fish production, and extended droughts have devastated communities dependent on fish for nutritional and economic security.[108]

Figure 8: Fish Population Dependence on Annual Flooding, USAID 2014



Additionally, pressure is placed on Mali's fisheries as the population moves to areas near rivers and lakes, particularly the inner delta region. The population density in this area is almost three times higher than the national average, placing stress on natural resources and decreasing the quality of nearby bodies of water, thus degrading the quality of fisheries. Further, as populations move towards these fertile areas, land use changes to meet agricultural needs can threaten the status of fisheries. Construction of dams has reduced catch volume as downstream flows are reduced, altering migratory paths and flooding patterns. The use of floodplains for agriculture

[104] Organization for Economic Co-operation and Development. (2008).
[105] Embassy of Mali. (Accessed January 2015).
[106] Consortium AGRECO. (2014).
[107] USAID. (2014).
[108] USAID. (2014).

has also affected fisheries in Mali, and the development of large irrigation projects has altered floodplain ecology and decreased the availability of fish in those areas.[109] According to USAID, however, the economic benefits of irrigation development outweigh the fishery production losses in the inner delta.[110]

Poaching and overharvesting also threaten the sustainability of fisheries in Mali. As fishery management has shifted away from traditional governance systems, in which only certain groups were allowed fishing rights, overharvesting has decreased volume and diversity of total catch. The illegal capture and use of other species has also contributed to fishery decline.[111] Local bird species provide water nutrients that sustain fish populations, and declining bird populations have a wider effect on floodplain ecology and fishery capacity.[112]

Commercial fish products are also susceptible to physical and quality losses during production, processing, and distribution processes. Approximately 11 to 21 percent of fish products experience quality loss, mostly from poor icing practices, inadequate insulation measures, mishandling of product and spoilage. Fish are often press packed and transported in open trucks on unpaved roads, and time spent tending to vehicular issues can increase the chance of spoilage.[113]

MINING

Status of Mineral Resources

Mali has vast mineral resources, only some of which are under development. Gold is Mali's principal mineral commodity, along with phosphate rock, rock salt, kaolin, uranium, gypsum, granite, semiprecious stones (including amethyst, epidote, garnet, prehnite, and quartz), and small quantities of diamonds that are produced as a byproduct of gold mining.[114,115] Mali's undeveloped mineral resources include bauxite, chromium, copper, iron ore, lead, lithium, manganese, marble, nickel, niobium, palladium, rutile, silver, talc, thorium, tin, titanium, tungsten, and zirconium.[116,117] This section focused on the environmental impacts of gold mining since it is Mali's most significant mineral commodity.

Gold Production

Mali produces an average 50 metric tons of gold annually and is the third largest gold producer in Africa (Figure 8).[118,119] Gold has surpassed cotton as Mali's primary export commodity and accounts for 75 percent of Mali export receipts and 24 percent of GDP.[120,121]

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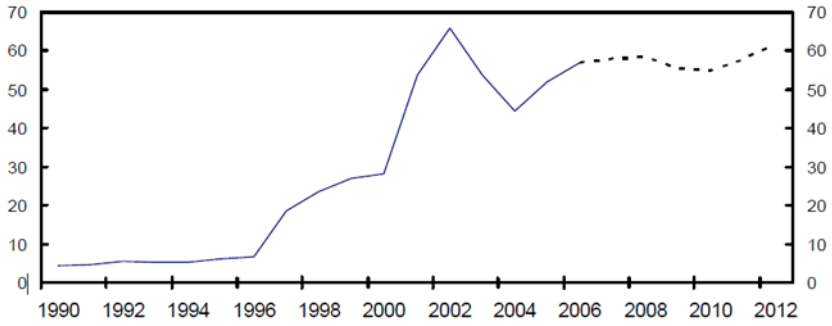
[109] World Wildlife Fund. (Accessed January 2014).
[110] USAID. (2014).
[111] Ibid.
[112] Diarra, S.T. (2013).
[113] Akande, G & Diei-Ouadi, Y. (2010).
[114] USGS. (2013).
[115] CIA. (2014).
[116] USGS. (2013).
[117] CIA. (2014).
[118] Diallo. (2013).
[119] IMF. (2008).
[120] Diallo. (2014a).
[121] IMF. (2008).

Figure 8: Mali Gold Production, 1990-2012 (in tons), IMF 2008



Mali has 600 tons of proven gold reserves.[122] There are two major types of gold mining in Mali: large-scale foreign-direct investment (FDI) mines and small-scale or artisanal mining operations. Both activities are concentrated near the southwestern border of Mali. There are nine active FDI mines. The mining operations are joint ventures, with the Mali government holding a minority stake (18 to 20 percent) while the majority is held by large mining companies, including Endeavour Mining Corp., AngloGold Ashanti Ltd., Randgold Resources Ltd., IAMGOLD Corp., Avnel Gold Mining Ltd., and Resolute Mining Ltd.[123,124]

Gold production by small-scale artisanal miners is estimated to be about four to five tons per year.[125] Although small-scale and artisanal mining produces less gold overall, its output is increasing due to an influx of workers and mechanization, including mining equipment from China.[126] Exports from small-scale mining rose from approximately two tons in 2012 to 21 tons in 2013, which contributed to an overall gold export increase from 45 tons in 2012 to 67 tons in 2013.[127]

The future prospects of large-scale mining will be influenced by gold prices, as foreign investment drives a significant portion of large-scale mining, and investment decisions heavily influence overall gold production.[128] The Yatela mine began suspending mining activities in 2013 due to a variety of factors including miner safety, falling gold prices, and decreased profits, and this was expected to heavily impact overall gold exports.[129,130]

The Malian government is taking action to make room for additional FDI in the mining sector. In 2013, Mali's mining ministry, *Le Ministère de l`Industrie et des Mines*, began an inventory and review of mining contracts, titles, and leases in the mining and oil sector.[131] The stated objective was "cleaning up the mining sector," according to the Minister, Boubou Cisse, who cited compliance issues, financial audits, and technical, social, and environmental aspects as potential reasons for cancelling contracts.[132] The review resulted in the cancellation of 130

[122] Reuters. (2014a).
[123] USGS. (2013).
[124] Drakenberg. (2010).
[125] USGS. (2013).
[126] Diallo. (2014b).
[127] Ibid.
[128] IMF. (2008).
[129] IAMGOLD. (2013).
[130] Reuters. (2014a).
[131] Diallo. (2013).
[132] Diallo. (2014a).

mining permits (30 percent of existing permits) for which no development had taken place and will allow the government to issue new permits to investors with stronger development capacity.[133]

Environmental Impacts

Both large-scale FDI and small-scale artisanal mining have extensive environmental impacts, though they differ in scale and character. A typical FDI mining operation begins with exploration, including road construction and explorative pitting and drilling, which can lead to deforestation, habitat destruction, and soil erosion.[134,135] If the location is chosen for full-scale mining activities, those land impacts will increase. In addition, mining is water-intensive and can be a significant draw on surface and groundwater resources. Water resources may receive increased sediment loads from erosion originating from the mines or dump sites, or it may be polluted by chemicals used in gold processing (including mercury, cyanide, lead, and zinc oxides) or by disposal of tailings. All of these inputs can impact downstream fauna and flora and human settlements.[136,137] Use of those and other chemicals can also lead to air pollution.[138,139] Large-scale mining is energy-intensive and a contributor to climate change.[140] Furthermore, deforestation, hunting, and withdrawal of ground and surface water are likely to occur to meet the shelter, food, and water needs of mine workers.[141,142]

While there are similar impacts on land, water, and air resources from small-scale and artisanal gold mining operations, the processes are different enough that the scale and characteristics of these impacts vary. For instance, due to the lack of mechanized earth digging tools, small-scale gold mining typically relies on the use of shallow shafts and frequent moves as miners search for richer sites, resulting in hundreds of abandoned shafts.[143] This means that while the mining footprint is less deep in small-scale mining, it is wider on the surface, when deforestation and land erosion are included. Miners also look for gold in alluvium (material deposited by rivers) and riparian tree roots, which contributes to river bank destruction and deforestation. While large-scale mining operations are water-intensive, small-scale operations typically do not have the tools or capacity to divert water and therefore tend to perform cleaning and processing activities along rivers, leading to increased pollution. They also may rely on inexpensive compounds to aid in cleaning and purifying the gold. Mercury is a low-cost and effective way for poor miners to purify gold, but it's estimated that 40 percent of mercury can escape into the environment during use. Once in the river or sediment, bacterial action transforms it into methyl mercury, a toxic organic component that easily enters the food chain and affects those who inhale steam, drink the water, or eat any aquatic fauna.[144]

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[133] Reuters. (2014b).
[134] OECD. (2002).
[135] UNECA. (2011).
[136] OECD. (2002).
[137] UNECA. (2011).
[138] OECD. (2002).
[139] UNECA. (2011).
[140] Ibid.
[141] OECD. (2002).
[142] Drakenberg. (2010).
[143] IIED. (2001).
[144] Ibid.

WATER QUALITY AND AVAILABILITY

Water Resources

Mali's renewable water resources range from 3,500 to 7,000 m^3 per person per annum, exceeding the 1,700 m^3 per person threshold of water poverty.[145] Distribution, though, varies greatly by region, with some areas experiencing a water surplus and others falling below the water poverty threshold.[146] Mali's water resources are concentrated on the Niger River, the Senegal River, and the inland delta of northeastern Mali, with those with limited access living beyond the reach of the rivers' flows. Although the Niger and Senegal Basins cover roughly 60 percent of Mali, the actual areas that can directly benefit from these surface flows are limited by topography and technology.

There is greater rainfall in Mali's southern area, the "agricultural triangle." In the wettest southern areas, annual rainfall exceeds 1,400 mm. By contrast, annual rainfall in the Niger delta (central Mali) is less than 500 mm. All locations are stressed for several months a year. The dry season extends from November to May in the southern highlands and September to June in the north. Climatic data for rainfall show a year-to-year variation, but a consistent long-term decline.[147]

Mali has extensive groundwater resources, estimated at 20 million km^3.[148] These include both shallow groundwater that is recharged annually by rainfall, and extensive areas of fossil groundwater in northern parts of the country.

Despite the relative abundance of water, Mali has experienced drought-related catastrophes, including the prolonged drought of the 1980s and early 1990s (*La Grande Sécheresse*).The droughts, resulting from a combination of long-term decline in rainfall and a natural cyclical pattern of wet and dry periods, brought Mali's climate change vulnerability to the forefront and forced Mali and its donors to search for strategies to reduce vulnerability.[149]

Water Uses and Infrastructure

Irrigation is the largest water use in Mali. In the upper catchment areas of the Niger and Senegal rivers, irrigation involves the use of "*bas-fonds*" (i.e., shallow inland valleys that flood seasonally) for rice cultivation and small infrastructure (e.g., small retention dams). Groundwater use for agriculture is limited, as the volume of water required for agriculture is too great for manual lifting. In the Niger and Senegal River valleys, river flows last into the dry season and allow diversion of water into nearby agricultural land. However, the land area that can directly benefit from these surface flows is limited by topography and technology. Water management systems usually come in the form of small community-managed run-of-the river diversions; larger technical irrigated systems with pumping, canals, and distribution systems; and flooding of low-lying areas for rice production.

Drinking water represents a small percentage of Mali's total water use, but demand for and consumption of drinking water has increased due to population growth and improved

[145] WRI. (2012).
[146] USAID. (2013).
[147] Aquastat. (2013).
[148] Ibid.
[149] USAID. (2013).

technologies. Furthermore, a significant increase is expected with an increasingly urban population.[150] Eight of Mali's largest 10 cities and towns lie on the banks of the Niger and Senegal Rivers, where urban water supplies are primarily derived from larger wells sunk into riverine areas, which are easier to monitor for withdrawals. Peri-urban areas in all cities experience lack of adequate water supply largely due to lack of capital for infrastructure development and maintenance. Furthermore, areas away from the rivers face significant water stress, with stress increasing northwards with progressively lower rainfall. Only 52 percent of rural populations receive water from an improved drinking water source, compared to over 90 percent of urban populations.[151] These rural areas, along with the upper catchment areas of the major rivers, rely on shallow hand-dug wells, though use of motor and solar pumps is expanding, and withdrawal monitoring is rudimentary.

Industry represents a very small fraction of water withdrawals in Mali, although it poses a threat to water quality. Water quality studies have found concentrations of lead (associated with higher risk of cancer and damage to the central nervous system), aluminum, and manganese (associated with mental impairment) in downstream water supplies.[152] In addition, concentrations of chromium and other chemicals are expected downstream of tanneries, and uranium has been found in concentrations that exceed WHO guidelines.[153]

Hydropower generation requires surface water, but unlike domestic and industrial use, hydropower generation is non-consumptive. At present, Mali has two dams with significant storage capacity: the Selingue, on a tributary of the Niger, and the Manantali, on the Senegal River. Both these dams are multi-purpose, providing flood control, hydropower generation, and irrigation water. Mali received about 55 percent of the power generated by the Manantali Dam, which is 90 percent of the total power generated in Mali.

Threats to Water Resources

Irrigation and Agricultural Investments

The expansion of irrigation, as well as investment in development of groundwater sources, has helped Mali achieve the objectives of the Mali National Plan and Millennium Development Goals for water supply, sanitation, and food self-sufficiency. Meeting these objectives, though, has created vulnerabilities in the future of the water supply, generating a greater demand for water that will likely exceed available supply in years of low rainfall. Furthermore, the 3 percent annual population increase will put further strain on irrigation targets as need for agricultural outputs increases.

Large-Scale Infrastructure (Dams) and Technology

The expanded access to pumping technology has the capacity to change overall water demand. Motor pumps and solar powered pumps enable farmers to transition from very small, irrigated patches such as private or community vegetable gardens to larger private irrigated enterprises for cash crops as well as vegetables. Motor pumps not only pump more water; they can pump from greater depths, so that they have the capacity to impact overall water tables and thus affect adjacent shallower wells. While pumping helps mitigate the impacts of drought, two major

[150] Aquastat. (2013).
[151] CIA. (2014).
[152] Lutz, A, Diarra, S, Apambire, WB, Thomas, JM, and Ayamsegna, J. (2013).
[153] British Geological Survey. (2002).

issues require careful attention: the risk of groundwater depletion, and the capacity to operate and maintain pumps.

Climate Change

Large-scale irrigation and groundwater technology development have been key to Mali's climate change adaptation efforts. These investments, however, are not sustainable based on predicted climate change impacts on water resources. Models predict a reduction in rainfall in southern areas and a slight increase in central areas, as well as an overall increase in temperatures. Groundwater annual recharge is predicted to decrease by 8 to 11 percent, and by 2040, groundwater extraction rates are predicted to increase four-fold.[154,155] Changes in rainfall and population are expected to lead to a 52 percent per capita decline in freshwater resources by 2020, intensifying long- and short-term stress on groundwater resources. Rural areas that rely heavily on shallow groundwater and surface water sources are particularly exposed to changes in water availability. With little buffer capacity, populations are affected by reduced rainfall and increased demand within a single dry season.

Lack of Integrated Water Resource Management

There is a lack of good information to help track changes in water use and availability and guide informed water management plans. For instance, the large-scale expansion of the irrigated areas near the Niger Delta is increasing potential demand for dry season water. This shift will require a more sophisticated approach to planning for the area that can be safely irrigated each year, particularly if there is greater variation in dry season discharges due to climate change. Furthermore, the national level responses to climate change have not been matched by significant development of integrated water resources management (IWRM) at the regional or village level. There is little or no access to effective tools and information to help them develop more resilient IWRM plans.

IV. ENVIRONMENTAL THREATS

DIRECT THREATS

Interviews with key stakeholders and development actors revealed 10 categories of threats (called "priority issues") to tropical forests in Mali (Table 4). These dimensions cut across ecological, social, political, and economic factors, highlighting the need for a comprehensive, interdisciplinary approach to conservation policies. The priority issues and related impacts listed in the figure below (Figure 9) directly reflect the contributing factors identified and validated by stakeholders, with the list kept intact to maintain the integrity of opinions of local NGOs and agencies.

[154] Lutz, A, Thomas, JM, and Keita, M. (2011).
[155] Henry, CM, Demon, H, Allen, DM, Kirste, D. (2011).

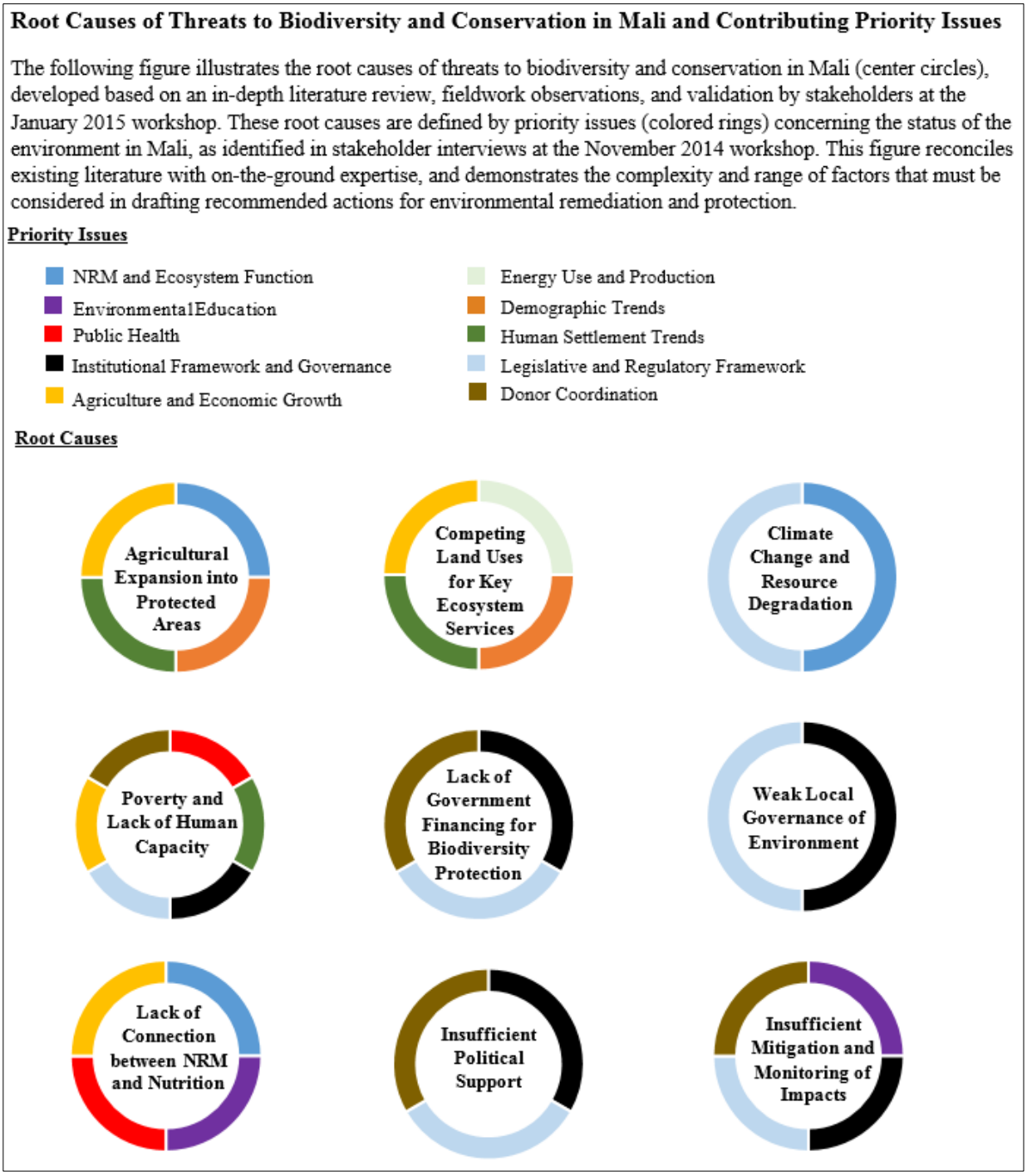
Table 4: Stakeholder-Identified Environmental Management and Conservation Priorities

PRIORITY ISSUES	RELATED IMPACTS
I. NRM and ecosystem function	• Drastic reduction of forest cover • Land degradation • Advanced significant desertification • Significant reduction in wildlife populations • Depletion of fish stocks • Degradation of water resources • Proliferation of invasive species • Sedimentation ('*ensablement*') of Niger River • Climate change
II. Energy use and production	• Quasi-dependence of households on fuelwood for cooking • Dependence on importation of hydrocarbons • Failure of the national grid • Low development of alternative solar and wind energy systems
III. Environmental education	• Weak environmental education programs • Absence of materials designed to raise awareness
IV. Demographic trends	• Increase in urban population pressure • High national population growth
V. Public health	• Weak management of medical waste • Weak risk-prevention measures
VI. Human settlement trends	• Informal settlements and lack of land tenure • Non-authorized construction projects • Poor sanitary conditions
VII. Institutional framework and governance	• Overlapping roles and responsibilities • Weak financial and human capacities • Challenges implementing decentralization • Weak involvement in civil society
VIII. Legislative and regulatory framework	• Inadequate legal mandates and regulation • Weak implementation of existing legislation • Difficulty implementing sector policies
IX. Agriculture and economic growth	• Decrease in agricultural productivity • Risk of loss of local genetic resources • Impacts of mining and artisanal gold prospecting • Weak employment opportunities
X. Donor coordination	• Reduced support among donors for development funding and conservation funding (i.e., making up for government shortfalls in conservation funding) • Poor coordination between NGOs and overlap of development efforts thereby limiting the overall efficacy of donor funds

ROOT CAUSES

To identify the actions necessary to protect the environment and conserve natural resources, the root causes of the direct threats must be identified and addressed. Figure 9 defines the root causes of environmental degradation in terms of the stakeholder-identified priority issues. This synthesis categorization of root causes is based on the overall analysis of threats, stakeholder consultations, and documents reviewed. Each root cause is discussed in further detail below.

