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# Intensification of Agriculture and Agroforestry Technologies (IAAT) for Climate Resilient Food and Nutrition Security: Tombouctou, Gao, Mopti, Koulikoro and Segou Regions of Mali

## Annex 16: Maps of Proposed Location for Interventions

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# 1. Determining community vulnerability to climate change

## Introduction and definitions

At the national level, Mali has high exposure to climate hazards and is ill-equipped to adapt to climate change. Mali is ranked the 11th most vulnerable country and the 23th least ready country to the impacts of climate change, out of 192 countries according to the ND-GAIN ranking.<sup>1</sup> With erratic rainfall (which is largely associated with floods and droughts), and mean temperatures which have increased by 0.7°C since the 1960s to ~28°C (associated with droughts and hotter days and nights and extreme heatwaves), Mali's climatic conditions negatively impact the country's agricultural suitability and productivity and ultimately contribute to increasing food insecurity.<sup>2</sup> This vulnerability is compounded by Mali's socio-economic context: just under half of the population live below the national poverty line,<sup>3</sup> and 75% of the population depends on agriculture (of which the majority is subsistence farming).<sup>4</sup>

Climate vulnerability, as defined by the IPCC, is a function of three components: exposure, sensitivity and adaptive capacity.<sup>5</sup> The risk **exposure** indicates how much a household or community is at risk from climate change, measuring exposure to both *climate trends* e.g. precipitation or temperature changes, and *climate events* e.g. floods. The **sensitivity** component refers to the degree to which a household or community is affected by changing climate. The **adaptive capacity** refers to the ability of a household or community to cope with and recover from the effects of climate change, this is typically linked to socio-economic factors.<sup>6</sup> Exposure and sensitivity both increase community or household vulnerability to climate change, whereas adaptive capacity protects against vulnerability to climate change.

IAAT will target the most climate-vulnerable communities within Mali to build the resilience of 460,965 direct beneficiaries. To achieve this, a vulnerability assessment was conducted to assess vulnerability at the circle level<sup>56</sup> for the five regions within the scope of the project (Gao, Koulikoro, Mopti, Segou, and Tombouctou<sup>7</sup>). This follows a semi-quantitative method that is guided by the IPCC structured framework and draws on available published data for climate and non-climate hazards.

## Assessment framework and indicators used.

Guided by the IPCC vulnerability framework, the three components (exposure, sensitivity, and adaptive capacity) are determined from a set of sub-indicators. The indicators selected are consistent with those of other vulnerability assessments but are tailored to the local context.<sup>8</sup>

- **The exposure component** assesses the circle's exposure to climatic trends and hazards that have been defined as significant threats in Mali. It is therefore a function of indicators that measure the severity and frequency of occurrence of specific hazards namely water scarcity (which includes precipitation decrease and drought occurrence), floods, extreme heat, and wildfires. The assessment includes both current and future exposure.<sup>8</sup>
- **The sensitivity component** aims to quantify how reliant that circle is on agriculture, acknowledging that agriculture, and therefore communities that depend on it, is highly affected by changing climate conditions. In addition, it identifies key metrics that serve as proxies to identify heightened strain on the agricultural system (as well as infrastructure system and other

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<sup>1</sup> NDC Gain index. 2021. Available here

<sup>2</sup> World Bank, (2023), Climate Knowledge Portal Mali profile. Available [here](#)

<sup>3</sup> <https://data.worldbank.org/indicator/SI.POV.NAHC?locations=ML>

<sup>4</sup> CGIAR, Solar Irrigation to counter climate-vulnerability and improve food security in Mali. Available [here](#)

<sup>5</sup> Mali is divided into regions, then circles, then communes, then villages. Please see the Mali context chapter for a full explanation of the administrative levels within Mali.

<sup>6</sup> There have been changes to the administrative boundaries in Mali. Due to availability of data, this analysis follows historic boundaries, acknowledging that some of the circles may have changed categorization.

<sup>7</sup> The five regions were selected in the GCF approved IAAT concept note.

<sup>8</sup> The exposure indicators have all been taken directly from the World Bank's Think Hazard portal available [here](#). It assesses current and projected exposure to hazards and categorizes 'High', 'Medium', 'Low' and 'Very Low'.

services). This includes population density and levels of displacement, with the logic flowing that a high number of internally displaced persons (IDPs) and/or high population density would add additional strain onto resources.

- **The adaptive capacity component** assesses how well equipped the circle is at dealing with climate stress. This is made up of socio-economic indicators including poverty levels, unemployment, and female illiteracy which constrain adaptive capacity.

For further information on the selected indicators that make up these components, please see Table 1 which includes the full list included in the analysis, grouped by category. This table includes the indicator name, the short description, the source, the data granularity (region, circle)<sup>9</sup>, the year of publication, and the data treatment which explains any analysis that has been performed, and how the data has been categorised into 'High', 'Medium' or 'Low' for this analysis. Different forms of data treatment have been applied to different indicators depending on the type of data available but broadly the data has been translated raw data into High, Medium and Low based on the distribution of scores.

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<sup>9</sup> Please note that there are data availability constraints impacting several indicators. The most up to date and most granular datasets available for all indicators have been included.

