Food and Agriculture Organization of the United Nations

BIOPHYSICAL AND SOCIO-ECONOMIC BASELINES

THE STARTING POINT FOR ACTION AGAINST DESERTIFICATION

ACTION AGAINST DESERTIFICATION

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Food and Agriculture Organization of the United Nations
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Acronyms and abbreviations

AAD	Action Against Desertification
ACP	Africa, Caribbean and Pacific Group of States
°C	degrees Celsius
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
FAO	Food and Agriculture Organization of the United Nations
GGWSSI	Great Green Wall for the Sahara and the Sahel Initiative
ha	hectare(s)
km	kilometre(s)
LGA	local government area (Nigeria)
mm	millimetre(s)
NTFP	non-timber forest product
UNEP	United Nations Environment Programme
USD	United States dollar(s)

Executive summary

The Action Against Desertification (AAD) project supports eight countries – Burkina Faso, Ethiopia, Fiji, Gambia, Haiti, Niger, Nigeria and Senegal – in the Africa, Caribbean and Pacific Group of States in the sustainable management and restoration of degraded land. Baseline assessments have been carried out in each of these countries to establish a reference against which to monitor changes and project impacts, as well as to better target project activities and inform other stakeholders and restoration initiatives in the eight countries.

Because the project aims to strengthen links between the resilience of the natural resource base and livelihoods, two sets of indicators – biophysical and socio-economic – have been assessed. Data gathered in the eight countries were analysed, cleaned, validated and compiled in a harmonized database. Thus, this report summarizes the socio-economic situation and state of the environment in the intervention areas in each of the eight countries involved in the project.

Methodology

Biophysical data were collected using Collect Earth, a tool developed by FAO, although each country also had the option of using its own preferred tools. Collect Earth is a free, open-source application that allows local experts to manually interpret high-resolution satellite imagery to assess land use and land cover. The socio-economic data were obtained from household surveys carried out in sample sets of households and villages in the intervention areas. These surveys used a questionnaire organized arounad five categories of information corresponding to the five "capitals" of the Sustainable Livelihoods Framework (i.e. human, social, natural, physical and financial capital).

Baseline data

The biophysical and socio-economic data presented in this report will help all stakeholders involved in the project to know these areas better, target their restoration interventions, and monitor the impacts of such interventions on people and the environment. The data are presented by country, with the following sections:

- **a summary table with key data on the AAD intervention area, including the name and size of the project site(s), the number of beneficiaries, the main land uses, the main sources of livelihood, and an estimate of the area in need of restoration;**
- **a map of the area(s) of intervention;**
- **biophysical data, including on land use, land-use change, and land cover; and**
- **socio-economic data, organized around the five capitals of the Sustainable Livelihoods Framework.**

The restoration needs and opportunities in Africa's Great Green Wall countries, and in Caribbean and Pacific countries, are huge. This report shows that, in the six intervention areas in Africa, an estimated 14 million ha are in need of restoration, which is 56% of the total area encompassed by the project. The report identifies high levels of both land degradation and poverty in the project countries and the links between these two challenges.

The AAD project represents a substantial state-of-the-art technical model. It will need to be replicated at a massive scale to respond to the huge and increasing demand for restoration, not only in the eight project countries but also worldwide.

1.

The Action Against Desertification (AAD) project is supporting local communities, governments and civil society in six African countries (Burkina Faso, Ethiopia, the Gambia, Niger, Nigeria and Senegal), Haiti in the Caribbean and Fiji in the Pacific (Figure 1) in the sustainable management and restoration of their fragile agro-sylvo-pastoral ecosystems affected by desertification, land degradation and drought.

INTRODUCTION

The AAD project aims to help alleviate poverty, end hunger, improve livelihoods and strengthen resilience to climate change.

Monitoring and evaluation is essential for measuring the impacts of land restoration and for ensuring that the AAD project achieves tangible results. Effective monitoring and evaluation requires measurable indicators, which facilitate evaluation of the extent to which a project is on track and enable the adaptation of implementation strategies in light of evidence.

The AAD project aims to strengthen knowledge of the links between the use of natural resources and livelihoods and therefore requires both biophysical and socio-economic indicators. Monitoring tools and approaches differ between countries, as does the capacity to carry out such monitoring. The approach adopted by the AAD project is to complement, as needed, the existing tools of countries with other relevant, up-to-date, easy-to-use tools in ways that will generate harmonized data across countries. To this end, FAO organized trainings and workshops in collaboration with partners to harmonize approaches, develop capacities and plan monitoring and evaluation activities. Variables were identified and are being measured over time to continuously improve programme delivery.

The baseline data presented in this report represent the starting point at which project implementation begins; at each project site, they provide clear benchmarks for the biophysical and socio-economic indicators.

The baseline data presented in this report, for the nominal baseline year of 2015, represent the starting point at which project implementation begins; at each project site, they provide clear benchmarks for the biophysical and socio-economic indicators. Knowing the values of the indicators at time zero, the project is now well placed to monitor activities and to transparently demonstrate its impacts on communities and the environment. The baseline studies have also increased knowledge of the intervention areas, thereby enabling project stakeholders to better target activities based on up-to-date, fine-scale data. Moreover, the scope of the baseline data goes well beyond the AAD project; the data can be considered as a reference point for other sustainable management and restoration efforts, including other aspects of the Great Green Wall for the Sahara and the Sahel Initiative (GGWSSI).

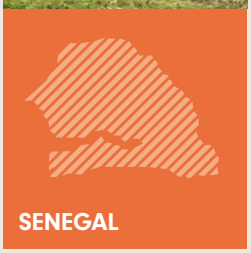
This document summarizes the key results of the biophysical and socio-economic baseline assessments for the AAD project. For all eight countries, the data have been analysed, cleaned, validated and compiled into a harmonized database.

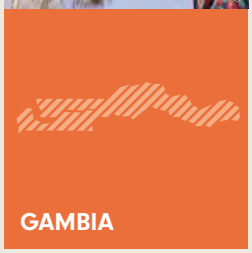
FIGURE 1.

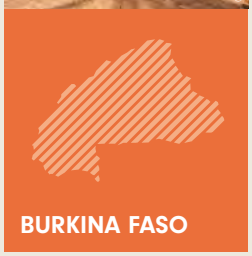
AAD PROJECT COUNTRIES IN AFRICA, THE CARRIBBEAN AND THE PACIFIC

AFRICA

- **12 000**
  HA RESTORED IN 2015-17
  18 000 HA IN 2018
- **1 500 000**
  SEEDLINGS USED IN 2015-17
- **500 000**
  PEOPLE REACHED IN 2015-17







CARIBBEAN

1 250
HA RESTORED IN 2015-17
1 500 HA IN 2018

500 000
SEEDLINGS USED IN 2015-17
750 000 IN 2018

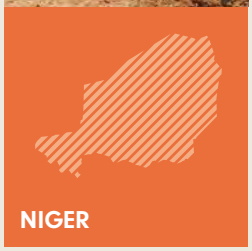
3 000
PEOPLE REACHED IN 2015-17

PACIFIC

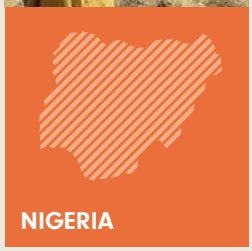
2 000
HA RESTORED IN 2018

1 000 000
SEEDLINGS TO BE USED

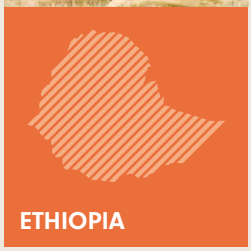
6 200
PEOPLE TO BE REACHED



NIGER



NIGERIA



ETHIOPIA

FIJI

2.

Biophysical data were collected using Collect Earth, a tool developed by FAO, although each country also had the option of using its own preferred tools. Collect Earth is a free, open-source application that allows local experts to manually interpret high-resolution satellite imagery to assess land use and land cover. The socio-economic data were obtained from household surveys carried out in sample sets of households and villages in the intervention areas.

ASSESSMENT METHODOLOGIES

Biophysical baselines

Biophysical baseline data were assessed using a remote sensing application called Collect Earth1, which was promoted by the project and developed by FAO as part of the Open Foris initiative based on open-source software and freely accessible, high-resolution satellite imagery (Google Earth, Bing Maps and Here Maps). Collect Earth tools allow the cost-efficient, user-friendly assessment of forests, trees, land use and land-use change in given areas using customizable plot grids (Bey et al., 2016).

A workshop[2] convened in Rome in January 2015 provided training to monitoring-and-evaluation experts and GGWSSI focal points and developed a customized version of the Collect Earth tools to better capture features in the GGWSSI countries. Two back-to-back regional training workshops (Anglophone and Francophone) were held in collaboration with the Permanent Interstate Committee for Drought Control in the Sahel (CILSS)/Agrhymet in Niamey, Niger, in March and April 2015.

Collect Earth was used in a step-wise sequence to complete country assessments. First, the areas to be assessed were delimited with georeferenced boundaries. Then, a sampling approach defined a grid of sample plots, usually 0.25–4 ha in size (Table 1). Sampling strategies were checked to ensure that the sample size was sufficient to produce a maximum margin of error of 0.05 and a minimum confidence level of 95%. In small areas, a sampling density of at least 25% was achieved.

In Africa, a restoration opportunity analysis was carried out in the various regions of AAD intervention, based on a statistical model applied to the data collected for FAO's global drylands assessment survey (FAO, 2016).

For each country, a team of local data collectors compiled data using "cards". These cards allow to assess land use elements and human activities (such as tree felled from the sites assessed by comparing the before and after images, grazing and crop production areas) based on photointerpretation and the field knowledge of the local experts carrying out the survey. These experts then analysed the data, and drafted a country baseline report, using either the Open Foris Saiku software or Microsoft Excel to generate summary tables, graphs and charts. The draft reports and the Collect Earth data were sent to FAO headquarters for final corrections. All the data were set out in Excel tables and validated and harmonized, and statistics were checked against the validated database and reviewed as necessary. A database was developed in multiple formats for future use.

Some countries used tools other than Collect Earth for their data collection, with the choice left to country experts. In Senegal, the methodology for analysing biophysical features involved the visual interpretation of high-resolution imagery and wall-to-wall mapping. In Haiti, a participatory approach was used for the biophysical study.

In Africa, a restoration opportunity analysis was carried out in the various regions of AAD intervention, based on a statistical model applied to the data collected for FAO's global drylands assessment survey (FAO, 2016). All surveyed plots were stratified by aridity zone (using the United Nations Environment Programme's classification)

[1] www.openforis.org/tools/collect-earth.html
[2] www.fao.org/in-action/action-against-desertification/events/detail/en/c/281800/

and land use (according to the Intergovernmental Panel on Climate Change). In each unique combination of aridity zone and land use, tree-cover percentage was used to select only above-average plots. Based on an "optimum" level of tree cover for each aridity–land-use stratum, the plots were sorted according to their need for restoration. Estimates of the area presenting restoration opportunities were calculated for the AAD areas of intervention.

Socio-economic baselines

Starting in early 2015, teams in each AAD country conducted surveys following a methodology for socio-economic baseline assessment based on livelihood assets (Table 2). The Sustainable Livelihoods Framework, developed by the the

TABLE 1. Areas assessed and sampling strategies used in the biophysical assessment

Region	Country	Administrative regions covered	Area of intervention	
Africa	**Burkina Faso**	Soum and Séno provinces, Sahel Region	15 communes	
	Ethiopia	Metema Woreda in Amhara regional state, Raya-Azebo Woreda in Tigray regional state, and Gollina Woreda in Afar regional state	6 watersheds: Wodigemzo, Adi Bojabano, Fokisan, Galikoma, Kelewan and Wanasa	
	Gambia	North Bank Region, Upper River Region and Lower River Region	27 villages in 8 districts	
	Niger	Dosso, Tahoua and Tillaberi regions	10 communes (Abala, Sanam, Tébaram, Bambeye, Kourfeye, Kourfeye-Centre, Soucoucoutane, DogonKiriya, Bagaroua and Illéla)	
	Nigeria	Bauchi, Jigawa and Sokoto states	Malori Community, Gamawa Local Government Area (LGA), Bauchi state; Jeke Community, Sule-tankarkar LGA, Jigawa state; and Basanta Community, Illela LGA, Sokoto state	
	Senegal	Departments of Linguère and Louga, Louga Region	Rural communities of Téssékéré (Widou plot) and Mboula (natural reserve of Koyli-Alpha) in Linguère and rural community of Syer in Louga	
Caribbean	**Haiti**	Grand'Anse Department	"Section communale" of Désormeau (Bonbon commune) and "première section communale" d'Anse du Clerc (Abricots Commune)	
Pacific	**Fiji**	8 provinces covering 4 islands: Bua, Macuata and Cakaudrove (the island of Vanua Levu); Ba, Ra and Tailevu (Viti Levu); Ono (Kadavu); and Lau (Lakeba)	20 villages	

United Kindom's Department for International Development (DFID, 2001), was used to provide an organized structure for analysing livelihoods. This framework is one of the most widely used in development practice; it views people in the context of vulnerability, within which they have access to five classes of assets, or "capitals" – human, social, natural, physical and financial.

The AAD methodology involved the use of questionnaires, customized for each country, with five sections corresponding to the five classes of capital (Figure 2), thus enabling the capture of a full representation of livelihoods. Field staff used the questionnaires in interviews with sample households in the AAD intervention areas. A systematic sampling approach was recommended, in which the sample size was determined based on census data (number of households)

	Areas assessed, and total size	Methodology	No. of sample plots assessed using Collect Earth	Size of Collect Earth plots (ha)
	2 provinces 1 908 500 ha	Collect Earth	401	1
	6 microwatersheds selected and delimited 2 718 ha	Collect Earth	691	1
	Study areas selected and delimited in 27 villages 191 2176 ha	Collect Earth	532	4.41
	10 communes 2 623 114 ha	Wall-to-wall mapping and Collect Earth	863 (+74 plots verified through ground-truthing)	1
	3 study areas around the Malori, Jeke and Basanta communities 65 776 ha	Collect Earth	509	2.25
	2 study areas around the Téssékéré and Mboula communities (Syer was not assessed) 62 834 ha	Wall-to-wall mapping	N/A	N/A
	2 communes 13 734 ha	MARP (Méthode Accélérée de Recherche Participative)	N/A	N/A
	8 provinces 910 813 ha	Collect Earth	6 639	0.25

to ensure a confidence level of 95% and a 5% margin of error to ensure that the sample was representative of the entire project population.