Figure 9: Priority Issues Defining Root Causes of Environmental Degradation



(1) Agricultural and pastoral expansion, including encroachment on forests and protected areas

Since 2000, land use has change dramatically in Mali. While many areas have remained developed or in their non-vegetated state, large portions of land have been developed (Figures 6 and 7), particularly in the Mopti and across the south. Very little land has been restored to an undeveloped state, and in fact, some development has occurred within the borders of PAs, which indicates the need for better protection. Population growth has increased demand for natural resources, and much of the encroachment into these undeveloped PAs has been driven by agricultural expansion, both for food and cotton production.

Many policies promote the development of the agricultural sector. High import taxes and restrictions on exports of staple crops, for example, are intended to bolster small-scale staple crop production in Mali, promoting food security.[156] Cotton production is promoted through subsidies for inputs and loan forgiveness for farmers, and therefore drives exports.[157] As a result, agricultural production has risen steadily over the years. Agricultural production is further supported by international donors. Promotion of irrigation to combat desertification, depletion of soil quality, and reduction in agricultural output has improved access to water resources, but has subsequently created a new demand for agricultural activity, contributing to continued expansion and development of vegetated land.[158] Lastly, increased demand for cattle has further shifted land use needs, with more land converted for the grazing and production of cattle.[159] This development has created tensions between farmers and pastoralists, particularly where traditional systems of governance and land use have been replaced.[160]

(2) Competing land uses for non-critical habitat and areas providing key ecosystem services

Forest area in Mali declined from 11.5 percent to 10.3 percent of total land cover from 1990 to 2005, at a rate of 500,000 ha/year, as a result of overharvesting of forest resources for fuel, brushfires, and expansion of agricultural areas, as well as shifts in climatic conditions as a result of climate change. The loss of forest area has continued, particularly in the northern regions of Mali.[161,162,163] Further, a growing population has placed additional pressures on natural resources as agriculture and energy needs increase, contributing into the expansion of forested areas and subsequent deforestation of lands for cultivation and irrigation (see above for discussion on changes in land use).

Decreased availability and quality of forest, water, and soil resources all negatively affect biodiversity, as these inputs contribute to the health of species and ecosystems. Deforestation, driven by competing land uses and need for agricultural expansion, and land degradation affects the hydrologic cycle and the quality of water resources in Mali, the availability of which is already strained. Reduced forest cover can lead to increased flash flooding and soil erosion,

[156] FAO. (2013).
[157] Russell, K., & Sylla, F. (2012).
[158] USAID. (2013).
[159] FAO. (2013).
[160] USAID. (2013).
[161] IUCN. (2008).
[162] Ministère de l'Environnement et de l'Assainissement du Mali. (Accessed November 2014).
[163] United Nations Environment Programme. (Accessed 2014).

depletion of soil nutrients, and reduced ability of groundwater resources to recharge.[164] Deforestation contributes to increased sedimentation and silting of water resources as erosion increases, and purification ecosystem services also decrease with deforestation.[165] Also a result, agricultural productivity declines, with a reduction in both yield and quality of crops.[166]

(3) Global climate change leading to natural resources degradation (e.g., reduced water availability, soil depletion)

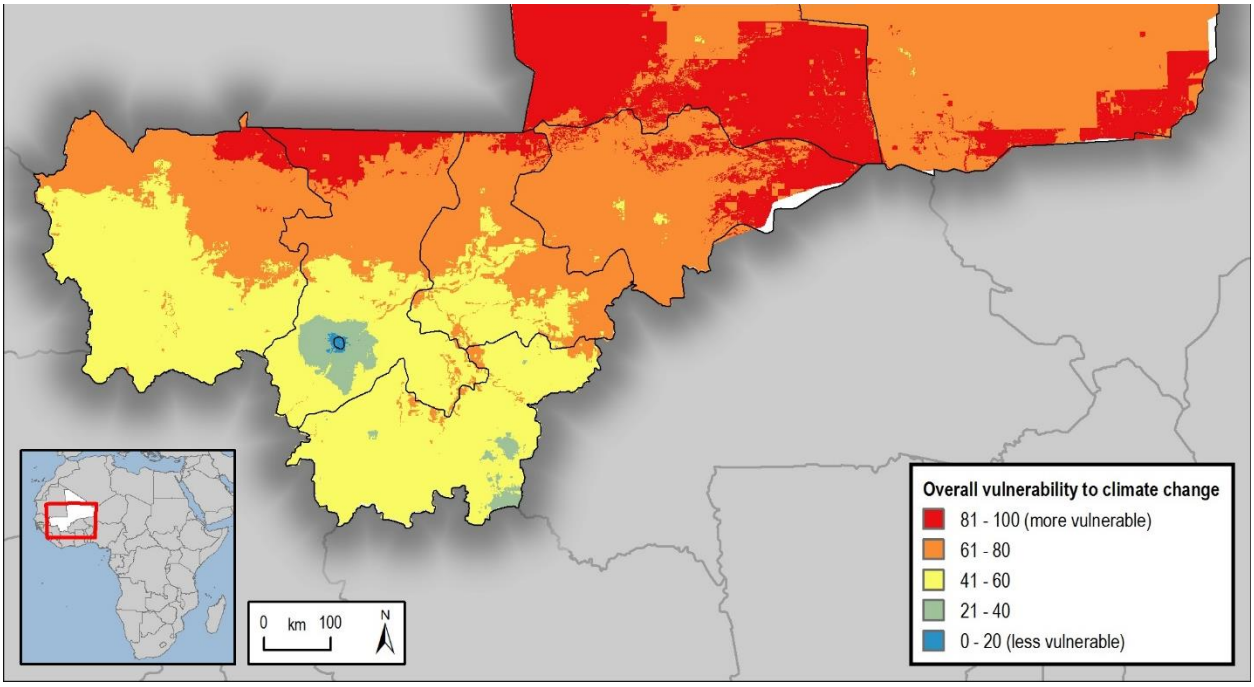
Climate change affects environmental and economic conditions in Mali and has reduced the amount of arable land in a country that depends heavily on agricultural production for food security and household income. The northernmost border of land amenable to sorghum and millet production, for example has shifted south by 50 km in the past 60 years due to changes in rainfall and temperature, adding stress to already vulnerable regions.[167] Further, more than 20,000 ha of productive land has been lost in Mali due to accelerated wind erosion, with available arable land declining at a rate of six tons/ha to 30 tons/ha.[168]

Climate change has also exacerbated weather events—droughts, floods, high winds, and sandstorms—of increasing severity, frequency, and duration. Between 1980 and 2007, Mali experienced five major droughts and two major floods, affecting three million people. Due to variable rainfall, water scarcity in Mali has increased, particularly in areas located far from major rivers or water infrastructure.[169]

With a high rate of poverty and heavy dependence on natural resources and ecosystem services, Mali is extremely vulnerable to climate change and its negative effects. The 2014 USAID African and Latin American Resilience to Climate Change (ARCC) report mapped the vulnerability of Mali to the stressors of climate change. In general, Mali was found to be highly vulnerable to climate change, with the northern regions the most vulnerable. The heavily populated and developed Bamako region was found to be the least vulnerable region due to access to infrastructure and markets that increase adaptive capacity (see Figure 10). The southwest region of Mali, containing 75 percent of the population, is defined by a medium to medium-high risk, warranting the attention of policymakers and development professionals.[170]

[164] USAID. (2013).
[165] International Institute for Sustainable Development. (2005).
[166] USAID. (2013).
[167] USAID. (2014).
[168] Consortium AGRECO. (2014).
[169] Ibid.
[170] De Sherbinin, et al. (2014).

Figure 10: Overall Vulnerability Index of Mali reproduced from De Sherbinin, et al. (2014).



The study defined vulnerability as a function of exposure, sensitivity, and adaptive capacity, based on 18 indicators. These indicators include both physical values (e.g., annual precipitation, flood frequency, soil quality) and socioeconomic factors (e.g., household wealth, education level of mother, market accessibility), highlighting the association between natural resources, agriculture, and poverty. According to this index, socioeconomic factors play a major role in determining one's susceptibility to the effects of climate change. Further, as most of the population of Mali depends heavily on agriculture for food security and income, degradation of agricultural land and water resources may exacerbate poverty and food insecurity.[171]

In light of the threats posed by climate change, the GoM created the *Politique Nationale Changements Climatiques* (PNCC) in 2011, to guide actions focusing on the mitigation of and adaptation to climate change. The strategies outlined in this policy document were used to inform the 2012-2017 Strategic Framework for Growth and Poverty Reduction.[172] The objectives of PNCC are:

- Improve integration of climate actions into regional development policies and strategies and into the planning processes at national and territorial levels;
- Strengthen the adaptive capacity of populations and the resiliency of environmental, economic, and social systems by integrating adaptive measures in the most vulnerable sectors;

[171] Ibid.
[172] Global Climate Change Alliance. (2012).

- Strengthen preventive capacities and capacity for management of risks related to natural disasters;
- Contribute to global efforts to stabilize GHG emissions, and promote regional and international cooperation;
- Promote national research efforts and the transfer of climate change technologies;
- Build national capacity for mitigating and adapting to climate change.[173]

(4) Poverty and lack of human capacity

Poverty can drive decreased adherence to laws and regulations and weakens rule of law. With a strong reliance on the agricultural sector for income, adherence to conservation and NRM regulations is subsumed by the challenges of securing food, shelter, and financial viability, leading to severe degradation of forest resources through illegal hunting and harvesting.[174,175] The recent political conflict has further weakened the economy, slowing the growth rate from 4 percent in 2011, to just over 1 percent in 2012.[176]

Stagnated economic development and the resulting state of poverty can reduce adaptive capacity to external shocks (e.g., droughts, floods, variable temperatures, etc.), destabilizing populations and increasing risk of conflict and illegal activity as economic, social, and political conditions become increasingly uncertain.[177] For example, local communities often rely on the natural resources of nearby PAs for sustenance and income, and a lack of resources for enforcement of these areas leads to illegal hunting and overharvesting. Also, as poverty places pressure on the need for maximum agricultural output, practices such as excessive fertilizer use and overharvesting of crops can deplete soil and water quality, and they may further drive poverty by decreasing land productivity the following season.[178]

(5) Weak local governance of environment

With limited financial resources, agencies often lack the funds needed to adequately oversee conservation activities or effectively implement environmental programs. Agencies—especially their local/decentralized offices—often do not have enough staff—or enough staff with appropriate qualifications—to properly manage programs. Even with sufficient staff, stakeholders and interview participants found an inefficient delegation of responsibilities, with many duplicate positions and significant overlap of assignments and responsibilities. Management of PAs is often compromised due to inability of staff – due to lack of training, personnel, and financial resources – to enforce laws and regulations that govern illegal activities. Additionally, while Mali has started to shift once more towards a decentralized governance structure, the lack of staff and funding, along with poor communication between national and local agencies, has hindered this transition.[179]

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[173] AEDD. (Accessed December 2014).
[174] Ministère de l'Environnement et de l'Assainissement du Mali. (Accessed November 2014).
[175] U.S. Agency for International Development. (2008).
[176] Consortium AGRECO. (2014).
[177] U.S. Agency for International Development. (2014c).
[178] Afrique Nature Internationale. (2009).
[179] IUCN. (2008).

(6) Lack of government financing for biodiversity protection and management

The Malian Forest Administration faces burdens in properly financing its forestry program, leading to insufficient administrative resources for effectively overseeing a program with such a vital, diverse set of resources.[180] Although forest ecosystem programs receive minimal funding, they have the potential to positively contribute to economic growth in the country. According to a 2013 Public Environmental Expenditure Review, the Ministry of Environment receives only 1 percent of the national budget, despite natural resources and ecosystem services contributing more than 40 percent to the GDP. This supports an earlier 2009 report citing a 21 percent loss in GDP should sustainability initiatives continue to be underfunded and underdeveloped.[181]

(7) Insufficient top/national-level political support and resources for proper management of natural resources and biodiversity protection

Participants in stakeholder meetings and interviews noted a lack of both financial resources and political motivation by senior officials at the national level to properly manage natural resources and support environmental safeguarding mechanisms, such as ESIAs (see below). This deficiency stems from both an inadequate delivery system for public services at local and regional levels, but also a high rate of corruption among top-level officials, resulting in lack of rule of law and lack of democratic political engagement. The recent political conflict in Mali also redirected attention from conservation programs to peacekeeping and humanitarian efforts. In light of the conflict, funding for development assistance (with the exception of emergency aid), ceased in many cases, decreasing opportunities for projects and efforts aimed at addressing climate change, protecting biodiversity, and mitigating environmental threats. Additionally, reduced international trade and investment has weakened Mali's GDP, and this lack of financial resources has limited the success of NRM efforts.

(8) Lack of connection between NRM and nutrition

Poor management of natural resources can reduce agricultural productivity and output, further exacerbating nutrition and food security issues and placing additional strains on natural resources. These stressors on natural resources and public health can reduce a population's adaptive capacity, posing an additional environmental threat.

Both the GoM and NGOs support activities that promote economic growth through development of agricultural training programs for farmers and the creation of micro-enterprise opportunities. While these programs often emphasize agricultural development as a means of economic security and community empowerment, integration of an environmental component can increase understanding of how both economic growth and food security depend upon ecosystem services provided by tropical forests and proper management of ecological resources.

According to stakeholders, the role of ecosystem services in supporting agricultural growth, food security, and public health is not well known, and is often superseded by the short-term need for increased agricultural output and use of natural resources.

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[180] U.S. Agency for International Development. (2008).
[181] United Nations Environment Programme. (2014).

(9) Insufficient mitigation and monitoring of foreseeable environmental impacts

ESIAs help improve the design of development activities and their long-term sustainability and "[ensure] that environmental factors and values are integrated into the decision-making process."[182] Applied prior to the implementation of a project, ESIAs emphasize mitigation and prevention of significant adverse effects during early stages of the decision making process. The term "environment" is used broadly, describing a larger context that considers social, cultural, and health effects.[183] The goals of an ESIA also include engendering public trust and confidence in public institutions, complying with the law, and reinforcing civil society and democracy through transparent public participation.

Given the large number of international institutions engaged in environmental projects and activities in Mali (see Annex F), proper ESIA protocol is necessary to ensure significant adverse impacts to the physical and social environmental do not outweigh the benefits, and that Mali laws and institutions governing the environment are respected. For example, while many climate change adaptation strategies include increased irrigation to cope with degradation of agricultural resources, these efforts must be properly evaluated to assess unintended adverse impacts, such as depletion of fisheries from diversion of water resources. In interviews with key stakeholders, participants noted a need for more frequent and effective monitoring of environmental projects and mitigation of adverse effects. Additionally, inadequate funding for monitoring efforts makes implementation of proper ESIA protocol difficult, and limits the effectiveness of environmental programs.[184]

V. OPPORTUNITIES FOR CONSERVATION AND SUSTAINABLE DEVELOPMENT

CASE STUDIES: SUCCESS IN ENVIRONMENTAL ACTIVITIES/PROJECTS IN MALI

The following case studies demonstrate the opportunities and challenges in implementing successful environmental activities and projects in Mali. For a more extensive list of completed and ongoing projects, see Annex F.

Mali Elephant Project

The Mali Elephant Project (MEP) is a conservation program spearheaded by The Wild Foundation and the International Conservation Fund of Canada that demonstrates a successful approach to integrating conservation, environmental management, and community health efforts to achieve biodiversity protection goals. Mali is home to 550 Gourma herd elephants which face threats of poaching, habitat degradation, and resource scarcity. MEP was developed to protect this threatened species despite limited financial resources and government support for conservation efforts.

[182] U.S. Agency for International Development. (June 1976).
[183] UNEP. (2002).
[184] U.S. Agency for International Development (2014).

Using GPS data, elephants were tracked every two hours for 18 months, creating a map of migration patterns. Migration fluctuated with availability of water, with the elephants settling at Lake Banzena as other lakes and water sources dried up, creating a conflict with human populations in the area. MEP identified key threats to both the elephant populations and resource sustainability in developing a plan for conservation:

- **Exploitation of water resources by outside groups.** The arrival of 50,000 cattle to the area led to the drying up of Lake Banzena, placing pressure on the elephants' habitat and migration patterns. Community members confirmed that cattle belonged to wealthy urban Malians who did not live in the area and did not monitor the herd's effect on natural resources.

- **Environmental degradation of surrounding communities and areas.** Elephants originally migrated to Lake Banzena after natural resources in southern regions became depleted and degraded, leading to conflicting use of resources and habitat areas by elephants and humans.

- **Influence of rebel groups on youth populations.** Rebel groups in the northern regions of Mali offer relatively high pay to male youths for recruitment into the groups, threatening stability and conservation efforts in the area.

With limited financial resources and government support, MEP focused on building relationships with community members to garner support for environmental protection and elephant conservation. After participating in extensive exploratory interviews and focus groups with community members, MEP worked to develop a campaign that created a sense of pride in the elephants, and strengthened the link between the presence of elephants and the wellness and productivity of the nearby environment. MEP also hired youths to patrol the designated migratory area, and despite more lucrative payment from rebel groups, not one person involved in the enforcement efforts joined these groups, stating that the work protecting the elephants was "more noble." Lastly, MEP addressed broader risks and contributing factors to human-elephant conflict. Half of those community members living by Lake Banzena stated that they would be willing to move if clean water resources were available in other areas. MEP worked to bring clean water to nearby areas, allowing for more space between the human and elephant populations.

By engaging community members, creating positive relationships, and addressing root causes such as political conflict and public health, MEP demonstrated a successful means of environmental and social programming in Mali that stands as an example of a positive outcome.[185]

Morila Mine Restoration

The Morila mine is a joint venture between RandGold, AngloGold, and the GoM located near the village of Sanso in in the Sikasso Region of south-western Mali. The large-scale FDI mine is a model for environmental and social management in Mali. The mine opened in 2000 and by 2002 it was producing more gold than any other mine in the world. While production has since decreased and the mine is set to close by 2017, the environmental restoration effort and management of social issues are well established. Within the first year of operation, environmental restoration started. Over 300 species of trees, shrubs, and grasses are grown in

[185] Canney, S. (2014, January 6).

the on-site tree nursery to support the restoration effort and floral biodiversity. The goal of the restoration effort is to restore the structure of the ecosystem, although not explicitly to restore particular ecosystems services. Antelope were re-introduced to some sites and reptiles returned to the restored areas on their own. The regeneration of the ecosystem is supported by managing top soil and mine burden separately. While mining is underway, top soil is separated. After mining is complete, the burden is returned to a site, packed, and the top soil is added back to create a foundation for plants.

The social efforts at the mine are significant. The mine currently employs 1,200 people supporting a community of over 3,000 people (including women and children). A key component of the social management effort is the establishment of an agroforestry cooperative that miners are eligible to join when they leave or retire from the mine, or when the mine is shut down. Farmers are trained for the cooperative on the mine site, producing alternative products such as eggs and fish that benefit the local community and provide a venue for training. Over 6,000 eggs are produced on-site each day and are available for purchase in the local communities, along with fish raised in the aquaculture facility. Some challenges are still being resolved with the agroforestry cooperative, such as land tenure issues and acquisition of necessary agriculture business permits. However, the mine still serves as a model for the Ministry of Mines and RandGold in implementing similar environmental and social programs at the Lulu mine in Keyes region.

The large-scale Morila mine is more efficient than smaller-scale artisanal mining in the area. While the environmental impact is substantially greater, more opportunities also exist for environmental mitigation and restoration efforts. The mine has maximized the economic potential of the gold industry and has branched out to support locally beneficial food production businesses. Employees of the mine are predominately local, providing economic support for families in the area. Given the scale of the mine, oversight by GoM is simplified and rules can be enforced not only by government officials, but also by RandGold, an international company, to enforce international standards and scrutiny. The mine is ISO 14000 certified and certified for occupational health and safety.

RECOMMENDED ACTIONS AND OPPORTUNITIES

Based on the actions necessary to conserve tropical forests and biodiversity discussed above, this section identifies priority actions most appropriate for support from USAID/Mali. These are strategic recommendations intended to provide general guidance as the mission prepares its CDCS. The recommendations reflect those areas where USAID support could significantly affect the protection of Mali's biodiversity and tropical forests.

For long-term, sustainable results, the root causes of the threats to biodiversity must be addressed. These recommended actions were developed based on fieldwork and observations, a desk review of literature, and input from stakeholders identifying and validating possible means of addressing environmental threats in Mali based on priority issues (see Figure 9). For additional context and details on these issues, please refer to the European Union (EU) 2014 Mali Environmental Profile and the USAID ARCC Climate Change in Mali series, which were drawn upon in identifying several of the recommended actions. [186, 187] These defining reports are referenced throughout this section, and are noted with a [*] and [**], respectively, in Table 5.

[186] Consortium AGRECO. (2014).
[187] U.S. Agency for International Development. (2014b).