Table 1: Climate vulnerability indicator information

Indicator category	Indicator name	Description	Source	Data granularity	Year	Details on data and treatment applied
<b>Exposure</b>						
Exposure	Water scarcity	Projected vulnerability to water scarcity and droughts.	ThinkHazard (World Bank) <sup>10</sup>	Circle	2023	Raw High, Medium and Low categorization taken directly from ThinkHazard analysis aggregates multiple data sources and provides a 'High', 'Medium', 'Low', and 'Very Low' ranking. There were no instances of 'Very Low' for this indicator in Mali and so this has been excluded from the categorization. The categorization refers to how frequently droughts are likely to occur. High = every 5 years. Medium = up to a 20% chance in the coming 10 years. Low = 1% chance in the coming 10 years.
Exposure	Extreme heat vulnerability	Projected vulnerability to extreme heat.	ThinkHazard (World Bank) <sup>11</sup>	Circle	2023	Raw High, Medium and Low categorization taken directly from ThinkHazard analysis. There were no instances of 'Very Low' and so this has been excluded from the categorization. The categorization refers to how frequently prolonged exposure to extreme heat, resulting in heat stress, is expected to occur. High = at least once in the next five years. Medium = >25% chance at least one period in the next five years. Low = 5% - 25% chance in the next five years.
Exposure	Wildfire vulnerability	Projected vulnerability to wildfires.	ThinkHazard (World Bank) <sup>12</sup>	Circle	2023	Raw High, Medium and Low categorization taken directly from ThinkHazard analysis. There were no instances of 'Very Low' and so this has been excluded from the categorization. The categorization refers to how likely it is to encounter weather that could support a significant wildfire that is likely to result in both life and property loss in any given year. High = >50% chance. Medium = 10%-50% chance. Low = 4%-10% chance.
Exposure	River flood vulnerability	Projected vulnerability to river floods.	ThinkHazard (World Bank) <sup>13</sup>	Circle	2023	Raw High, Medium and Low categorization taken directly from ThinkHazard analysis. There were no instances of 'Very Low' and so this has been excluded from the categorization. The categorization refers to how likely "damaging and life-threatening river floods" are expected to occur. High = at least once in the next 10 years. Medium = at least once in the next 50 years. Low = at least once in the next 10000 years.
<b>Sensitivity</b>						

<sup>10</sup> World Bank's Think Hazard portal available [here](#)

<sup>11</sup> World Bank's Think Hazard portal available [here](#)

<sup>12</sup> World Bank's Think Hazard portal available [here](#)

<sup>13</sup> World Bank's Think Hazard portal available [here](#)

Indicator category	Indicator name	Description	Source	Data granularity	Year	Details on data and treatment applied
Sensitivity	% grassland lost	Percentage of forest land lost from 2004 to 2019 per region.	OECD Land cover in countries and regions <sup>14</sup>	Region	2021	<p>Raw percentage of grassland lost categorized into High Medium and Low based on distribution of scores.</p> <p>A high % of grass land loss is associated with higher sensitivity to climate change, as it indicates a decreasing trend in available natural resources. In addition, it indicates areas suitable for climate change mitigation, as it identifies areas where land use emissions have been increasing.</p>
Sensitivity	% cropland lost	Percentage of crop land lost from 2004 to 2019 per region.	OECD Land cover in countries and regions <sup>15</sup>	Region	2021	<p>Raw percentage of grassland lost categorized into High Medium and Low based on distribution of scores.</p> <p>A high % of crop land loss is associated with higher sensitivity to climate change, as it indicates a decreasing trend in available natural resources. In addition, it indicates areas suitable for climate change mitigation, as it identifies areas where land use emissions have been increasing.</p>
Sensitivity	Grassland and cropland area	Area of grassland and cropland added together per circle (thousand km squared).	OECD Land cover in countries and regions <sup>16</sup>	Circle	2019	<p>Raw area of grassland and cropland added together, categorized into High, Medium, and Low based on distribution of scores.</p> <p>These metrics have been combined as there is a higher presence of grassland in the North, where agricultural activities are dominated by animal husbandry, whereas cultivation activities dominate in areas where there is more cropland. Combining them together provides an indication on the amount of agricultural land in the circle.</p>
Sensitivity	Prominence of agriculture	Percentage of households who cultivate cereals and/ or rear livestock.	Institut National de la Statistique du Mali (General Census of Population and Housing) <sup>17</sup>	Circle	2021	<p>Established % of local population that cultivate cereals and/ or practice livestock rearing by dividing total number of households that cultivate cereals by population of the circle. Assumption taken here that the ratio of households to population is the same in different circles.</p> <p>Percentage categorized into High, Medium, and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.</p>

<sup>14</sup> OECD (2021) Land cover in countries and regions available [here](#)

<sup>15</sup> OECD (2021) Land cover in countries and regions available [here](#)

<sup>16</sup> OECD (2019) Land cover in countries and regions available [here](#)

<sup>17</sup> [https://www.instat-mali.org/storage/135/rapport-module-rga-rgph5\\_rap.pdf](https://www.instat-mali.org/storage/135/rapport-module-rga-rgph5_rap.pdf)

Indicator category	Indicator name	Description	Source	Data granularity	Year	Details on data and treatment applied
Sensitivity	Volume of production (SDG 2.3.1)	Estimates of volume of agricultural production (Mt)	Food and Agriculture Organization (FAO) of the United Nations - Disaggregating SDG indicators at subnational level in Mali <sup>18</sup>	Circle	2023	Initial data is based on FAO Small Area Estimates on SGD 2.3.1 in Mali. Data is further categorized their volumes into High, Medium and Low. High is categorized as volume of production >3750, Medium 2250-3750, and Low <2250 following their groupings.  To estimate SDG 2.3.1 the FAO produced small area estimates (using the Fay-Herriot statistical approach) incorporating the covariates: levels of agricultural production (cotton, wheat, rice, sorghum) and soil health.
Sensitivity	Population density	Number of people per square km	ODHD, UNDP and UNICEF, (Pauvreté multidimensionnelle Pauvreté des 703 communes du Mali, édition 2022	Circle	2022	Established number of people dividing population of the circle <sup>19</sup> by the surface of the circle <sup>20</sup> .
Sensitivity	Displacement	Internally Displaced People as a percentage of population	RSU (Matrice de suivi des déplacés) <sup>21</sup>	Circle	2022	Established Internally Displaced People as a % of local population by dividing total number of IDPs by population of the circle <sup>22</sup> .  Percentage categorised into High, Medium, and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.
<b>Adaptive capacity</b>						
Adaptive capacity	Poverty Rate	Percentage of poor and very poor communes.	ODHD, UNDP and UNICEF, (Pauvreté multidimensionnelle Pauvreté des 703 communes du Mali, édition 2022 <sup>23</sup>	Circle	2022	Established % of poor and very poor communes out of total number of communes in the circle. Translated this % into High, Medium and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.
Adaptive capacity	Youth unemployment	Percentage of young people (18-35)	Afrobarometer (Unemployment report) <sup>24</sup>	Region	2020	Raw data of % young people (18-35) neither working not at school as a proxy for youth unemployment.

<sup>18</sup> <https://www.fao.org/3/cc3944en/cc3944en.pdf>

<sup>19</sup> OCHA (2022), Mali population estimates. Available [here](#).