FAO convened a regional training workshop[3] in Ouagadougou, Burkina Faso, in March 2016, in collaboration with experts from the University of Tuscia (Italy) and CILSS/Agrhymet, with the aim of adopting the survey approach and harmonizing the establishment of baselines. Project coordinators and national experts in African AAD countries received training on coordinating the household surveys, preparing the questionnaires and determining the sampling strategy. The collected data were entered into a matrix, cleaned, and analysed to produce descriptive tables and charts.

The AAD methodology involved the use of questionnaires, customized for each country, with five sections corresponding to the five classes of capital (Figure 2), thus enabling the capture of a full representation of livelihoods.

The questionnaires included a set of generic questions guided by the Household Food Insecurity Access Scale for Measurement of Food Access (Coates, Swindale and Bilinsky, 2007) related to three domains of food security: 1) anxiety and uncertainty about the household food supply; 2) insufficient quality; and 3) insufficient food intake and its physical consequences. Each country adapted the questions according to its national context. The analysis of responses provided valuable information on food insecurity in each country. FAO staff verified all survey results, including consistency between questionnaires and matrices; consistency between matrices and the statistics presented in the draft reports; and the sampling strategies used. Countries reviewed the draft reports as necessary, and the data were validated and compiled in a harmonized AAD project database.

[3] www.fao.org/in-action/action-against-desertification/events/detail/en/c/410337/

FIGURE 2. AAD socio-economic baselines established using the five capitals of the Sustainable Livelihoods Framework - Source: DFID (2001).

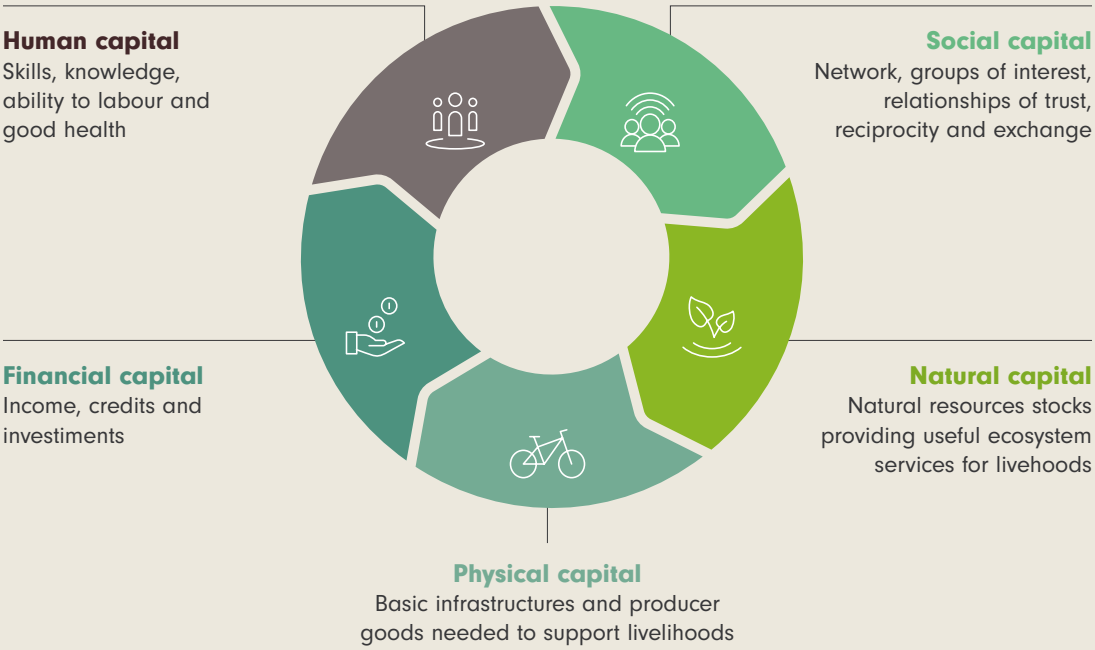


TABLE 2. **Population data and sampling strategies used in the socio-economic assessments**

Region	Country	Number of beneficiaries	Women %	Level of data	Selection of households to survey	No. of households	Sample size*
Africa	**Burkina Faso**	549 454	50.5	Province	6 communes selected out of the 15	114 945	437
	Ethiopia	359 211	47.9	Woreda			382
	Gambia	390 283	52.3	Village	20 villages selected	5 000 (in the area assessed)	373
	Niger	116 321	51.1	Village		12 138	400
	Nigeria	569 361	49.7	Local government area	One-third of households selected in each of the 3 communities	Unknown (10 people per household assumed for calculating sample size)	450
	Senegal	26 871	49.7	Communal	22 villages selected	Unknown	122
Caribbean	**Haiti**	44 173	46.9	Communal	10% of households selected in Bonbon and Anse du Clerc (i.e. not the entire Abricots commune)	3 288 (in Bonbon and Anse du Clerc)	345
Pacific	**Fiji**	2 000 (estimated)	n/a	Village	Socio-economic assessment carried out at only 2 sites (Tomaniivi and Delaikoro)	n/a	n/a

* (no. of households surveyed).

3.

RESULTS OF THE BASELINE ASSESSMENTS

Because the project aims to strengthen links between the resilience of the natural resource base and livelihoods, two sets of indicators – biophysical and socio-economic – have been assessed. Data gathered in the eight countries were analysed, cleaned, validated and compiled in a harmonized database. Thus, this report summarizes the socio-economic situation and state of the environment in the intervention areas in each of the eight countries involved in the project.

3.1

ACTION AGAINST DESERTIFICATION
AFRICA

BURKINA FASO

FIGURE 3. The AAD project intervention area, Burkina Faso

The Séno and Soum provinces are in the Sahel region, an agropastoral area in northern Burkina Faso. The climate is warm semiarid, with maximum temperatures up to 45 °C during the long dry season under the influence of the harmattan wind (which blows from the Sahara). The rainy season occurs from June to October, but annual rainfall does not exceed 600 mm.

Intervention area

Provinces of Séno and Soum

15 communes

412 villages

Area

1 908 500 hectares (provinces of Séno and Soum)

Restoration potential

1 120 473 hectares

59% of the land area of the Soum and Séno provinces

Population in the AAD intervention area

549 454 inhabitants (provinces of Séno and Soum)

50.5% are women

Main land uses

61.8% grasslands

18% croplands

15.2% other land

2.8% wetlands

1.8% forests

0.26% settlements

Main sources of livelihood

92.4% agriculture

4.8% livestock farming

0.9% small-scale gold mining

0.7% commerce

0.2% manual work

BIOPHYSICAL FEATURES

The intervention area comprises 15 communes in the two provinces of Seno and Soum (Figure 3). Grasslands comprised about 60% of the intervention area in 2015 (the nominal baseline year), croplands nearly 18% and other land 14.5%; forests account for only 1.5% of the area (Figure 4).

Grassland with shrubs were the most common type of grassland with 43% of the total land use. Twenty-two percent was sand and rainfed cropland was the most common type of cropland with 12%, while floodplain, perennial and fallow cropland totalized 3%. Shrubland (with and without trees) occupy 8%. Nearly two-fifths (37.8%) of the area was assessed as having a sand cover of 10% or more. Rivers and streams covered 3.5% of the intervention area.

43%
of the total land use is grassland with shrubs

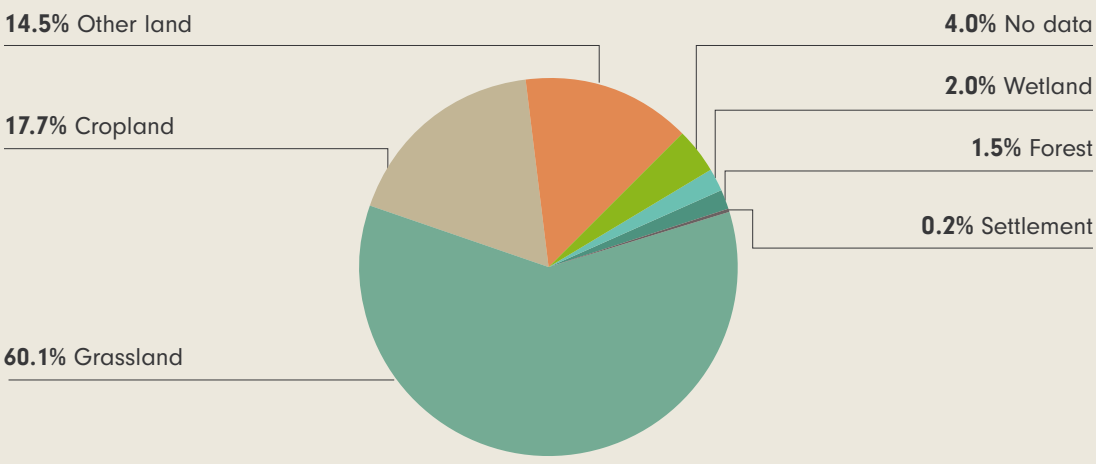
Thirty-six percent of the sample plots had a crop cover of at least 10%; 41.6% of sample plots had a shrub cover of more than 10%; and only 2% of sample plots had a tree cover of more than 10%. Tree cover was observed to be lower than shrub cover in the intervention area. Only 1.7% of plots had a tree density of 30 trees per ha or more in the communes of Arbinda, Koutougou, Nasoumbou, Seytenga and Tongomael. In 13 of the 15 communes, about 20% of the sample plots had a shrub density greater than 30 plants per ha.

Desertification was the prevailing trend in an estimated two-thirds of the intervention area; greening was the prevailing trend in 4% of plots; and 29% of plots were classed as stable.[4] As observed using Collect Earth, the main identified human impacts were grazing, trees felling and crop production.

An estimated 1 120 473 ha (59% of the land area of the Soum and Séno provinces) was assessed to be in need of restoration in the intervention area

[4] The terms "greening" and "desertification" are used in this report in the context of Collect Earth – that is, they are based on the interpretation of multitemporal archives of images and the Normalized Difference Vegetation Index using Google Earth Engine in each sample plot.

FIGURE 4. Land use in the intervention area, Burkina Faso
Note: percentages may not sum to 100 due to rounding.



Human capital

Of the surveyed households, 92% had male heads and 8% had female heads; the average household size was about 11 members. More than half of surveyed households had no literate adult, and the level of school enrolment among children was low for both girls and boys.

In almost one-fifth of households, at least one member was reported to have out-migrated to find seasonal employment.

More than three-quarters (77%) of surveyed households reported involvement in soil and water conservation and soil protection and restoration activities, and 59% indicated that they had participated in plantation work. Of those households reporting involvement in soil and water conservation, 91% indicated that they practised soil fertility management; 74% employed livestock-fattening techniques.

94%
reported that they had experienced anxiety and uncertainty about their food supply in the previous 12 months

Less than one-third of respondents reported that at least one member of their household had benefited from technical training in the 12 months preceding the AAD project intervention. Trainings most in demand were agricultural techniques (cited by 97% of households) and water and soil conservation (cited by 53% of households).

Strategies for coping with climate change reported by households included tree planting (62% of households) and the use of improved seeds (58%). Ninety-four percent of surveyed household heads reported that they had experienced anxiety and uncertainty about their food supply in the previous 12 months, and this had resulted in a decrease in daily dietary intake for 80% of households. Half the surveyed households reported that a lack of food was an issue. One-third of households reported experiencing hunger without the possibility of eating and/or having spent at least one day or evening without eating because of a lack of money or other resources.

Social capital

About three-quarters of survey respondents indicated that at least one community organization was active in their village. Community organizations with a focus on agricultural activities were most popular, mobilizing nearly all households. Almost half the respondents reported that at least one woman was taking part in a community organization, of which half were involved in decision-making and institutional processes that affected the entire community.

Almost all surveyed households indicated that they provided other members of their communities with free labour when needed, and almost as many reported that they received help from other community members if needed.

Natural capital

Most households (83%) indicated that they considered their lands to be moderately degraded, and 15% considered their lands to be highly degraded. The majority (84%) of households reported soil erosion on their lands. According to the survey, land degradation is caused mainly by the collection or excessive cutting of wood (52%), poverty (48%) and inadequate soil conservation measures (43%). Eighty-five percent of households reported the degradation of vegetative cover; about 10% of households reported owning at least one tree plantation.

84%
reported soil erosion on their lands

Households reported using various wood species for multiple uses, with differing preferences. Commonly used trees included baobab (94% of households), jujube tree (63%), and desert date palm (25%). The main uses (other than food) reported for trees were the provision of materials for the building of shade structures (93%), energy for cooking meals (74.8%) and traditional medicines (73%). More than nine out of ten households reported using leaves for non-food purposes, as well as other parts of trees.

According to survey respondents, crop production was the principal land use in the study area. Those respondents residing in villages in which at least one forest was present reported that the main categories of forest in their area were: "protected areas (wooded bushlands)", "agroforestry parks", and "relicts, natural massifs, gallery forests and sacred forests". Two-thirds of respondents indicated that they were satisfied with their access to forest resources, and more than half felt that they "co-owned" a forest.

90%
reported that they had observed changes in the climate in the ten years preceding the survey

Two-thirds of respondents indicated that land allocated to agriculture reduces the area of forest land, and about half indicated that it also reduces pastoral land. Only 1.4% of the respondents felt that grazing areas were encroaching on agricultural land.

About one-third of survey respondents reported the presence of a forest in their villages. One-third also reported that they had access to at least one natural water point, but about half of survey respondents indicated that water was not continuously available.

Sixty-two percent of households in the study area owned dune lands, 54% owned degraded lands and 40% owned lowlands. The majority (88.6%) of households reported that they were landowners who farmed their own lands; 20% of respondents indicated that they farmed "loaned" land.