Table 5: Root Causes of Environmental Degradation in Mali and Stakeholder-Verified Recommended Actions

ROOT CAUSES	RECOMMENDED ACTIONS AND OPPORTUNITIES
(1) Agricultural and pastoral expansion, including encroachment on forests and PAs	1. Bolster resiliency programs to promote sustainable development and CSA. 2. Diversify Malian economy to reduce economic dependence on the agricultural sector. 3. Strengthen industrial capacity for food processing. 4. Improve oversight of forests and PAs, and increase capacity for management and enforcement by PA staff.
(2) Competing land uses for non-critical habitat and areas providing key ecosystem services	5. Strengthen local and regional collaboration and participation to develop land use guidance and apply regulations related to land use and occupation. 6. Increase capacity for renewable energy sources to decrease pressure on forest resources as fuel source. 7. Engage private industry in public-private partnerships to explore and secure renewable energy resources, specifically the development of small- and large-scale biofuel operations to improve energy security while utilizing non-arable lands.*
(3) Global climate change leading to natural resources degradation (e.g., reduced water availability, soil depletion)	8. Develop regional and local GCC adaptation strategies to counter desertification and deforestation and related effects (e.g., implementation of an equitable and sustainable *Schéma d'Aménagement du Territoire* and *Schéma Régional d'Aménagement du Territoire* **) 9. Support Malian and international environmental NGOs in generating policies and technologies related to growth of renewable energy sector and CSA.
(4) Poverty and lack of human capacity	10. Reduce economic, political, and social disparities through increased access to education. 11. Diversify economy to reduce dependence on gold as an export, and support industries that promote NRM, long-term economic growth, and worker well-being. 12. Establish and emphasize programs and policies to rehabilitate the economic, environmental, and social status of northern regions most affected by the recent political conflict, including restoration of infrastructure and depleted resources, and employment opportunities in the environmental sector.*
(5) Weak local governance of environment	13. Increase political capacity/empowerment of communities and local groups through continued support for decentralization. 14. Develop infrastructure to promote economic opportunities and growth in rural areas (that will contribute to tax base). 15. Translate national laws into the dominant local languages.* 16. Communicate results of socioeconomic and scientific studies to different segments of the Mali citizenry. 17. Support education programs that raise awareness of the impact of land-based activities (e.g. agriculture, deforestation, hunting) on biodiversity and conservation of tropical forests. 18. Clarify and reinforce the process of public consultations within the preparation of ESIAs.* 19. Incorporate cultural considerations into economic and conservation programs and policies to build capacity of communities.

ROOT CAUSES	RECOMMENDED ACTIONS AND OPPORTUNITIES
(6) Lack of government **financing** for biodiversity protection and management	20. Ensure adequate funding for environmental programs in the national budget. 21. Implement a "trust fund for Protected Areas," paid into by natural resource-based industries, to establish resources for funding of the protection and management of natural resources, PAs, and biodiversity-related agencies; and environmental planning research and analysis. 22. Garner support from Malian and international NGOs for fair, equitable, and sustainable investments in PAs and biodiversity conservation efforts. 23. Fully utilize available funds and development finance sources for which Mali is eligible (e.g., Climate Fund, Clean Development Mechanism, Planet Finance, Natural Disaster Prevention Fund).
(7) Insufficient top/national-level political support and resources for proper management of natural resources and biodiversity protection	24. Produce the necessary application text (i.e., directives) pertaining to existing environmental laws so that each respective Ministry can fully implement the laws. 25. Continue emphasis on natural resource protection in the context of UN peacekeeping and other conflict-management programs. 26. Strengthen capacity of Malian and international environmental NGOs to intervene in NRM and biodiversity protection efforts. 27. Support opportunities for economic, social, and political growth and inclusion to reduce instability in the country. 28. Support the implementation of the *Stratégie Nationale du Développement Durable*. 29. Engage private sector via public-private partnerships for the management of PAs and other natural resource-dense areas.
(8) Lack of connection between NRM and nutrition	30. Include agricultural considerations in decisions regarding NRM. 31. Support integration of environmental considerations in the contents of educational curricula. 32. Increase environmental education and awareness, particularly in communities reliant on the agricultural sector, for continued integration of NRM and health and nutrition programs. 33. Restart *Plan d'Accompagnement de la Généralisation de l'Education Environnementale au Mali* (PAGGEM) environmental education program and identify ways of sustaining funding for the program.* 34. Develop resiliency programs to promote CSA, reduce detrimental agricultural inputs and outputs, and decrease food insecurity in Mali. 35. Embed food security programs with GCC-adaptive strategies and techniques (e.g., CSA practices).
(9) Insufficient mitigation and monitoring of foreseeable environmental impacts	36. Expand ESIAs and enforce consistent application of regulated evaluation practices.* 37. Promote mechanisms for cooperation between the MEEA and regional management offices.* 38. Support economic and environmental modeling and analysis capabilities within MEEA, possibly within the structure of an SNGIE.* 39. Implement a functional SNGIE including environmental, social, and economic baseline indicators and necessary resources for data collection and analysis.* 40. Provide support for AEDD Climate Fund and Information Center, as well as the *Agence Nationale de la Météorologie*.**

KEY RECOMMENDATIONS FOR USAID/MALI

Based on the actions identified as necessary to conserve tropical forests and biodiversity, this section identifies key recommendations most appropriate for support from USAID/Mali. **These are strategic recommendations based on the recommendations above, and highlight key themes that developed among the 39 recommended actions listed above.** They are

intended to inform USAID/Mali in the preparation of PADs and during project implementation. The recommendations reflect those areas where USAID support could significantly affect the protection of Mali's biodiversity and tropical forests.

1. Support the development of application text (i.e., directives) to support the implementation of existing environmental laws so that each respective Ministry can fully carry out the laws.

2. Support efforts to ensure adequate funding for the environment through the national budget and support the development of "trust fund for PAs" paid in to by natural resource-based industries.

3. Develop regional and local GCC adaptation strategies that focus on infrastructure and promote sustainability and CSA.

4. Integrate ecosystem services concepts into education programs and land use planning.

5. Engage in public-private partnerships to achieve scale economies and invest in infrastructure that maximizes social and environmental benefits with careful ESIA.

EXTENT TO WHICH ACTIONS PROPOSED BY USAID MEET THE NEEDS

This section addresses FAA sections 118 and 119d(2). Although a complete USAID/Mali CDCS was not yet approved at the time of this assessment, program planning has occurred at the sector team level that can inform this assessment and help identify opportunities for mission activities to advance environment-related objectives. All USAID/Mali development assistance programming will support the goal that "Malians secure a democratic, resilient, and prosperous future."[188]

USAID Program Overview

The USAID/Mali portfolio includes four sectors, or programming areas. Each program area encompasses a number of activities or projects that will be implemented by USAID/Mali and its partners for a certain amount of time, typically two to five years. Some of these projects are underway and currently being implemented; others are at various points in the pre-implementation process (e.g., design stage, solicitation, procurement, etc.). This assessment reflects USAID/Mali projects that are both planned and underway. A central objective of this assessment is to identify those areas ripe for collaboration across sectors. While there are instances of project-level collaboration across program areas, this cannot be taken for granted. Indeed the objectives within each program area are rather focused, which can make it difficult to identify common interests, particularly with regard to environment.

The Mission's Development Objectives (DOs) are cross-cutting and highly integrated. They include *Prosperity* – socio-economic well-being advanced, *Resilience* – adaptive capacity of vulnerable communities and households increased, and *Democratic Governance* – public trust in government improved. The Mission's strategy also includes a *Transition Initiative* – stabilization of conflict-affected areas reinforced. Projects under each program area are designed to achieve or support multiple DOs. A summary of projects or activities in each program area is also included.

[188] Mali Results Framework Paper. (November 2014).

Program Area 1: Accelerated Economic Growth (AEG)

AEG programming primarily supports the Prosperity and Resilience DOs by improving the adaptive capacity of vulnerable communities, and promoting the sustainable, efficient use of water and soil resources. Efforts to increase the productivity of cultivated land —and therefore reduce demand for the conversion of new land for agricultural use—will entail the use of agro-inputs, including fertilizer, pesticide, and certified seeds. While the use of such inputs is key to many food security and economic growth initiatives, these inputs do present the risk of adverse impacts to human health and the environment.

The conversion of forested or uncultivated land for agricultural purposes is a primary environmental threat in Mali, and is linked to topsoil loss and desertification. Reducing the need to bring new land under cultivation to meet food security needs and spur economic development will require enhanced cultivation on existing farmland. Beyond integrating climate-appropriate agricultural techniques or practicing conservation farming, such enhanced cultivation is expected to rely on the types of agro-inputs that can sufficiently increase crop yields at the smallholder level. The expanded but judicious use of agro-inputs as part of AEG activities should be viewed as an important aspect of helping to limit deforestation and increasing the productivity and value of Mali's agriculture sector.

Projects or activities comprising the AEG portfolio include:

- The Cereals Value Chains project (a Feed the Future project)
- Livestock for Growth
- GCC Adaptation
- Institutional capacity building with Mali METEO
- Food for Peace, including commodities procurement and livelihood recovery

The AEG program is also looking to expand its PPP engagements and broaden support to agriculture based investments. In addition, the program will support a crosscutting D&G activity to reduce rent-seeking and bureaucratic inefficiencies along agriculture trade corridors.

Program Area 2: Health

Health programming also primarily supports the Prosperity and Resilience DOs. Health activities are focused on increasing access to child and maternal health care, improving nutrition, especially for mothers and children, combating infectious disease, improving sanitation & hygiene practices, and developing stronger local health systems. While health programming does present several distinct environmental management challenges (e.g., health care waste management, disposal of unused pharmaceuticals or commodities, etc.) a response to broader environmental threats and opportunities will depend on integration of NRM practices as one element of project implementation. A good example of this can be seen in the Strengthening Partnership in Nutrition Globally (SPRING) project, which promotes improved nutrition through the planting of fruit trees. The replacement of tree cover and investment in silviculture could deliver lasting benefits to soil and water resources beyond achieving nutrition and food security objectives.

Projects or activities comprising the Health portfolio include:

- Integrated (i.e., "high impact") health services focusing on: family planning, water, sanitation, and hygiene sector (WASH), HIV/AIDS, and malaria

- Commodity supply efforts for family planning, HIV/AIDS and malaria
- SPRING project, including tree planting
- Asian Vegetable Research and Development Center (AVRDC) (will soon operate under AEG portfolio)
- Behavior Change Communication programming

Program Area 3: Education

Education programming primarily supports the Prosperity and Resilience DOs. Education activities are focused on improving early-grade reading for girls and boys and increased post-conflict access to education. Similar to health-related programming, it is often difficult to identify a direct connection between education programming and improved environmental management. There are several immediate impacts, such as access to WASH at an individual school or facility, or the absence of environmental education as part of a curriculum that could otherwise increase awareness or help to form or train environmental professionals. However, broader environmental threats and opportunities also have an important bearing on the success of educational efforts. For example, natural disasters (e.g., drought, flood) can be expected to adversely impact school attendance, as can a decrease in household incomes. As natural disasters and extreme weather events increase in frequency, intensity, and duration, integrity of school buildings and infrastructure is often compromised, resulting in lack of opportunities to educational facilities resources. Preoccupation with natural disaster-related impacts can decrease quality and quantity of study time, and displacement and migration as a result of climate change impacts can also decrease access to education.[189] Additionally, the adoption of enhanced agricultural techniques or use of GCC adaptation strategies could provide the level of food security and economic development in a rural setting that enables more children to attend school on a continued basis.

Projects or activities comprising the Education portfolio include:

- A flagship five-year early-grade reading project
- Out-of-school youth program (concluding within one year)
- Implementation of WASH activities using Health funds

Program Area 4: Democracy and Governance

Democracy and Governance (D&G) programming primarily supports the Democratic Governance DO. D&G programming is focused on increasing accountability for delivery of government services at the local level and fostering respect for the rule of law. There are a number of opportunities to integrate NRM themes and interventions as part of this portfolio. The focus on improved service delivery creates a window for enhanced technical assistance and oversight in the agricultural sector and the provision of WASH and related municipal services. The conflict resolution objectives can also reflect principles of sustainable land management,

[189] UNICEF. (2012).

particularly when addressing long-standing conflicts over land use (e.g., farmers versus pastoralists), and access to water resources.

Projects or activities comprising the D&G portfolio will include:

- Support for municipal elections (through 2015)
- Improving the administration of justice and respect for human rights
- Making local service delivery more responsive and accountable
- Support for civil society organization monitoring of human rights
- Access to justice/judicial training
- Peace and Security project (in north), entailing public accountability and media
- Office of Transition Initiatives quick impact grants

Within each of these program areas there are opportunities to design and implement interventions that are responsive to environmental conditions in Mali. These interventions can increase resilience to environmental changes, or limit the occurrence or impacts of adverse changes in the environment (e.g., desertification, water scarcity, loss of biodiversity, etc.). Some interventions may also span multiple program areas, which is consistent with the cross-cutting nature of environmental challenges.

The figures in Annex H illustrate how the recommended actions to protect forests and conserve biodiversity in Mali align with the various projects and activities that comprise the USAID/Mali portfolio.

USAID/Mali Program Support for Key Recommendations

Sections 118 and 119 of the FAA require an articulation of "the extent to which the actions proposed for support by the Agency meet the needs thus identified." The following table (Table 6) suggests which of the current and proposed programs at USAID/Mali (i.e., actions) are contributing, or could contribute, to the key recommendations (i.e., needs identified).

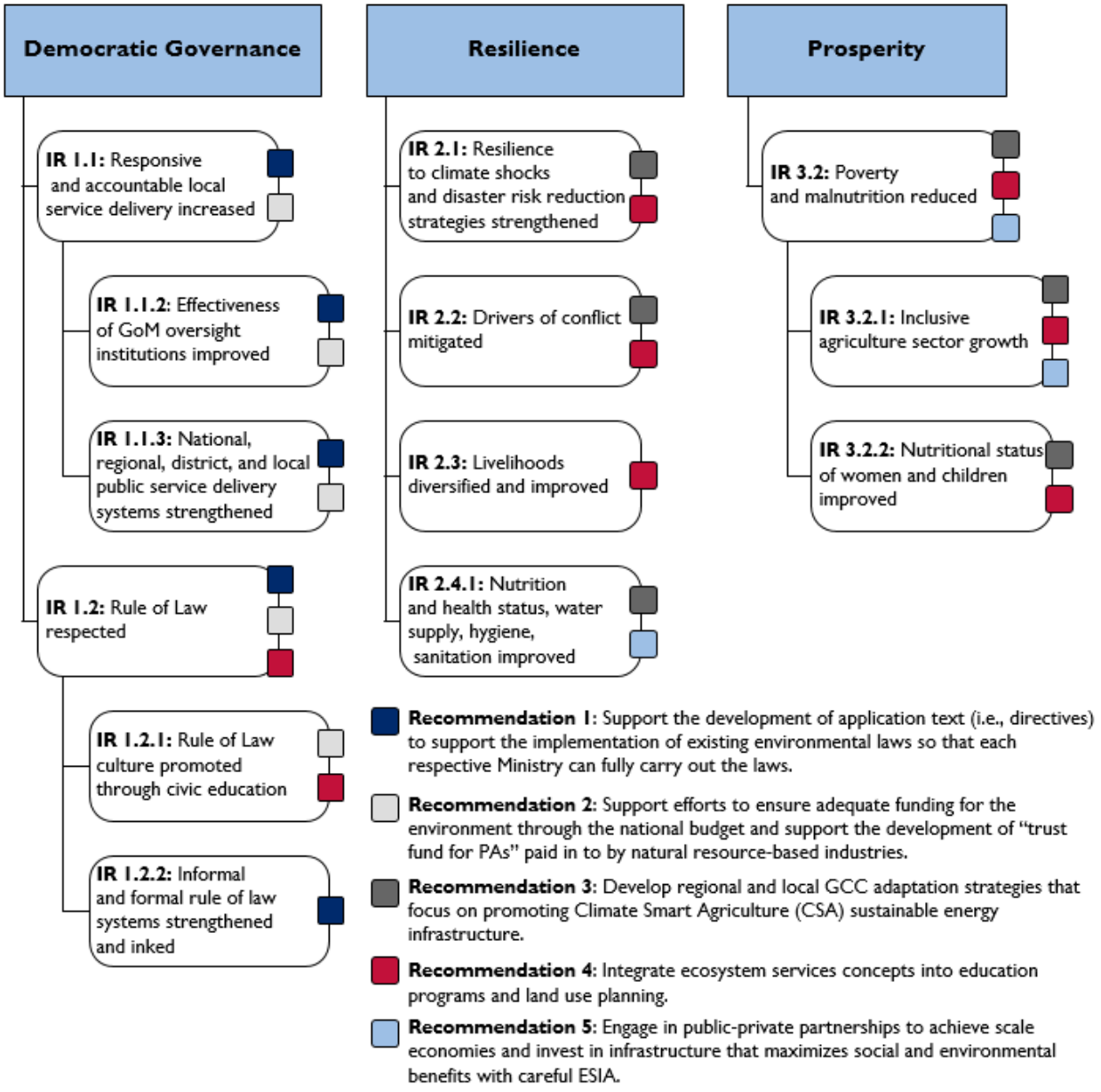
Table 6: Extent to Which Key Recommendations are Supported by USAID/Mali Programs

O = Opportunity. Program could contribute to the key recommendation/opportunity + = Key Recommendation/Opportunity that USAID/Mali is currently contributing to.	Accelerated Economic Growth (AEG)	Health	Education	Democracy and Governance
1. Support the development of application text (i.e., directives) to support the implementation of existing environmental laws so that each respective Ministry can fully carry out the laws.				O
2. Support efforts to ensure adequate funding for the environment through the national budget and support the development of "trust fund for PAs" paid in to by natural resource-based industries.				O
3. Develop regional and local GCC adaptation strategies that focus on infrastructure and promote sustainable and CSA.	+	O		O
4. Integrate ecosystem services concepts in education programs and land use planning.			O	
5. Engage in public-private partnerships to achieve scale economies and invest in infrastructure that maximizes social and environmental benefits with careful ESIA.	+			

VI. DISCUSSION OF KEY RECOMMENDATIONS AND ANTICIPATED OUTCOMES

This section describes the five key recommendations in detail. The recommendations will have positive outcomes for the environment and thus support economic development by addressing the root causes of environmental degradation and will also help achieve Intermediate Results (IRs) as specified in the USAID/Mali Results Framework Paper (i.e., short-term achievable results). While none of the key recommendations support IRs in the Transition objective (not shown in the figure below), several of the recommendations—if implemented—would be supportive of more than one IR. (**Figure 11**).

Figure 11: USAID/Mali Results Framework (2015-2019) Strategies and Interim Results as They Relate to Key Recommendations



Support the development of application text (i.e., directives) to support the implementation of existing environmental laws so that each respective Ministry can fully carry out the laws.

Since 2009, a wave of environmental legislation has been passed (as illustrated in Annex B). Following the National Conference on the Environment in July 2009, the 1998 PNPE, the national framework for environmental considerations and actions) was updated to include 12 additional strategies and policies for the protection of natural resources. Further integrating environmental policy into its national strategy, Mali has been working towards the adoption of the *Stratégie Nationale de Développement Durable* since 2011. The GoM also worked to

strengthen its international efforts through the development of the *Cadre Stratégique pour la Croissance et la Réduction de la Pauvreté* 3, a national strategy in line with provisions from the Rio Convention.

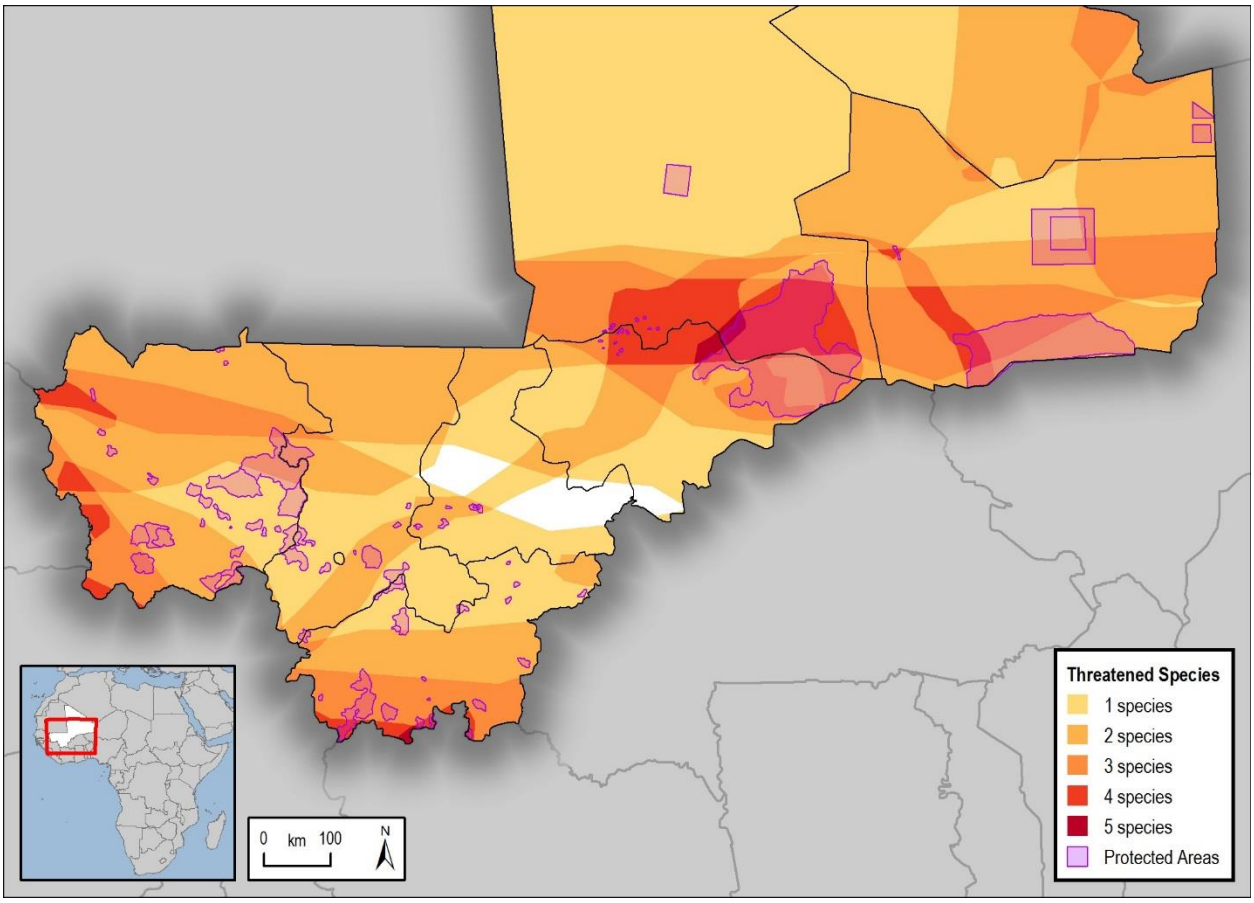
While these new laws, agreements, and strategies are necessary for environmental protection, the lack of an implementation framework and application text (i.e., directives) is a barrier to adequately empowering and funding implementation at the local level. For example, because the national ban on plastic bags is not enforced, unmanaged plastic bag waste remains a problem and the vision outlined in the revised PNPE remains, ultimately, largely unimplemented. On a larger scale, this lack of implementation means that decisions over land use and resource management respond only to short-term economic development pressures and opportunities (leading to booms and busts, especially in artisanal mining) and not environmentally sustainable economic development consistent with national plans.

