

INTRODUCTION

It is increasingly acknowledged that climate change adaptation will form a necessary component of development strategies. Adaptation to climate change will be required from both natural systems (such as hydrological systems) and from social and institutional systems (such as farming systems).

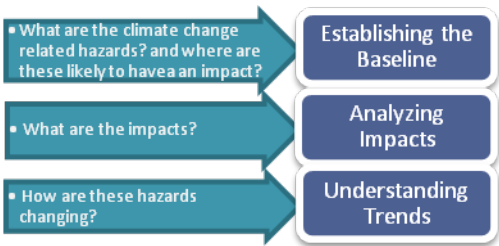
An analysis of the likely consequences to development sectors such as food production and water availability is complex as it involves food and its production, trade, nutrition and other aspects as well as how people access and secure food.

A sound risk assessment process is fundamental to ensure that climate change is appropriately taken into account in development planning and decision-making processes. The purpose of this assessment is to identify risks that may be inducted or exacerbated by climate change, and to evaluate their effects and likelihood. This allows the responses available to be prioritized and compared equitably with other risks, resource availability and cost issues.

This document highlights such a risk assessment approach, using the ACCCA project Climate Change Adaptation from the Bottom Up: Collaboration between Malian Communities and Scientific Organizations to Identify and Implement Responsive Water Management Actions. The project examines the links between vulnerability and adaptation to climatic changes in the basins of the Sankarani and Baoulé rivers to the effects of climatic changes, and also assesses the vulnerability of cotton and corn production to the effects of climate change. The purpose of the proposed ACCCA project is to help the members of the three pilot communities in southern Mali identify and implement promising water management innovations that could improve household conditions by increasing resilience to climate change.

Three case study sites were chosen in three administrative areas of Mali: Kiban (area of Koulikoro), Diouna (area of Ségou) and Massabla dabs the Circle of Bougouni (area of Sikasso), see Figure 1.

This document addresses the following sets of questions within the baseline components of the case study to begin an initial screening of the climate change risks to existing and future activities. These questions will help ensure that the selection, quality, accessibility and use of data and information are verified and improved as needed. Existing as well as potential sources of information necessary to answer these questions are listed throughout.



ESTABLISHING THE BASELINE

Guiding question: What are the major climate hazards? And where do these occur?

Highlighting the location of specific hotspots in the country where climate-related hazards are experienced or likely to be felt is a key step in identifying intervention areas. The initial screening process begins with this question, which allows the user to reframe the climate change problem in the context of local conditions/constraints and opportunities. This can show whether climate change impacts are likely to be material for a particular development function, activity or service. The Moreover, Isolating these locations for further examination is a critical starting point. Further analysis of the trends and impacts of these hazards, when combined with key vulnerability indicators will help to narrow down priority zones for specific project targets.

TABLE 1: BASELINE DATA SOURCES

The data used to assess the impacts of climate-related hazards included a mix of models, published evidence, empirical studies, past and present observations. These provide knowledge of location, severity, probability of occurrence and other key features of natural and climate related hazards. The choice of data will invariably vary among countries and sectors, reflecting the data quality and availability, as well as time

constraints of the teams.

- Inventories, maps and data series of natural events and climate related risks (e.g. drought, flooding)
- National evaluations on desertification, National Communications on Climate Change
- Disaster preparedness plans, inventories and reviews
- Meteorological data (observations) Indicators of historical outcome risk on decadal time scales constructed from the Emergency Events Database (EM-DAT), <http://www.cred.be/emdat>.
- IPCC Assessment Reports

The foundation dataset for Mali was used to develop indices that quantify the vulnerability of groups already identified as targets: in the project: women and children, and the elderly.

Two key concepts guide the baseline activities in the following examples. These, and some of the solutions currently employed to address them, are:

- 1) *Risk assessment needs to be appropriate:* Vulnerability is a key factor that could be influenced by expected changes in climates. The poor have limited access to resources and few income-generating opportunities, and their living conditions are often affected by laws, policies, and economic forces over which they have little or no control. Although it is by no means clear whether vulnerable groups, with their pressures to survive, or affluent groups, with their pressures to consume, ultimately leads to the impacts which continue to drive vulnerability, it does seem clear that poor people will not, indeed, cannot, meet the MDG goals if this requires looking beyond their immediate needs. The process begins with vulnerability exposure analysis. This links to a participatory exercise on defining scenarios of the reference vulnerability (changes in the exposure unit), climatic stresses (but also opportunities), and sensitivity of the exposure unit to each stress. The outcome provides some conclusions regarding coping strategies, vulnerability indicators and adaptation options.