About 90% of survey respondents reported that they had observed changes in the climate in the ten years preceding the survey, including increased temperature, changes in rainfall frequency and intensity, and an increased frequency of high winds. The majority of respondents indicated that they had observed a trend of increasing land degradation in the preceding ten years.

Physical capital

Seventy-one percent of surveyed households mentioned traditional agricultural tools as the most valuable items in their possession; bicycles and carts were also commonly cited. About half of surveyed households indicated that they possessed one or more draught animal.

Seventy-six percent of all survey respondents indicated that they had regular access to at least one market in which they could engage in trade. Seventy-five percent of surveyed households in Séno and 85% in Soum considered that the road network was poorly maintained or underdeveloped.

Financial capital

Agriculture was cited as the primary source of livelihood by 92% of surveyed households. Livestock farming provided the primary income of only 5% of surveyed households, but it was the second most important socio-economic activity for 78% of respondents. According to survey respondents, the majority of households owned at least five head of livestock. Small-scale gold mining was an unexpectedly important source of livelihood in the intervention area, ranking first for 1%, second for 6% and third for 14% of households.

92%
agriculture as the primary source of livelihood

Households generated income from cash crops (79.4% of surveyed households) and remittances (22%). Even though the area had low vegetative cover, households also earned income from the trade of tree products such as charcoal, firewood, art objects and lumber. The proportion of households involved in the commerce of non-timber forest products (NTFPs) was negligible.

Sixty-eight percent of households reported that their incomes had decreased in the two years preceding the survey. Similarly, 65% of households indicated that they had experienced difficulties related to crop establishment and severe weather conditions.

ETHIOPIA

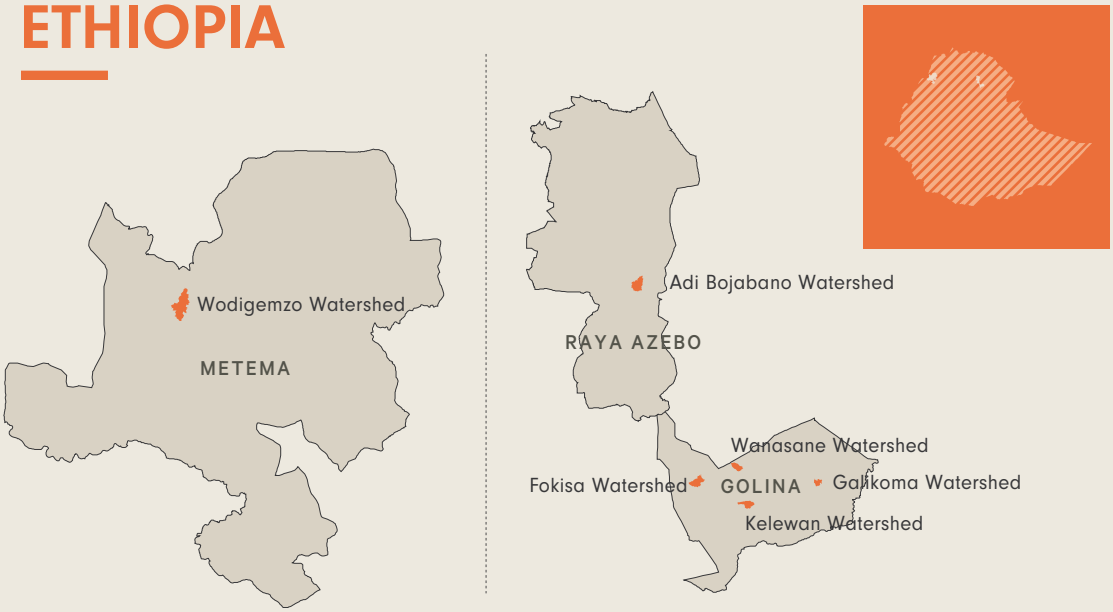


FIGURE 5. The AAD project intervention area, Ethiopia

The AAD intervention area in Ethiopia comprises six watersheds in the north of the country with varying geographical features (Figure 5). Metema (Amhara regional state), bordered by the Sudan, is characterized by a tropical savannah climate, with precipitation of 835–1 189 mm. Raya Azebo (Tigray) and Golina (Afar) are in the eastern part of the Ethiopian plateau. The climate there is warm semiarid, with average annual rainfall of 566–835 mm (Berhanu, Melesse and Seleshi (2013). The heaviest rainfall usually falls in June, July and August.

Intervention area

6 study watersheds

Wodigemzo in the Metema Woreda (Amhara regional state)

Adi Bojabano, in the Raya Azebo Woreda (Tigray regional state)

Fokisan, Galikoma, Kelewan and Wanasa in the Golina Woreda (Afar regional state)

Area

2 718 hectares (corresponding to the 6 watersheds)

Restoration potential

3 881 308 hectares

61% of the land area of the North Gondar (Amhara regional state), Southern (Tigray regional state) and Zone 4 (Afar regional state) administrative zones

Population in the AAD intervention area

359 200 people in the three districts of intervention

47.9% are women

Main land uses

13.2% grasslands

12.8% croplands

71.6% other land

1.0% forests

1.4% settlements

Main sources of livelihood

72% staple crops

16% livestock production

10% mixed farming

BIOPHYSICAL FEATURES

The dominant land-use type in the intervention area in 2015 (the nominal baseline year) was classified as "other land" (mainly bare soils). The second most common land-use type was grasslands, and croplands ranked third (Figure 6).

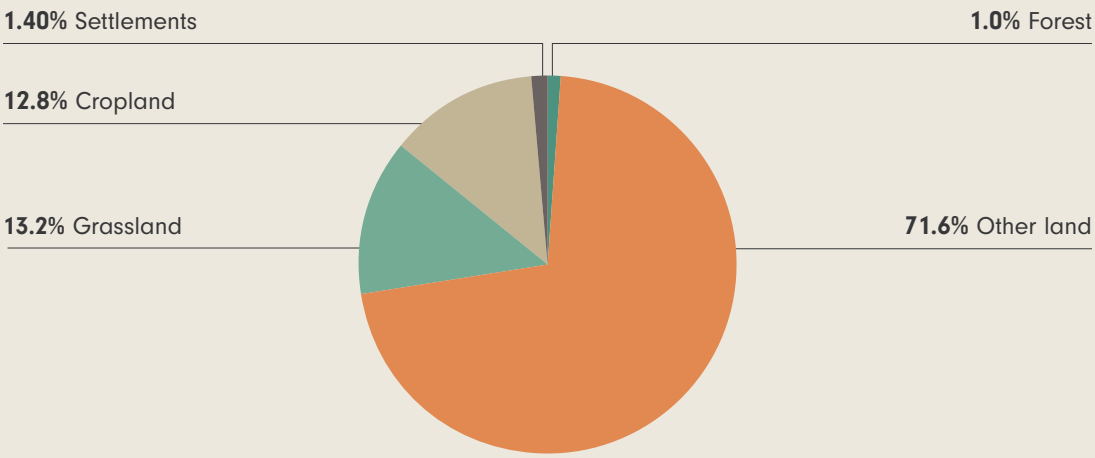
- In the Wodigemzo watershed, other land (including land featuring bare soil and exposed rock) covers 439 ha (51.1% of the total land area) and was the most extensive land-use type in the watershed, followed by croplands (35%), grasslands (8.9%) and settlements (4.2%). Forests comprised only 0.6% of the watershed.

The dominant land-use type in the intervention area in 2015 (the nominal baseline year) was classified as "other land" (mainly bare soils).

- In the Adi Bojabano watershed, "other land" accounted for 400 ha (70.3% of the total land area), followed by grasslands (20%), croplands (6.9%) and forests (2.8%). The area of bare soil in this watershed was relatively low – about two-thirds of the watershed had less than 10% bare soil. The Adi Bojabano watershed, which is at a high altitude compared with other watersheds in the intervention area, contained the largest proportion of forest.

- "Other land" was the dominant land use in the four watersheds in the Golina Woreda. Small areas in the Fokisa and Galikoma watersheds were forested, associated with seasonal streams originating in neighbouring higher-altitude woredas in the Tigray and Amhara regional states. Trees with large canopies were prevalent along rivers in both microwatersheds. Grasslands were the second most dominant land-use type in the Fokisan, Kelewan and Wanasa watersheds.

FIGURE 6. Land use in the intervention area, Ethiopia



Desertification was observed in 179 of 180 sample plots assessed in the Wodigemzo watershed. A desertification trend was also observed in all sample plots in the Adi Bojabano watershed, despite the prevalence of soil and water conservation structures, particularly bench terraces. This indicates that previous efforts to halt desertification in the watershed were insufficient to prevent desertification. Desertification was observed in all watersheds in the Golina Woreda.

61%
of the total area was in need of restoration

In Wodigemzo, grazing was identified as a disturbance in 89 of the 104 plots assessed, implying that livestock numbers and grazing resources were not in balance. Grazing was also identified as a disturbance in 130 of the 140 plots assessed in the Adi Bojabano watershed. Grazing was the most common type of disturbance in the Wanasa watershed. No human disturbance was observed in the majority of sample plots in the Kelewan and Galikoma watersheds; fire, logging, gardens and other types of disturbance were observed in the Fokisa watershed.

The study estimated that 3 881 308 ha of land was in need of restoration in the North Gondar, Southern and Zone 4 administrative zones, which is 61% of the total area of these zones.

SOCIO-ECONOMIC FEATURES

Human capital

Households have developed various adaptation measures for drought and climate change. For example, 54% of surveyed households indicated that they practised watershed-based conservation, 54% had planted trees, and 52% had changed crops.

Twelve percent of surveyed households were headed by women and 88% were headed by men. Sixty-four percent of surveyed household heads had never attended school, 22% had received some formal education (primary or secondary), and 14% had received informal education. No survey respondents indicated that they had undertaken study beyond secondary school.

64%
of respondents reported that they had experienced food insecurity in the previous 12 months

Of the surveyed households, more than half (58%) had received training in farming practices; 48% had participated in training in livestock development and management; and 36% had undertaken training in forestry. Thus, households had relatively low exposure to training, especially in forestry and community development.

About 64% of respondents reported that they had experienced food insecurity in the previous 12 months, and about 70% had lacked nutritious food. Among the latter group, more than half (52%) reported that they did not eat enough meat, indicating that access to nutritious food was a significant problem. About 57% of survey respondents said they had needed to skip meals, and 60% had had an inadequate quantity of food because they lacked money or other resources. Moreover, 38% of households said they sometimes ran out of food, and one-third of respondents said that, on occasion, they had had no food despite a desperate need.

Households used various mechanisms to cope with hunger. Many sold livestock assets. Reducing meals and borrowing foods were the second and third most popular coping strategies among survey respondents; 39% of households said they depended on food aid.

Social capital

Women took a significant part in decision-making in only 57% of surveyed households. About 39% of survey respondents indicated that they received extension support from the local government (the agriculture department), and 32% reported that they received assistance from government projects. Most households had little contact with, or they received insignificant support from, non-governmental organizations or community-based organizations.

Natural capital

Almost all (91%) of survey respondents reported that forest degradation was taking place, with free grazing and the expansion of farmlands cited as the major drivers. Forty-one percent of respondents reported a “high” level of forest degradation. Sixty percent of survey respondents reported soil erosion on their farming land.

Sixty-six percent of households reported that croplands were the major land-use type in their area, followed by rangelands (21% of households) and mixed agriculture (5% of households).

95%
reported a perception that the average temperature had increased in the ten years preceding the survey

Ninety-five percent of survey respondents reported a perception that the average temperature had increased in the ten years preceding the survey; 96% and 95% respondents, respectively, also indicated that they had detected changes in rainfall patterns and rainfall intensity in the last decade.

A significant number of households reported a lack of access to natural water points. Almost all (94%) respondents in the Golina Woreda and half (49%) in the Raya Azebo Woreda indicated that natural water points had dried up in the previous five years.

Almost all surveyed households (93%) reported that they extracted fuelwood from forests, and only 6% said they purchased fuelwood, confirming that there was high demand for accessible fuelwood for household cooking. About three-quarters of surveyed households extracted medicinal plants and construction materials from forests (75% and 73%, respectively). About 43% harvested fodder, 36% extracted timber, and 30% took artisanal materials. Thus, despite the wide range of forest products that could be taken, most households tended to remove only a few (i.e. fuelwood, construction materials and medicines) that were relatively easy to extract.

Fruits and nuts were part of the household diet for about three-quarters of respondents. One-third of respondents consumed forest products such as leaves and honey.

Physical capital

Eighty-six percent of survey respondents reported that they owned traditional farming tools and goods; 69% owned a plough. About 34% of respondents had 1–2 draught animals for farming (e.g. oxen, donkeys and horses), and 20% indicated that they possessed 3–4 draught animals. A significant portion (35%) reported that they had no draught animal, however.

Financial capital

Dryland agriculture was an important economic activity in the intervention area. The farming of staple crops was the primary source of livelihoods for almost three-quarters of surveyed households. Livestock (cattle, goats, sheep and poultry) provided the primary livelihoods of 16% of surveyed households and constituted a secondary source of livelihood for 80% of households. Only 10% of surveyed households relied on mixed farming as the primary source of their livelihoods.

59%
reported that their income was declining

More than half (59%) of respondents reported that their income was declining; just 17% reported that their income was increasing (and about one-quarter reported no change). Because agriculture was the main income source for many, this trend may reflect changes in farm productivity.