<sup>20</sup> <http://odhd-mali.org/uploads/a24eb9082a74ac82ea55dfa1963164130df77baf.pdf>

<sup>21</sup> <https://rsu.gouv.ml/portail/download/matrice-de-suivi-des-deplacés-aout-2022/>

<sup>22</sup> OCHA (2022), Mali population estimates. Available [here](#).

<sup>23</sup> <http://odhd-mali.org/uploads/a24eb9082a74ac82ea55dfa1963164130df77baf.pdf>

<sup>24</sup> [https://www.afrobarometer.org/wp-content/uploads/2022/02/ad414-le\\_chomage\\_au\\_mali\\_phenomene\\_urbain\\_jeune\\_et\\_eduque-depeche\\_afrobarometer-21dec20\\_0.pdf](https://www.afrobarometer.org/wp-content/uploads/2022/02/ad414-le_chomage_au_mali_phenomene_urbain_jeune_et_eduque-depeche_afrobarometer-21dec20_0.pdf)



Indicator category	Indicator name	Description	Source	Data granularity	Year	Details on data and treatment applied
		neither working nor at school (2020).				Raw data categorised into High, Medium, and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.
Adaptive capacity	General unemployment	Percentage of people with no fixed income (2020)	Afrobarometer (Unemployment report) <sup>25</sup>	Region	2020	Raw data of % people with no fixed income as a proxy for general job insecurity. Raw data categorised into High, Medium, and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.
Adaptive capacity	Female Illiteracy	Sex disaggregated illiteracy rate	Institut National de la Statistique du Mali (Enquete modulaire et permanente aupres des menages EMOP) <sup>26</sup>	Region	2022	Raw literacy rate of girls and women aged 15 and over by region. Percentage categorised into High, Medium and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.
Adaptive capacity	Educational attainment	Level of schooling attained by region (inverse)	Institut National de la Statistique du Mali (Enquete modulaire et permanente aupres des menages EMOP) <sup>27</sup>	Region	2022	Raw net school enrolment rate in 'Fondamental 1' by region as a percentage. Calculated 100%-answer to ensure that a low degree of schooling, corresponds to high vulnerability score. Percentage categorised into High, Medium and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.
Adaptive capacity	Health - child stunting	Percentage of children under five who are stunted	Institut National de la Statistique du Mali (2018 Demographic and Health Survey) <sup>28</sup>	Region	2018	Raw percentage score of children under five who were stunted as a signifier of health by region. Percentage categorised into High, Medium and Low based on distribution of scores with the top third as High, middle third as Medium and bottom third as Low.
Adaptive capacity	Food insecurity	Percentage of population above IPC phase 3	IPC Mapping Tool (Acute food insecurity) <sup>29</sup>	Circle	2023	Took the categorisation of the IPC's food insecurity projections for June-August 2023. The IPC categorisation has five levels minimal, stressed, crisis, emergency, and famine. There are no circles in Mali projected to fall into 'famine' category, therefore translated 'minimal' to Low, 'stressed' to Medium and 'crisis' to High. There was one circle defined as 'emergency'. In this instance a special Very High categorisation has been used.

<sup>25</sup> [https://www.afrobarometer.org/wp-content/uploads/2022/02/ad414-le\\_chomage\\_au\\_mali\\_phenomene\\_urbain\\_jeune\\_et\\_eduque-depeche\\_afrobarometer-21dec20\\_0.pdf](https://www.afrobarometer.org/wp-content/uploads/2022/02/ad414-le_chomage_au_mali_phenomene_urbain_jeune_et_eduque-depeche_afrobarometer-21dec20_0.pdf)

<sup>26</sup> <https://instat-mali.org/fr/publications/enquete-modulaire-et-permanente-aupres-des-menages-emop>

<sup>27</sup> <https://instat-mali.org/fr/publications/enquete-modulaire-et-permanente-aupres-des-menages-emop>

<sup>28</sup> <https://dhsprogram.com/pubs/pdf/SR261/SR261.E.pdf>

<sup>29</sup> <https://www.ipcinfo.org/cadre-harmoniseb>

## Assessment method

To assess vulnerability based on the three components, this analysis used a series of filters to identify the circles that had the highest exposure or sensitivity, or the lowest adaptive capacity. Within each component, each circle has been scored for each indicator (High = 3, Medium = 2, Low = 1).

There is then an 'overall score' for the component which is derived from an average score across each of the indicators within the component. For exposure and sensitivity, the overall score has been used as is. For adaptive capacity, a 'high' ranking for each of the indicators e.g. female illiteracy actually serves to decrease adaptive capacity. Because of this, the average adaptive capacity score has been subtracted from 3 (max score) to result in a more intuitive scoring. The circles with lower adaptive capacity have been progressed as this causes higher vulnerability.

To filter based on the three components, this analysis has taken the scores in the top quartile (exposure and sensitivity) and bottom quartile (adaptive capacity) as the score to pass through the process of shortlisting circles.

Due to the presence of active conflict across Mali, several circles cannot be accessed or present a significant risk to implementation. Because of this, the 'climate vulnerability analysis has been supplemented with a security analysis to create a shortlist of the most climate-vulnerable circles that are also suitable for project implementation.<sup>30</sup> In summary, the process follows three steps:

- **Step 1:** Assess the list of 31 circles based on exposure. Progress the circles with scores in the top quartile.
- **Step 2:** Assess the remaining circles based on sensitivity and adaptive capacity. Progress the circles in the top quartile (sensitivity) or bottom quartile (adaptive capacity). This results in a shortlist of 16 circles that are the most vulnerable within Mali.
- **Step 3:** Filter out circles with high-security risk. This results in a shortlist of 12 circles.

## Results

The final results have identified the 12 most vulnerable circles within the five regions, where conflict risk is at an acceptable level, as seen in **Error! Reference source not found.** Table 2. Within the 12 circles, five circles overlap with the Albarka project and are indicated with an asterisk (Ansongo and Gao in the Gao region, Douentza and Koro in the Mopti region, and Gourma-Rharous in the Tombouctou region). This is beneficial in terms of conducting activities that have synergies with the IAAT project and enabling compounding benefits for end beneficiaries.