Stakeholders and interview participants noted these types of regulatory constraints as a limiting factor in conservation efforts, citing both insufficient legal texts and authority, as well as weak implementation and enforcement of existing laws. Given the short-term economic gain of natural resource exploitation, comprehensive, enforceable laws and policies can help establish a framework for effective environmental protection and stable economic growth.

Consistent with the USAID/Mali Results Framework Paper, the results associated with this recommendation include the improved effectiveness of GoM oversight institutions (IR 1.1.2), the strengthening of national, regional, district, and local public service delivery systems (IR 1.1.3), and improved linkages in formal rule of law systems (1.2.2). These results could be important in all biomes of Mali, but particularly in the southern Kayes region of Mali and inner Niger delta areas where threatened and endangered species habitats extend well outside of PAs (Figure 12). The effective implementation of environmental laws means that the PAs would receive the full intended level of protection and that the areas surrounding, or adjacent to, PAs will be developed with environmental considerations in mind. Additionally, application of directives will empower local officials and park guards to fulfill national mandates, and will provide legal certainty for individuals, businesses, and NGOs pursuing economic development opportunities, investing in infrastructure, or expanding operations. USAID's Democracy and Governance program should help support the design and implementation of the necessary application text (i.e., directives) pertaining to existing environmental laws so that each respective Ministry can fully implement the laws. Institutions and partners that could help support the implementation of this recommendation include CTB (Belgium), GIZ (*Gesellschaft für Internationale Zusammenarbeit*) (Germany), *Coopération Suédoise* (ASDI) (Sweden), UNDP, and GEF (see Annex C).

Figure 12: Heat map of threatened and endangered species with Protected Areas shown in purple

(Sources: USAID (2015); UNEP (2006), Sahelo-Saharan Antelopes Status and Perspectives; Kingdon, Happold, Butynski, Hoffmann, Happold, & Kalina (2013), Mammals of Africa Volumes 1-6; IUCN (1998), Crocodiles; Ray, Hunter, & Zigouris (2005), Setting conservation and research priorities for larger African carnivores; Brochu et al. (2002), A Dyrosaurid Crocodyliform Braincase from Mali; Ultimate Ungulate (2013), Eudorcas rufifrons; Encyclopedia of Life (2015), Gazella dorcas; Convention on International Trade in Endangered Species (2008), The Status of Africa's Elephants: Emerging Challenges and Opportunities for Their Conservation and Management; Bergmans (1990), Taxonomy and biogeography of African fruit bats (Mammalia Megachiroptera).; Wagner (2006), Behavioral Ecology of the Striped Hyena (Hyaena hyaena))



Ensure adequate funding for environment through the national budget and "trust fund for Protected Areas" paid-in to by natural resource based industries.

With limited financial resources, GoM agencies and institutions lack the funds needed to adequately oversee conservation activities or effectively implement environmental laws and programs. Agencies often do not have adequate staffing to properly manage programs, and even when offices are adequately staffed, stakeholders and interview participants found an inefficient delegation of responsibilities, with confusing and overlapping assignments and responsibilities. Management of PAs is often compromised due to the inability of staff to police against illegal activities such as poaching, illegal hunting and fishing, and exploitation of forest resources. Increased authority of and resources for agencies overseeing environmental conservation and development programs and increased funding for environmental protection programs in the Malian national budget can support conservation efforts in Mail.

Beyond central funding, more can be done to establish decentralized funding sources to improve local environmental performance. The passage of the 2012 decentralization law (§4.1.5

décentralisation) transferring financial and governing power to Communes, Circles, and Regions and allowing for semi-autonomy over NRM and development decisions demonstrated support for local governance. While this is an important shift (back) towards decentralized governance, this transition has not yet been fully realized due to a lack of financial and human resources. For example, if a park ranger levies a fine for poaching or illegal cutting, only a portion of the funds are kept local with the largest share being returned to the central Treasury in Bamako for redistribution. Greater, more balanced retention and control of funds by park rangers and local communities will encourage enforcement of environmental laws and regulations by providing a financial signal and supporting job performance (e.g., fuel vehicles and buy office supplies and computers). Local communities depend heavily on the natural resources provided by nearby tropical ecosystems, and both legislative frameworks and funding programs supporting decentralized rule can empower Communes, Circles, and Regions to manage resources appropriately and make NRM decisions that affect the physical, social, and economic health of their populations.

One specific mechanism to support decentralized funding is the establishment of trust funds for PAs and environmental programs paid into by the industries reliant on the ecosystem services stemming from those areas, or effecting the ecosystem services in a particular geographic area (e.g., fisheries and agriculture industries paying to conserve and manage specific watersheds, or extractive industries disrupting ecosystem structure and function to access sub-surface resources). More and more African countries are following this model (e.g., Guinea) and successfully programs have been implemented in Mali. For example, the environmental performance of the mining industry is supported by a trust fund program where each mine operator pays into a mine-specific trust to ensure appropriate mine closure, restoration, and abandonment. This supports the polluter pays principle at specific mine sites, but could be utilized more broadly to support the management of key ecosystem services or PAs.

USAID/Mali's Democracy and Governance program should lead support efforts to ensure adequate funding for environment through the national budget and a "trust fund for PAs" paid-in to by natural resource based industries. Institutions and partners that could help support the implementation of this recommendation include the GEF (see Annex C), although lack of opportunities for NGOs to support funding restructuring have been documented.[190] USAID should also continue to support autonomous funding for the AEDD Climate Fund and the Mali-Météo.

Consistent with the USAID/Mali Results Framework Paper, the results associated with this recommendation include the improved effectiveness of GoM oversight institutions (IR 1.1.2), the strengthening of national, regional, district, and local public service delivery systems (IR 1.1.3), and the promotion of Rule of Law culture through funded civic education (IR 1.2.1). These results will be important nationwide, but particularly in communities near PAs, or with economies highly dependent on ecosystem services.

Develop regional and local climate change adaptation strategies that focus on infrastructure and promote sustainable and CSA.

Global climate change will continue to negatively affect Mali and its ecosystems, threatening biodiversity and placing additional pressures on already strained natural resources. In interviews, stakeholders noted a number of signs of environmental degradation, including desertification, depletion of tropical forest resources, declining soil quality, reduced agricultural

[190] Lawson, A., & Bouaré, S. (2008).

output, and increased water scarcity, which are all exacerbated by climate change. Climate change has decreased primary productivity due to decreased rainfall and increased soil erosion. Decline in the agricultural sector—a large part of the overall economy—translates to broader economic decline in Mali, as well as an increase in food insecurity. Mali's vulnerability to climate change (see Figure 13) can be summarized as highest in the northeast, lower in the south west, and lowest around cities, as driven by availability of built infrastructure, water availability, and prevalence of agricultural or forest ecosystems.

To reduce vulnerability (e.g.., build resiliency), regional and local climate change adaptation strategies must be developed and implemented, with a focus placed on countering desertification and deforestation, sustainably building infrastructure, and promoting CSA. As such, these strategies need to link to national infrastructure and land use planning efforts like the *Schéma d'Aménagement du Territoire* and regional land use planning efforts like the *Schéma Régional d'Aménagement du Territoire.* Local and regional land use guidance should also include climate change adaptation considerations.

Beyond land use and infrastructure planning, USAID can support Malian and international environmental NGOs in promoting, supporting, and applying policies and technologies encouraging growth of the renewable energy sector and application of CSA principles. By definition, the implementation of CSA best practices will promote higher agricultural and economic productivity and will reduce vulnerability to climate change. Sustainability of the agricultural sector and agricultural productivity in Mali is of critical importance due to high economic and nutritional dependence on variable outputs. The large-scale production of jatropha oil has demonstrated potential for improving energy security in Mali while maintaining use of crucial agricultural land for food production. Over 700 communities have successfully cultivated jatropha oil for energy production, and the economic and environmental gains associated with this biofuel have been confirmed by the World Bank.[191,192]

Beyond agriculture, post-conflict job creation policies emphasizing development of alternative sectors can promote economic diversification and adaptation (i.e., support economic growth that does not further deplete already-scarce timber resources which are critical for maintaining the adaptive capacity of ecosystems and local communities). For example, an unreliable national power grid negatively affects productivity and growth, while simultaneously increasing reliance on forest-based fuelwood as a source of power. Developing infrastructure to promote sustainable renewable energy sources and alternatives to unsustainable use of fuel wood can decrease reliance on tropical forest resources and increase adaptive capacity through sustainable sources of energy and reduced dependency on wood for fuel. Investments in renewable energy will help create reliable decentralized electricity sources and support the development of industrial and commercial sectors. The adoption of Cleaner and Resource-efficient Production techniques and technologies can also reduce the negative public health impacts of economic diversification.

USAID/Mali's Democracy and Governance, Accelerated Economic Growth, and Nutrition programs should support the development of regional and local adaptation strategies that focus on infrastructure and promote CSA practices. Institutions and partners that could help support the implementation of this recommendation include Reso-Climat Mali, ASDI (Sweden), UNDP, and United Nations Environment Programme (UNEP) through AEDD (see Annex C). USAID

[191] Worldwatch Institute. (2013)
[192] Boccanfuso, Coulibaly, Timilsina, & Savard, Luc. (2013).

should continue working with GIZ to incorporate climate change into communal planning (PDSEC).

Consistent with the USAID/Mali Results Framework Paper, the results associated with this recommendation include the improvement of nutrition and health (IR 2.1) from CSA, the strengthening of strategies for climate change resilience and disaster risk reduction (IR 2.2), the improvement and diversification of livelihoods, inclusive agriculture sector economic growth (IR 3.2.1), and the improved nutritional status of women and children (IR 3.2.2). These results will be particularly important in the central and northern regions of the country that are currently more vulnerable to climate change.

Integrate ecosystem services considerations into education programs and land use planning.

Both the GoM and NGOs support activities that promote economic growth through development of agricultural training programs for farmers and the creation of micro-enterprise opportunities. While these programs often emphasize development of the agriculture sector as a means of economic security and community empowerment, integration of an environmental component can increase understanding of how agricultural growth and NRM relate, and how agriculture and financial well-being are dependent upon ecosystem services provided by tropical forests.

In interviews with key stakeholders, participants noted a need for greater environmental education, and for increased awareness of the link between NRM and poverty. Environmental education should promote the economic value of ecosystem services, clarify the link between availability of natural resources (e.g., soil and water) and food security, and demonstrate application of these environmental principles through CSA methods and practices. Continued funding and support for educational programs such as PAGGEM, as well as continued support for international efforts to build capacity for resiliency programs, can serve as a means of delivering these awareness programs. Greater awareness of the role of ecosystem services in supporting agricultural systems can promote conservation and management of tropical forest resources, especially when ecosystem service considerations are incorporated into land use plans and guidance. This is of particular importance given the scale of land use change seen over the past decade (see Figures 6 and 7 in Section III) and the little economic return associated with that change.

USAID/Mali's Education, Accelerated Economic Growth, and Nutrition programs should support the integration of ecosystem services considerations in education programs and land use planning. Institutions and partners that could help support the implementation of this recommendation include the WILD Foundation, Mali Folkecenter, and ECO Sahel (see Annex C).The results associated with this recommendation include an understanding of how humans benefit from the environment (i.e., ecosystem services) and can therefore support the implementation and justification of environmental laws, climate smart agriculture practices, and conservation. Interim results could include improved rule of law through civic education (IR 1.2.1), improvement of nutrition and health (IR 2.1), the strengthening of strategies for climate change resilience and disaster risk reduction (IR 2.2), the mitigation of conflict drivers (IR 2.3), the improvement and diversification of livelihoods, inclusive agriculture sector economic growth (IR 3.2.1) and the improved nutritional status of women and children (IR 3.2.2). These results will be particularly important in the central and northern regions of the country that are currently more vulnerable to climate change.

Engage in public-private partnerships to achieve scale economies and invest in infrastructure that maximizes social and environmental benefits with careful ESIA.

Mali has experienced, and continues to grapple with, economic and political instability, creating an even greater need for job creation and opportunities for economic rehabilitation. This economic decline is due in part to decreased trust and investments in Mali by international entities, and efforts should be made to rebuild investor relationships to secure funding for recovery, development, and conservation efforts, and to promote the restoration of international trade. Further, conflict has disproportionately affected the country's northern region, creating economic, social, and health disparities, and migration south.

Public private partnerships in the mining industry and agriculture industries have demonstrated promise for environmentally responsible and socially inclusive economic growth (see examples of success in Section V). Given the scarcity of agricultural, water, and forest resources and arable land in Mali, achieving scale economies and large-scale interventions that can stimulate economic growth while minimizing environmental and social impacts is critical (e.g., similar to the Morila mine). Beyond PPPs in mining and agriculture sectors, USAID can help identify and market economic opportunity alternatives to gold mining, and support industries that can promote sound NRM, long-term economic growth, and worker well-being. For example, PPPs may be particularly important for the development of distributed renewable energy.

Institutions and partners that could help support the implementation of this recommendation include the World Bank, GEF, and MINUSMA (see Annexes C and F).The results associated with this recommendation include economic growth that leverages private sector capital, makes the most of scarce natural resources, and safeguards the environment. These results could be particularly important in the south where there is the greatest risk that resources will be underutilized, and in the north where the risk of conflict may be exacerbated by food insecurity and poverty. Indicators of these results could include the diversification and improvement of livelihoods (IR 2.4) and inclusive agriculture sector economic growth (IR 3.2.1).

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ANNEXES

ANNEX A: STAKEHOLDERS CONSULTED

November Stakeholder Meetings

MONDAY, 17 NOVEMBER 2014

- USAID/Mali in-brief and team meetings
  - ETOA team
    - Chad Conlin
    - Aminata Diarra
    - Amadou Camara
  - Accelerated Economic Development (AED) team
    - Andrew McCown
    - John Mullenax
  - Health team
    - Dr. Aboubacar Sadou
    - Souleymane Sogoba
    - Fatimata Ouattara
    - Dr. Madina Sangare
    - Madiou Yattara
  - Democracy & Governance team
    - Eric Pacific
    - Salimata Marien
    - Ina Bagayoka
  - Education team
    - Dr. Aliou Tall

- *Agence de l'Environnement et du Développement Durable* (AEDD)
  - Madame Macalou Awa Anoune Mare, *Directrice Générale Adjointe*
  - Abdrahamane Démé , *Expert Gouvernance*

TUESDAY, 18 NOVEMBER, 2014

- *Direction Nationale de l'Assainissement et du Contrôle des Pollutions et des Nuisances* (DNACPN)
  - Famoussa Bagayoko, *Chef de Division Evaluation Environnementale et Sociale* (DEES)
  - Demba Sidibe, *Coordinateur National du Projet, Programme Africain relatif aux Stocks de Pesticides Obsolètes* (PASP-Mali)

- Direction Nationale de la *Pêche* (DNP)
  - Bocari Allaye Kossibo, *Directeur National Adjoint de la Pêche*
  - Mamadou Diallo, *Chef de Division*

- *Centre National de l'Energie Solaire et des Energies Renouvelables* (CNESOLER)
  - Sékou Oumar Traoré, *Directeur*
  - Souleymane Berthe, CNESOLER
  - Souaïbou B. Diarra, DNE
  - Famakan Kamissoko, CNESOLER
  - Sékou C. Traore, CNESOLER

WEDNESDAY, 19 NOVEMBER, 2014

- *Délégation de l'Union européenne en République du Mali* (EU)
  - Sylvie Fontaine, *Chargé du programme environnement et sécurité alimentaire*

- *Direction Nationale des Eaux et Forêts* (DNEF)
  - Adikarim Toure, Directeur
  - Kouloutan Coulibaly, Focal Point, Great Green Wall
  - Amadou Sow, *Chef de Division*

- *Projet Initiative Pauvreté Environnement* (IPE) Mali
  - Lala Camara Diarra, *Coordinatrice Nationale*

THURSDAY, 20 NOVEMBER, 2014

- *Institut d'Economie Rurale* (IER)
  - Amadou Ndiaye, *Directeur de Recherche*
  - Abdou Yehya Maiga, *Coordinateur Scientifique*
  - Harouna Yossi, *Chef Divsion Recherche Forestière et Hydrobiologique*

- Stakeholder Workshop

Atelier sur l'Etude des Menaces et Opportunités Environnementales (ETOA)
20 Novembre 2014 – Hôtel Radisson

LISTE DE PRESENCE

NOMS ET PRENOMS	ORGANISATION	ADRESSES E-MAIL	TELEPHONE
1. DOSSA Yvette	AVRDC	yvette.dossa@worldveg.org	
2. Dr Keita Oumou SIDIBE	SOUTOURA	soutoura.sanko@gmail.com	76317179 / 66317179
3. SISSOKO IDRISSA	USAID CVC Project	[illegible]-mali.org	66767280 / 73475228
4. Modibo Kante	USAID / PCSP	modibo.kante@savethechildren.org	66.79.71.83
5. Gaoussou Diarra	World Vision	gaoussou_diarra@wvi.org	66-66-28 16
6. Aly BOCAM	NEF - Mali	[illegible]	66 86 71 36
7. Amadou SOW	DNEF	amadsogmail@yahoo.fr	65662836
8. Ousmane Diakité	Direct Nat Hydraulig	diakito44@yahoo.fr	76 27 99 91
9. Bourama DAO	DNP	bouramadao@yahoo.fr	66819645
10. Cheick AK Diakité	SOGEIA	Kader.Diakite@afribonemali.net	76132978
11. Tarcile MBALLA-NGANOUGEH	FONDATION AGHA KHAN	tarcile.mballa@akdn.org	94 65 63 84.
12. Sory Kipsi	DNE / DE	maigabory@yahoo.fr	79.04.57.62.
13. Abdou Y. MAIGA	IER	[illegible]	76449183
14. Marcelin SANOU	SIFOR	[illegible]@gmail.com	66 79 36 10
15. Nianga Keita	Consultant indépendant	keita.nianga@yahoo.fr	66 83 43 23.
16. COULIBALY TAHIROU	ABFN - MEEA	tahirou.coulibaly@yahoo.fr	69184421
17. Arinloye Ademonla Djalal	ICRAF	a.arinloye@cgiar.org	75193623

	NOMS ET PRENOMS	ORGANISATION	ADRESSES E-MAIL	TELEPHONE
18.	SOW AlHassane	CARE MALI	Alhassane.[illegible]@co.care.org	78 74 01 03/ 66 67 95 80
19.	Mamadou TIEMATRAORE	OPNBB	[illegible] @ yahoo.fr	69-31-31-07
20.	Kouloutan Coulibaly	DNEF/MEEA	kouloutan@yahoo.fr	0022366980960
21.	Mamadou Mallo	CRS/Mali	mamadou.diallo@crs.org	76 40 93 07
22.	Manda Sadio Keita	UICN/MALI	[illegible].keita@iucn.org	66 73 90 99
23.	MONICA PETRI	ICRISAT	M.petri@cgiar.org	9486 1885
24.	Modibo TOURE	FAO	Modibo.Toure@fao.org	66 93 76 76.
25.	Yacouba Djire	PSI Mali	ydjire@psimali.org	76233950
26.	CHeick [illegible] KEITA	DNGM/MM	[illegible]@yahoo.fr	79153890
27.	Souleymane BERTHE	CNESOLER	souleymane.berthe@gmail.com	73967335
28.	Mamadou Saliou DIALLO	CADMUS	madousalioupep@yahoo.com	+224657360303
29.	PATRICK HALL	CADMUS	patrick.hall@cadmusgroup.com	+1 617-673-7124
30.	Ousmane SOGORE	DNACPN	[illegible]@yahoo.fr	66834321
31.	Modibo TRAORE	INSTAT	traorenmd@yahoo.fr	76389924.
32.	Sekou Oumar TRAORE	CNESOLER	straore7@yahoo.fr	66944094
33.	Yacouba Sanbara	USAID	ysanbara@usaid.gov	66 75 17 61
34.	Aminata Diarra	USAID	adiarra@usaid.gov	20702776
35.	Harouna Almoustapha	DNEF	[illegible]@yahoo.fr	65770066
36.	MAMADOU SENE	USAID	msene@usaid.gov	76 74 75 26
37.	Coulibaly Maimouna Sidibe	Faso Kaba Sarl	fasokaba@yahoo.fr	76 28 24 76.
38.	McBROOM, MICHAEL	USAID	MMcBROOM@USAID.GOV	75 99 82 96
39.				
40.				