THE GAMBIA

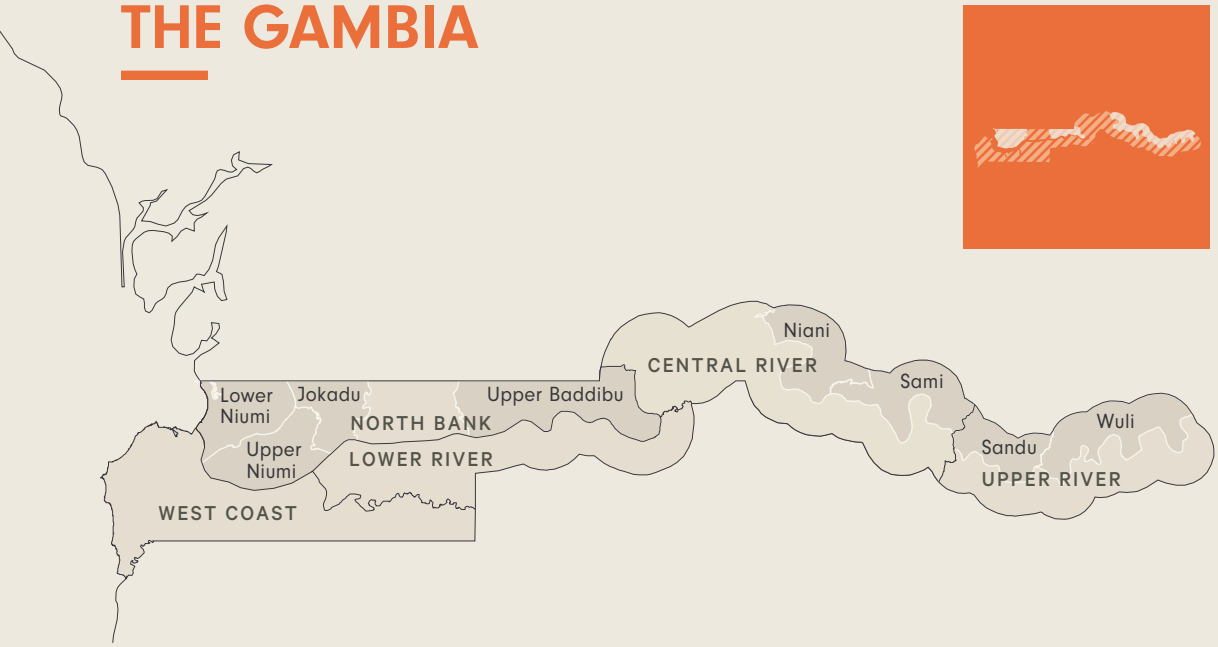


FIGURE 7. The AAD project intervention area, Gambia

The AAD intervention area in the Gambia (Figure 7) is on the north bank of Gambia River in the North Bank, Upper River and Lower River regions. The river's grassy floodplain contains Guinean mangroves close to the Atlantic Ocean in the west, while savannahs dominate in the eastern part. The climate is subtropical, with a dry season from November to May and a rainy season from June to October. The inland is warmer and drier than the coast, with average annual rainfall of about 920 mm; annual rainfall near the coast is as high as 1 400 mm.

Intervention area

27 villages in 8 districts in the North Bank Region, Upper River Region and Lower River Region)

Area

361 500 hectares (total area of the 8 districts combined)

Restoration potential

549 262 hectares

48% of the total land area of Gambia

Population in the AAD intervention area

390 283 people in the 27 villages of intervention

52.3% are women

Main land uses

44.3% croplands

31.1% forests

11.5% wetlands

6.0% grasslands

4.9% settlements

2.3% other land

Main sources of livelihood

84% farming

5% salaries/wages

3% livestock

3% remittances

2% crafts (masonry, carpentry and mechanics)

2% commerce

1% fishing

1% traditional healing

Land use in the intervention area in 2015 (the nominal baseline year) comprised croplands (44.3%), forests (31.1%), wetlands (11.5%), grasslands (6.0%), settlements (4.9%) and other land (2.3%) (Figure 8).

The proportions of all land uses except forests increased in the intervention area between 2004 and 2017. Forests accounted for more than 60.5% of all land uses that changed to another land use during the period. Croplands expanded most, accounting for 52.7% of all land-use change. Wetlands appeared to have been well conserved in the intervention area. Only 75.7% of forests were retained over the period, and the remainder was converted to croplands (12.1%), wetlands (4.7%), grasslands (4.2%) and other land uses (3.3%). A significant proportion of "other land" and grasslands will eventually become croplands, should current trends continue.

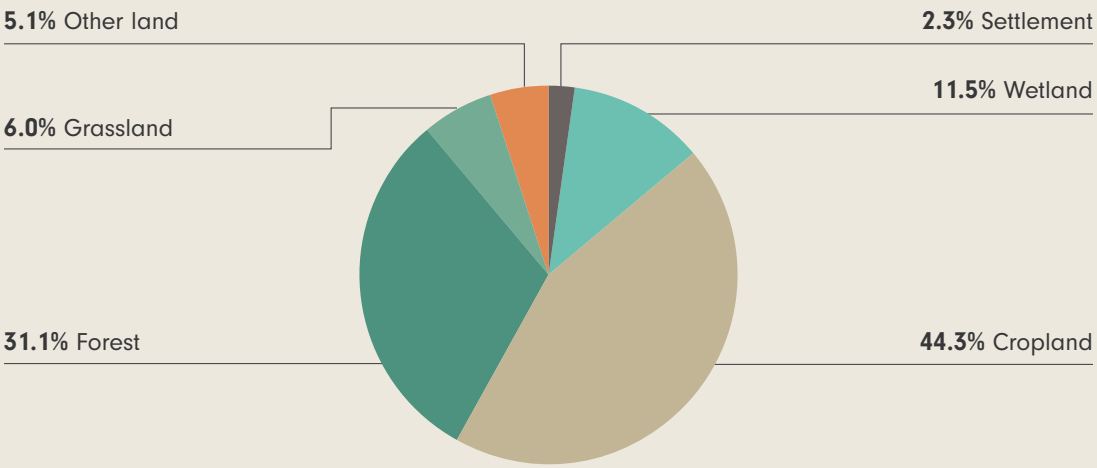
75.7%
of forests were retained over the period

A total of 12 651 trees outside forests were counted in the sample plots. Most (64.5%) of the trees outside forests were in croplands.

A desertification trend was detected on 9.2% of the area, mostly in croplands (40.8% of all observed desertification), suggesting that unsustainable practices were driving desertification in these areas. Logging was the biggest cause of disturbance (58.3% of all disturbance detected). Grazing accounted for 37.7% of low-impact disturbance and for 46.3% of medium-impact disturbance.

The study estimated that, nationally, 549 262 ha (48% of the total country area) was in need of restoration.

FIGURE 8. Land use in the intervention area, Gambia



SOCIO-ECONOMIC FEATURES

Human capital

Males constituted 92% (and females 8%) of household heads. Thirty-two percent of surveyed households reported that 1–2 members had out-migrated for work and been away for more than six months; 9% reported that 3–4 members had out-migrated; and 2% reported that more than four members had out-migrated. In 57% of households, no family member had out-migrated for work and been away for more than six months. In 37% of surveyed households, the heads had never attended school.

59%
reported having experienced anxiety and uncertainty about food in the previous four weeks

Fifty-nine percent of survey respondents reported having experienced anxiety and uncertainty about food in the previous four weeks. Households adopted the following coping strategies for food shortages, among others: gardening; sale of livestock or fuelwood; remittances; loans; borrowing food; bartering; help from friends or relatives; the use of less-preferred food; and reduced food consumption (especially for adults in favour of children).

Social capital

Seventy-one percent of surveyed households reported that they practised vegetable gardening for home consumption or to generate income; 46% participated in community farming.

In 35% of surveyed households, members were engaged in soap-making, predominantly as part of women's organizations. Some of the money generated was used to develop such organizations and the remainder was offered as loans to group members.

Natural capital

The majority (84%) of surveyed households reported that agriculture was the main source of livelihood. The main food crops were reported as rice, millet, maize and sorghum; groundnut was a major cash crop. The ability of households to maximize production was hindered by limited agricultural skills and by a lack of access to and affordability of agricultural inputs.

84%
reported that agriculture was the main source of livelihood

Eighty percent of surveyed households owned land for agriculture. The land-tenure system in the Gambia, particularly in rural areas, is such that most land ownership is inherited. Most surveyed households indicated that they had access to land for farming.

Ninety-six percent of households that had access to land for farming reported that they were engaged in upland cultivation. This high percentage may be explained by the fact that most Gambian farmers cultivate cereals and groundnuts, which are best suited to upland production.

Land degradation over the years, including soil erosion, is a causal factor in the low productivity of farmlands. Seventy-nine percent of surveyed households reported that their farms were subject to soil erosion, caused either by water or wind; in extreme cases, erosion had led to the abandonment of farms.

Unsustainable forest resource use is common, especially outside community forests and national parks. Fifty-seven percent of surveyed households reported that forest resources in their area were heavily depleted. Eighty percent indicated that they thought there had been a decline in forest cover in their area in the five years preceding the survey, and 60% reported that there had been an increase in forest fires over the same period.

Gambia's community forestry approach attempts to fully involve local people in the sustainable management and use of forest resources. The majority (73%) of surveyed households indicated a perception of co-ownership in community forests.

57%
reported that forest resources in their area were heavily depleted

Seventy-one percent of surveyed households reported that women were actively involved in the management and protection of forests in the area. Women carried out duties such as fetching water to extinguish forest fires and transporting seedlings for planting, and they were included as members of community forest committees.

Forest products contributed to the food supply of households; the majority of survey respondents indicated that fruits, nuts, leaves, honey, tubers and resin and gums were part of their household diets. A significant proportion (28%) of surveyed households indicated that they extracted non-food forest products – such as fuelwood, medicines, construction materials, rope and fodder – from forests.

The most common form of private plantation was fruit trees, which can generate substantial income for households through the sale of fruit. Overall, 25% of surveyed households reported owning a fruit-tree plantation.

Over 70% of households reported that they were engaged in strategies to deal with the effects of climate change, perceived to be low rainfall, heavy winds and erosion. Strategies included tree planting for shade and windbreaks, staggered cropping, and crop change.

Physical capital

Ninety-six percent of surveyed households indicated that a lack of markets in their area was a problem. Large quantities of agricultural products may be wasted because of a lack of access to markets.

Financial capital

Eighty-four percent of surveyed households indicated that farming was their primary source of livelihood. Sixty-five percent reported a decrease in household income in the previous two years associated with the erratic distribution and insufficient quantity of rain in the period, as well as declining soil fertility.

Off-season agriculture – mainly in the dry season – was cited as a source of income and food for a majority (68%) of surveyed households. This mostly comprised horticultural activities practised by women, as well as dry-season rice production in irrigated areas.

Eighty percent of surveyed households engaged in cash-crop production, but 70% reported problems in the value chain, including long distances to markets.

Sixty-one percent of surveyed households reported that they were not involved in any form of small forest-based enterprise, 28% indicated that they were engaged in small enterprises involving NTFPs such as resins and wild fruit, and 10% traded timber.

NIGER

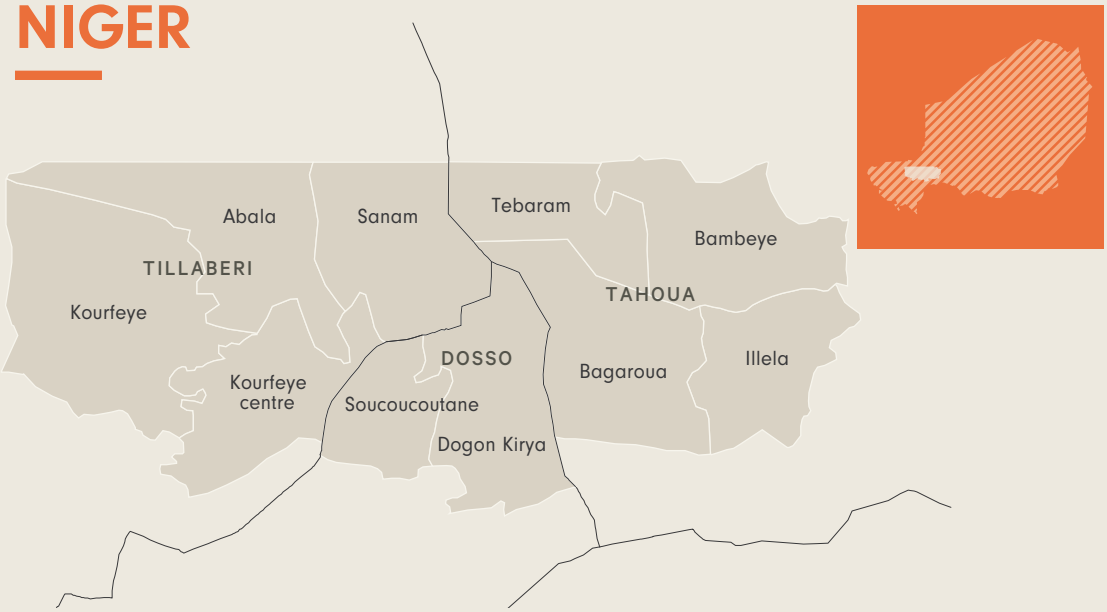


FIGURE 9. The AAD project intervention area, Niger

The intervention area encompasses 35 villages in ten communes in the Tillaberi, Tahoua and Dosso regions in the southeast of Niger (Figure 9). This area stretches from the Sahelian phytogeographical zone in the south to the Sahara in the north. The southern Sahelian zone, which contains all ten communes in the intervention area, consists of *Combretum* thickets on the lateritic plateaus and steppes and savannahs on sandy terraces and fixed dunes and in dry valleys. The climate type is hot desert climate, with extremely high temperatures, especially during the nine-month dry season. The rainy season is from June to August, with an average annual rainfall at Kourfeye (Tillaberi) of 513 mm and high interannual variability. Average maximum temperatures are in the range of 18–41 °C, with the hottest months in March–June.

Intervention area

35 villages in the communes of Kourfeye Centre, Kourfeye, Abala and Sanam (Tillaberi region); Bagaroua, Illéla, Tébaram and Bambeye (Tahoua region); and Dogonkiriya and Soucoucoutane (Dosso region)

Area

2 623 114 hectares (the land area of the 10 communes combined)

Restoration potential

1 446 624 hectares

56% of the land area of the Tillaberi, Tahoua and Dosso regions

Population in the AAD intervention area

116 321 people (the population of the 35 villages combined)

51.1% are women

Main land uses

47% grasslands

34% croplands

16% other land

2% forests

<1% settlements

Main sources of livelihood

27.5% agriculture and livestock

20% livestock

12.3% commerce

Grasslands were the dominant land use, accounting for 47% of the intervention area in 2015 (the nominal baseline year), and croplands were also important, covering 34% of the area (Figure 10). Forests accounted for only 2% and were subject to uncontrolled exploitation for wood production and lack management plans.