The full list of results of the assessment against each contributory indicator is available in Table 3.

*Table 2: Shortlisted circles based on vulnerability (grouped by region). \*Albarka overlap denoted with asterisk*

Region	Circle	Region	Circle
Gao	Ansongo*	Mopti	Douentza*
Gao	Gao*	Mopti	Koro*
Koulikoro	Dioila	Mopti	Tenenkou
Koulikoro	Nara	Segou	Bla
Mopti	Bankass	Segou	Segou
Mopti	Djenne	Tombouctou	Gourma-Rarhous*

<sup>30</sup> The security analysis was completed by the Save the Children Mali security expert. The analysis was completed at the circle level but will be continually assessed at the commune level for implementation.



## 2. BENEFICIARY SELECTION AND TARGETING

### Targeting beneficiaries within shortlisted circles

The beneficiaries will be selected from the 12 circles that have been prioritized based on climate vulnerability (Ansongo and Gao in the Gao region, Dioila and Nara in the Koulikoro region, Bankass, Djenne, Douentza, Koro, and Tenenkou in the Mopti region, Bla and Segou in the Segou region and Gourma-Rarhous in the Tombouctou region).

The analysis to establish the target number of beneficiaries from these activities uses population and demographic data in these regions and circles, in addition to data from previous projects in the country and region.

The total population of these 12 circles is estimated at over 4 million people<sup>31</sup>. The average population per commune in the target circles (including both rural and urban communes) is roughly 25,000 people. This is slightly under the national average commune population (consistent with the fact that the capital city of Bamako is not covered in the target regions of the project). The average population per *rural* commune in the target circles is just under 24,000. As this project will be implemented in rural communes, the population averages follow this estimate.

This project will aim to work in four communes per circle<sup>32</sup>, resulting in 48 communes in scope for the IAAT project. In the circles where there are overlapping activities with the Albarka project (Ansongo and Gao in the Gao region, Douentza and Koro in the Mopti region, and Gourma-Rharous in the Tombouctou region), the three communes selected by the Albarka project, plus one additional commune will be selected. During the implementation of the project, target communes will be selected in each circle based on consultations with circle and regional administrations. The consultations will be based on the initial criteria set out in the national validation workshop, which include:

- The potential for agroforestry techniques
- Prevalence of land degradation
- Existing support (ongoing initiatives)
- The integration of climate change in the PDESC (5-year planning document)
- Security analysis from the SCI Mali security team
- Geographical relationship to other implementation locations
- Known coverage of extension services
- % of female-headed households

IAAT will work both with individual farmers, entrepreneurs, businesses and government employees to improve services e.g. extension services, as well as institutions. The specific households and services selected will also be determined during implementation, working with local leaders and agricultural groups to identify suitable people or services and acknowledging the different structures, customs and norms in different parts of the country.

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<sup>31</sup> It is widely recognized that population estimates are not accurate in Mali as the last census was performed in 2009. The data here has been taken from the OCHA official estimate from 2022 which is available [here](#).

<sup>32</sup> During the validation workshop it was raised that some circles have fewer communes than others (average of 14 communes per circle). Therefore in some circles it might be +/- 4 communes and will be defined during implementation phase.

## Direct beneficiaries (assumptions and values)

*Table 4: Aggregated Beneficiary reach of IAAT interventions*

Beneficiary Segment	Total #	Note
Total beneficiaries	460,965	Includes: Direct beneficiaries from the improvements to extension services (1.2), the direct beneficiaries from entrepreneur training (2.2) and private sector businesses guidelines (2.1)
Female beneficiaries	230,483	50% of beneficiaries from improved extension services and private sector businesses, 85% of entrepreneurs
Male beneficiaries	230,482	50% of beneficiaries from improved extension services and private sector businesses, 15% of entrepreneurs
Total beneficiaries as % total population of Mali	2.6%	

*Table 5: Beneficiary reach of IAAT interventions, by intervention*

Relevant activity	Intervention Summary	# of Beneficiaries	What other activity are these beneficiaries a sub-set of?	Assumptions
1.2.1	Farmers trained through improved extension services	460,965	N/A	40% of total estimated population of 48 implementation communes (% based on AGRA statistic of smallholder access to extension services in Mali) <sup>33</sup> 50% women and 50% male target
1.2.1	Farmers trained through improved extension services: sub-set trained through farm field schools	45,556	1.2.1: Farmers trained through improved extension services	4% of total estimated population of 48 implementation communes <sup>34</sup>
1.2.1	Farmers receiving support through new and existing Community Action Cycles	17,540	1.2.1: Farmers trained through improved extension services	Leveraging the 250 CACs established by Albarka and adding a further 627 by IAAT expansion to additional circles (1 per village). Assumes 20 members per CAC.
1.2.1	Farmers who are trained by the project and adopt at least 1 CSA technique and agroforestry	68,334	1.2.1: Farmers trained through improved extension services	The willingness of farmers to participate in project interventions new adoption rate based on USAID Albarka logframe target (+15ppts) Cross-referenced w/ CGIAR achieved rate of increased adoption in CSV village in 5-year period
2.1.1.1	Farmers connected to broader services and markets through access to online platforms	22,778	1.2.1: Farmers trained through improved extension services	All farmers taking part in extension service training will be encouraged to sign up. Adoption rate of 5% of these farmers (assumes the same % interested (15% as adopting CSA practice) but reduced by 1/3 to take into account internet availability in Mali) <sup>35</sup>
2.1.1.2	Private Sector Businesses Trained	100		Assumes 20 established private sector businesses are trained per year, in line with Albarka targets

<sup>33</sup> This follows the information from the (2021) Agra Mali Report Final - Alliance for a green revolution in Africa. Available [here](#) that 37%-40% of people access agricultural advisory extension support services

<sup>34</sup> This follows the information from the (2021) Agra Mali Report Final - Alliance for a green revolution in Africa. Available [here](#) that 4% of people can access farmer field schools

<sup>35</sup> Latest WorldBank data reports that 34% of Mal's population is using the internet, 2021, accessible [here](#)