FRIDAY, 21 NOVEMBER, 2014

- USAID/Mali out-briefs
    - ETOA team, AED team
        - Gary Juste, Mission Director

SATURDAY, 22 NOVEMBER, 2014

- Site visit to *forêt classée de la Faya*
    - Aminata Diarra, USAID
    - Mamadou Madiyou Haidara *Chef Unité Appui à la Sté de Gestion Forestière TAM* (DNEF)
    - Bourama Kané *Chef Adjoint Appui à la Sté de Gestion forestière TAM -DNEF*
    - Tidiani Sangaré, *DG Sté de Gestion Forestière TAM*
    - Moussa Kane, *Chef Adjoint Unité d"Appui au projet FAYA*
    - Mamadou Coulibaly, *Adjoint DG Unité de Gestion TAM*

January Stakeholder Meetings

TUESDAY, 20 January, 2015 (Washington, DC)

- Liliana Bachelder, U.S. Department of Agriculture Foreign Agricultural Service

THURSDAY, 22 JANUARY, 2015 (WASHINGTON, DC)

- Andre Mershon, U.S. Agency for International Development Climate Change Program

MONDAY, 26 JANUARY, 2015 (BAMAKO, MALI)

- USAID/Mali in-brief and team meetings
    - Chad Conlin
    - Aminata Diarra
    - Amadou Camara
    - Souleymane Sogoba

TUESDAY, 27 JANUARY, 2015 (KITA & KOUROUNINKOTO, MALI)

- Bishoulbaba T.Ould *KAGNASSY* Chef Secteur *OPNBB* Kourounikoto
- Sagaba SAMAKE, Gestionnaire des Aires Protégées du Projet ERSAP
- Alhousseiny B, TOURE stagiaire ERSAP
- Moudibo Coulibaly, Aménagiste de Faune du Projet ERSAP
- Mme Keita Aida Mbo Chef Programme Environnement, UNDP

WEDNESDAY, 28 JANUARY, 2015 (SAGABARI, MALI)

- Kanda Toure, Sous-préfet de Sagabari
- Diabate Yaya
- Ibrahim Kamissoko

FRIDAY, 30 JANUARY, 2015 (BAMAKO, MALI)

- USAID/Mali out-brief
    - Gary Juste, Mission Director
    - Erin Pacific, Deputy Mission Director
    - Mohamed Traore, Education Program
    - Amadou Traore, Education Program
    - Valerie Hovetter, Supervisory Program Officer
    - Aminata Diarra Traore, Mission Environmental Officer

SATURDAY, 31 JANUARY, 2015 (MORILA MINE & DOMBA, MALI)

- RandGold
    - Abdoulaye Kone, Plant Manager
    - Abdoulaye Kente

    - Boubacar Gengaly
- Village outside of Domba
    - Sina Diabate
    - Yaya Diabate
    - Zan Togola

WEDNESDAY, 11 FEBRUARY, 2015 (WASHINGTON, DC)

- Jami Montgomery, USAID/DCHA Climate Change Advisor

WEEK OF 16 FEBRUARY 2015 (MOPTI)

- Aly Bocoum Near East Foundation
- Kevin Salvador World Vision
- Lassana Traoré AK F
- Alassane Ballo GAE-Walia Environmental Education

January Validation Workshop Agenda

USAID/Mali - Deuxième Atelier des Parties Prenantes sur l'Evaluation des Menaces et des Opportunités Environnementales (ETOA)

Un Forum Participatif à focus environnemental à l'intention des Professionnels et Organisations actives au Mali.

Bamako, Mali (Radisson Hotel)
Thursday, 29 January, 2015

Résumé et Objectif de l'Atelier

L'Agence américaine pour le développement international (USAID) au Mali se prépare à conduire une évaluation sur les Menaces et Opportunités Environnementales (en anglais, Environmental Threats and Opportunities - ETOA). L'ETOA recueillera des informations qui seront mises à disposition pour être utilisées dans le processus de planification stratégique de l'USAID et aider à identifier et hiérarchiser les solutions de programmation en ce qui concerne l'environnement, la gestion des ressources naturelles, et les effets du changement climatique mondial (CCG).

Un atelier précédent des parties prenantes ETOA a été tenu en Novembre 2014 qui appelait la contribution d'un large éventail de partenaires et collaborateurs de l'USAID / Mali, dont de nombreuses entités du gouvernement du Mali, des organismes de développement et de représentants du secteur privé. Cette contribution a été recueillie, s'ajoutant aux contributions obtenues à travers d'autres entretiens et consultations auprès d'intervenants, le tout ayant servi à la préparation d'un rapport préliminaire.

Le présent atelier de validation par les parties prenantes invite la même audience avec comme objectif l'approbation du rapport préliminaire de l'ETOA, considérant la prise en compte des contributions, commentaires et points de vue des parties prenantes et s'accordant consensuellement sur les principales questions soulevées et la manière dont l'USAID est prête à faire face aux menaces et opportunités environnementales significatifs.

Programme:

Horaire	Module	Objectifs/Contenus	Présentateur/Facilitateur
13:00-13:30	Arrivée et inscription des Participants		
13:30-13:40	Discours de bienvenue et ouverture des travaux	Souligner l'importance de la participation à l'atelier et des résultats attendus.	Mission USAID/Mali
13:40-14:00	Introductions et détente d'atmosphère	- Auto-présentation des participants et des animateurs et expression d'attentes particulières. - Revue logistique. - Détente d'atmosphère.	- Equipe GEMS ETOA - Participants
14:00-14:10	Rappel du Processus ETOA et du Cycle de planning stratégique quinquennal de l'USAID.	Survol du processus ETOA et de son rôle dans la planification stratégique au niveau de la Mission (CDCS).	- Mission USAID/Mali
14:10-14:30	Résumé des apports du premier atelier des Parties Prenantes et présentation des constats reportés dans le Rapport préliminaire de l'ETOA	Récapitulation des contributions du premier atelier et des aspects clés contenus dans le rapport préliminaire.	- Equipe GEMS ETOA
14:30-14:45	Préparation aux travaux en petits groupes (introduction et instructions)	Constituer des petits groupes et introduire l'approche d'exercice participatif/collaboratif à mener sur le rapport préliminaire et ses recommandations	- Equipe GEMS ETOA
14:45-15:00	Break& Networking		
15:00-16:15	Travaux en petits groupes (échange et discussion en groupe)	Poursuite de travaux en petits groupes et collecte des idées clés.	- Equipe GEMS ETOA - Participants
16:15-16:45	Travaux en petits groupes (rapportage et discussion en plénière)	Partage de consensus et de points de vue et recommandations/constats basés sur l'exercice participatif/collaboratif Discussion de groupe et identification des questions prioritaires et des approches de gestion.	- Equipe GEMS ETOA - Participants
16:45-17:00	Closing Remarks	Remercier les participants pour leur temps et leurs contributions et clôturer les travaux.	- Equipe GEMS ETOA - - Mission USAID/Mali

January Validation Workshop Attendees

ATELIER USAID-ETOA – PARTICIPANTS

NOM	ORGANISATION	TEL.	EMAIL
1. BOURAMA DAO	Direction N. pêche DNP	66819645	bouramadao@yahoo.fr
2. TARCILE, MBALLA-NGAMOUGOU	AGA KHAN FOUNDATION	94656384	tarcile.mballa@akdn.org
3. SANGARE Tidiane	Groupe Klédu TAM-VOYAGES	65878070	tisangare@hotmail.com sgcff@groupekledu.com
4. Kerri AGEE	CRS	75995317	kerri.agee@crs.org
5. CISSE DAOUDA	NEF. MALI	76215986 66886914	dcisse@neareast.org
6. Fomba Oumou N'tji Coulibaly	FASO-KABA sarl	20200679 78212628	fasokaba@yahoo.fr bamecoull92@yahoo.fr
7. COULIBALY Tahirou	ABFN	69184421	tahirou.coulibaly@yahoo.fr
8. Operi Berté	ABFN	60788637	operiberte68@yahoo.fr
9. ARINLOYE Djalal	ICRAF	75193623	a.arinloye@cgiar.org.
10. David Yanggen	USAID	76741836	dyanggen@usaid.gov
11. Harouna Almoustapha	DNEF	65770066	hamseddangaumag@yahoo.fr
12. Niaizié Mallet	DNEF	73636384	mallet80dnef@yahoo.fr
13. Ibrahima Sissoko	USAID CVC Project	66764280 73475228	[illegible]@acdivoca-mali.org
14. TOURE Modibo	FAO	66937676	Modibo.Toure@fao.org.
15 Sylvie Fontaine	DUE	44929292	sylvie.fontaine@eeas.europa.eu
16. Al Hassane Sow	CARE Mali	78740108	Alhassane.Sow@co.care.org.
17. Modibo	TRAORE	76389924	traoremod@gmail.com
18. Souleymane	SOGOBA	76311616	ssogoba@usaid.gov
19. Modibo Kanté	USAID/MCSP	66.79.71.83	modibo.kante@savethechildren.org
20. Marc Traoré	ICRISAT/Mali	76.30.32.34	m.traore@icrisatml.org marctrr@gmail.com
21. Gaoussou Diarra	World Vision	66662516	gaoussou_diarra@wvi.org
22. Alassane Abdouramane	CNESOLER	76465007 65503105	cnesoler@yahoo.fr
23. Famakan Kamissoko	CNESOLER	65809759	kmakan200298@yahoo.fr
24. Yacouba Djire	PSI-Mali	76233950	ydjire@psimali.org
25. Aminata Diarra	USAID/MALI	20702776	adiarra@usaid.gov
26. Mamadou Salieu DIALLO	GEMS	+224 657 360 303	madousalioupep@yahoo.com
27. Seydou Bouaré	GEMS	66731597	magentafart@gmail.com
28. CHARLES HERNICK	THE CADMUS GROUP GEMS	+1.617.935.9416	CHARLES.HERNICK@CADMUSGROUP.COM
29. Manda Sadio KEITA	UICN/MALI	66739099 76737274	mandasadio.keita@iucn.org

ANNEX B: LEGISLATION

The principal framework for environmental management and impact assessment in Mali is established by the Environmental Protection Law, Law No. 91-047/AN-RM of 23 February 1991, which is supplemented by various laws, decrees, and orders as discussed below. Legislation passed prior to 2008, as stated in the 2008 USAID Mali 118/119 report[193], are noted with a [*] throughout this section.

Additionally, on 29 May 2014, a bill was presented before the Ministry Council outlining a framework for the management of fishery and aquaculture resource, including the following provisions:

- Alignment of fisheries and aquaculture legislation with national policy governing development of fisheries and aquacultures and the Agriculture Act;
- Consideration of protocol for decentralization, including transfer of oversight and resources to collective territories and strengthening of international and transboundary cooperation;
- Consideration of the provisions of the convention on international trade of wild flora and fauna;
- Capacity building for monitoring and enforcement of regulations pertaining to fisheries and aquaculture.[194]

LEGISLATION	DATE ENACTED	LEGISLATION DETAILS
Law No. 95-004*	December 1994	Sets out the general conditions for conservation, protection, and valorization of forestry resources in the national forestry domain, and defines protected zones. The law requires that bush clearance in erosion-susceptible areas, along watercourses and around water points follow resource conservation measures. Article 17 of the law lists 11 protected tree species as Elaeis guineensis, Borassus aethiopium, Pterocarpus erinaceus, Afzelia Africana, Acacia Senegal, Parkia biglobosa, Butyrospermum paradoxum, Bombax costatum, Kaya senegalensis, Acacia albida, and Anogeisus leiocarpus.
Law No. 95-031 // Decree No.96-050/P-RM*	February 1995	Covers fauna and habitat management, and hunting regulations. Two categories of protection are defined by this law: totally protected fauna such as chimpanzees, which may not be hunted or captured other than for reasons of scientific research; and partially protected species, which may be hunted under specific conditions and in specific numbers.

[193] U.S. Agency for International Development. (November 2008).
[194] Consortium AGRECO. (2014).

LEGISLATION	DATE ENACTED	LEGISLATION DETAILS
Law No. 02-006*	January 2002	Regulates the use, conservation, protection, and management of water resources. Discharge of substances that may negatively affect water resources and aquatic fauna and flora is forbidden. Polluting industries must take necessary measures to prevent pollution at their own cost, and groundwater abstraction requires a permit from the cabinet. Industrial effluents must be treated prior to discharge, and where it is technically and economically feasible, water should be recycled. The Commission of Regulation of Water and Electricity is an independent entity that works with the Ministry of Mines, Energy, and Water to develop water and sanitation plans and ensure that mining operators respect regulations. The commission has the authority to impose regulations on any department, contracting authorities, users, and legally recognized operators.
Law No.04-005*	January 2004	Regulates the fauna, classifies and creates protected habitat, and establishes a fund for its protection. The fund consists of four types of revenue streams: hunting permits, live animal capture, wildlife tourism revenues, and royalties for skins and animal trophies.
Environmental Impact Assessments Decree	June 2008	Classifies all projects requiring an environmental and social impact assessment according to their impact on nature and the country, establishes rules and impact study procedures, and monitors and enacts sanctions in the event of a violation of the rules.
Law No. 06-045/AN-RM // Decree No. 09-011/P-RM	January 2009	Charges local and municipal land commissions with the responsibility of conciliation of parties engaged in agricultural land disputes prior to referral to higher courts, and participation in development and implementation of community land management policy.
Law No. 91-04/AN-RM // Decree No. 09-318/P-RM	June 2009	Establishes an environmental impact study procedure by establishing a social component to the study and outlining procedures for public consultation of the studies.
Law No. 10-027	July 2010	Establishes the AEDD
Law No. 10-028 // Decree No. 10-387-P-RM	July 2010	Establishes the list of protected tree species and forest species of economic value.
Law No. 10-028 // Decree No. 10-388/P-RM	July 2010	Establishes the rate of fees charged in connection with the exploitation of forest products.
Law No. 10-028 // Decree 2011-637/P-RM	September 2011	Determines the conditions and procedures for exercising the rights conferred by the transport of forest products.
Law No. 10-031	July 2010	Establishes the creation of a national fund to support agricultural endeavors.

LEGISLATION	DATE ENACTED	LEGISLATION DETAILS
Decree No. 10-574	October 2010	Establishes the organization and management protocol and procedures for the national fund to support agricultural endeavors, specifying funds to finance: o Programs that prevent and minimize major risks and calamities pertaining to agricultural development and living conditions of rural populations; o National seed stock to be used in times of catastrophe, and programs supporting production of such seeds; o Compensation for producers of such seeds during times of catastrophe.
Law No. 2011-036	July 2011	Relates to fiscal resources of Communes, Circles, and Regions.
Law No. 2012-003	January 2012	Prohibits in Mali the production, importation, possession, marketing, and use of non-biodegradable plastic bags and non-biodegradable granules for the production of plastic bags
Law No. 2012-007	February 2012	Establishes the Code of Collective Territories, and places the responsibility of environmental management and land use planning, as well as policy creation and management of public facilities, on local authorities.

ANNEX C: STAKEHOLDERS

The environmental legislation and decrees enumerated above are implemented by a range of GoM institutions. Collectively, these entities are responsible for overseeing and managing Mali's natural resources, including forests and biodiversity. The GoM regularly receives support from bilateral donors (e.g., USAID, EU, ASDI, etc.), as well as NGOs, to fulfill their environmental management, protection, or conservation mandate. These organizations represent a first tier of stakeholders with which USAID must constructively engage—or partner—in order to implement programs that are responsive to environmental threats and opportunities in Mali. The ETOA team prioritized a number of these institutions for stakeholder interviews and consultations in Bamako in November 2014. USAID/Mali expects to liaise and in certain cases collaborate with the following GoM institutions and other partners on environment-related initiatives (those organizations denoted with an asterisk [*] were the subject of interviews/consultations with the ETOA team in November 2014 and January/February 2015).

ORGANIZATION		ACTIVITIES/PROJECTS
International	ASDI	ASDI focuses on forestry and sustainable NRM as it relates to community development, promoting biodiversity while supporting opportunities for economic growth. In addition to improved NRM, ASDI also contributes to women's economic empowerment, as well as improved nutritional status of food supplies. ASDI currently funds US$ 6.5 million in environmental, agricultural, and forestry assistance, as well as resiliency programs using goats, seeds, and beekeeping for food security and income generation.[195]
	Délégation de l'Union Européenne en République du Mali (EU)*	The Global Climate Change Alliance program of the European Commission Environment Program (as funded by the EU) has provided €6.215 million in funding from 2010 to 2014 for forestry and carbon sequestration research in the Kayes, Koulikoro, Sikasso and Ségou regions. Additionally, grant contracts have been signed for the implementation of six afforestation/reforestation projects in the Kayes, Ségou and Mopti regions: • Support to community-based forest management for climate change adaptation in the Djenne district (PAFAC project; implemented by the NGO *Association des Volontaires pour le Développement Rural*); • Support to forest cover enhancement in the Bafoulabé and Kénieba districts (implemented by the NGO African Centre for the Integration of Human Rights); • Community project for land cover restoration and carbon sequestration along the Niger River in the Ségou region (implemented by the NGO *Association pour la Promotion de la Femme et de l'Enfant au Mali*); • "Greening Mopti" (implemented by the NGO SAHEL ECO); • Development of the arabic gum value chain in the Kayes region (implemented by the NGO AVSF); • Promotion of local initiatives for natural resource protection (PILPRN project; implemented by the NGO *Le Groupe d'Animation au Sahel Mali*).
	GIZ	GIZ, the German state development agency, is involved in several conservation and sustainable development programs in Mali: • Development of Strategic Environmental Assessment (SEA) to build capacity and strengthen policy to implement biodiversity and natural resource measures;

[195] Swedish International Development Cooperation Agency. (2014).

ORGANIZATION		ACTIVITIES/PROJECTS
		• Support in financing environmental initiatives in compliance with the Rio Convention and other international biodiversity conventions, as well as translating ideas on biodiversity and desertification into planning documents; • Leadership on establishing Biodiversity Action Day in Mali by emphasizing the role of traditional knowledge in biodiversity initiatives.
	IUCN- Mali Program	The IUCN in Mali supports a number of programs and activities related to sustainable development and NRM, particularly in the Inner Niger Delta region. The Youwarou Communities Program promotes decentralization by empowering local communities to develop rules and regulations to manage their natural resources to generate income and maintain biodiversity. The Poverty Reduction and Environmental Management Initiative (2009 – 2012) promoted integrated NRM of as a means of reducing poverty and adapting to climate change. Most recently, IUCN held the "Vers une sécurisation foncière du paysan dans la riziculture à grande échelle au Sahel" workshop in Bamako in June 2014, with more than 60 representatives from neighboring countries to promote sustainable rice cultivation through enhanced financing.
	Near East Foundation*	Near East Foundation (NEF) supports agriculture and NRM activities, emphasizing the need to increase awareness and education of climate change impacts among small-scale farmers, and to increase access to the necessary tools and resources to adapt to climate change and most effectively utilize limited resources to promote food security. These projects include development of water resource management tools and technologies, and water-efficient farming practices. NEF works specifically in Mali to improve water resource management practices and strengthen and inform climate change-related policies and legislation.
	TREE AID UK	TREE AID UK supports poverty reduction efforts through environmental protection and NRM programming, establishing the link between economic development and the environment. TREE AID UK's programming follows four key themes: access and rights; looking after the environment, nutrition and food security, and enterprise and trade. Projects in Mali include a partnership with Sahel ECO to reverse land degradation and promote sustainable agriculture.
	World Vision Mopti*	World Vision is a Christian humanitarian organization dedicated to working with children, families, and their communities worldwide to reach their full potential by tackling the causes of poverty and injustice. World Vision has been providing Malians with clean water supplies, agriculture development, literacy training and famine relief projects throughout the regions of Kayes, Gao and Ségou. In 1982, an official World Vision office was opened to expand activities to include emergency relief, and in 1986, World Vision Mali started child sponsorship programs.
	United Nations Development Program (UNDP)*	The UNDP Mali program promotes resiliency, NRM, and sustainable development, particularly through strengthening of local institutions and cooperation of policy makers. Under the Program Objective, "Préserver l'Environnement," UNDP has built capacity for local resource management and mobilization, citing an increase in percentage of forested area from 2006 to 2011.
	MINUSMA)/Bamako	MINUSMA was created in 2013, to assist with stabilization efforts following the recent political crisis. Resolution 2164 was passed on 25 June, 2014, extending MINUSMA and, for the first time, placed an emphasis on the environmental implications of the crisis. The resolution addresses the need to acknowledge cultural and historical sites when implementing the mission, as well as the environmental impact of both

ORGANIZATION		ACTIVITIES/PROJECTS
		the conflict and the mission consistent with the new UNEP report "Greening the Blue Helmets: Environment, Natural Resources, and UN Peacekeeping Operations."
	Wetlands, Inc.	Wetlands, International works to protect wetlands, particularly Ramsar sites, through advocacy, community empowerment, and mobilization of resources and expertise. With offices in Mopti and Bamako, Wetlands programs in Mali involve preservation of the Inner Niger Delta, and research into the impact of dam construction on protected wetland ecosystems and species. Wetlands also publishes the Niger Basin Atlas in conjunction with WWF. This resource details flood extension, land use and coverage, and precipitation in the Niger Basin, with a focus on the effects of climate change on ecosystem changes.
	World Wildlife Fund (WWF)	The WWF supports climate change, biodiversity, and conservation programs and projects, most notably the Alatona Irrigation Project, which works to provide and encourage equitable land use rights for women in Mali to promote food security and sustainable agriculture on small-scale farms. WWF also supports the protection of endangered species and threatened ecosystems in Mali.
National – Government Agencies	Agence de l'Environnement et du Développement Durable (AEDD)*	AEDD was created by the Malian government in July 2010 to serve as a consultative body to support and develop environmental programs to increase the capacity of environmental actors to fulfill their objectives and goals. AEDD carries out these primary activities: • Supports the secretariat of the *Conseil National de l'Environnement*; • Informs the public on environmental protection issues; • Reinforces the capacity of environmental actors through environmental education; • Mobilizes resources to lead environmental protection action against desertification and other detrimental effects of climate change; • Assures the coordination and leadership of the international conventions, accords, and treaties ratified by Mali; • Promotes the inclusion of environmentalism in the conception of programs, project developments, and land use plans to ensure consistency with Government actions; • Assures the management and oversight of environmental guidance (*Rapport National sur l'État de l'Environnement*, *Production des Statistiques sur l'Environnement et le Développement Durable*, etc.); • Disseminates results of research on biotechnology, environmental protection, reversal of desertification, and sustainable development in the face of climate change.[196]
	DNACPN*	DNACPN was created in 1998 to assure adherence to the *Programme National d'Amélioration du Cadre de Vie de la Politique Nationale de Protection de l'Environnement*. DNACPN is responsible for the implementation of programs with the assistance of international partners, including: • Construction of compact landfills in Noumoubougou (Bamako), Sikasso, Tombouctou and Sévaré; • Construction of a purification station in Mopti; • Management plan for the Bamako sanitation director;

[196] Minstère de l'Environnement et de l'Assainissement du Mali. (Accessed November 2014).