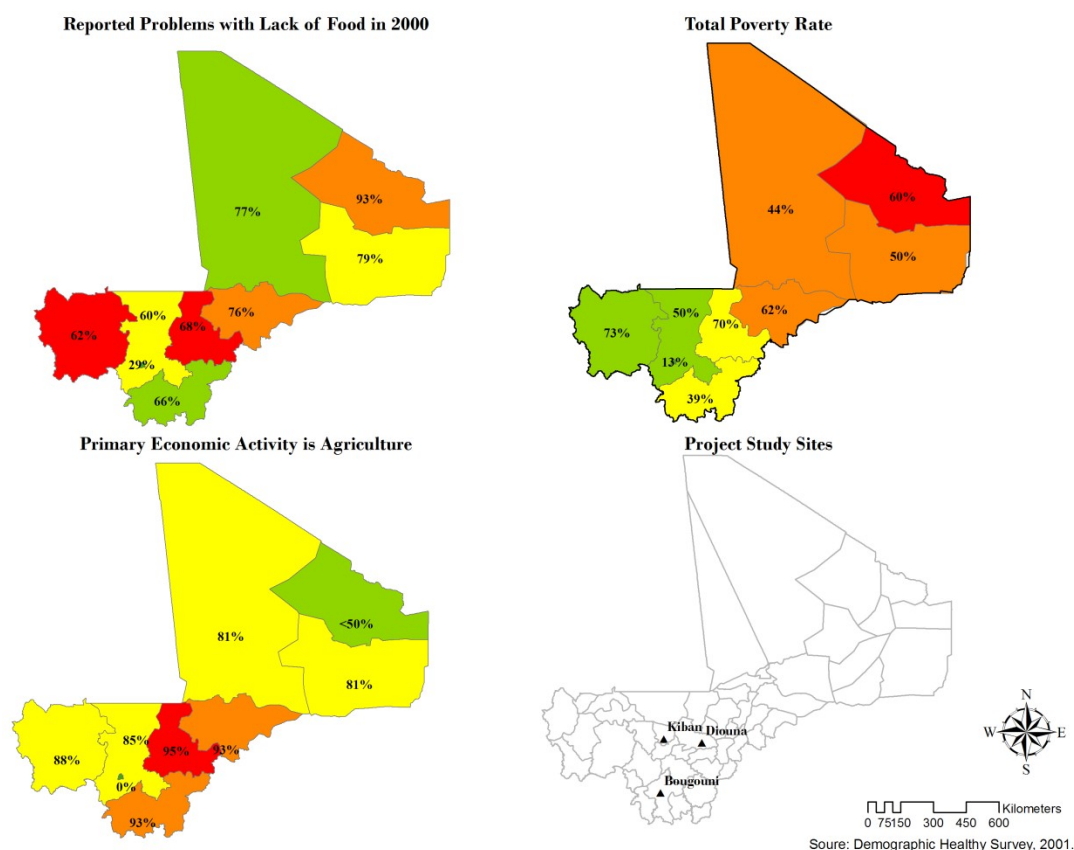
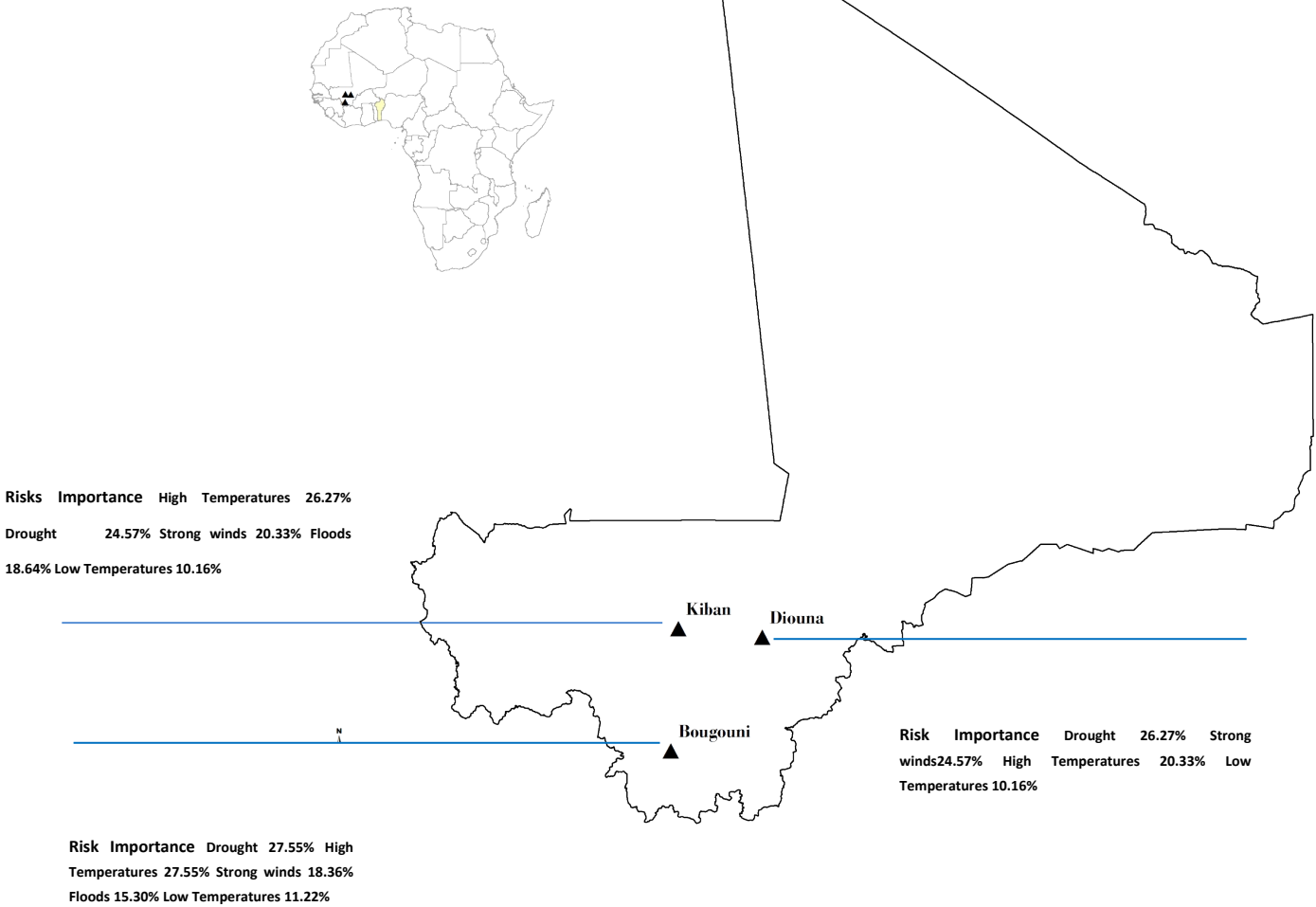


FIGURE 2: RESULTS OF DEMOGRAPHIC HEALTH SURVEY OF 2001 IN MALI

- 2) *Risks vary over time and space (even over relatively short distances)* – this reflects both the changing probability of the risk occurring and the changing scale of consequence when and if the risk occurs. Understanding the underlying dynamics that drive these processes is important. To this end, baseline activities are currently engaged in the quantification of spatial and temporal risks from climate change by leveraging both online and real time access to spatial information with the analytical power of a geographic information system (GIS). The following are examples of these activities, all of which make use of the AWhere spatial information system: (1) Characterizing vulnerability indicators on a national or regional level, (2)

understanding the current trends in these indicators, and (3) analyzing the impacts of climatic changes on populations. See Figures 3 through x

FIGURE 3: COMMUNITY IDENTIFIED CLIMATE CHANGE RELATED HAZARDS THEY FACE. IDENTIFIED AS PART OF THE ACCCA PROJECT.