Relevant activity	Intervention Summary	# of Beneficiaries	What other activity are these beneficiaries a sub-set of?	Assumptions
2.2.1.2	Members of new women and youth focused VSLAs	18,000	1.2.1: Farmers trained through improved extension services	Project aims to create the same density of VSLAs achieved by Albarka per commune (28) across the 33 new communes, resulting in ~900 new women and youth targeted VSLAs (split 70:30, women:youth focus, with youth having 50% male: female gender split) Each VSLA includes on average 20 people.
2.2.2	Training delivered to women and youth entrepreneurs	5,250		Sum of 3750 women entrepreneurs trained (based on Albarka achieved precedent of 750/year, for 5 years) and 1500 youth entrepreneurs trained (planned by Albarka during the 2 years of overlapping projects) Youth entrepreneurs assumed to have a 50:50 Gender split
3.1.1	Introduction of biodigester systems	35,000	1.2.1: Farmers trained through improved extension services	The beneficiary number corresponds to the number of biodigesters [5000] (identified during the feasibility study as in line with existing market size) multiplied by # of people per household (7) <sup>36</sup>
3.1.1	Introduction of solar irrigation systems (pumps)	7,000	1.2.1: Farmers trained through improved extension services	The beneficiary number corresponds to the number of solar irrigation systems [1000] (identified during the feasibility study as in line with existing market size) multiplied by # of people per household (7) <sup>37</sup>
4.1	Institutional actors trained on integrating adaptation and mitigation into planning/processes	58		1 local government representative per commune is trained (48 commune-level beneficiaries) 10 national-level representatives are trained

### Indirect beneficiaries (assumptions and values)

As well as directly benefiting people and services in the targeted communes through CSA and agroforestry curriculum tailored to the commune level (Activity 1.1.1.2), this project will also develop an updated curriculum for public extension services in the wider project regions (Gao, Mopti, Koulikoro, Segou and Tombouctou) (Activity 1.1.1.1). Additional people in the regions will benefit indirectly from these advances and therefore the number of **indirect beneficiaries will be 3,488,531**.

*Table 6: Indirect beneficiaries' calculations*

Relevant activity	Intervention type	Scale	Explanation
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<sup>36</sup> This is a conservative estimate as biodigester systems may benefit multiple households

<sup>37</sup> This is a conservative estimate as in some circumstances solar irrigation pumps may benefit multiple households.

1.1.1 (Sub activity 1.1.1.1)	Updated curriculum for public extension services and Farmer Field Schools in project regions (Gao, Mopti, Koulikoro, Segou and Tombouctou)	3,949,496 people	It is assumed that 40% of the population of the region benefits from extension services. <sup>38</sup>
Total indirect beneficiaries	3,488,943	The number of direct beneficiaries is subtracted from to total reach of extension services to avoid double counting beneficiaries.	
Male indirect beneficiaries	1,747,957		
Female indirect beneficiaries	1,740,573		
Indirect beneficiaries as % population	19%		
Female indirect beneficiaries as % population	10%		
Male indirect beneficiaries as % population	10%		

### Other Assumptions and Inputs for Key Outcome and Output Targets

The Albarka project's existing achievements and forward-looking implementation plan has guided additional scoping of the project deliverables and corresponding outputs and outcomes, featured above as well as in the project's logical framework. These datapoints have been summarized below in Table 7: Inputs from Albarka Project.

*Table 7: Inputs from Albarka Project*

Data Point Category	Description of Datapoint	Value	How this input is used in IAAT
Geographic overlap between Albarka and IAAT	# of Communes where Albarka is active	18	Relevant when scaling up Albarka activities to non-overlapping communes
	# of Communes overlapping between Albarka & IAAT	15	
	# of IAAT Communes without Albarka presence	33	
Albarka achieved results that provide inputs for IAAT targets	VSLAs: # Albarka successfully established / re-vitalized	513	Informs assumptions for activity 2.2 beneficiaries
	# of youth entrepreneurs trained per year historically and planned	750	Informs assumptions for activity 2.1 beneficiaries
	# of private sector organizations trained per year	20	Informs assumptions for activity 2.2 beneficiaries
	# of CACs established (1 for all safely accessible villages)	250	Informs assumptions for activity 1.2 deliverables

In addition, a detailed approach has been taken to estimate the area covered by agroforestry during the project.

<sup>38</sup> This follows the information from the (2021) Agra Mali Report Final - Alliance for a green revolution in Africa. Available [here](#) that 37%-40% of people access agricultural advisory extension support services.



*Table 8: Approach and assumptions for Agroforestry Adoption at the Farmer Level*

Step	Value	Assumptions
1. # of Smallholder Farmers adopting agroforestry	345,724 farmers	75% adoption of at least one agroforestry technique amongst those farmers trained in 1.2.1
2. Total existing land available for agroforestry (the land farmed by agroforestry adopting farmers)	389,501 hectares	Assumes 5.7 ha average farm size (based on IAAT field data survey of farmers) multiplied by the number of agroforestry-adopting farmers
3. Estimated land converted to Agroforestry during IAAT	128,535 hectares	Assume either 1/3 of existing land is converted to agroforestry crops, or land is expanded by 1/3 (e.g. neighboring non-cultivated state-owned lands are planted with agroforestry). It also corresponds to ~1.8 hectares of agroforestry per adopting farmer. This corresponds to ~1% of the total land in the relevant circles, but closer to 2.5% of the land in the relevant communes.

*Table 9: Grass and Crop Land within Project Circles, Source: OECD Land Use Data, 2019<sup>39</sup>*

Geographic Coverage	Grassland and cropland area	
	Sq. Km	Hectares <sup>40</sup>
Gao (project circles only)	30,842	3,084,157
Koulikoro (project circles only)	42,293	4,229,313
Mopti (project circles only)	52,467	5,246,726
Segou (project circles only)	21,385	2,138,510
Tombouctou(project circles only)	24,154	2,415,403
<b>Total across all project circles</b>	<b>171,141</b>	<b>17,114,109</b>

Note that, as outlined above in “

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<sup>39</sup> OECD Land Use Database, accessible [here](#)

<sup>40</sup> Note: 1 square kilometer is equivalent to 100 hectares



**3. Appendix: Maps of project locations and vulnerability analysis.....17**

**1. Determining community vulnerability to climate change”, the project is targeting 12 circles across the project regions.**

*Table 8: Grass and Crop Land, Mali, Source: OECD Land Use Data, 2019<sup>41</sup>*

Geographic Coverage	Grassland and cropland area	
	Sq. Km	Hectares
Gao (all circles)	44,532	4,453,150
Koulikoro (all circles)	79,709	7,970,948
Mopti (all circles)	70,799	7,079,925
Segou (all circles)	61,029	6,102,947
Tombouctou (all circles)	35,654	3,565,397
Combined across Gao, Koulikoro, Mopti, Segou and Tombouctou	291,724	29,172,368
<b>Total Across all regions of Mali</b>	<b>408,728</b>	<b>40,872,818<sup>42</sup></b>

<sup>41</sup> OECD Land Use Database, accessible [here](#)

<sup>42</sup> Note: the corresponds to ~33% of the total land in Mali, the other main categories of land use are “bare area” 55%, “shrubland” 6%, and “sparse vegetation” 4%.