ORGANIZATION		ACTIVITIES/PROJECTS
		• Sanitation project for the Sotuba industrial zone (Bamako); • Rural nutrition and potable water program.[197]
	DNEF*	Established during the colonial era, DNEF is one of Mali's oldest agencies. Its goal is to oversee the sustainable management of forest ecosystems, promote conservation on a national level, and execute targeted environmental programs. These efforts include: • Implementing land use and restoration plans for forest, parks, and reserves, with particular emphasis on programs to reverse desertification; • Participating in convention and international treaty negotiations regarding conservation of forests and fauna, and overseeing their application; • Collecting and disseminating relevant research and statistics; • Training staff and authorities in proper NRM operations and allocating financial resources for community-based and decentralized NRM programs.[198]
	DNP*	DNP serves under the *Ministère de l'Elevage et de la Pêche* and is responsible for the implementation of fishing and aquaculture policy and development, sustainable management of fishery resources and channels, enforcement of fishing regulations, and collection and dissemination of fishing and aquaculture research and educational materials.[199]
	CNESOLER*	CNESOLER was created in 1990, and evolved from the original *Laboratoire de l'Energie Solaire* (LESO) in Mali. The ECOWAS Center for Renewable Energy and Energy Efficiency (ECREE) has served as a partner with CNESOLER, featuring workshops and presentations by CNESOLER.[200] The CNESOLER mission includes: • Collecting baseline research and establishing an inventory of potential renewable energy resources; • Researching the production, development, marketing, and installation for the implementation of technologies for solar, wind, and biomass energies; • Engineering technologies to strengthen national programs; • Evaluating renewable energy technologies and equipment; • Training and development of small- and medium-sized industries in the sector.
	Direction Nationale de l'Energie (DNE)*	Created in 1999, DNE manages both conventional and renewable energy projects.[201] It is an ECOWAS ECREE focal point institution, and is involved in the Scaling Up Renewable Energy Program, which received USD $1.5M in funding in 2011. DNE also received funding for a number of solar and photovoltaic initiatives to reduce use of already-strained natural resources.[202]
	Direction Nationale des Productions et des Industries Animales (DNPIA)	DNPIA has supported projects related to natural resource conservation and technologies, and has served as an organizational and educational partner with NGO efforts for agricultural projects. In 2008, DNPIA served as a partner of the Mali Livestock and Pastoral Initiative, a program led by Texas AgriLife Research and other US universities to

[197] Minstère de l'Environnement et de l'Assainissement du Mali. (Accessed November 2014).
[198] Minstère de l'Environnement et de l'Assainissement du Mali. (Accessed November 2014).
[199] SOFRECO. (2011).
[200] Traore, S.O. (2014).
[201] Direction Nationale de l'Energie. (Accessed November 2014).
[202] Climate Investment Funds. (2014).

ORGANIZATION		ACTIVITIES/PROJECTS
		implement USAID/Mali mission objectives of building technological capacity for an extensive livestock system. This program included a community empowerment component, strengthening resilience to decrease illegal use or exploitative use of natural resources.[203]
	Direction Nationale Agriculture (DNA)	DNA serves as an educational and outreach entity focused primarily on Mali's rural farmers. As an extension office (and with NGO assistance), DNA provides technical support and extension services for agricultural projects, particularly training for young farmers. DNA's more than 800 staff support both outreach and research efforts.[204]
	Direction Nationale Hydraulique (DNH)	DNH operates under the *Ministère de l'Environnement et de l'Assainissement* (MEA) and oversees the *Projet de Développement des Ressources en Eau et Préservation des Écosystèmes du Bassin du Niger*. This project targets a sustainable increase in productivity and economic development through use of water resources in the Niger River Basin area. Keeping in mind the impact of such activities on NRM, the program emphasizes: • Reinforcement of the institutional capacity of the African National Bank and other international organizations; • Rehabilitation of existing water infrastructure; • Restoration of environmental degradation in targeted areas; • Implementation of the *Cadre de Gestion Environnementale et Sociale*, a national effort to rehabilitate water sources, manage irrigated land and forests, and promote reforestation and targeted economic activities to improve infrastructure.[205]
National – NGOs	IER*	IER was created in 1990 and is the principal national entity for the implementation of agricultural research, providing more than 70 percent of agricultural research used by the Malian government for policy development. IER has focused on decentralization, restructuring in order to more thoroughly and appropriately cover its research zones.[206] Most recently, it has been involved in the Gourma Biodiversity Conservation Project in conjunction with the World Bank to research and promote sustainable use of natural resources in the Gourma PA region.[207]
	Mali-Folkecenter (MFC)	MFC is an extension of the Danish Folkecenter and supports sustainable development and NRM, with an emphasis on building and empowering local communities and mobilizing economic resources to ensure long-term success. MFC works with local populations, municipal authorities, government departments, multi-lateral institutions, local and international NGOs and other development partners. MFC programming includes: • Household biogas plants to combat desertification and climate change (Global Environment Facility Small Grants Program); • Building capacity for municipal environmental action planning (GTZ via STP - Secretariat Permanent Technique at the Ministry of Environment); • *Program National d'Infrastructures Rurales Acces à l'Eau Potable & Assainissement* (National Program for Rural Infrastructure Access to Drinking Water & Sanitation) (World Bank);

[203] Center for Natural Resource Information Technology. (2014).
[204] Agricultural Extension and Advisory Services Worldwide. (Accessed November 2014).
[205] Minstère de l'Environnement et de l'Assainissement du Mali. (2014).
[206] L'Institut d'Economie Rural de Mali. (2014).
[207] The World Bank Group. (2014).

ORGANIZATION		ACTIVITIES/PROJECTS
		• Study on community participation in the World Bank/GEF/UNDP Household Energy & Universal Rural Access Program (UNDP Mali); • Study on the Senegal River infestation by aquatic plants (Finnida via Finnish Environmental Institute); • Establishing an alert system for water hyacinth in the Senegal River (Finnida via WaterFinns, a Finnish environmental NGO); • Aligning community forest management with the Kyoto Protocol (University of Twente, Netherlands, via ENDA Tiers Monde, Senegal); • Capacity building of local authorities and populations regarding construction of a waste dump (Swiss Cooperation);[208] • Large-scale Jatropha project to provide power to 10,000 people in the village of Garalo in southern Mali, decreasing reliance on conventional energy sources that contribute to degradation of natural resources and loss of biodiversity.[209]
	Sahel ECO	Sahel ECO is an independent Malian NGO, and operated under the UK NGO of the same name until 2004. Sahel ECO works to improve civil society in the region through improved environmental management and empowerment and mobilization of affected communities. Sahel ECO projects in Mali include Regreening Mopti, Regreening Sokura, Trees for Livelihood, and the Shea Tulu Project, which aim to reverse desertification and deforestation to prevent land degradation and promote food security among semi-arid communities.[210]
	Reso-Climat Mali	Created in 2008, *Reso-Climat Mali* is a networking platform for agencies, NGOs, NGO networks, associations, etc. to work together to inform climate change and sustainable development programs and policies. Programs include: • *Le Programme d'Appui aux Initiatives du RESO-Climat Mali pour l'Adaptation aux Changements Climatiques* ; • *Le Programme d'Appui à l'Adaptation aux Changements Climatiques dans la zone Sahélienne du Mali*; • *Campagne pour une justice climatique*. *Reso-Climat Mali* Partners include: • MEA; • AEDD; • ASDI; • *L'ambassade du Royaume de la Norvège*; • Le Diakonia; • Sustainable Energy (Denmark); • Siemenpuu Foundation (Finland); • Christian Aid (UK).[211]
	GAE-WALIA, Mopti	Founded in 1992, GAE-WALIA is a former IUCN project, and focuses on populations living in climate-change affected regions that depend on natural resources for survival, income, and sustenance. GAE-WALIA provides environmental education to inform thousands of students, teachers, and technical stakeholders on sustainable agriculture, fishing, and health practices. The NGO focuses on local knowledge and expertise as a basis of program development, and this approach has been applied to other environmental education and communications programs in West Africa.

[208] Mali-Folkecenter. (Accessed November 2014).
[209] Mali-Folkecenter. (Accessed November 2014).
[210] Sahel ECO. (2013). *Sahel ECO*.
[211] Reso Climat Mali. (Accessed November 2014).

ANNEX D: THREATENED AND ENDANGERED SPECIES

KINGDOM	SCIENTIFIC NAME	COMMON NAMES(S)	RED LIST STATUS[1]	YEAR ASSESSED	TREND (I, D, U)[2]
Animalia	*Mecistops cataphractus*	Slender-snouted Crocodile, African Slender-snouted Crocodile	CR	2014	D
Animalia	*Nanger dama*	Dama Gazelle, Addra Gazelle	CR	2008	D
Animalia	*Falco cherrug*	Saker Falcon, Saker	EN	2013	D
Animalia	*Gazella leptoceros*	Slender-horned Gazelle, Rhim	EN	2008	D
Animalia	*Gyps africanus*	White-backed Vulture	EN	2012	D
Animalia	*Gyps rueppelli*	Rüppell's Vulture, Ruppell's Vulture, Rüppell's Griffon Vulture, Rueppell's Griffon	EN	2014	D
Animalia	*Lycaon pictus*	African Wild Dog, Painted Hunting Dog, Cape Hunting Dog	EN	2012	D
Animalia	*Necrosyrtes monachus*	Hooded Vulture	EN	2012	D
Animalia	*Neophron percnopterus*	Egyptian Vulture, Egyptian Eagle	EN	2014	D
Animalia	*Pan troglodytes*	Chimpanzee, Robust Chimpanzee, Common Chimpanzee	EN	2008	D
Animalia	*Philochortus zolii*		EN	2013	D
Animalia	*Oryx dammah*	Scimitar-horned Oryx	EW	2008	
Animalia	*Cyclanorbis senegalensis*	Senegal Flapshell Turtle	NT	1996	
Animalia	*Ardeotis arabs*	Arabian Bustard	NT	2012	D
Animalia	*Arius gigas*	Giant Sea Catfish	NT	2010	D
Animalia	*Aythya nyroca*	Ferruginous Duck, White-eyed Pochard, Ferruginous Pochard	NT	2012	D
Animalia	*Circus macrourus*	Pallid Harrier, Pale Harrier	NT	2013	D
Animalia	*Coracias garrulus*	European Roller, Roller	NT	2012	D
Animalia	*Eidolon helvum*	African Straw-colored Fruit-bat, Pale Xantharpy, Straw-colored Flying Fox, Straw-colored Fruit Bat	NT	2008	D
Animalia	*Falco vespertinus*	Red-footed Falcon, Western Red-footed Falcon	NT	2013	D
Animalia	*Gallinago media*	Great Snipe	NT	2012	D
Animalia	*Glareola nordmanni*	Black-winged Pratincole	NT	2012	D

KINGDOM	SCIENTIFIC NAME	COMMON NAMES(S)	RED LIST STATUS[1]	YEAR ASSESSED	TREND (I, D, U)[2]
Animalia	*Gobiocichla wonderi*		NT	2010	U
Animalia	*Hipposideros jonesi*	Jones' Roundleaf Bat, Jones's Roundleaf Bat	NT	2008	D
Animalia	*Hyaena hyaena*	Striped Hyaena	NT	2008	D
Animalia	*Limosa limosa*	Black-tailed Godwit	NT	2012	D
Animalia	*Micropanchax ehrichi*		NT	2010	U
Animalia	*Neotis denhami*	Denham's Bustard, Stanley Bustard	NT	2014	D
Animalia	*Neotis nuba*	Nubian Bustard	NT	2013	D
Animalia	*Numenius arquata*	Eurasian Curlew, Curlew	NT	2012	D
Animalia	*Panthera pardus*	Leopard	NT	2008	D
Animalia	*Papio papio*	Guinea Baboon	NT	2008	U
Animalia	*Raiamas nigeriensis*		NT	2010	U
Animalia	*Rynchops flavirostris*	African Skimmer	NT	2012	D
Animalia	*Terathopius ecaudatus*	Bateleur	NT	2012	D
Animalia	*Acinonyx jubatus*	Cheetah, Hunting Leopard	VU	2008	D
Animalia	*Ammotragus lervia*	Aoudad, Uaddan, Barbary Sheep	VU	2008	D
Animalia	*Balearica pavonina*	Black Crowned-crane, Black Crowned-Crane, Black Crowned Crane, Northern Crowned Crane	VU	2012	D
Animalia	*Barbus niokoloensis*		VU	2010	U
Animalia	*Centrochelys sulcata*	African Spurred Tortoise, Grooved Tortoise	VU	1996	
Animalia	*Ceratogymna elata*	Yellow-casqued Hornbill, Yellow-casqued Wattled Hornbill	VU	2012	D
Animalia	*Circaetus beaudouini*	Beaudouin's Snake-eagle, Beaudouin's Snake Eagle	VU	2014	D
Animalia	*Dasyatis garouaensis*	Smooth Freshwater Stingray, Niger Stingray, Niger Stingray, Smooth Freshwater Stingray	VU	2005	D
Animalia	*Eudorcas rufifrons*	Red-fronted Gazelle	VU	2008	D
Animalia	*Gazella dorcas*	Dorcas Gazelle	VU	2008	D
Animalia	*Hippopotamus amphibius*	Hippopotamus, Large Hippo, Common Hippopotamus	VU	2008	D

KINGDOM	SCIENTIFIC NAME	COMMON NAMES(S)	RED LIST STATUS[1]	YEAR ASSESSED	TREND (I, D, U)[2]
Animalia	*Loxodonta africana*	African Elephant	VU	2008	I
Animalia	*Marmaronetta angustirostris*	Marbled Teal, Marbled Duck	VU	2012	D
Animalia	*Panthera leo*	Lion, African Lion	VU	2012	D
Animalia	*Polemaetus bellicosus*	Martial Eagle	VU	2013	D
Animalia	*Psittacus timneh*	Timneh Parrot	VU	2013	D
Animalia	*Sagittarius serpentarius*	Secretarybird, Secretary Bird	VU	2013	D
Animalia	*Torgos tracheliotos*	Lappet-faced Vulture	VU	2012	D
Animalia	*Trichechus senegalensis*	African Manatee, Seacow, West African Manatee	VU	2008	U
Animalia	*Trigonoceps occipitalis*	White-headed Vulture	VU	2012	D
Plantae	*Acridocarpus monodii*		EN	2011	U
Plantae	*Pteleopsis habeensis*		EN	1998	
Plantae	*Vepris heterophylla*		EN	1998	
Plantae	*Dalbergia melanoxylon*	African Blackwood, Mozambique Ebony	NT	1998	
Plantae	*Cyanotis ake-assii*		NT	2011	U
Plantae	*Justicia niokolo-kobae*		NT	2011	U
Plantae	*Afzelia africana*	Afzelia	VU	1998	
Plantae	*Ceropegia rhynchantha*		VU	2014	D
Plantae	*Gilletiodendron glandulosum*		VU	2011	I
Plantae	*Khaya senegalensis*	African Mahogany, Benin Mahogany, Dry Zone Mahogany, Senegal Mahogany	VU	1998	
Plantae	*Pavetta lasioclada*		VU	1998	

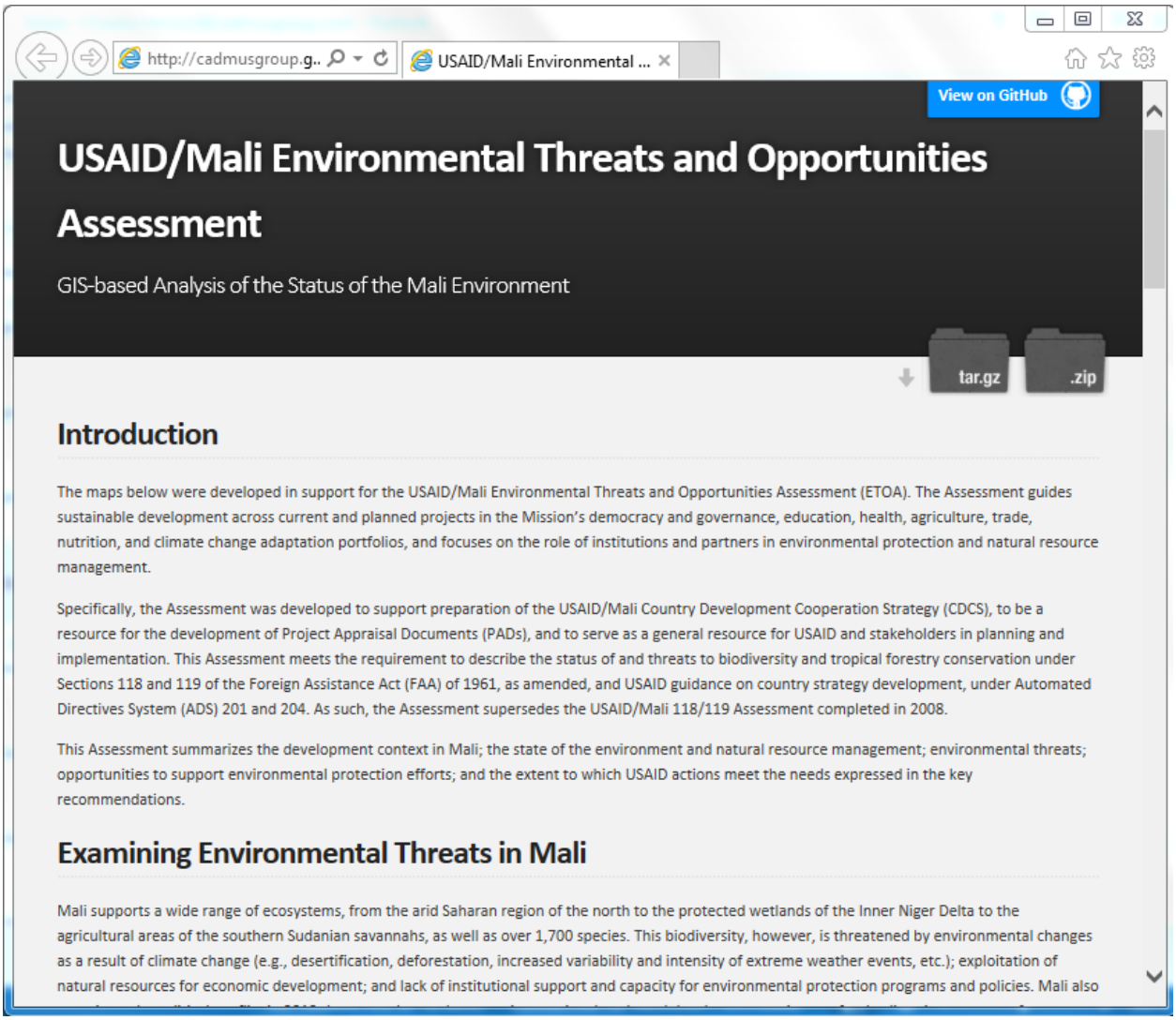
Source: IUCN, 2015

[1] EW = extinct in the wild, CR = critically endangered, EN = endangered, VU = vulnerable, NT = near threatened

[2] I = increasing, D = decreasing, U = unknown. Several cells in this column were blank in the IUCN dataset.

ANNEX E: MAPS

Maps are available online at: http://cadmusgroup.github.io/USAID-Mali-ETOA/



ANNEX F: ENVIRONMENTAL ACTIVITIES AND PROJECTS IN MALI

The following table includes efforts undertaken by international agencies, NGOs, and external actors to promote conservation initiatives and improve environmental conditions in Mali, as originally presented in the EU "*Révision du profil environnemental du Mali*," USAID "Mali Tropical Forests and Biodiversity 118/119 Assessment," and Adaptation Partnership "Review of Current and Planned Adaptation Action: West Africa."[212,213,214] The extent of these programs demonstrates the high level of involvement by a variety of international actors both before and after the 2012-2013 political crisis, which imposed an embargo on international funding outside of emergency aid. Further, the range of implementing agencies highlights the involvement of the Malian government in facilitating environmental projects and activities.

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Alliance Globale sur le Changement Climatique	EC	MEEA	2010-2017	6.1 million
Alliance Globale pour l'Initiative Résilience	EC		2012-present	
Développement de référentiels techniques et économiques dans les filières biocarburant à la base de Jatropha	EC	DN Energie	2011-2014	7.4 million
Programme d'Appui aux Collectivés Territoriales pour l'Eau et l'Assainissement (PACTEA)	EC	DNH	2013-2017	20.2 million (FCA)
Garantir les droits et restaurer les terres en vue d'améliorer les moyens d'existence (régional)	EC	UICN	2009-2014	2.0 million
Programme d'appui au développement de l'Office du Niger (PADON II)	AFD (France)		2009-2012	15.0 million
Projet d'appui au système d'exploitation en zone cotonnière (PASE II)	AFD (France)	EU	2008-2015	11.0 million
Programme d'alimentation en eau potable et d'assainissement dans la région de Mopti	AFD (France)	DNH	2008-2015	11.3 million
Pilote assainissement Kayes	AFD (France)		Ongoing	450,000
Hydraulique urbaine – AEP Bamako/Kabala	AFD (France)		Ongoing	56.6 million
Appui à l'assainissement et au développement urbain du quartier de Baco Djicoroni	AFD (France)		Ongoing	1.5 million
Projet de développement urbain Bamako (PADU)	AFD (France)		Ongoing	20.0 million
Programme d'urgence d'alimentation en eau potable de la ville de Bamako	AFD (France)		2008-2010	8.0 million
Alimentation en eau potable et assainissement de centres semi-urbains du sud Mali, phase II	AFD (France)		Ongoing	6.1 million
Programme eau potable de Bamako	AFD (France)			12.0 million

[212] AGRECO. (2014).
[213] USAID. (2008).
[214] De Vit, C., & Parry J. (2011). Review of current and planned adaptation action: West Africa.