Wall-to-wall land-use mapping determined that at least 40% of the land area was under agropastoral, silvopastoral, agrosilvopastoral or agroforestry land use. Farmers reported various types of encroachment, such as by agriculture on grazing areas (reported by nearly half of surveyed households) and agroforestry land and by livestock on agricultural land.

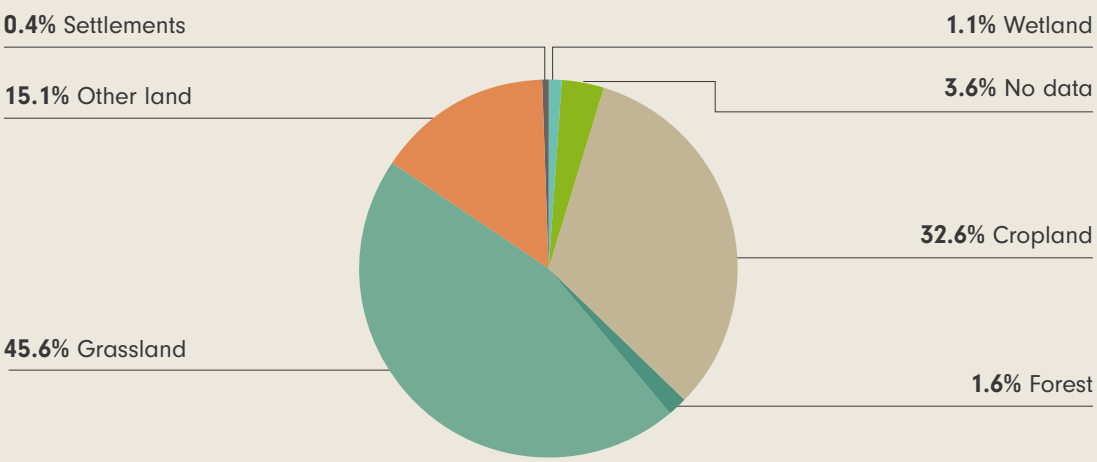
Surface water and easily accessible shallow water resources were scarce in the intervention area. There were a few permanent ponds, but the most important were ephemeral. The 65-km-long Badaguichiri Valley in eastern Illéla Department had a highly degraded hydrographic system. It was fed mainly by stormwater, although even minor rain events could generate widespread local runoff on valley slopes.

Erosion caused by wind and water, and climate change, were the main causes of land and vegetation degradation in Niger

Areas of bare soil, considered an indicator of degraded land, were found mostly in the Kourfeye and Bambeye communes, accounting for 27 706 and 26 039 ha, respectively. Erosion caused by wind and water, and climate change, were the main causes of land and vegetation degradation in Niger, with severe consequences for farmers. An estimated 71% of land in the intervention area was affected by desertification, which was present in all ten communes.

The survey estimated that 1 446 624 ha (56% of the Tillaberi, Tahoua and Dosso regions) was in need of restoration in the intervention area.

FIGURE 10. Land use in the intervention area, Niger



SOCIO-ECONOMIC FEATURES

Human capital

In all ten communes in the intervention area, the majority of household heads were male, and most had never attended school. The literacy rate was particularly low among adults (1% of adult household members). More than half of survey respondents reported, however, that some of their children were literate and attended school.

The survey revealed a strong need for capacity building. Of the 13 training themes proposed, more than 10% of respondents indicated interest in three: agroforestry; the processing and preservation of agricultural products and NTFPs; and beekeeping.

80%
reported experiencing at least some level of food insecurity, including anxiety and uncertainty about their food supply

The use and knowledge of sustainable land management practices was generally low: about 11% of survey respondents indicated that they undertook limited pruning and tree felling; about 10% reported conducting thinning and weeding. Just over 9% of surveyed households indicated that they practised erosion-control measures, and 7% of households conducted nursery management. Survey respondents reported the adoption of three climate-change adaptation strategies, in roughly equal proportions: planting trees for windbreaks and shade; varied-cycle multiple cropping (early and late varieties); and crop rotation.

More than 80% of surveyed households reported experiencing at least some level of food insecurity, including anxiety and uncertainty about their food supply; a reduction in daily rationing (i.e. in the size or number of meals); a lack of food; and experiencing hunger without being able to eat. More than half of surveyed households reported that they experienced a lack of food between July and November. Survey respondents indicated that the main strategies for tackling hunger and food insecurity were selling livestock; rural exodus; reducing food intake; collecting and selling fodder; and borrowing food from neighbours.

Social capital

More than half of household heads took part in decision-making meetings at least once a month, but more than one-third never took part in any such meetings. Two-thirds of respondents indicated that women participated in decision-making, and the other third reported that women did not participate in decision-making. Half of the surveyed households indicated that they had female members who were involved in community organizations. The large majority of households participated in community work for free, and equally as many benefited from this kind of community support.

Natural capital

Nearly all surveyed households reported that rainfall patterns and intensity had changed in the ten years preceding the survey

Nearly all surveyed households reported that rainfall patterns and intensity had changed in the ten years preceding the survey. Most also reported an increase in average temperature over the same period. Eighty-three percent of surveyed households indicated that natural water points had dried up in the five years preceding the survey. A significant proportion of households also reported a reduction in vegetative cover in the area in the ten years preceding the survey.

The farms of 40% of surveyed households were situated on plains, with smaller proportions cultivating on plateaus (22.8%), valleys (17.5%) and dune fields (19.4%). The large majority of farmers were landowners; a small proportion used a share-rent system or paid for the land.

All communes in the study area faced water and wind erosion

All communes in the study area faced water and wind erosion, ranging from 77% of households in the Kourfeye commune to 100% in Soucoucoutane, with severe consequences for agricultural production. The majority of surveyed households (62.1%) indicated that their lands were degraded, with one-third reporting that their lands were highly degraded. The most cited causes of land degradation were the reduction of vegetation cover and residues (13.7%), followed by deforestation and the suppression of natural vegetation (13.0%). Poverty was the next most cited cause of land degradation (13.1%), followed by straw collection (11.6%) and population pressure (9.2%).

Forty-two percent of surveyed households indicated that conflicts existed in their area over access to natural resources. One-fifth of surveyed households reported that agriculture was encroaching on agroforestry land, and two-thirds observed that livestock farming was encroaching on agricultural land. A small proportion (6.2%) of respondents reported that agriculture was encroaching on grazing lands.

Wood energy was important in the intervention area, with 14.4% of surveyed households indicating that they used it for cooking; a similar percentage of households reported that they used wood as a construction material. Thirteen percent of survey respondents indicated that they used trees for shade, traditional medicines, animal feed and organic fertilizer; 7% reported using wood for craft-making.

Physical capital

In rural households, livestock was used for milk or meat production, sold, or used for domestic and farm work. Nearly half of surveyed households reported that they owned one or two animals for domestic and farm work.

Market access was relatively good, with 46.2% of survey respondents stating that they had access to at least three weekly markets and 38.2% indicating access to one weekly market. Only 2.3% of respondents mentioned insufficient access to market in their area.

Water infrastructure was available for 34.4% of survey respondents through tap water, and 33.8% and 9.2% of respondents, respectively, reported access to covered and non-covered wells. Boreholes and water catchment (springs) were used by 21.4 and 1.1% of households, respectively.

Financial capital

Agriculture was the main source of livelihood for 47.7% of the surveyed households, and 20% of households obtained their livelihoods primarily from livestock. Remittances constituted the primary source of livelihood for 9.5% of surveyed households, and trade was the primary source of livelihood for 6.2%. The sale of NTFPs was the main source of livelihood for only 1% of surveyed households.

20%
of surveyed households reported that they struggled to add value to their products, and that their products were not marketed well enough

More than one-fifth of surveyed households reported that they struggled to add value to their products (a processing problem) and that their products were not marketed well enough (a market-chain problem). Generally, households produced for their own consumption (home-consumed production); goods intended for sale comprised cash crops and off-season crops. In the intervention area, only one-fifth of households produced off-season crops, and most households grew cash crops. Seventy-nine percent of surveyed households indicated that their incomes had decreased in the two years preceding the survey.

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NIGERIA

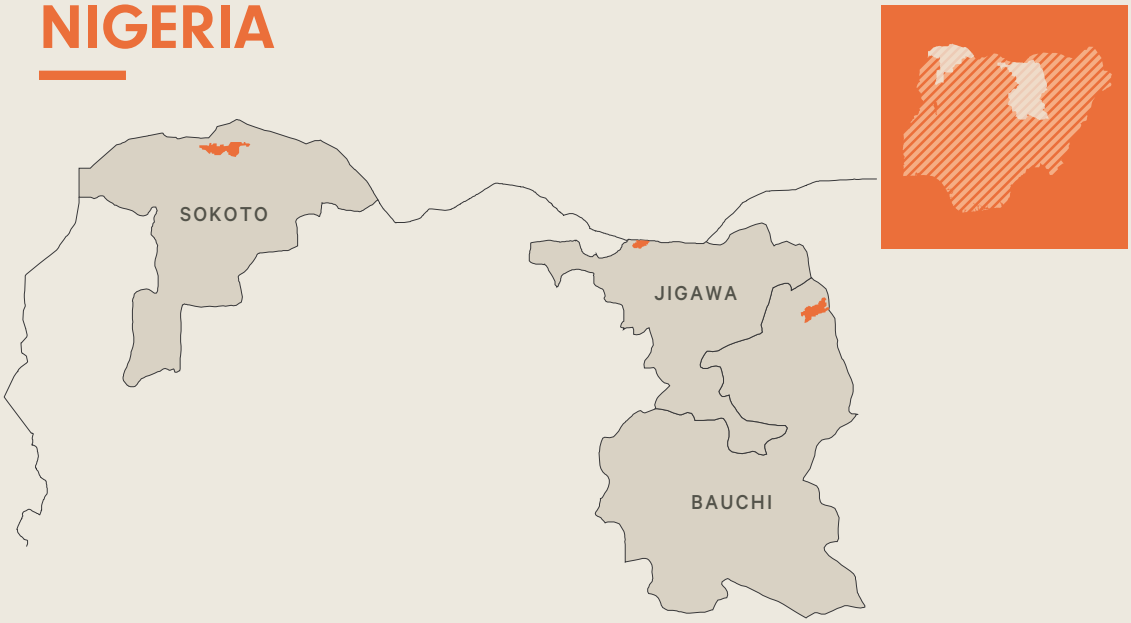


FIGURE 11. The AAD project intervention area, Nigeria

The AAD intervention area in Nigeria is composed of three communities in the northern parts of Bauchi, Jigawa and Sokoto states, close to the border with Niger (Figure 11). The vegetation is dominated by shortgrass savannah. The climate is warm semiarid – considerably warmer and drier than that in the central and southern parts of Nigeria. The average annual temperature is 28 °C. There is one rainy season per year, from June to October, and average annual rainfall is in the range of 450–1 050 mm.

Intervention area

Malori community, Gamawa Local Government Area (LGA), Bauchi state

Jeke community, Sule-tankarkar LGA, Jigawa state

Basanta community, Illela LGA, Sokoto state

Area

65 776 hectares (selected watersheds in each of the 3 communities)

Restoration potential

5 431 263 hectares

57% of the land area of Sokoto, Bauchi and Jigawa states

Population in the AAD intervention area

569 361 people in the 3 LGAs

49.7% are women

Main land uses

4.9% grasslands

73.6% croplands

1.4% forests

3.3% settlements

0.6% settlements

16.1% other land

Main sources of livelihood

73.9% farming

20.8% livestock grazing

2.6% fishing

BIOPHYSICAL FEATURES

The main land uses in the intervention area in 2015 (the nominal baseline year) were croplands (73.6%), other land (16.1%), grasslands (4.9%), settlements (3.3%), forests (1.4%) and wetlands (0.6%) (Figure 12).

50%
of the forests that existed in 2007 remained as forest at the time of the survey

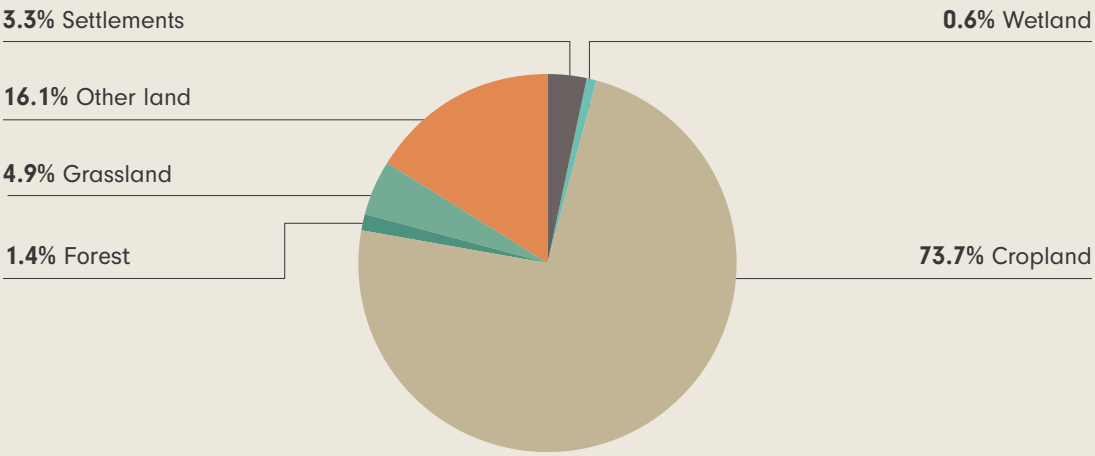
Forests are disappearing at an alarming rate. Only 50% of the forests that existed in 2007 remained as forest at the time of the survey. The other 50% had been converted to croplands (41.7% of the pre-existing forest area) and other land (8.3%). At this pace, there is considerable risk that forests could disappear from the intervention area.