### 3. APPENDIX: MAPS OF PROJECT LOCATIONS AND VULNERABILITY ANALYSIS

*Figure 1: Heatmap of Climate Exposure in Mali, by Circle*

Climate Exposure

2.0 - 2.5

2.5 - 3.0

Mali Circles

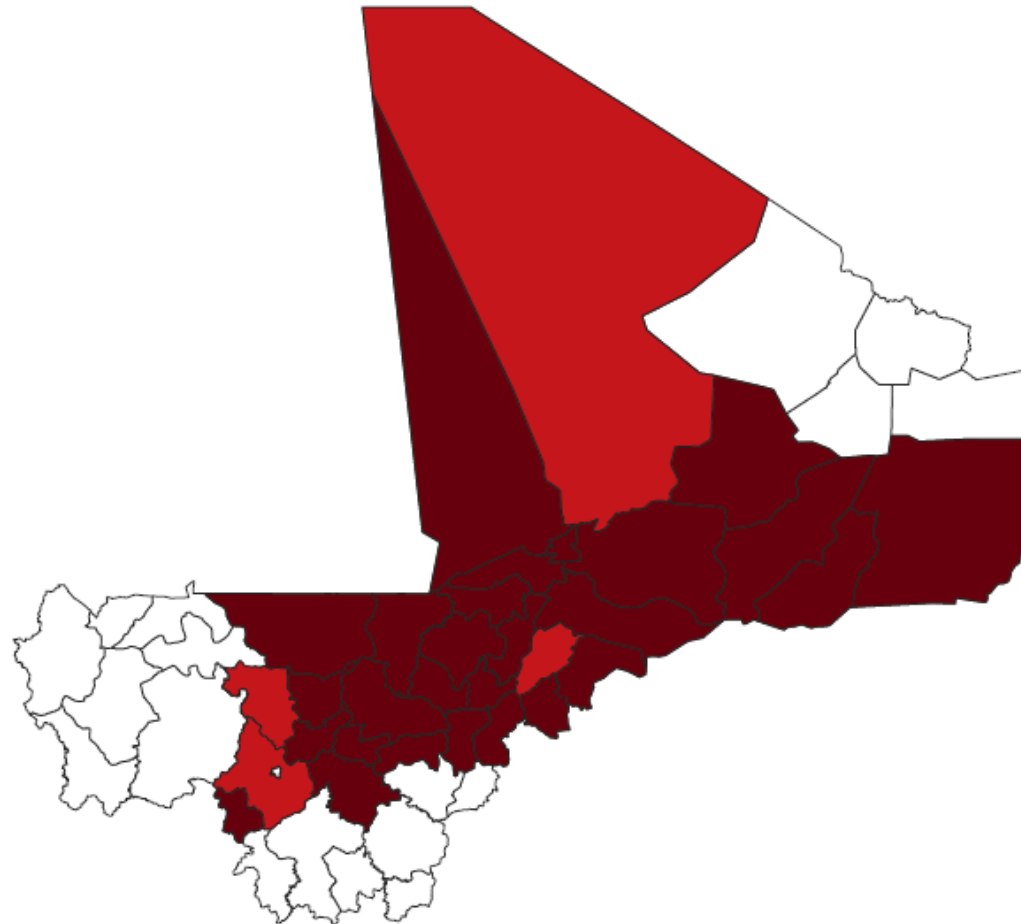


Figure 2: Heatmap of Climate Sensitivity in Mali, by Circle