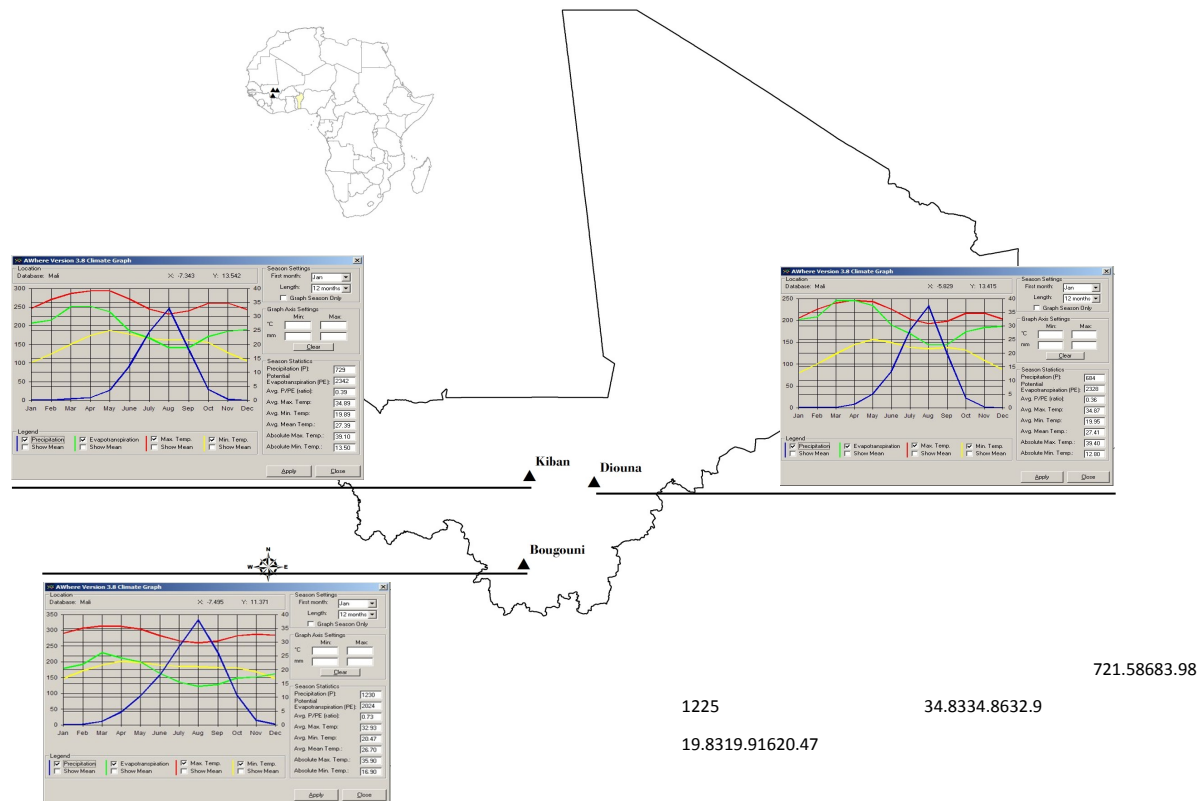


FIGURE 4: MONTHLY LONG TERM NORMAL CHARTS FOR TEMPERATURE, PRECIPITATION AND EVAPOTRANSPIRATION

Figure 4: Monthly Long Term Normal Charts for Temperature, Precipitation and Evapotranspiration