Grasslands and wetlands were being heavily encroached. Of the grasslands detected in 2007, 78.3% remained, with most of the remainder (13% of pre-existing grasslands) converted to croplands. Of the wetlands that existed in 2007, 62.5% had been converted to other land uses. Of the total area in 2007, 37.5% had been converted to croplands and 25% had been converted to grasslands.

A considerable number of trees occurred outside forests, mostly (80.9%) in croplands. About 6.2% of trees outside forests were in settlements.

An estimated 5 431 263 ha (57% of the total area of Sokoto, Bauchi and Jigawa states) was in need of restoration in the intervention area.

FIGURE 12. Land use in the intervention area, Nigeria



SOCIO-ECONOMIC FEATURES

Human capital

In each of the three communities, more than 95% of surveyed households had male heads. Forty-eight percent of surveyed households reported that 1–2 members had out-migrated for work and been away for less than six months. In 44% of households, 1–2 members had out-migrated for work and been away for more than six months. Almost the same proportion (44%) of surveyed households reported that 1–2 members had been gone for more than six months.

90%
said they had experienced anxiety and uncertainty about food in the previous four weeks

Alarmingly high levels of food insecurity were reported: nearly 90% of survey respondents said they had experienced anxiety and uncertainty about food in the previous four weeks (nearly 74% of households had experienced such anxiety and uncertainty 3–10 times in that period). Most households that had suffered food shortages (91%) reported that this had occurred between July and October.

The four main coping strategies for food shortages reported by survey respondents were fuelwood collection and sale (52% of households); forest harvesting (46%); sale of livestock (25%); and gardening (25%). A large majority (87%) of surveyed households indicated that leaves harvested in forests were part of their diets; 68% said that fruit and nuts were part of their diets; and 34% referred to honey.

Eighty-nine percent of survey respondents (the highest percentages being in Bauchi and Jigawa) indicated that their biggest needs for technical training were in seed collection and propagation and nursery management. Just over 63% of respondents (the highest percentages being in Jigawa and Sokoto states) indicated that the biggest need for technical training was in beekeeping.

Social capital

About 1% of survey respondents in Bauchi, 9% in Sokoto, 41% in Jigawa and 19% overall reported that women in their households participated in socio-economic interest groups.

Natural capital

Household heads were asked about the types of forests present in their areas. The leading type was community forest (mentioned by 64% of respondents), followed by private natural forests (63%), protected areas (35%, mostly in Jigawa state) and forest parks (28% in Jigawa and Sokoto states).

65%
indicated that they extracted fuelwood from forests

About 54% of respondents reported that forest cover had decreased in the five years preceding the survey (a perception in line with the findings of the biophysical assessment). Eighty-five percent of respondents in Sokoto said they thought that forest cover had decreased. Nearly 43% of all survey respondents (i.e. in all three states combined) reported that the incidence of forest fires had trended higher in the preceding five years, 38.7% said it had been stable and 18.4% said it had decreased.

About two-thirds (65%) of survey respondents indicated that they extracted fuelwood from forests; 95% extracted medicinal plants; 36% extracted timber; 29% extracted obtained rope-making material; 37% harvested fodder; 35% obtained organic fertilizer; 18% took fibres; and 11% used forests as a source of construction material. More than half (57%) of respondents reported that they bought fuelwood for household use, including almost all respondents (93%) in Bauchi state, and 59% of all respondents indicated that they used charcoal for household cooking.

More than one-third of respondents (38%) said that conflict over natural resources had occurred in the five years preceding the survey. About 92% of all respondents reported that agricultural land had encroached on forests, and 52% said that livestock had encroached on agricultural land.

Just over half (56%) of survey respondents indicated that they had access to natural water points. Fifty-four percent reported that natural water points in their area had dried up in the previous two years; in Bauchi, almost all water points were reported to have dried up.

54%
reported that natural water points in their area had dried up in the previous two years

About 46% of all survey respondents, including 89% in Bauchi, considered that the average temperature had increased in the five years preceding the survey. Nearly 52% of respondents indicated their belief that rainfall patterns had also changed in the period, and 38% believed that rainfall intensity had decreased. Thirty-four percent of respondents considered that the frequency of extreme windy events had increased in the previous five years. Sixty-five percent of all survey respondents (99% in Bauchi state) reported problems with soil erosion.

Physical capital

Forty-five percent of all surveyed households reported that they had access to tap water, 82% indicated that they had access to a borehole, and 90% said they were able to obtain water from open wells.

Financial capital

Survey respondents reported their main sources of livelihood as farming (about 74% of respondents) and livestock enterprises (21%). The median number of livestock owned by surveyed households was reported as two for cattle, three for goats and sheep, and six for poultry. Fishing was practised by 2.6% of respondents. About 68% of all surveyed households reported that they practised off-season agriculture; about 86% reported producing cash crops.

Fifty-two percent of surveyed households reported receiving monetary remittances from out-migrated household members.

About 65% of survey respondents indicated that they experienced problems in their product value chains and with insufficient marketing.

Sixty-five percent of all survey respondents reported that they had no access to microcredit or loan schemes. Thirty-eight percent of respondents in Jigawa state reported that they had access to community loans or to loans from community-based organizations.

SENEGAL

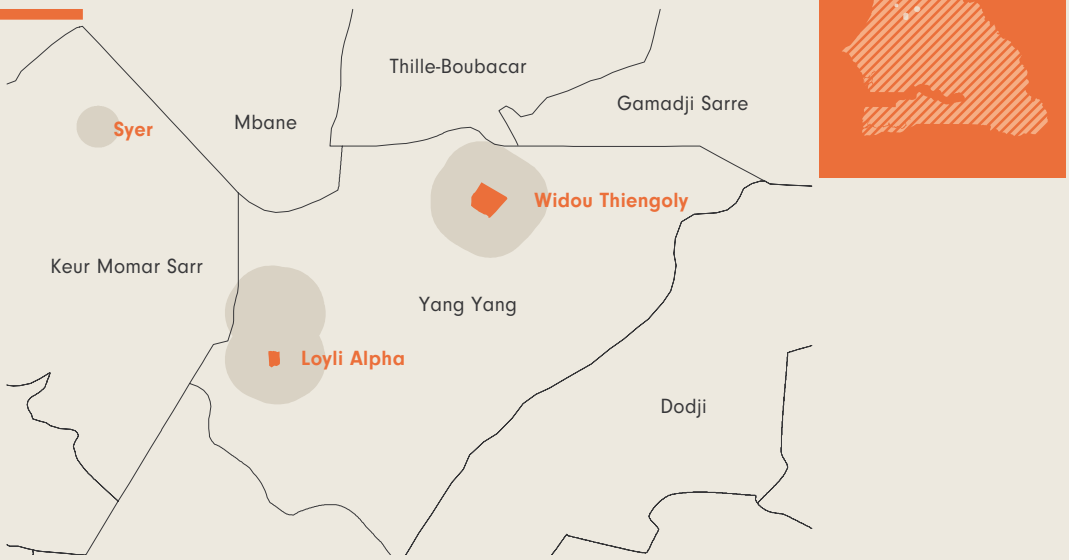


FIGURE 13. The AAD project intervention area, Senegal

The rural communities of Téssékéré and Mboula in Linguère and the rural community of Syer in Louga are located in the Ferlo, a large area in northern Senegal dominated by silvopastoralism (Figure 13). This semiarid region is subject to the Harmattan wind during the nine-month dry season, which exacerbates soil erosion and desertification. The rainy season is from June to September, and the average annual rainfall is 300–500 mm.

Intervention area

Rural communes in the study area of Téssékéré (Widou plot) and Mboula (natural reserve of Koyli-Alpha), Louga Department, Louga Region

Area

1 000 hectares in Koyli-Alpha

2 300 hectares in Widou

Restoration potential

2 120 606 hectares

48% of the land area of the Louga and Saint-Louis regions

Population in the AAD intervention area

26 871 the total population of the communes of Mboula, Tessékéré and Syer

49.7% are women

Main land uses

45% shrublands (steppe)

39.5% shrublands with trees

8.3% forests

3.6% cultivated areas

Main sources of livelihood

Koyli-Alpha:

75% livestock breeding

13.3% commerce

3.3% agriculture

1.7% remittances

Widou:

90% livestock breeding

5% agriculture

2% commerce

2% manual work (masonry, carpentry, mechanics)

BIOPHYSICAL FEATURES

48%
of the Louga and Saint-Louis regions was in need of restoration

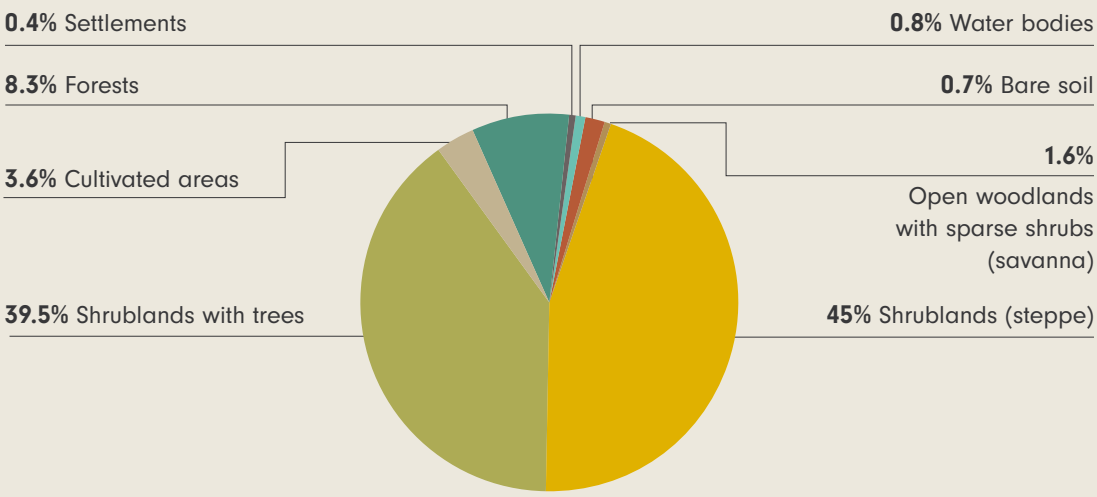
In Koyli-Alpha, natural vegetation accounted for about 89% of the total land area in 2015 (the nominal baseline year), of which almost half comprised shrublands with trees and shrubs. Subclasses of these shrublands are defined according to tree and shrub density: shrubland with closed trees; shrubland with open trees; degraded shrubland; and open woodland with sparse shrubs (savannah). Crops occupied 7% of the total land area, and the remainder comprised bare soils, remnants of degraded forest, surface water, and settlements. The community natural reserve was composed of savannah, with species including *Acacia tortilis* and *Balanites aegyptiaca* on sandy loam soils; there was also 500 ha of plantations of *Acacia senegal* in the northeast.

At Widou, shrublands of various types occupied 83.8% of the land area; classes of shrublands with trees covered 50%. Forest plantations accounted for 14.7% of the land area. The area of croplands, settlements and water surfaces did not exceed 1% of the total land area. The influence of human activities was limited in this site, which is located in the "Six Forages" sylvo-pastoral reserve.

Figure 14 shows the distribution of land uses in Koyli-Alpha and Widou, combined.

An estimated 2 120 606 ha (48% of the Louga and Saint-Louis regions) was in need of restoration in the intervention area.

FIGURE 14. Land use in the intervention area, Senegal (adapted from LCCS*)



* The categories used here are derived from the LCCS approach developped by FAO (http://www.fao.org/3/a-i5232e.pdf)

SOCIO-ECONOMIC FEATURES

Human capital

Of the surveyed households, 75% in Koyli-Alpha and 58% in Widou had men as their heads. The level of illiteracy was high in both communes, and education among children was relatively low. In about half of households in both communes, at least one girl attended school regularly. Long-duration out-migration (i.e. longer than six months) was rare in both communes; however, 30% of surveyed households in Koyli-Alpha and 12% in Widou reported that at least one household member had out-migrated for six months or less.

97%
reported experiencing periods of anxiety and uncertainty about their food supply in the 12 months preceding the survey

The main agricultural techniques used by households were soil-fertility management, animal ploughing and crop rotation. The use of certified seeds and the combination of two or more plants were cited to a lesser extent. Survey respondents indicated the following needs in technical capacity building: farming techniques; the processing of NTFPs; and the processing and preservation of dairy products.

Eighty-three percent of survey respondents in Koyli-Alpha and 40% in Widou reported that their main adaptation strategy to climate change was the planting of trees as windbreaks and for shade. Other reported strategies included off-season crops and shifting to other cultivated species.

Many surveyed households reported that issues related to a lack of food occurred in May–June and July–August. Almost all households (97%) reported experiencing periods of anxiety and uncertainty about their food supply in the 12 months preceding the survey. In that period, 45% of households spent at least an entire day without eating due to a lack of money or other resources. These findings raise important concerns about food security in the intervention area. The main strategies reported by households for dealing with food insecurity were selling livestock, borrowing money, purchasing on credit, borrowing food from neighbours, and reducing food intake per meal.

Social capital

Most surveyed households reported that members were involved in community groups, associations or community-based organizations. More than half indicated that they were involved in groups, associations and community-based organizations that practised market gardening. Other organized groups mobilized people in the two communes in group activities related to the marketing of agricultural products, the planting of fruit trees with high commercial potential, agriculture, handicrafts and reforestation (i.e. commercial nurseries).

The participation of women was high: 92% of women in Koyli-Alpha and 75% of women in Widou belonged to at least one producer group, association or community-based organization. Most of these women participated in decision-making and institutional processes that affected their communities.

Almost all survey respondents indicated that they provided free labour to community members when needed and received free help in return.

Natural capital

100%
survey respondents reported a perception that vegetation cover had decreased in the ten years preceding the survey

All survey respondents reported a perception that vegetation cover had decreased in the ten years preceding the survey. In Koyli-Alpha, 50% of respondents said they thought the land was degraded, 40% reported that it was highly degraded and 10% said it was not degraded. In Widou, all respondents reported that all the land was degraded. About one-third of respondents in both communes said they were addressing soil erosion.