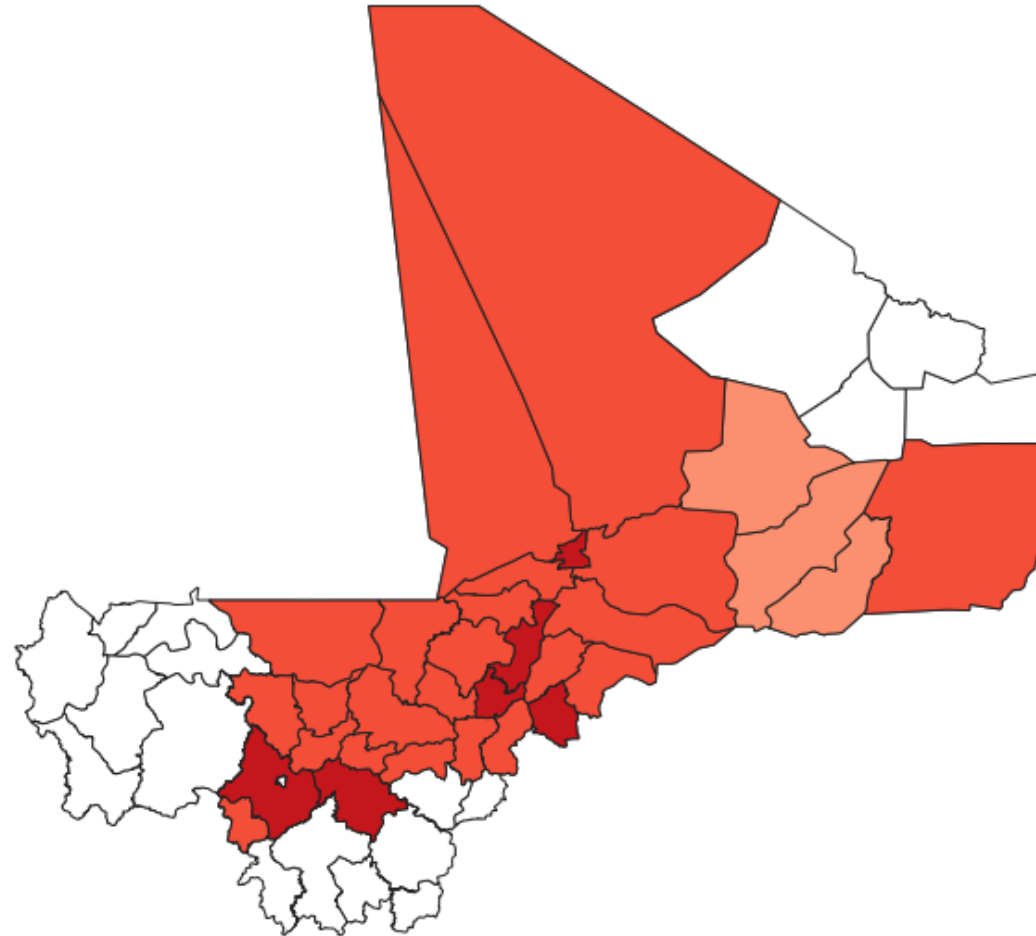


Figure 3: Heatmap of Climate Adaptive Capacity in Mali, by Circle

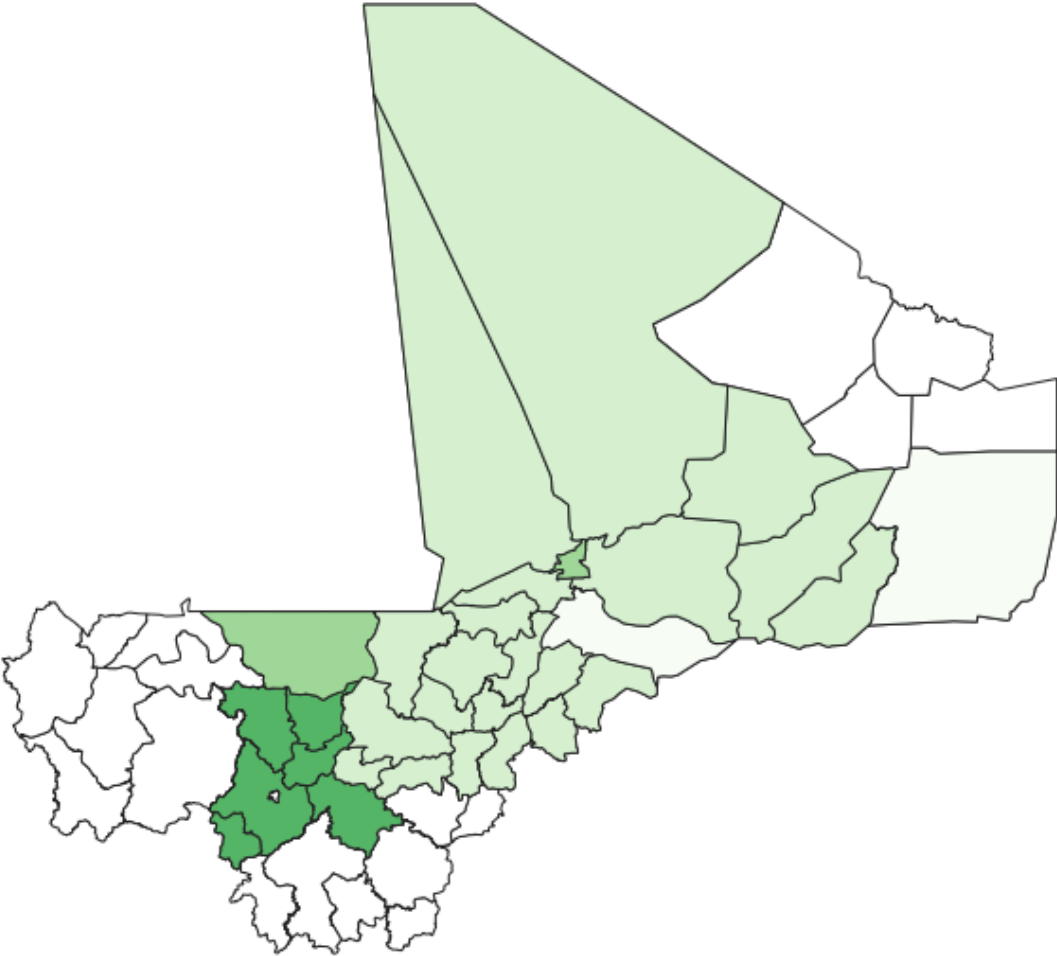
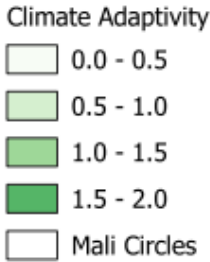


Figure 4: Map of security status within circles selected by the climate vulnerability analysis