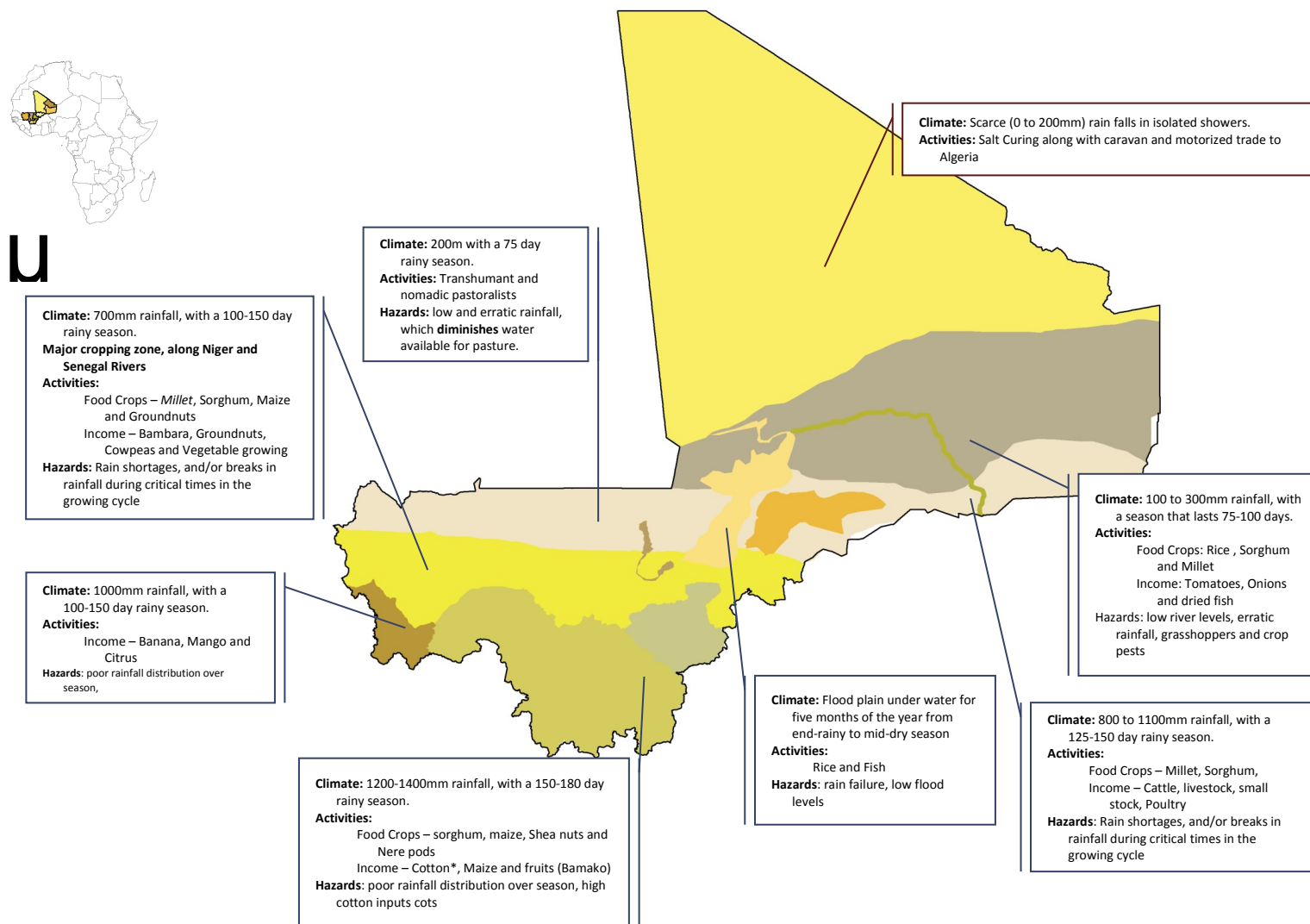


FIGURE 5: LIVELIHOOD ZONES, PRODUCTION CHARACTERISTICS AND THE HAZARDS THEY FACE. ADAPTED FROM FEWS DATA.

The diversity in cropping pattern is very different across regions and within regions. The area comprised between northern Kayes, Koulikoro, Mopti (i.e. Douentza, Koro, Bandiagara, west Tenenkou), southern Tombouctou (southern Gourma-Rharous, west Niafunke), northeastern Niono (Ségou), and southeastern Gao (Meneka) are largely dependent on rain-fed agriculture. However, since this area falls in the Sahelian zone with a yearly average rainfall of 400mm and high variations in time and in distribution, agricultural production in these areas is uncertain. Around the Delta more opportunities for different types of agriculture exist. Immediately around or in the Delta, at least three types of cropping patterns are practised (irrigation, submersion, and rain-fed agriculture), providing more diversity and lower production risk. The areas concerned are the

cercles of Mopti, southern Tenenkou, northeast Youvarou, central Niafunke, Dire, northwest Djenne, Ansongo, Gourma and Gao. Further away from the Delta, irrigation is no longer practiced but rain-fed agriculture is combined with rice submersion, and recessional agriculture. These cropping patterns are found in the remaining parts of Niafunke, Mopti, Youvarou, Bourem and Djenne.

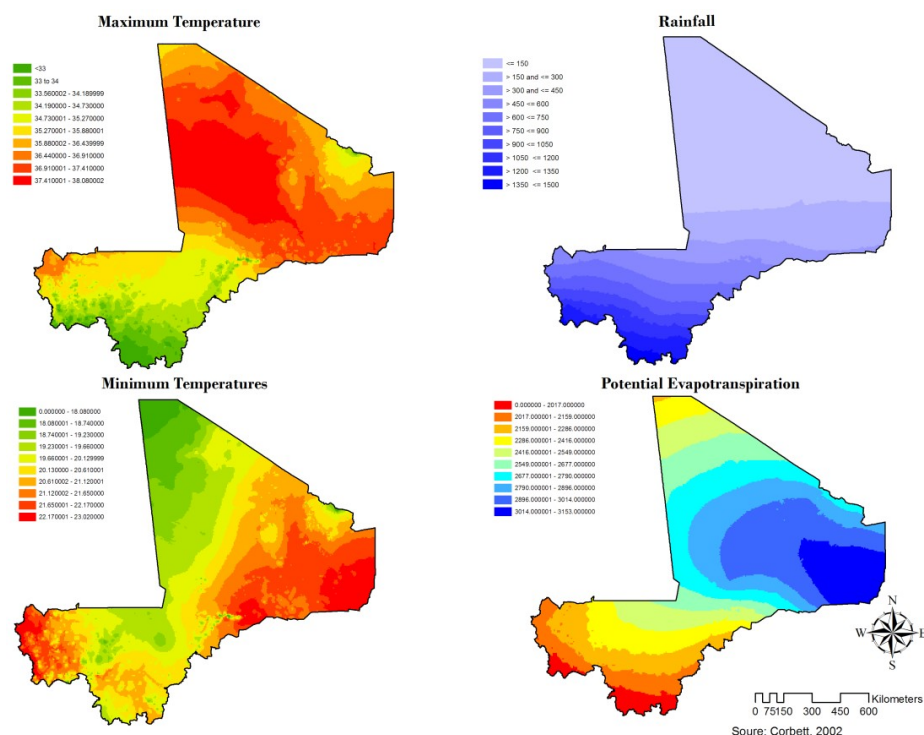


FIGURE 6: ANNUAL CLIMATIC CHARACTERISTICS.