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Station Compacte Missabgou	AFD (France)	DNH	2010-2014	8.3 million (FCA)
Projet Consolidation de la Gestion Durable des 3 Forêts Classées de la Faya des Monts Mandingues et du Sousan	AFD (France)	DNEF	2002-2014	1.8 million (FCA)
Projet coton bio et équitable	AFD (France)		2011-2015	5.0 million
Gestion durable de la biodiversité agricole	AFD (France)		2008-2014	1.6 million
Production de biocarburant (Jatropha)	AFD (France)		2011-2014	260,000 (USD)
Projet d'Appui au Développement Economique des territoires Ruraux des régions de Ségou et de Tombouctou (PADER)	AFD (France)		2014-2018	30.0 million
Projet Conservation et Valorisation de la Biodiversité du Gourma et des Eléphants	AFD (France)	DNEF	2005-2014	5.5 million (FCA)
Energie renouvelable et réduction des émissions de CO2	AFD (France)		2011-2017	460,000
Consolidation à la Filière de Transformation et Gestion des Déchets Solides de la ville de Sikasso (CONFIDES)	CTB (Belgium)		2014-2017	1.8 million
Projet d'Appui au Développement des Activités Maraîchères Périurbaines à Samanko (PADAP)	CTB (Belgium)		2006-2013	1.9 million
Projet d'Appui au Développement de l'Elevage du Zébu Maure dans le cercle de Nara (PRODEZEM)	CTB (Belgium)		2009-2015	8.8 million
Programme de Micro Interventions (MIP)	CTB (Belgium)		2009-2012	500,000
Projet d'Appui au Développement de la Filière Aquacole dans la région de Sikasso (PRODEFA)	CTB (Belgium)		2010-2016	6.1 million
Projet d'appui institutionnel auprès l'administration territoriale (PAIMAT)	CTB (Belgium)		2011-2014	3.5 million
Projet d'Appui à la Décentralisation de la région de Koulikoro – Phase II (PADK II)	CTB (Belgium)		2010-2016	308,000
Projet d'appui à l'état civil (PAEC)	CTB (Belgium)		2013-2015	1.1 million
Programme d'appui au sous-secteur d'irrigation de proximité (PASSIP)	GIZ, KFW, BMU (Germany)		Ongoing	
Programme Mali – Nord (IPRODI 2)	GIZ, KFW, BMU (Germany)		2011-2017	
Projet d'intégration de l'adaptation aux changements climatiques dans la planification du développement au Mali	GIZ, KFW, BMU (Germany)	AEDD, DNCT, DNPD, CFCT	In preparation	
Planification innovante du développement visant l'adaptation aux changements climatiques (PIDACC)	GIZ, KFW, BMU (Germany)			3.0 million
Conseiller à la direction nationale de l'hydraulique	GIZ, KFW, BMU (Germany)	DNH		

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Programme d'appui aux collectivités territoriales (PACT)	GIZ, KFW, BMU (Germany)			
Program. Nat de Mobilisation des Ressources en Eau /Assainissement AEP Centres Semi Urbains en 1ère, 2ème, 5ème et 6me régions.	GIZ, KFW, BMU (Germany)	DNH	2011-2016	33.0 million
Projet protection berges fleuve Niger	GIZ, KFW, BMU (Germany)	DNH	2012-2016	10.8 million
Programme d'Appui à la Politique Environnementale (PAPE)	GIZ, KFW, BMU (Germany)	MEA	1995-2011	
Projet plan d'action national de gestion des zones humides du Mali (PAZU)	Netherlands	DNEF	Ongoing	10.6 million
Energie solaire domestique	Netherlands			
Biogaz	Netherlands			
L'efficacité énergétique (diffusion de foyers/fourneaux améliorés	Netherlands			
Renforcement des capacités de résilience des producteurs aux changements climatiques	Netherlands			
Projet de gouvernance locale démocratique de la gestion des ressources naturelles dans la région de Gao	Netherlands		In preparation	
Programme de gestion décentralisée des forets (GEDEFOR)	ASDI (Sweden)	MEEA, DNEF	2013–2015	2.8 million
Gouvernance démocratique locale	ASDI (Sweden)	CSO, DIAKONIA, HELVETAS	2008–2013	
Programme de développement durable du Delta Intérieur du Niger (PDD-DIN Wetlands)	ASDI (Sweden)	DNEF	2014-ongoing	
Appui au renforcement du Réseau ONGs sur les changements climatiques et à leur initiative de terrain	ASDI (Sweden)		2014 – 2016	4.0 million
Stratégies locales d'adaptation aux changements climatiques (Kidal et Gao)	ASDI (Sweden)		2012 – 2013	1.8 million
Fonds Climat Mali	ASDI (Sweden)		2014-ongoing	3.8 million
Facilité d'adaptation locale aux changements climatiques	ASDI (Sweden)		2014–2015	652,200
Projet de réhabilitation des écosystèmes dégradés du delta intérieur du Niger	ASDI (Sweden)	IUCN, Wetlands International	Ongoing	2.3 million
Sécurité alimentaire focalisée à la résilience dans les régions de Koulikoro et Kayes	ASDI (Sweden)	ACF	2012-2013	2.3 million
Sécurité alimentaire au Mali Nord	ASDI (Sweden)		Ongoing	1.6 million
Sécurité alimentaire des femmes	ASDI (Sweden)		Ongoing	2.1 million
Accès à l'eau potable des petits enfants	ASDI (Sweden)	UNICEF	2013-2015	2.2 million - 4.5 million

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Gouvernance Environnementale en Afrique de l'Ouest (régional)	ASDI (Sweden)		2015-ongiong	
MDP (eau et assainissement, gestion durable de l'eau) (PADS/PROSEA)	ASDI (Sweden)	MEEA	2010-2014	9.8 million
Financement innovatif de l'eau en milieu rural (iFoRuM)	ASDI (Sweden)			5.5 million
L'eau potable	ASDI (Sweden)			760,900
PADS/ PROSEA – HU	DANIDA (Denmark)	SOMAPEP	2013-2015	13.2 million
PADS/ PROSEA – assainissement	DANIDA (Denmark)	DNACPN	2013-2015	5.1 million
Program PADS/ PROSEA – HR	DANIDA (Denmark)	DNH	2013-2015	16.2 million
Carte provisoire de ressources d'énergie renouvelables du Mali	DANIDA (Denmark)	DN ENERGIE	Concluded 2012	
Eau, assainissement et hygiène au sud du Mali	Canada		2013-2015	
Programme d'appui aux organisations de la société civile – phase II	Canada		2011-2017	
Appui au programme de développement institutionnel du Mali (PDI)	Canada		2011-2017	
Appui au cadre stratégique pour la croissance et la réduction de la pauvreté	Canada		2011-2015	
Réhabilitation d'infrastructures hydro-agricoles dans la zone de l'Office du Niger	Canada		2010-2017	
Appui à l'irrigation de proximité	Canada		2010-2014	
Filières agricoles	Canada		2008-2015	
Appui au plan décennal de développement sanitaire et social – nord du Mali	Canada		2004-2015	
Fonds commun de développement	Canada		2002-2014	
Technologie solaire pour l'Union Economique et Monétaire Ouest-Africaine (régional)	Canada		2013-2018	
Mécanisme pour l'adaptation au changement climatique	Canada		2013-2016	
Programme d'appui aux collectivités territoriales du PACY	Switzerland		2014-ongoing (restarted)	4.2 million
Programme d'appui aux filières agricoles	Switzerland		2014-2018	13.3 million
Promotion des opportunités liées aux mécanismes du marché du carbone/MDP	Norway		2010-2011	
Recherche –développement sur adaptation de l'agriculture et de l'élevage au changement climatique	Norway	IER/NORAGRIC	2011-2015	5.0 million

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Appui à l'office de mise en valeur du système de lac Faguibine (OMVF)	Norway		2011-2015	
Programme sécurité alimentaire et adaptation aux changements climatiques	Norway		2008-2015	
Projet de développement de l'agriculture dans zone de Kangaba	BID	DNH	2006-2014	10.6 million
Station Compacte Kalaban-coro	BID	DNH	2010-2014	14.3 million
Projet d'hydraulique villageoise dans le plateau Dogon (phase II)	BOAD	DNH	2007-2014	6.2 million
Projet d'AEPA dans les régions de Gao, Koulikoro et Ségou	ADB	DNH	2009-2014	3.9 million
Appui à la mise en place du plan GIRE	ADB	DNH	2010-2015	2.5 million
Programme développement irrigation dans le bassin du Bani et à Selingue phase I	ADB		2009-ongoing	
Projet d'appui au développement des productions animales en zone de Kayes sud (PADEPA-KS)	ADB	DMPIA	2008-ongoing	
Mini-micro centrale hydroélectrique au Mali	ADB	DNE	2014-ongoing (approved)	
Projet d'approvisionnement en eau potable de Bamako	ADB	DNH	2014-ongoing (approved)	
Projet de renforcement de la sécurité alimentaire par le développement des cultures irriguées au Mali	ADB	MDR	2014–ongoing (approved)	
Projet d'assainissement de Bamako	ADB		In planning	
Projet aménagement Phedie Sabalibougou	ADB	MDR	In planning	
Réhabilitation des infrastructures agricoles zones Nord	ADB		In planning	
Projet d'électrification rurale	ADB	DN Energie	In planning	22.8 million
Projet d'amélioration de la productivité des terres	ADB	MEEA	In planning	
Plan d'investissement SREP	ADB	AMADER	2012-2014	
Projet de gestion des ressources naturelles et changement climatique (PGRNCC)	World Bank	AEDD	2014-2018	14.1 million
Projet d'appui aux communes urbaines du Mali (PACUM)	World Bank	CAB, MUPV	2012-2017	12.2 million
Projet Energie Domestique et Accès aux Services de Base en milieu rural (PEDASB)	World Bank	DN ENERGIE	2004-2012	6.3 million
ML-BioCarbon fund MASPP & Biomass	World Bank			
Projet de systèmes hybrides pour l'électrification rurale	World Bank			19.0 million

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Projet d'Accès aux Services Energétiques (PASE)	World Bank	DN ENERGIE	2010-2014	9.1 million
Projet de reconstruction et de relance économique qui inclus le plan de gestion des pestes et pesticides	World Bank			2.2 million
Programme Sahel en Afrique de l'ouest en appui à l'Initiative de la Grande Muraille Verte	World Bank			13.7 million
Lighting Africa	World Bank		2007-2014	2.3 million
Elimination des substances appauvrissant la couche d'ozone	PNUE	DNACPN	2010-2014	1.7 million
African rural energy entrepreneur development (regional) (AREED)	PNUE	DN ENERGIE		379,500
Initiative Pauvreté – Environnement (IPE 2)	PNUD		In planning	
Programme d'Appui à la gestion de l'Env. et la Promotion du Développement Durable au Mali (PAGGED)	PNUD	AEDD	2011-2015	4.7 million
Projet Appui Stratégie Nationale Adaptation Changement Climatique	PNUD	AEDD	2013-2017	10.2 million
Gestion Végétation Autochtone pour la Réhabilitation des Terres de Parcours Dégradés en Zones Arides et semi-arides d'Afrique	PNUD	DNEF	2002-2014	2.8 million
Projet Extension et Renforcement du Système des Aires Protégées au Mali (ERSAP)	PNUD	DNEF	2011-2015	2.8 million
Renforcement des capacités des structures étatiques et des collectivités décentralisées pour atténuer les risques liés aux changements catastrophes	PNUD	DGPC	2009-ongoing	1.1 million
Promotion de la production et de l'utilisation du Jatropha comme agro biocarburant durable au Mali	PNUD	DN Energie	2011-2015	5.1 million
Promotion des Energies Nouvelles et Renouvelables pour l'avancement des Femmes (PENRAF)	PNUD	DN Energie	2010-2012	3.8 million
Renforcement de la sécurité alimentaire au Mali face aux changements climatiques	PNUD	DG de la météorologie	2009-ongoing	150,000
Programme de Micro- fonds	PNUD			
Gestion de la biodiversité dans le Delta Intérieur du Niger	FIDA		In planning	
Intégrer la résilience face au changement climatique dans la production agricole en vue de la sécurité alimentaire dans les zones rurales du Mali	FAO		2015-ongoing (expected)	1.5 million
Programme Sahel en Afrique de l'Ouest en appui à l'initiative de la Grande muraille verte	FAO			300,000
Projet d'appui è la sécurité alimentaire dans la région de Koulikoro	FAO			
Projet de petite irrigation villageoise dans les régions de Mopti et de Gao	FAO			
Projet d'intensification agricole par la maîtrise de l'eau dans le Sahel occidental	FAO			

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Projet d'appui à la gestion participative des ressources forestière centré sur la faune et les produits forestiers	FAO			
Coopération Sud Sud en appui à la sécurité alimentaire dans le cercle de Yelimane (PADDY)	FAO			
Projet de développement urbain	BM/AFD			
Programme Africain Relatif aux Stocks de Pesticides Obsolètes	FEM/FAO/ CROPLISCE /FFEM	DNACPN	2007-2014	7.7 million
Programme de Valorisation à Grande Echelle des Energies Renouvelables	BAD, BM, IFC	DNE	2012-2017	29.0 million
Projet AEP Bko-Kabala	UE, AFD, BEI, BM, BAD, BID, ISTISNA	SOMPEP	2014-2017	27.0 million
Programme Régional Aménagement Massif Fouta Djallon	PNUE/FAO	AEDD	2009-2018	1.1 million
Elaboration du Cadre National de Biosécurité au Mali	UEMOA	AEDD	2003-2014	440,600
Hydraulique villageoise Ségou	UEMOA	DNH	In planning	2.6 million
Projet Composante Mali du Programme de lutte contre l'ensablement dans le bassin du fleuve Niger	BAFA/UEM OA	DNEF	2005-2015	13.0 million
Projet Multinational de Gestion Intégrée des Plantes Aquatiques Proliférantes en Afrique de l'Ouest	BAFA/UEM OA	DNEF	2005-2014	2.9 million
Renforcement des capacités en planification pour une croissance efficace et durable du secteur énergétique au Mali	AIEA		2012-ongoing	150,000
Projet sucrier de Markala (valorisation énergétique)	BAD, BID, KFAED, FSD, KEX, OFID, SFI, BOAD, BIDC, DGE	DN Energie, secteur privé (PPP)	2011-2017	21.2 million
Projet de construction d'une centrale solaire de 10 MW à Mopti	IFC		2011-2031 (in planning)	30.4 million
Projet Eclairage des Villages par l'Energie Solaire	INDE	DN Energie	2010-2014	
Projet Adaptation changement climatique local	FENU	AEDD	2014-2018 (in planning)	610,000
Projet Hydraulique Villageoise Pastorale (Phase III)	FKD	DNH	2002-2013	12.7 million
Projet Saoudien Forage Développement Rural AEP TBTOU/Kayes	Fonds Saoudien	DNH	2010-2014	3.9 million
National Capacity Needs Self-Assessment (NCSA) for Global Environmental Management	GEF	UNDP	Under Implementation	150,000
SIP: Fostering Agricultural Productivity in Mali	GEF	IBRD	Under Implementation	6.1 million

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
Strengthening Resilience to Climate Change through Integrated Agricultural and Pastoral Management in the Sahelian zone in the Framework of the Sustainable Land Management Approach	GEF	FAO	PPG-Approved	1.6 million
Third National Communication to the UNFCCC	GEF	UNDP	CEO-Approved	380,000
Enabling Activities to Review and Update the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (POPs) in the Republic of Mali	GEF	UNIDO	CEO-Approved	171,000
Scaling up and Replicating Successful Sustainable Land Management (SLM) and Agroforestry Practices in the Koulikoro Region of Mali	GEF	UNEP	PIF-Approved	1.2 million
Promoting Sustainable Electricity Generation in Malian Rural Areas through Hybrid Technologies	GEF	UNDP	PIF-Approved	879,200
Building Capacity in Sub-Saharan Africa to Respond to the UN Framework Convention on Climate Change	GEF	UNDP	Under Implementation	1.5 million
Sustainable Management of Globally Significant Endemic Ruminant Livestock of West Africa	GEF	UNDP	Under Implementation	7.6 million
Addressing Transboundary Concerns in the Volta River Basin and its Downstream Coastal Area	GEF	UNEP	Under Implementation	4.1 million
Capacity-building for Improving Greenhouse Gas Inventories (West and Francophone Central Africa)	GEF	UNDP	Under Implementation	2.0 million
Reducing Dependence on POPs and other Agro-Chemicals in the Senegal and Niger River Basins through Integrated Production, Pest and Pollution Management	GEF	UNEP	Under Implementation	3.1 million
Fouta Djallon Highlands Integrated Natural Resources Management Project (FDH-INRM) (Tranches 1 and 2)	GEF	UNEP	Under Implementation	8.3 million
Demonstration of a Regional Approach to Environmentally Sound Management of PCB Liquid Wastes and Transformers and Capacitors Containing PCBs	GEF	UNEP	Under Implementation	3.7 million
SIP PROGRAM: Strategic Investment Program for SLM in Sub-Saharan Africa (SIP)	GEF	IBRD	Council-Approved	1.4 million
SPWA-BD: Evolution of PA systems with regard to climate change in the West Africa Region	GEF	UNEP	Under Implementation	2.8 million
AFLDC: Capacity Strengthening and Technical Assistance for the Implementation of Stockholm Convention National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the ECOWAS Subregion	GEF	UNEP	Under Implementation	6.1 million
Disposal Of Obsolete Pesticides Including POPs And Strengthening Pesticide Management In The Permanent Interstate Committee For Drought Control In The Sahel (CILSS) Member States	GEF	FAO	PPG-Approved	5.6 million

ACTIVITY/PROJECT	FUNDING AGENCY	IMPLEMENTING AGENCY	DATES	BUDGET (€)
SPWA-BD: GEF Program in West Africa: Sub-component on Biodiversity	GEF	IBRD	Council-Endorsed	
SPWA-CC: GEF Strategic Program for West Africa: Energy Component (PROGRAM)	GEF	UNIDO	Council-Endorsed	
Africa Stockpiles Program (ASP) – Project 1-Supplemental Funds for Disposal and Prevention	GEF	IBRD	CEO-Endorsed	3.0 million
SPWA-CC Promoting Coherence, Integration and Knowledge Management under Energy Component of SPWA	GEF	UNIDO	Under Implementation	531,200
GGW Sahel and West Africa Program in Support of the Great Green Wall Initiative	GEF	IBRD	Council-Approved	3.7 million
Support to Preparation of the Second National Biosafety Reports to the Cartagena Protocol on Biosafety-Africa	GEF	UNEP	CEO-Approved	750,000
Improve the Health and Environment of Artisanal and Small Scale Gold Mining (ASGM) Communities by Reducing Mercury Emissions and Promoting Sound Chemical Management	GEF	UNIDO	Under Implementation	751,000
Support to GEF Eligible Parties (LDCs & SIDs) for the Revision of the NBSAPs and Development of Fifth National Report to the CBD – Phase II	GEF	UNEP	Under Implementation	4.6 million
GEF SGP Fifth Operational Phase – Implementing the Program Using STAR Resources II	GEF	UNDP	CEO-Endorsed	54.0 million
Continuing Regional Support for the POPs Global Monitoring Plan under the Stockholm Convention in the Africa Region	GEF	UNEP	Council-Approved	3.2 million
Support to 20 GEF Eligible Parties for Alignment of National Action Programs and Reporting Process under UNCCD (Add-on Umbrella 2)	GEF	UNEP	IA-Approved	759,000
Senegal River Basin Climate Change Resilience Development Project	GEF	IBRD	CEO-Endorsed	12.1 million
Improving IWRM, Knowledge based Management and Governance of the Niger Basin and the Iullemeden Taoudeni Tanezrouft Aquifer System (ITTAS)	GEF	UNDP	Council-Approved	10.2 million
Integrated Development for Increased Rural Climate Resilience in the Niger Basin	GEF	AfDB	Council-Approved	9.1 million
Technical Assistance to Francophone LDCs to Implement the UNFCCC8/CP8 Decision	GEF	UNDP	CEO-Approved	160,200

ANNEX G: SUMMARY OF USDA TECHNICAL ASSISTANCE ACTIVITIES

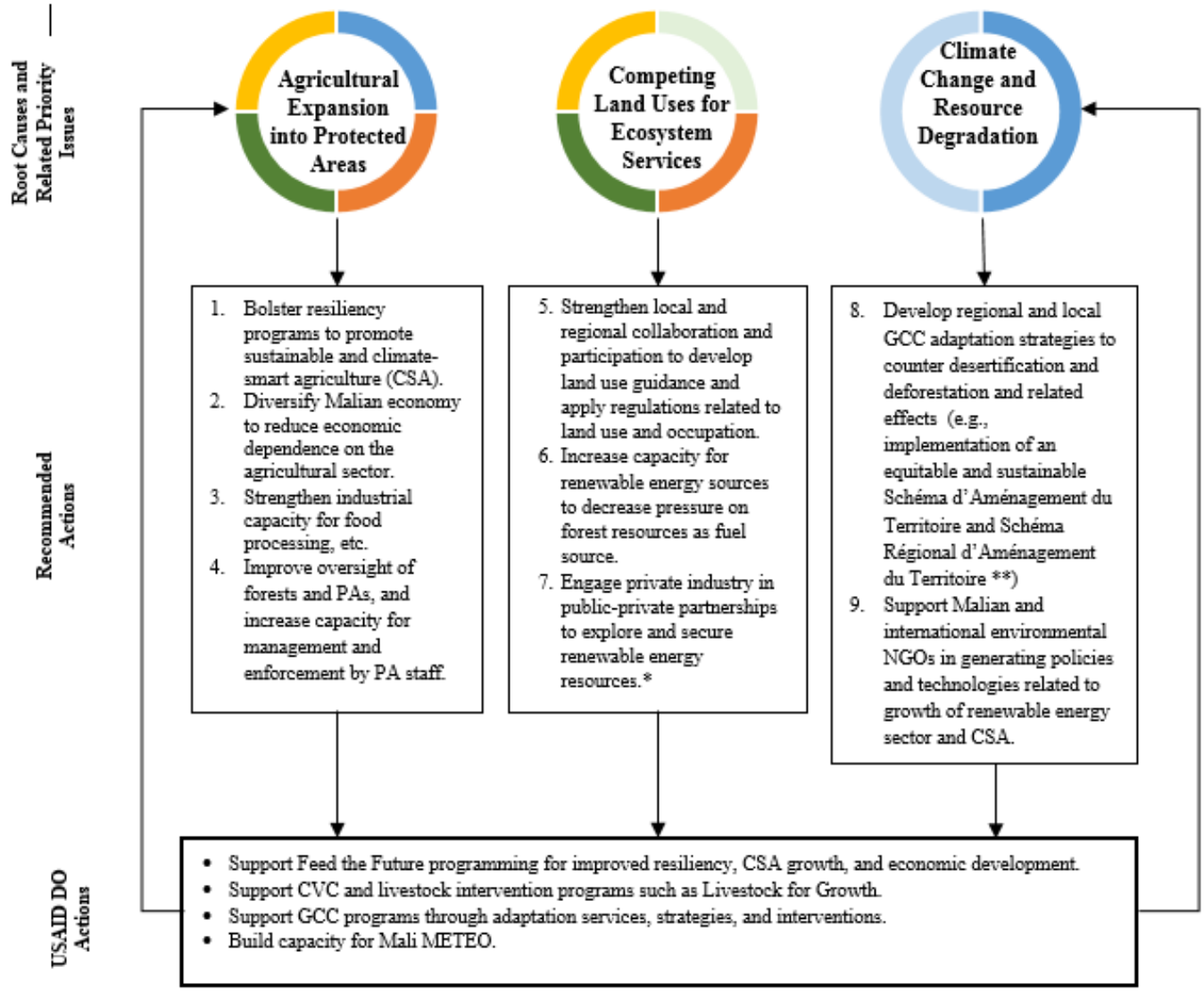
Information from USDA Foreign Agricultural Service (FAS) Office of Capacity Building and Development (OCBD), January 2015.