The causes of land degradation cited by respondents in Koyli-Alpha were, in descending order, deforestation and the suppression of natural vegetation; low rainfall; and overgrazing due to the presence of transhumant pastoralists. In Widou, the main causes of land degradation cited were wood collection for energy and timber; low rainfall; free-range grazing of livestock; overgrazing due to the presence of transhumant pastoralists; poverty; and the loss of vegetation cover.

In Koyli-Alpha, households reported meeting their water needs from nearby ponds and Lake Guiers. More than half (60%) of households indicated that they had access to at least four ponds. Ten percent of households in Koyli-Alpha had no access to any natural water point, however; in Widou, 3% of households lacked such access. In both communes, all survey respondents indicated a belief that some natural water points had dried up in the five years preceding the survey.

The survey revealed that 97.9% of households in Koyli-Alpha and 94% of households in Widou owned the land they cultivated. Two percent of households in Koyli-Alpha and 6% in Widou reported that they accessed land through tenant

farming. Forty percent of survey respondents in Koyli-Alpha and 58% in Widou indicated that livestock encroached on agricultural land. Conflicts were common: 80% of respondents in Koyli-Alpha and 75% in Widou reported the existence of land-related conflicts in their communities.

The survey indicated that the preferred tree species in the intervention area are *Ziziphus mauritiana*, *Citrus* (orange, lemon and lime trees), *Mangifera indica* (mango) and *Musa* spp. (banana; especially in Widou). Survey respondents indicated, however, that the availability of their preferred trees was declining. In addition to food consumption, most respondents indicated that they used trees primarily for shade, followed by traditional medicines, fodder and construction materials; two-thirds of respondents in Widou and all respondents in Koyli-Alpha indicated that they used trees for energy. Tree components used for these purposes were branches, leaves, bark and dead wood. A small number of households indicated that they used tree roots and litter.

Physical capital

The main household equipment used for agricultural work were carts, traditional agricultural tools and ploughs. Half the surveyed households indicated that they possessed one or two horses or donkeys.

The main water points accessible to households were taps and boreholes. Ninety-two percent of surveyed households in Koyli-Alpha indicated that they had access to tap water, compared with 10% in Widou. Seventy percent of households in Koyli-Alpha and 87% in Widou reported that they had access to water from boreholes. To a lesser extent, households also had access to covered or uncovered wells.

Financial capital

75%
of survey respondents in Koyli-Alpha reported that their primary source of livelihood was livestock

Seventy-five percent of survey respondents in Koyli-Alpha reported that their primary source of livelihood was livestock, followed by trade (13%), agriculture (3%) and remittances (2%); 32% and 29% of households indicated that agriculture and trade, respectively, were their second most important source of livelihood. In Widou, 90% of respondents indicated that livestock constituted their primary source of livelihood; agriculture was the primary source of livelihood for only 5%. Trade was the most-cited secondary source of livelihood in Widou, and no households reported receiving remittances as a source of livelihood.

In both communes, two-thirds of respondents indicated that their household income had declined in the two years preceding the survey.

One-third of respondents in Koyli-Alpha, but almost none in Widou, reported that they held private savings. About one-quarter of all respondents indicated that they had access to microcredit, mostly in the form of community or association loans. About half of respondents in both communes reported that they had benefited from development funds implemented in their communities.

90%
of respondents in Widou, indicated that livestock constituted their primary source of livelihood

Another important source of financial capital in the intervention area was livestock. A significant majority of households in both communes owned 2–10 head of cattle, and many also owned goats, horses and donkeys. About half of all households owned poultry.

3.2

ACTION AGAINST DESERTIFICATION
THE PACIFIC

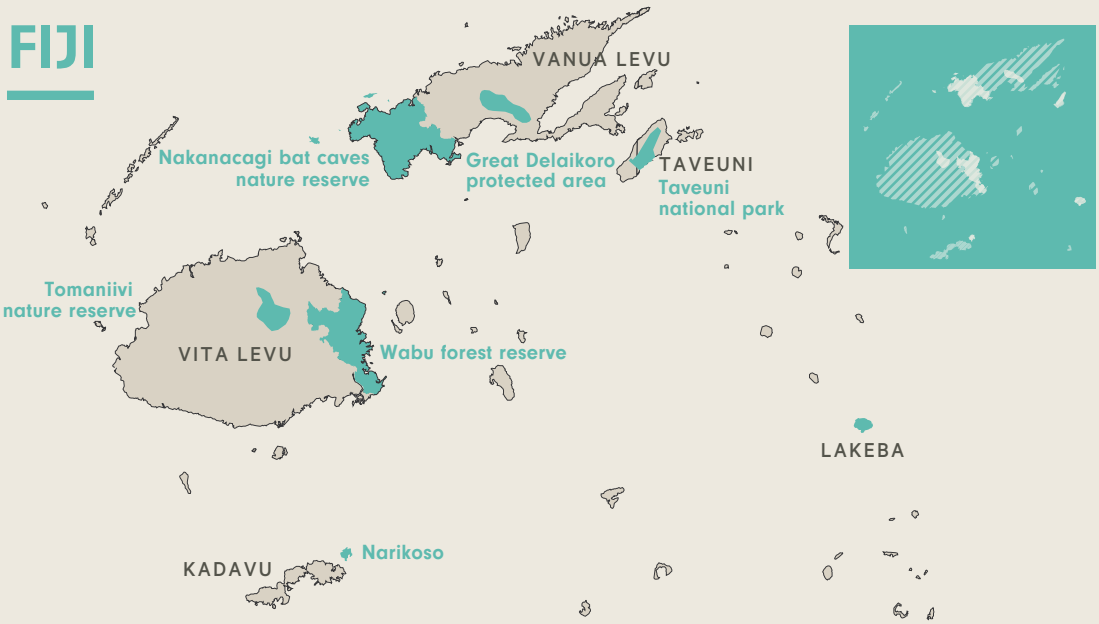


FIGURE 15. Land use in the study area, Fiji

The AAD intervention area in Fiji consists of 64 villages spread across four of the country's main islands, including the Greater Delaikoro Protected Area on the island of Vanua Levu, the Greater Tomaniivi Protected Area on Viti Levu, and sites on Kadavu and Lakeba (Figure 15). These areas are dominated by forested mountains of volcanic origin. The climate is tropical marine, with minimal seasonal variation in temperature (in the range of 26–31 °C), a hot rainy season from November to April, and a cooler, relatively dry season from June to October. Average annual rainfall ranges from 2 000–3 000 mm in the coastal and lower areas to 6 000 mm at higher elevations. The country is affected by many environmental threats, including tropical cyclones (usually between November and mid-May), soil erosion (through high runoff), and the rising sea level, driven by climate change.

Intervention area

8 provinces on 4 islands
Bua, Macuata and Cakaudrove (Vanua Levu); Ba, Ra and Tailevu (Viti Levu); Kadavu (Ono); and Lau (Lakeba)

Area

910 813 hectares
(the total area of the 8 provinces combined)

Population in the AAD intervention area

11 200 people in the 64 villages in the intervention area

47% women (estimated)

Main sources of livelihood

44% yaqona

14% cash crops

12% employment

7% vegetables

7% non-timber forest products (Delaikoro)

Main land uses

52.1% forests

23.8% grasslands

9.13% croplands

1.79% settlements

0.09% wetlands

0.39% other land

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BIOPHYSICAL FEATURES

Forests (52.1%) were the predominant land use in the intervention area in 2015 (the nominal baseline year), followed by grasslands (23.8%), croplands (9.1%), settlements (1.8%), other land (0.4%) and wetlands (0.09%) (Figure 16). Forests constituted the biggest land use in all eight provinces except Ba, where there was slightly more grassland than forest.

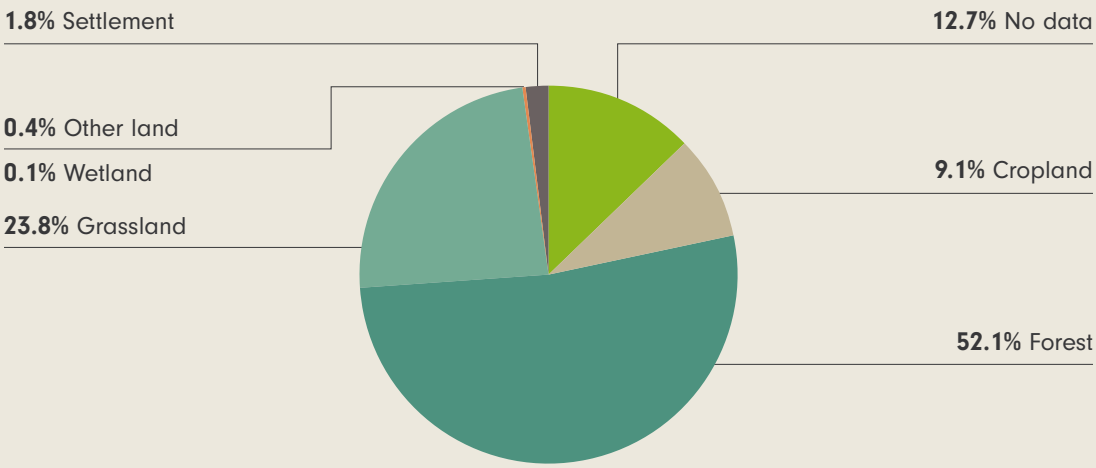
Most trees outside forests were in grasslands (50%), croplands (38%) and settlements (10%); generally, sample plots featured 1–10 trees.

The main drivers of land degradation in Fiji were erosion due to deforestation and the conversion of mangrove swamps, and agricultural encroachment.

There was a net loss of forest cover in the period 2001–2015, with forests converted mainly to grasslands (predominantly in Ba and Macuata) and croplands (predominantly in Cakaudrove). The main drivers of land degradation in Fiji were erosion due to deforestation and the conversion of mangrove swamps, and agricultural encroachment.

The "disturbances" that could be identified through Collect Earth in relation to observed changes in land use were subsistence harvesting, commercial logging and agriculture. Considering the overall area of each province, these human impacts were observed in the different provinces with the following percentages: Bua, 7.6%; Ra, 4.0%; Cakaudrove, 3.7%; Tailevu, 3.6%; Ba, 2.4%; Macuata, 0.9%; Kadavu, 0.4%; and Lau 0.4%.

FIGURE 16. Land use in the intervention area, Fiji



SOCIO-ECONOMIC FEATURES

This section was prepared based on socio-economic baseline assessments in the Greater Delaikoro Protected Area on Vanua Levu and the Greater Tomaniivi Protected Area on Viti Levu as part of the Forestry and Protected Area Management Project, a component of the Global Environment Facility–Pacific Alliance for Sustainability Programme.

Human capital

The average number of people in households in the Greater Delaikoro and Tomaniivi protected areas was five; most households had 4–6 members. The population was relatively young, with 5–14-year-olds constituting the largest age cohort; the median age was 25. Women comprised 46% and 49%, respectively, of the populations of Delaikoro and Tomaniivi. About half of all household heads had received a formal education up to primary-school level; 9% had received no formal education.

99%
of survey respondents in Delaikoro said they needed training to improve the protection of natural resources

Ninety-nine percent of survey respondents in Delaikoro said they needed training to improve the protection of natural resources in the Greater Delaikoro Protected Area. The most frequently cited capacity-development need was to increase awareness about forest uses and sustainable agricultural practices. Other cited training needs included improving resource management (such as farming methods, beekeeping, livestock management and craft-making); alternative income-generating activities; and fuel-saving technologies.

Social capital

Traditional values and cultures still prevail in the intervention area. Fiji has both an introduced land-tenure system and customary ownership. In the latter, land is owned collectively within *mataqali* (clans or landowning units); the *mataqali* system predominates in both Cakaudrove and Macuata.

Seventy-five percent of survey respondents in Delaikoro reported that they had full authority to develop and manage forests through the *mataqali* tribal council, thus indicating the importance of social organization in addressing land tenure.

Similarly, in Tomaniivi, the land owned by the different communities of the area is divided into *mataqali* native landowning units. For example, in *Tikina Nabobuco,* one of the three *tikinas* (districts) in the Tomaniivi area, 24 *mataqali* are registered, collectively owning a total area of 10 082 ha.

Natural capital

Crops and livestock play important roles in the livelihoods of communities in Delaikoro. Ninety-one percent of surveyed households stated that they ate food grown by household members, including rourou, dalo, cassava and bele. Other important resources cited were fuelwood from trees, wild pigs, and fresh water. These resources were harvested mainly in the Greater Delaikoro Protected Area.

93%
in the intervention area reported using the Greater Delaikoro Protected Area to obtain forest products

Most households (93%) in the intervention area reported using the Greater Delaikoro Protected Area to obtain forest products. Most timber used for construction was cut from trees in the region. Other uses of forest products mentioned by respondents were herbal medicines, wood for carving, fence posts, thatching reed and fuelwood; forests were also cleared for farming. Food was gathered in forests in the vicinity of villages, such as ferns (*Diplazium esculentum*, or ota), Tahitian chestnut (*Inocarpus fagifer*, or ivi) and wild yams (*Dioscorea* spp.).

74%
of surveyed households indicated that their water supply sometimes ran dry

Seventy-four percent of surveyed households indicated that their water supply sometimes ran dry, suggesting an occasional lack of water. In such cases, households relied on water from nearby creeks.

Physical capital

Water catchment infrastructure (e.g. small weirs and dams) was present in all villages in both areas, although water use was not monitored.

Financial capital

In the Greater Delaikoro Protected Area, the main source of income for 44% of surveyed households was the sale of yaqona (*Piper methysticum*), a plant used for its roots in the preparation of a traditional drink. The cultivation of cash crops was the main source of income for 14% of surveyed households, and formal employment in urban centres was the main source of income for 12%. Other income sources included sales of vegetables and of NTFPs such as boars, ferns and freshwater fish. The average monthly income was USD 719, with yaqona the most profitable crop, followed by other cash crops.

44%
of surveyed households in the Greater Delaikoro Protected Area, indicated the main source of income for was the sale of yaqona

Farming was the main source of income in Tomaniivi; only 2% of households indicated that formal employment provided their primary income. Other sources of income included small businesses such as canteens, and rent from land leased for various uses, such as logging.