Due to its geographical position, Mali spans four different eco-climatic zones: Sahara, Sahelian, Sudanian and Sudanian-Guinean with an average annual precipitation ranging between 100 and 1700 mm. It presents only one rainy season entirely limited to the summer, which lasts up to six months in the South and decreases to two months in the North. Only the Sudanian, Sudanian-Guinean and the areas with irrigation possibilities offer agricultural or agro-pastoral potential. These zones have sufficient rainfall, fertile soils, and offer possibilities for agriculture and livestock integration

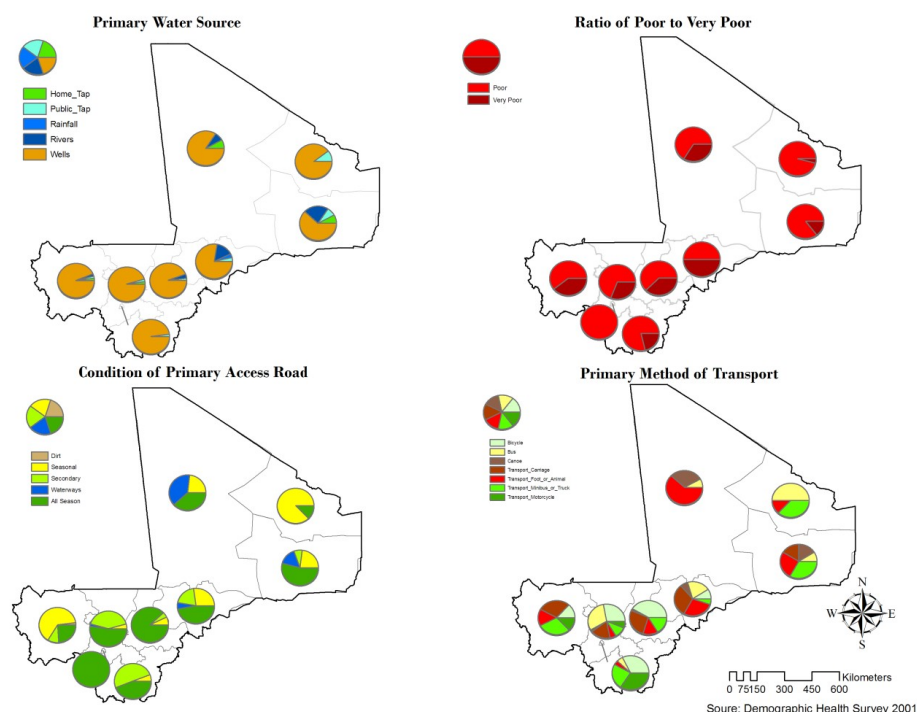


FIGURE 7: POVERTY AND FOOD AID.

Mali with a per capita GDP below 300 US\$, or less than 1 dollar per day, is classified among the low-income countries. In 1998, 69% of the population lived below the poverty line, a problem particularly acute in rural areas where the poverty rate is estimated to be 76%. Physical accessibility remains a problem in the Gao, Kidal and northern Tombouctou regions because of the low population

density, limited infrastructures and in some case civil insecurity. In the areas around the Delta and the lakes in Tombouctou, access is a problem especially during the rainy season.

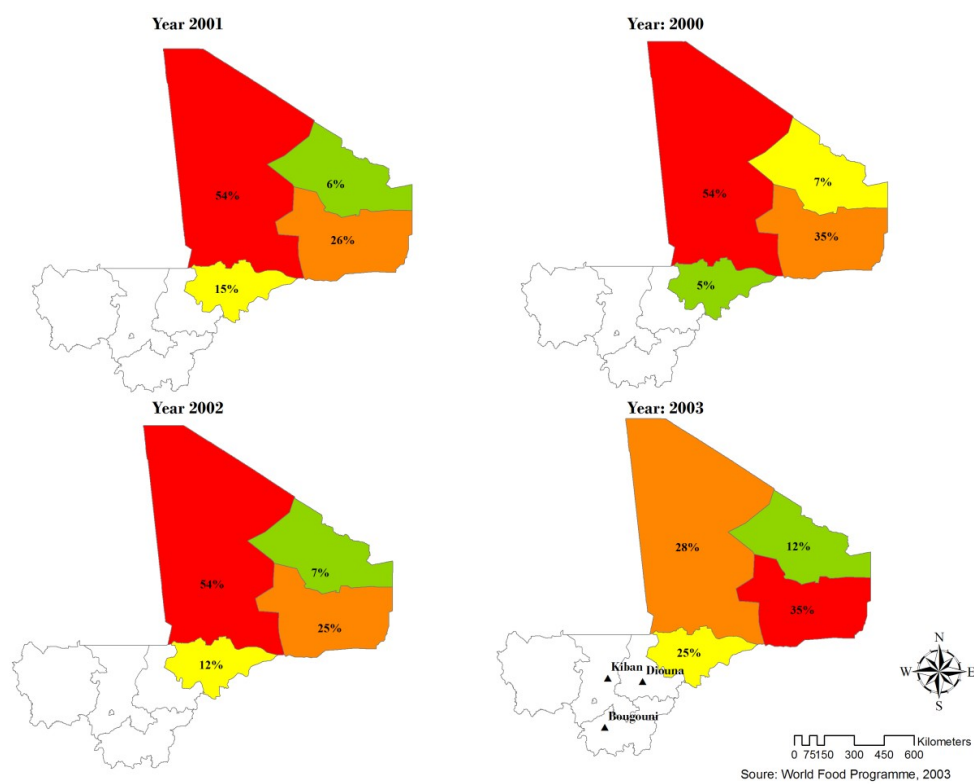


FIGURE 8: FOOD ASSISTANCE.