ACTIVITY NAME	USDA AGENCIES	INITIAL FISCAL YEAR	FINAL FISCAL YEAR	FUNDING SOURCE
Production and Market Information				
ERS Food Security Assessment	ERS		ongoing	USDA
Policy and Regulatory Capacity Building				
Sanitary and Phytosanitary (SPS) Program	FAS	2007	Ongoing	USDA/USAID
Pesticide Regulatory Harmonization Workshop	FAS	2009	2009	USAID
FAO/OIE Regional Animal Health Center	APHIS	2008	Ongoing	USDA
FDA Labeling	FAS	2010	2010	USDA
HACCP	FAS	2010	2010	USAID
African Codex Delegates Colloquium	FAS	2010	2010	US Codex Office and USDA
African Codex Delegates Colloquium	FAS	2011	2011	US Codex Office
African Codex Delegates Colloquium	FAS	2011	2011	US Codex Office and FAS EMP
Codex Coordinating Committee for Africa	FAS	2012	2012	US Codex Office and FAS EMP
African Codex Delegates Colloquium	FAS	2014	2014	FAS EMP
Veterinary services Program: Transboundary Animal Disease Information	FAS APHIS	2012	2012	USAID
West Africa aflatoxin awareness outreach	USDA	2012	2012	USAID
Oversight of Irrigation Activities, Utah State University	FAS			MCC
Agricultural Production, Processing, and Storage				
Veterinary Services Program	FAS APHIS	2011	2013	DOD
Veterinary Services Program: Field Review of African Livestock Institutions	FAS	2008	2008	USAID
SPS Program: Veterinary services training	FAS	2010	2010	USDA
SPS Program: Fruit Flies	FAS	2010	2010	USAID
Research, Extension, and Education				

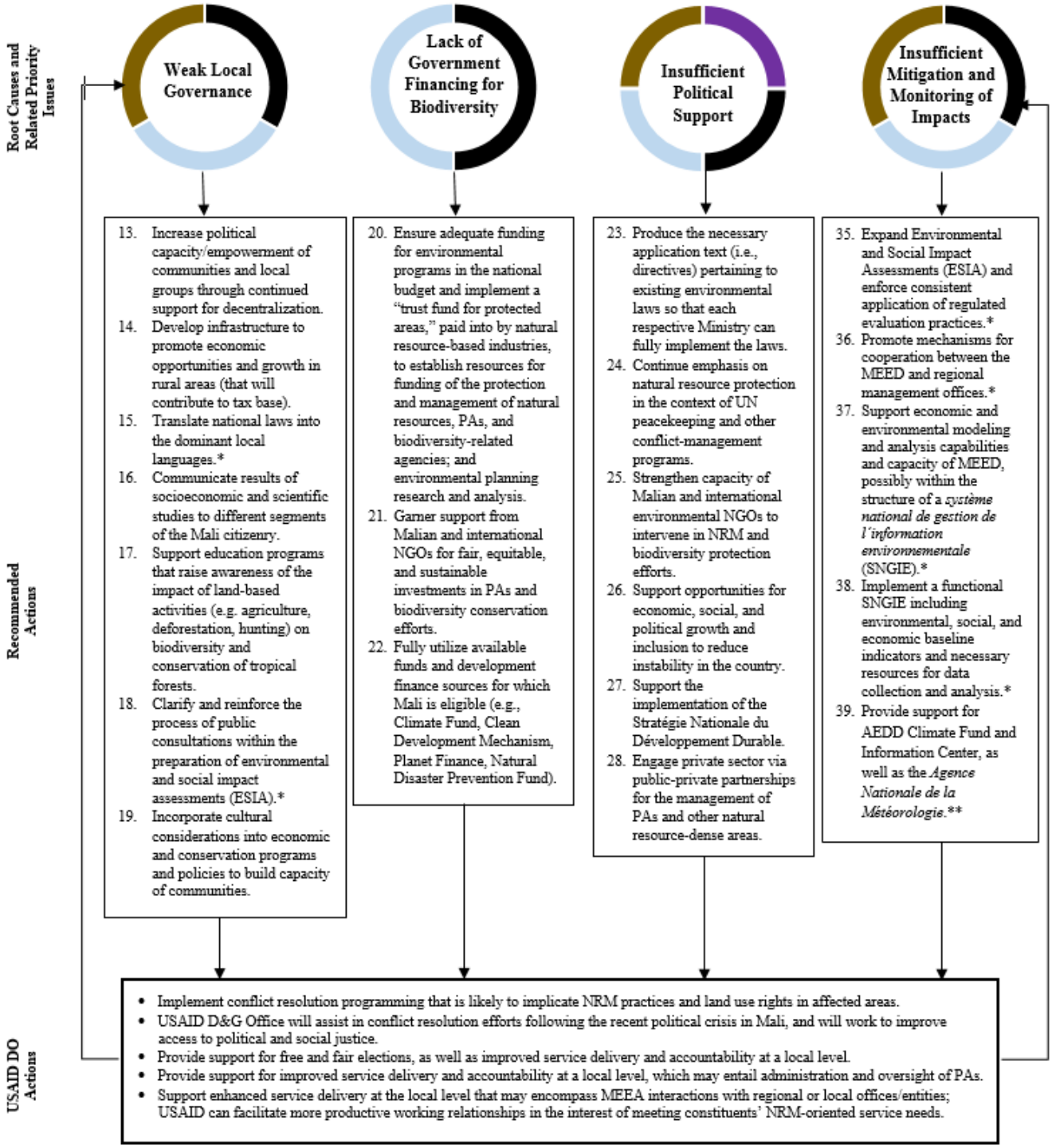
ACTIVITY NAME	USDA AGENCIES	INITIAL FISCAL YEAR	FINAL FISCAL YEAR	FUNDING SOURCE
Molecular Approaches to Reducing Plant Diseases	NIFA	2005	2011	USDA
Impact Analysis and Decision Strategies for Agricultural Research	NIFA	2006	2011	USDA
Microbial Ecology of the Rumen and Gastrointestinal Tract of U.S. and International Livestock in Nutrition and Health	NIFA	2007	2012	USDA
Immunological and Endocrine Host-Parasite Relationships in Insect Hosts	NIFA	2008	2013	USDA
“Applications of Adoption and Diffusion Models in Agricultural, Health and Nutrition Projects”	NIFA	2013	2018	USDA
Borlaug Fellowship Program	FAS	2006	2015	USAID
Cochran Fellowship Program	FAS	2005	2015	USDA
Scientific Cooperation Research Program	FAS	2011	2014	USDA
Sorghum Breeding and Genetics	NIFA	2004	2011	USDA
Biosurveillance: Veterinary Surveillance and Detection	FAS	2011	2011	DOS/ISN
NRM				
Gourma Ecotourism	FS	2008	ongoing	USAID USFS
Development and Evaluation of Agro forestry Systems	NIFA	2006	2011	USDA
Drought Management: Mitigation, Planning, and Policy Options	NIFA	2007	2012	USDA
Land Use and Cover Change Dynamics Using Geospatial Information	NIFA	2007	2012	USDA
Nutrition and Social Safety Nets				
Food for Progress	FAS	2006	Ongoing	USDA
Local and Regional Procurement Program	FAS	2009	2009	USDA
Food for Progress	FAS	2010	Ongoing, re-funded in 2012	USDA
Food for Progress	FAS	2010	Ongoing	USDA
Local and Regional Procurement Program	FAS	2010	2011	USDA
McGovern-Dole Food for Education	FAS	2011	Ongoing as of 2014	USDA
Food for Progress	FAS	2012	Ongoing	USDA

ANNEX H: EXTENT TO WHICH USAID PROGRAM AREA ACTIONS MEET PRIORITY ISSUES AND ROOT CAUSES

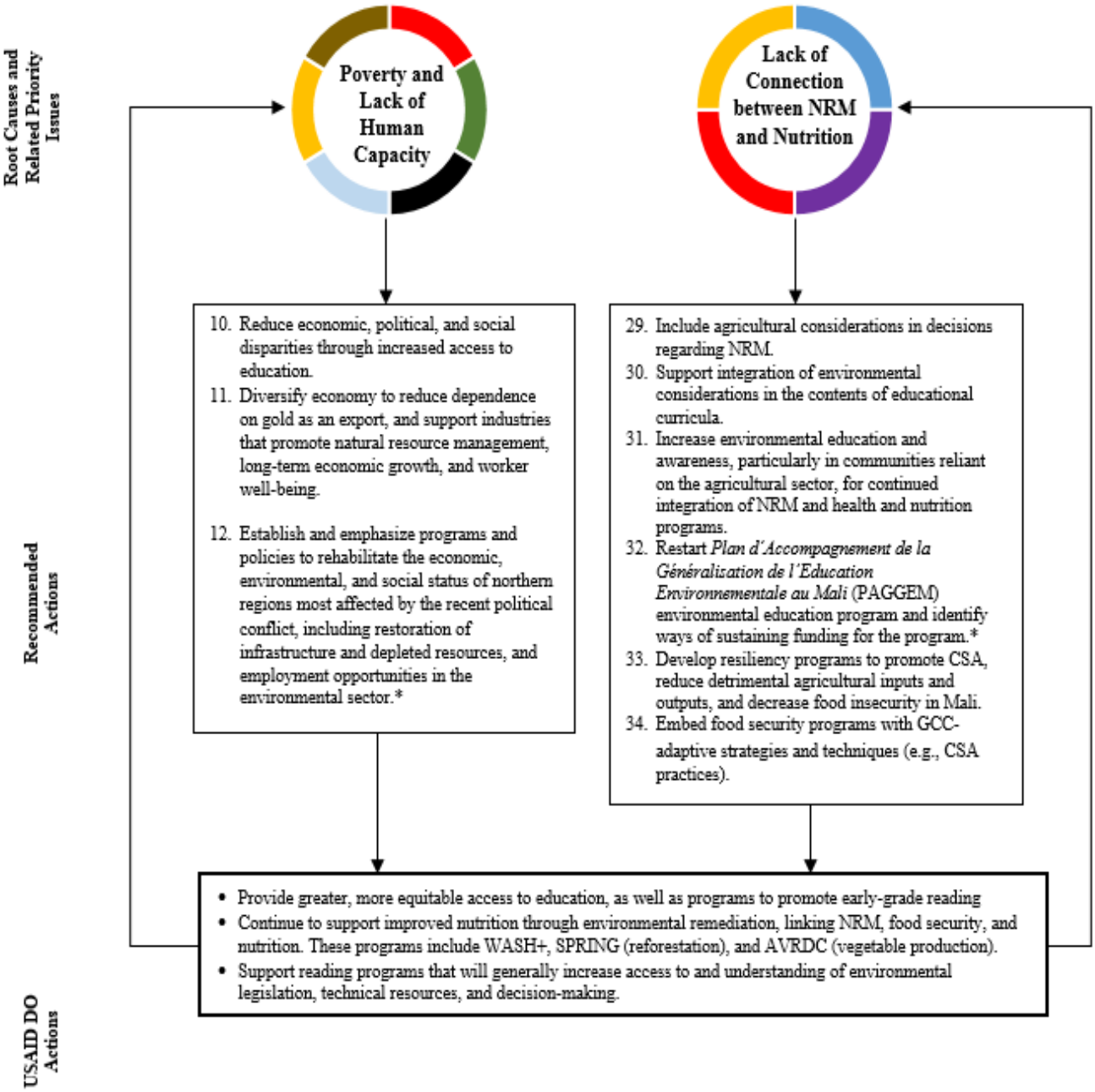
Related Issues, Threats, and Recommendations to USAID Economic Growth Program



Related Issues, Threats, and Recommendations to USAID Democracy and Governance Program



Related Issues, Threats, and Recommendations to USAID Health and Education Program



ANNEX I: BIOGRAPHICAL SKETCHES OF TEAM MEMBERS

Alphabetical by surname

Seydou Bouaré (Senior Mali Environmental and Institutions Expert). Mr. Bouaré is the Director of MAGENTA (Managing General Task Agency), a sustainable development agency. In The Netherlands where he studied, Mr. Bouaré obtained his Post Graduate diploma in geomorphology before obtaining a Master of Science in the field of Land(Scape)Ecology. With 30 years of experience as Project Manager of Mali Land Use Inventory Project (PIRT) as well as the National Program against the Desertification of Mali, he participated in the development of many of Mali's major programs, negotiations, and implementations of environment-related United Nations Conventions (desertification, biodiversity, climate change, etc.). Mr. Bouaré has worked for four years with the World Conservation Union (IUCN) as a representative in Mali, working also in Kazakhstan, Argentina, the Netherlands, and Madagascar. He has led many groups of experts in management of natural resources, climate change, and environmental evaluation on behalf of many departments in Mali. As an international consultant, he has overseen the planning, management, and execution of the projects under contracts with many different organizations, including the UNDP, the UNOPS, the World Bank, and the ODI (Overseas Development Institute) Royal Tropical Institute of Amsterdam. During the last decade, he has worked regularly with The Cadmus Group, Inc. in Mali, Madagascar, and Senegal to explain the USAID Reg.216 Mali Environmental and Social Impact Assessment system (Evaluation and Funding), participate in the development process of “Development of Environmental Impact Assessment and Environmental Audit Capacity in both the Public and Private Sectors,” and provide animation to the Cleaner Production training courses. Most recently, Mr. Bouaré has, on behalf of Cadmus for GEMS, served as an Environmental Best Practices Review co-facilitator for a BPR for the USAID Mali Mission in 2013.

Mamadou Saliou Diallo (Regional Enviornmental Expert). Mr. Diallo, currently Program Coordinator of *Guinée Ecologie*, an Guinean environmental NGO established in 1990, is an international consultant/trainer specializing in environmental and natural resources conservation issues. He is an experienced trainer proficient in USAID environmental procedures (Reg.216 and related ADS) and the conduct of Best Practices Review (BPR), Environmental Threats and Opportunities Assessment (ETOA), and 118-119 studies. He has 14 years of experience working with USAID environmental procedures in Mali, Madagascar, Burundi, Senegal, Sierra Leone, Liberia and Benin, and served as the lead consultant on BPRs for Liberia and Benin. His additional work experience in Africa covers the Seychelles and all countries of West Africa except Nigeria and Cape Verde. Mr. Diallo holds a 1972 D.E.S. (Diplôme d’Etudes Supérieures) in Literature and Linguistics from the University of Kankan, Guinea.

Tara Marie Fortier (Environmental Specialist). Ms. Fortier (Senior Analyst, The Cadmus Group, Inc.) is an environmental specialist with a background in international development and six years of experience supporting federal environmental policy development and implementation. Ms. Fortier has contributed to recent FAA Sections 118 and 199 assessments for South Sudan and Barbados and the Eastern Caribbean. She has utilized her experience in environmental impact assessment and social issues in the development of Affirmative Investigations for large hydropower projects including Inga 3-BC (DRC), Luhri (India), and a series of run-of-the-river dams in Nepal. Ms. Fortier has a B.A. in Environmental Studies (emphasis on International Development) from Allegheny College, where she conducted a senior thesis on developing an international carbon offset program and engaging stakeholders in the program through a religious focusing point.

Sarah Haack (Environmental Specialist). Sarah Haack is a public health professional specializing in nutrition science and policy, food security, and community health issues. A published author in the field of public health nutrition, she also has five years of experience in environmental chemistry and sustainable agriculture, supporting the production, transformation, and marketing and distribution of organic crops at a non-profit farm. Ms. Haack is currently an Analyst at The Cadmus Group, Inc., where she works to develop and implement public and environmental health communications strategy and content for federal agencies. While at Cadmus, she has also supported USAID Affirmative Investigations on large-scale renewable energy and development projects. Previous to Cadmus, she served as the director of a childhood nutrition program, and managed a grant project examining food insecurity among rural populations. Ms. Haack holds a B.A. in Environmental Studies from American University and an M.S. in Health and Human Development and Sustainable Food Studies from Montana State University.

Patrick Hall (Team Leader). Mr. Hall is an international development professional specializing in environmental impact assessment and natural resource management. A trained planner, Mr. Hall is highly proficient in USAID environmental procedures and the integration of best management practices, particularly in the area of agriculture and food security. He has research and field team leadership experience, and has implemented radio-based outreach to promote water and soil conservation programs. He is also an experienced trainer, having designed and facilitated multi-day workshops in Asia, and throughout Africa. His work in Africa goes back nearly 20 years, to his time as a Peace Corps Volunteer in Rep. of Congo. He has additional work experience in Egypt, Ethiopia, Kenya, Liberia, Madagascar, Nigeria, Senegal, Sierra Leone and Zimbabwe, most of it supporting a range of USAID DOs in the region. Mr. Hall is currently a Senior Associate at The Cadmus Group, Inc., where he oversees and implements a variety of contracts and projects on behalf of the company's international development practice. He holds a bachelor's in history from the University of Missouri-Columbia and a master's in Urban and Environmental Policy and Planning from Tufts University.

Charles Hernick (Tropical Biodiversity and Forestry Advisor, Phase II Field Team Leader, Quality Assurance and Quality Control). Mr. Hernick (The Cadmus Group, Inc.) is an expert on USAID environmental compliance requirements, including FAA Sections 118 and 119, most recently demonstrated through his contributions to assessments in Peru and South Sudan and his management of a tropical forestry/biodiversity and climate change vulnerability assessment for 10 Caribbean countries. He has 6 years of ecology field- and laboratory-based research experience. He has leveraged his background in ecology and economics to conduct environmental impact assessments for development projects in Asia and Africa, and to support environmental compliance trainings in Latin America and Africa. He has managed extensive policy and finance research and analysis, and facilitated expert consultations in the design of U.S. policy for mitigating the financial risks associated with environmental liabilities (i.e., polluter pays principle/financial assurance). Mr. Hernick has a B.S. in Ecology from the University of Minnesota and a M.A. in International Relations and Environmental Policy from Boston University.

Dan Mahr (GIS Specialist). Dan Mahr is a GIS specialist with 5 years of experience using geographic information systems in environmental science applications, including climate change assessments, land use change studies, demographic modeling, and hydrographic analyses. Mr. Mahr is responsible for developing and implementing technically demanding large-scale data processing and visualization workflows. He supplements ArcGIS with the Python programming language to automate complex GIS tasks in custom GIS tools. In previous work for USAID, he modified AERMOD—an EPA air modeling software suite—to function in Kosovo by drastically modifying input data. He also created a geoprocessing tool that visualized the outputs of over 500 air quality modeling runs in a consistent and understandable format. In a 118/119 Assessment for

Vietnam, Mr. Mahr prepared a series of maps describing the ecology, physiography, climate, and demographics of Vietnam. By client request, the source GIS datasets used were all publicly available to enable reproducibility and many were global-scale to enable intercomparison. As part of an ongoing project for the US Army Corps of Engineers, Mr. Mahr has worked extensively in calculating, aggregating, and visualizing indicators of climate change vulnerability on a watershed scale. In this role, he used GCM outputs to calculate a variety of hydrological indicators of vulnerability on watershed scale and developed geoprocessing tools that allow for rapid mapping and visualization of climate change vulnerability. Mr. Mahr has a B.S. in Environmental Science from Brown University, where he conducted honors research on remote sensing of agricultural intensification later published in Philosophical Transactions of the Royal Society B: Biological Sciences.