3.3

ACTION AGAINST DESERTIFICATION
THE CARRIBBEAN

HAITI

FIGURE 17. Land use in the intervention area, Haiti (as defined by the Haitian Centre for Geospatial Information)*

The AAD intervention area in Haiti comprises areas in the Bonbon and Abricots communes in Grand'Anse Department (Figure 17). The climate is tropical, with rainy seasons in April–June and October–November. Hurricanes occur from June to November: Grand'Anse was severely affected by Hurricane Matthew, which destroyed 80% of buildings in the department in October 2016. The intervention area is characterized by two agroecological zones: a low-altitude zone (up to 200 m above sea level), including coastal plains, with average annual rainfall of 800–1 300 mm; and a more humid, higher-altitude zone (200–800 m above sea level), with average annual rainfall of 1 300–1 800 mm and an average temperature of 25–30 °C. Because of its rugged topography (with slopes up to 60%), and alarming rates of deforestation, the region is highly prone to soil erosion, landslides and floods.

Intervention area

Communes of Bonbon and Abricots in the Department of Grand'Anse

Area

13 734 hectares (total area of the two communes)

Population in the AAD intervention area

44 173 inhabitants (the two communes combined)

46.9% are women

Main land uses

91,6% medium-dense agroforestry

3.09% scattered cultivated land

2.80% continuous cultivated land

2.49% dense agroforestry

Main sources of livelihood

69% agriculture (of households)

22% livestock

3.1% mixed farming

1.4% trade

* These land use categories have been defined by the Haitian Centre for Geospatial Information (CNIGS) and are described in Morales Dolores et al. (2015).

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BIOPHYSICAL FEATURES

94%
of the land use in the intervention area in Bonbon and the Abricots was constituted Medium-dense agroforestry and dense systems

Medium-dense agroforestry and dense systems constituted about 94% of the land use in the intervention area in Bonbon and the Abricots in 2015 (the nominal baseline year); continuous and scattered cultivated land comprised about 6% of the land use (Figure 18). The terrain comprises coastal plains, plateaus, mountains and valleys in Desormau (in the Bonbon commune) and semihumid plateaus and mountains in Anse du Clerc (in the Abricots commune). Slopes in the intervention area are mainly in the range of 12–60%, although the area of slopes greater than 60% is also significant.

The main water resources in the area are the Anse du Clerc and Bonbon rivers, which flow into the Caribbean Sea. There are also many smaller creeks and rivers (some of which flow continuously), as well as springs, especially at low and medium altitudes.

In the Bonbon commune, dense agroforestry systems comprised 72.6% of the area in 1998, but this had dropped to 3.8% in 2015; thus, Bonbon lost 95% of its dense agroforestry in 17 years. Moderately dense polyculture systems replaced the dense agroforestry systems, while savannahs[5] (which occupied 22.2% in 1998) were completely converted to moderately dense agroforestry systems.[6] Similarly, dense agricultural crops were partially replaced by medium-dense crops.[7]

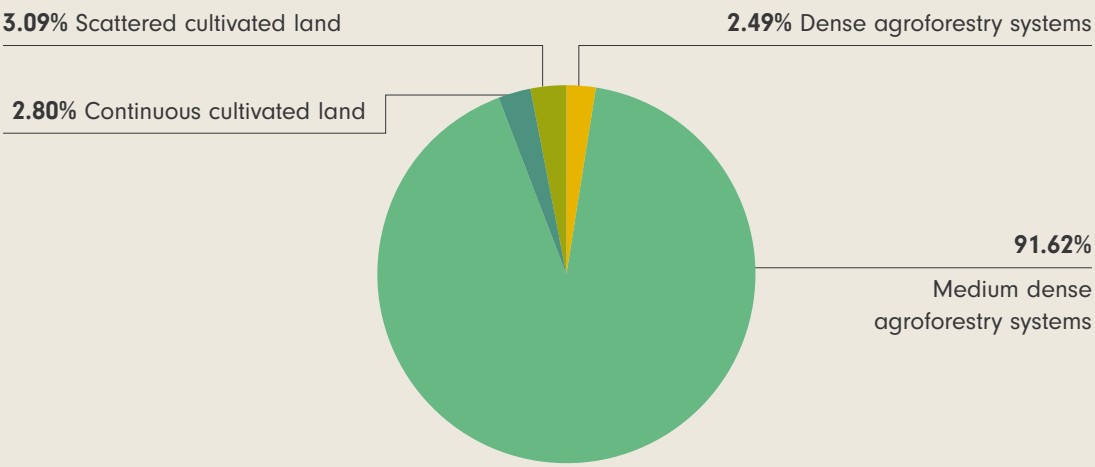
A similar trend occurred in the Abricots commune, where moderately dense systems replaced dense agroforestry and crop systems. This was due to the replacement of sugarcane with moderately dense agricultural crops such as banana, beans, yams and cassava. Cultivation and wood collection for charcoal-making were common, even on steep slopes, putting the area at risk of severe erosion.

5 Savannahs are natural areas with a predominance of natural shrub vegetation.

[6] In dense agroforestry systems, tree crops (usually fruit trees) occupy at least 75% of the land area; this percentage drops to 40–75% for medium-dense agroforestry systems.

[7] In dense crop systems, non-tree crops occupy at least 75% of the land area, compared with 40–75% for medium-dense crop systems.

FIGURE 18. Land use in the intervention area, Haiti



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SOCIO-ECONOMIC FEATURES

Human capital

More than 60% of surveyed households indicated that they were managed jointly by men and women. More than one-third (36.5%) of respondents were illiterate; only 12% of households reported that their children aged 7–18 attended school regularly. Most respondents said they had never received any sort of technical training. All indicated that they would like to take part in technical training, especially seed production, agricultural techniques, grafting, agroforestry and soil conservation. In addition, all survey respondents said there was a need to increase the availability of technical extension officers to provide training and technical assistance.

85%
of survey respondents were food-insecure

The majority (more than 85%) of survey respondents were food-insecure, indicating that they could not eat according to food and nutritional rules. Nearly 90% of respondents reported that they had experienced anxiety and uncertainty about their food supply in the four weeks preceding the survey, and 82.9% said they had needed to reduce their daily rations due to a lack of money or other resources. Overall, people living in the study area spent more than 50% of their income on food.

Survey respondents reported that the main strategies they used for dealing with food shortages were: buying food on credit (58% of households); the sale of livestock (51%); decreasing the quantity of food consumed per meal (34%); the manufacture of charcoal (30%); the harvest and sale of charcoal (14%); gardening (16%); small jobs (14%); loans (13%); cash inflow from external resources (10%); borrowing food from neighbours (5%); and fishing (5%).

Social capital

Each commune had dozens of local organizations (e.g. women's organizations, planters and fishers), but most lacked legal recognition. Lacking legal status and internal rules, such organizations were structurally weak, and the level of participation was moderate. Fewer than half of survey respondents in the two communes indicated that they were members of a local organization and, of those who were, most were men. Only a few women were members of groups of any kind, and a small percentage was involved in women's organizations, even though such organizations existed in both communes. Young people showed a low level of interest in joining organized groups. Overall, therefore, the role of women and youth in decision-making in local organizations was almost insignificant; traditionally, older men make most community decisions. Given the low level of participation in local groups, the amount of community work performed was low. Nevertheless, some active traditional groups undertook collective agricultural work to generate income; they were based on the principles of solidarity and were important for creating tight social bonds.

About 70% of households reported that they provided free labour to other members of their communities when needed.

Non-governmental organizations had a very limited presence in the two communes. The Bonbon commune and Anse du Clerc in Abricots were particularly isolated because of their topography and the lack of proper roads. Survey respondents in those two communities expressed a sense that national authorities had abandoned them.

Natural capital

In Bonbon and Abricots, the most widespread type of degradation was soil erosion caused by water runoff. In addition to the steep landscape and heavy rainfall events (in the rainy season), causes of water erosion included improper soil cultivation practices, poor soil conservation measures, deforestation, and the reduction of natural vegetation cover exposing bare soils. Deforestation was widespread and attributable to charcoal and timber production, fuelwood collection, and the clearing of forests for crops.

In Bonbon and Abricots, the most widespread type of degradation was soil erosion caused by water runoff

More than 90% of surveyed households indicated a perception that average temperatures had increased in recent years, the frequency of cyclones had increased, and the frequency and intensity of rain had decreased, meaning longer drought periods and changed seasonal cycles. Respondents reported that water sources and river flows had declined as well, with some completely drying up. These phenomena affected livestock and agricultural production, the environment, and households – 15% of survey respondents indicated that they had no access to natural water points. Many respondents also reported noticing the disappearance of certain species of plants and animals.

90%

of surveyed households indicated a perception that average temperatures had increased in recent years, the frequency of cyclones had increased, and the frequency and intensity of rain had decreased, meaning longer drought periods and changed seasonal cycles

Both communes produced a broad diversity of agricultural products, and fruit trees included citrus, avocado, apricot, mango, breadfruit (called “arbre veritable” in Haiti) and coconut. Eighty-nine percent of surveyed households reported consuming the fruits and leaves of trees, and half of respondents indicated they used tree roots. Given that self-consumption was the main objective of land use, this diversity was essential for ensuring a high-quality diet.

Eighty-five percent of households were landowners. Women had access to land through inheritance or by using their husband’s land. Buying land was impossible for most women, however, due to a lack of financial resources. Women and youth lacked land-related decision-making power and control.

The main uses of trees reported by respondents were cooking, charcoal-making, timber and construction material. Trees were also used for crafts, fodder, organic fertilizers, shading for coffee and cocoa, and traditional medicine. The excessive use of trees for charcoal and construction materials increased land degradation and soil erosion.

Physical capital

For the vast majority of households, fuelwood and charcoal were the main sources of energy for cooking.

Access to drinkable water was a challenge for people in both areas. Only 13% of households had access to running water, and 40% had access to tapped springs, which were in poor condition. Many people were only able to collect water from contaminated water points.

There were three markets in Bonbon and two in Anse du Clerc. Even though these markets had very poor infrastructure, they were essential for the livelihoods of local communities because they were one of only a few platforms where they could engage in trade.

Financial capital

In both communes, agriculture ranked first as the primary means of livelihood (69%), followed by livestock breeding (of cattle, goats, pigs and poultry) (22%), fishing (3%) and trade (1%). Agriculture and livestock were strongly threatened by land degradation and a lack of technical supervision, however, as well as by a lack of means of production and tools. Various crops were grown on single plots of land to minimize risks linked to climatic variability and to maximize productivity. Livestock breeding was an important source of financial capital for households, but the number of head of livestock per household had decreased due to disease.

For most survey respondents, crop yields were insufficient to cover production costs. Eighty-three percent of respondents indicated that their income had decreased in the two years preceding the survey, and they lacked any financial capital.

83%
of respondents indicated that their income had decreased in the two years preceding the survey

Financial institutions offering credit services were absent in both communes. The nearest institutions providing credit services were in Jérémie (the capital city of Grand'Anse Department), although the requirements for obtaining loans there were not well suited to investments in small-scale agriculture.

4.

This report provides an overview of the diverse socio-economic situations and environmental conditions that prevailed in 2015 in the eight countries involved in the AAD project in Africa, the Caribbean and the Pacific. It provides essential documentation of the situation before the interventions and will enable the measurement of the project's impacts and achievements. Collect Earth has proved its usefulness as an innovative tool for monitoring restoration interventions.

CONCLUDING REMARKS

The socio-economic surveys show that households in all intervention areas perceived many changes in the 5–10 years preceding the surveys, including changes in rainfall patterns and intensity, increases in average temperature, and the drying up of natural water points.

According to the surveys, a significant proportion of households had observed medium-to-severe signs of land degradation, such as reduced agricultural productivity. Many households in all surveyed areas reported a reduction in vegetation cover, and this was corroborated by the biophysical surveys.

According to the 2016 global drylands assessment carried out by FAO and partners under the AAD project (FAO, 2016), Africa's Great Green Wall encompasses a core area of 780 million ha (more than twice the size of India) and 232 million people. Of the total core area, 166 million ha are in need of restoration. This means that more than 10 million ha must be restored per year to achieve land degradation neutrality (Sustainable Development Goal 15.3[8]) by 2030.

The present study drew on the same methodology to further assess restoration opportunities at the national and subnational levels in the six countries in Africa; could not be established for the Caribbean and the Pacific due to data deficiency. In these six Great Green Wall countries, the AAD project intervention area was analysed to include 14 million ha of degraded lands, which makes 56% of total project administrative area (25 million ha). The total area addressed by the AAD project hosts a population of more than 1.76 million people.

Large-scale restoration undertaken as part of the AAD project has been contributing to global restoration needs since 2015. It is expected that, by the time the project concludes in 2019, it will have resulted in the planting of more than 35 000 ha of degraded land in the eight countries to initiate restoration, benefiting over 500 000 small-scale farmers – although this will represent only 0.25% of the total restoration needed in the six African countries.

The AAD project's land restoration method can play a key role in fighting against desertification and land degradation, combating the effects of climate change, and addressing food insecurity and poverty. Moreover, the AAD project's innovative monitoring system using geo-references (polygons) and remote sensing imagery enables the continuous, systematic observation of all lands under restoration in the intervention area. For the first time, it is possible to measure the exact contributions of land restoration to achieving land-degradation-neutrality targets.

[8] Sustainable Development Goal 15.3: "By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world".

The major challenge for the AAD project is to become a viable solution to the challenges of large-scale restoration in response to land degradation, desertification and climate change.

The major challenge for the AAD project is to become a viable solution – with replicable and scalable standard operational procedures – to the challenges of large-scale restoration in response to land degradation, desertification and climate change. This requires a good project exit strategy and sustained awareness-raising at all levels, targeting multiple constituencies. The AAD project represents a substantial state-of-the-art technical model. It will need to be replicated on a massive scale to respond to the huge and increasing demand for forest landscape restoration, such as that embodied in the African Forest Landscape Restoration Initiative and the Bonn Challenge.

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