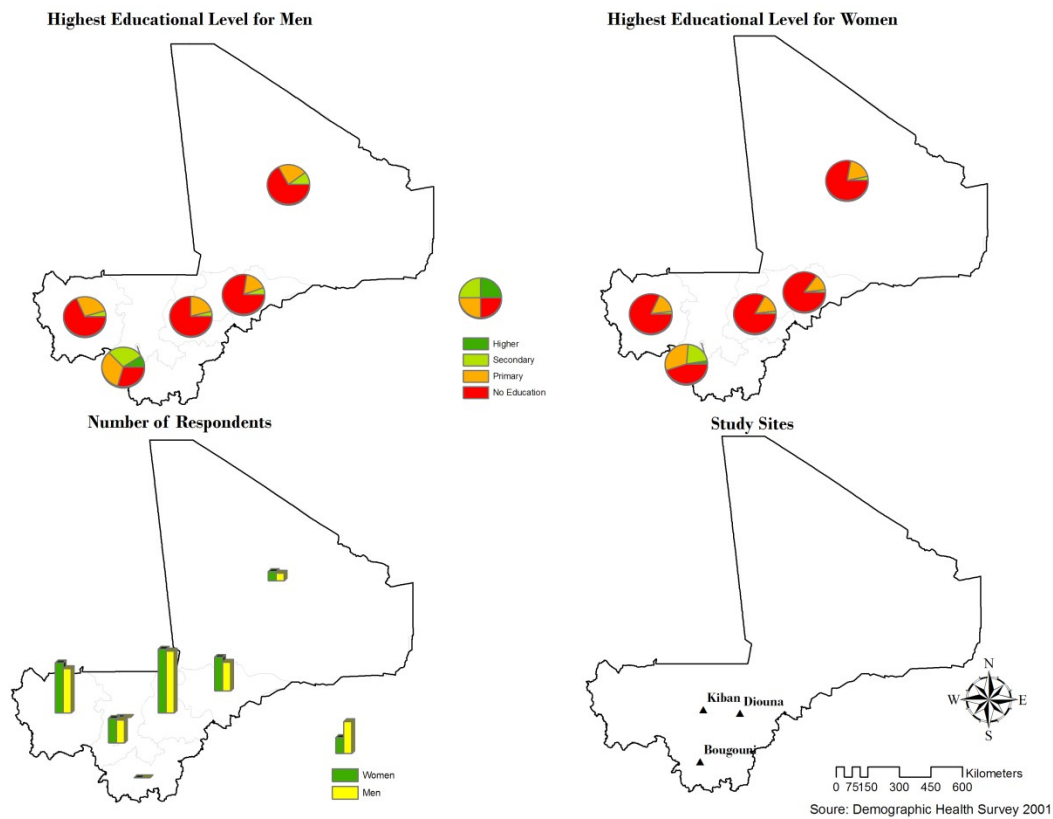


FIGURE 9: EDUCATION.

Most of the Malian population (80%) has not received any form of official education. Illiteracy rates are especially high in rural areas where 91% of women and 82% of men are uneducated. School enrolment is below 45%, but for girls it is significantly lower than for boys: 41% and 53% respectively.

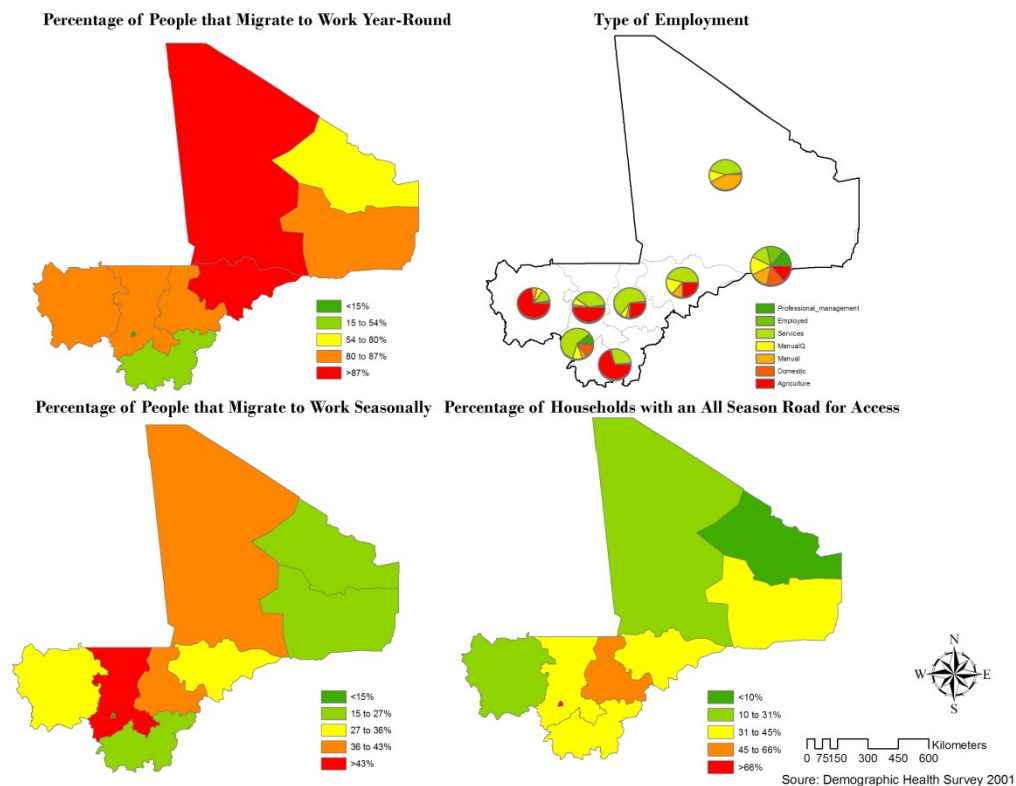


FIGURE 10: MIGRATION PATTERNS.