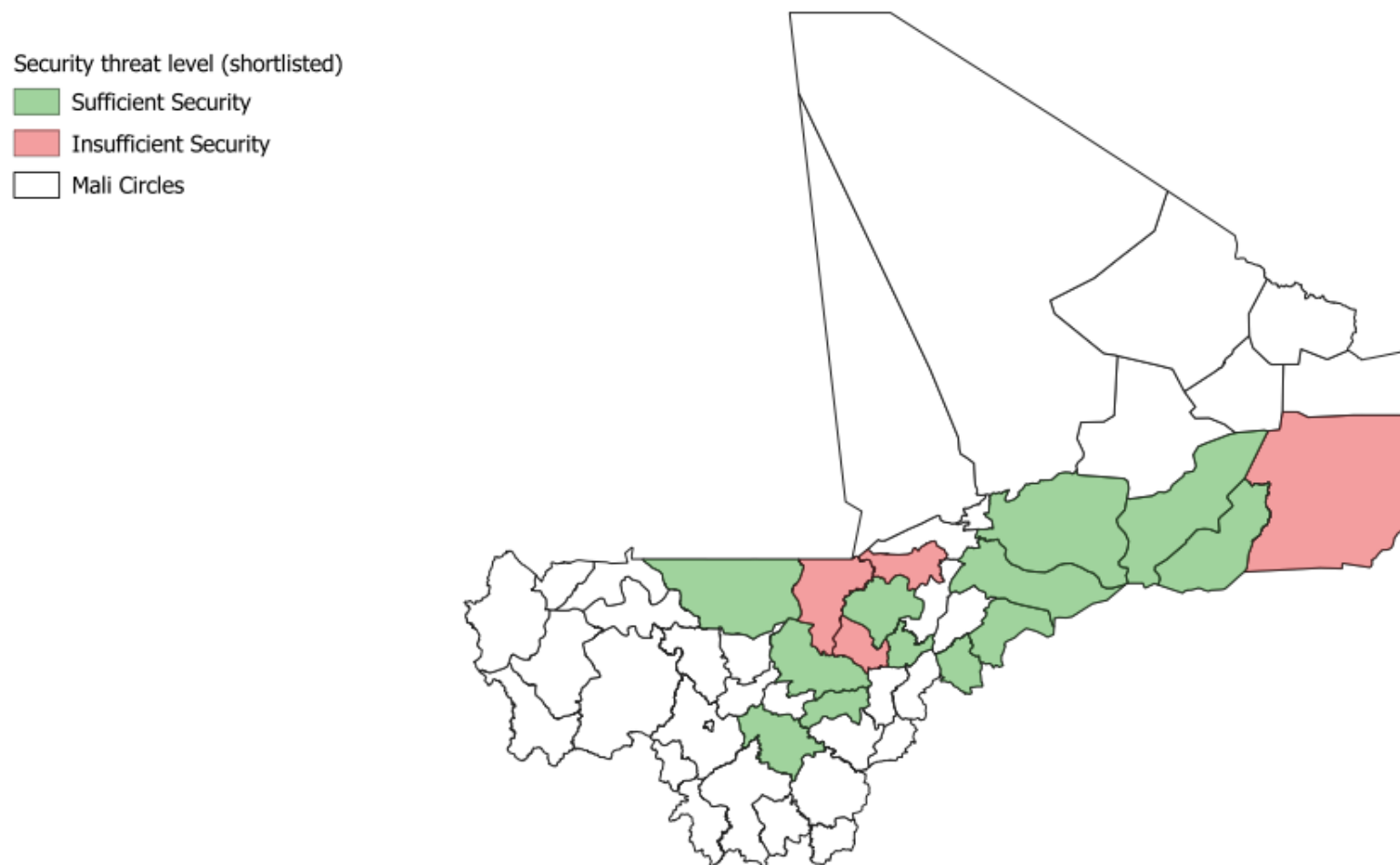


Figure 5: Map of IAAT project locations in Mali, by Circle

Final Selection

Not selected

Selected

Mali Circles

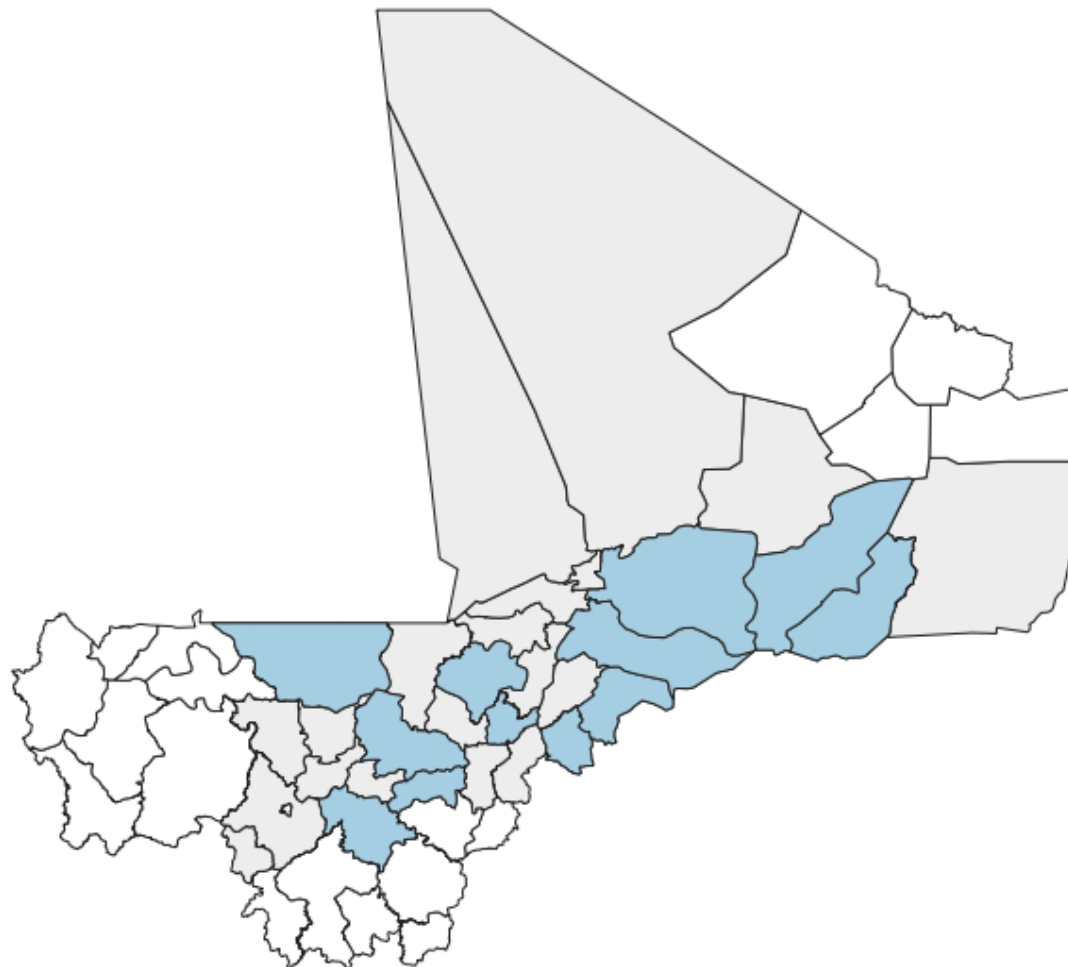


Figure 6: Map of IAAT project locations with named circles

**Key:**



Selected circles for IAAT



Other circles in project regions