Migration can be broadly classified into four categories: 1) Traditional seasonal migration in search of water and grazing land for livestock (transhumance); 2) Seasonal migration to other villages, cities etc. looking for a temporary job; 3) In-country long-term migration to Bamako, other towns and larger villages; 4) Long-term migration abroad. Mali has a long history of emigration to France, Ivory Coast, Central Africa, etc. Malian communities in foreign countries are well established and provide strong networks for Malian nationals. However, as a result of the improving economic situation in Mali emigration might slow down and migration from other countries is becoming an increasing phenomenon. In all regions but Sikasso, long term migration plays an important role. Especially in Gao, from where most people have migrated to countries in the sub-region, in Kayes where about half of the migrants have gone to countries in the sub-region and the other half to France, South Africa, Italy etc. In Mopti and Tombouctou from where an equally large numbers of people have migrated to countries in the sub-region

HAZARDS

SPATIAL DYNAMICS

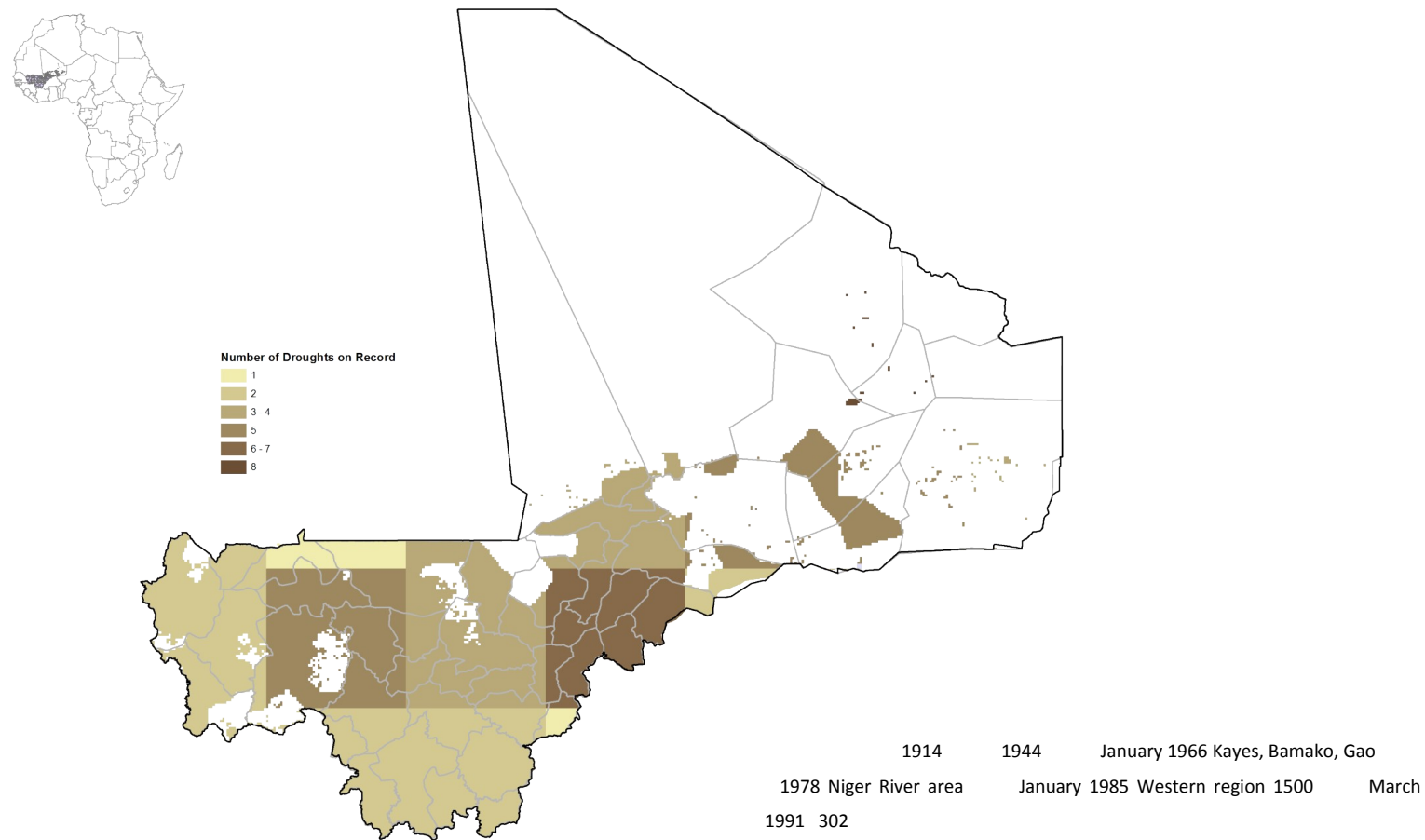
Translating indicators of vulnerability for specific exposure units/stresses (e.g populations at risk of drought) into vulnerability maps, and then defining hotspots and indicators of aggregate vulnerability using foundation datasets such as the one available for Mali the following figures, which highlight the zones within the country that face exposure to specific hazards.



FIGURE 11: DEGREE OF EXPOSURE TO FLOODS IN MALI FROM LARGE FLOOD EVENTS IN THE HISTORICAL RECORD

Insert description of flood conditions here

FIGURE 12: DEGREE OF EXPOSURE TO DROUGHTS IN MALI BASED ON DROUGHT EVENTS IN THE HISTORICAL RECORD.



Insert description of drought conditions here

TEMPORAL DYNAMICS

Climatic variability poses significant repercussions for agricultural production, but its spatial and temporal manifestations are considerably varied. The issues before agricultural policy in the face of climate change are complex enough that misunderstanding the full ramifications of events such as temperature extremes, or for that matter, a trend through a specific period such as the 1990s, will have significant impact at the farm level. Disease, pests, droughts and large storms, these are issues of great importance to agriculture and they appear to vary both in space and in time. Understanding local patterns in the context of the immediate region will help guide the development of viable coping mechanisms, from agronomic practices to crop insurance, in the face of uncertainty regarding both the direction of climate change trends and its magnitude.

The diagnostic capacity to investigate these impacts can be significantly increased by coupling detailed historical meteorological data with innovative analytic methods. On the basis of available data and information, it is possible to analyze the conditions and trends in climate parameters, from the most basic data (e.g. maximum and minimum temperature and rainfall), to more elaborate indicators (duration of the growing season), to complex indices (satisfaction index of water requirements for the growing season) to allow the identification of important thresholds and trigger points on short and medium time scales. This information can be used to assess potentially impacts and identify anticipatory adaptation measures.

A useful starting point is to develop a seasonal calendar for the region (as illustrated in Figure 13). The seasonal calendar presented here provides guidance for the identification of climate relevant time periods (key dates in terms of climatic thresholds) for cropping cycles. Further exploration, for example, of a changing onset of the growing season would focus attention on the months of April through May, for this particular case.

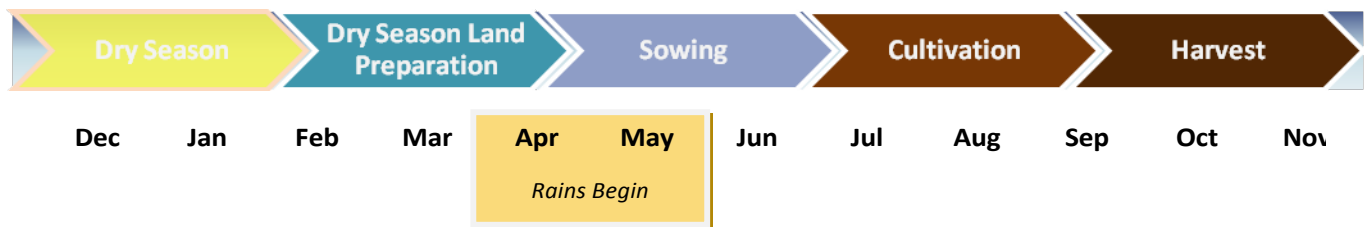


FIGURE 13: SEASONAL CALENDAR, FOR MAIZE GROWING REGIONS. ADAPTED FROM FEWS DATA.

Another example is illustrated in the figure 14 below for the Kiban meteorological station in western Mali. The chart compares rainfall distribution during the historical record with known periods of drought. Subsequent analyses are also available for other locations (Figures 15, 16 and 17). These compare the number of times during the period available, on a weekly basis, when maximum temperatures exceeded 39 or 42 degrees Celsius, which represent thresholds of high temperatures for the selected locations.

Though it remains difficult to pin particular disasters such as floods and storms to the phenomenon of climate change, it is clear that a destabilized climate system, together with other forms of environmental damage, will cause havoc more frequently. Climate change is not just about average values, but rather a matter of extremes. The predicted increases in maximum and minimum temperatures for Mali, coupled with reduced or erratic rainfall are likely to make events such as those represented in these figures more frequent and severe. Droughts in critical periods for agricultural production or livestock needs and flooding, coupled with may further limit already stressed communities.

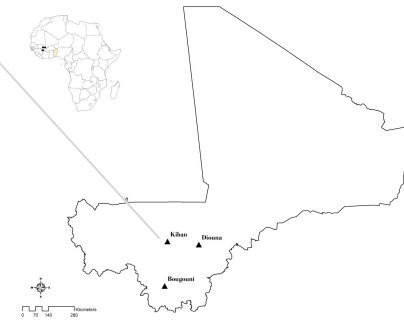
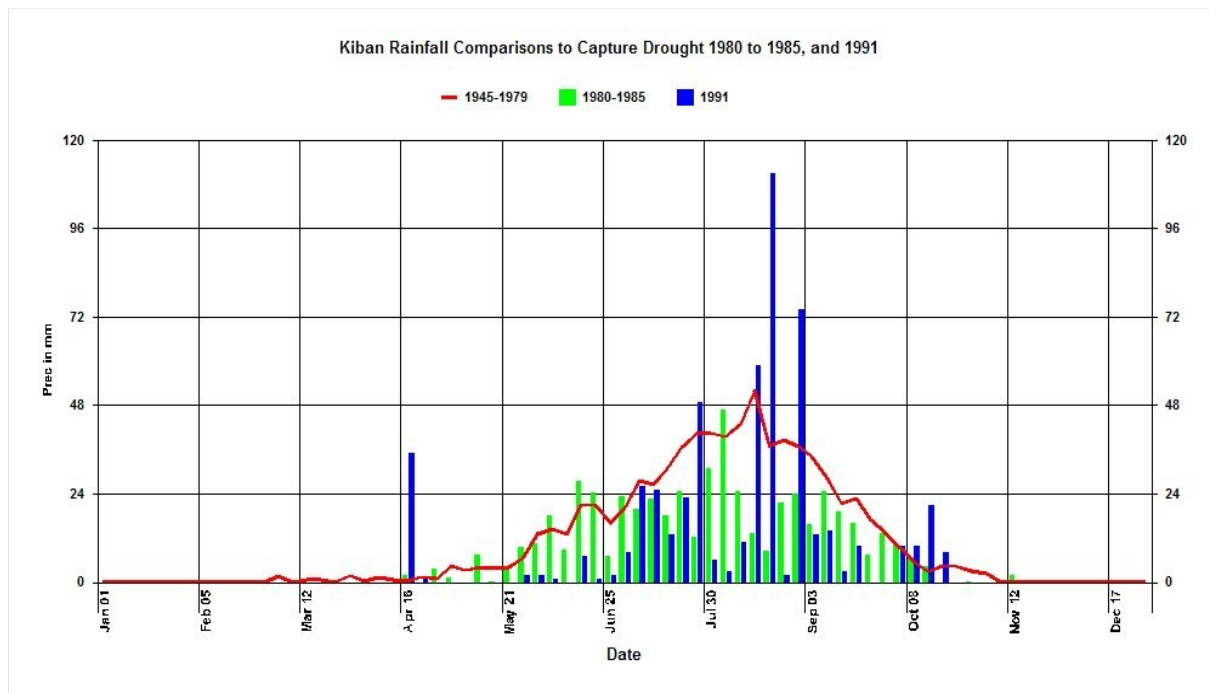


FIGURE 14: KIBAN, RAINFAL DISTRIBUTION DURING KNOWN DROUGHTS COMPARED TO LONG TERM HISTORICAL RECORD

FIGURE 15: SAN, DISTRIBUTION OF THE NUMBER OF TIMES MAXIMUM TEMPERATURES EXCEEDED 39 DEGREES

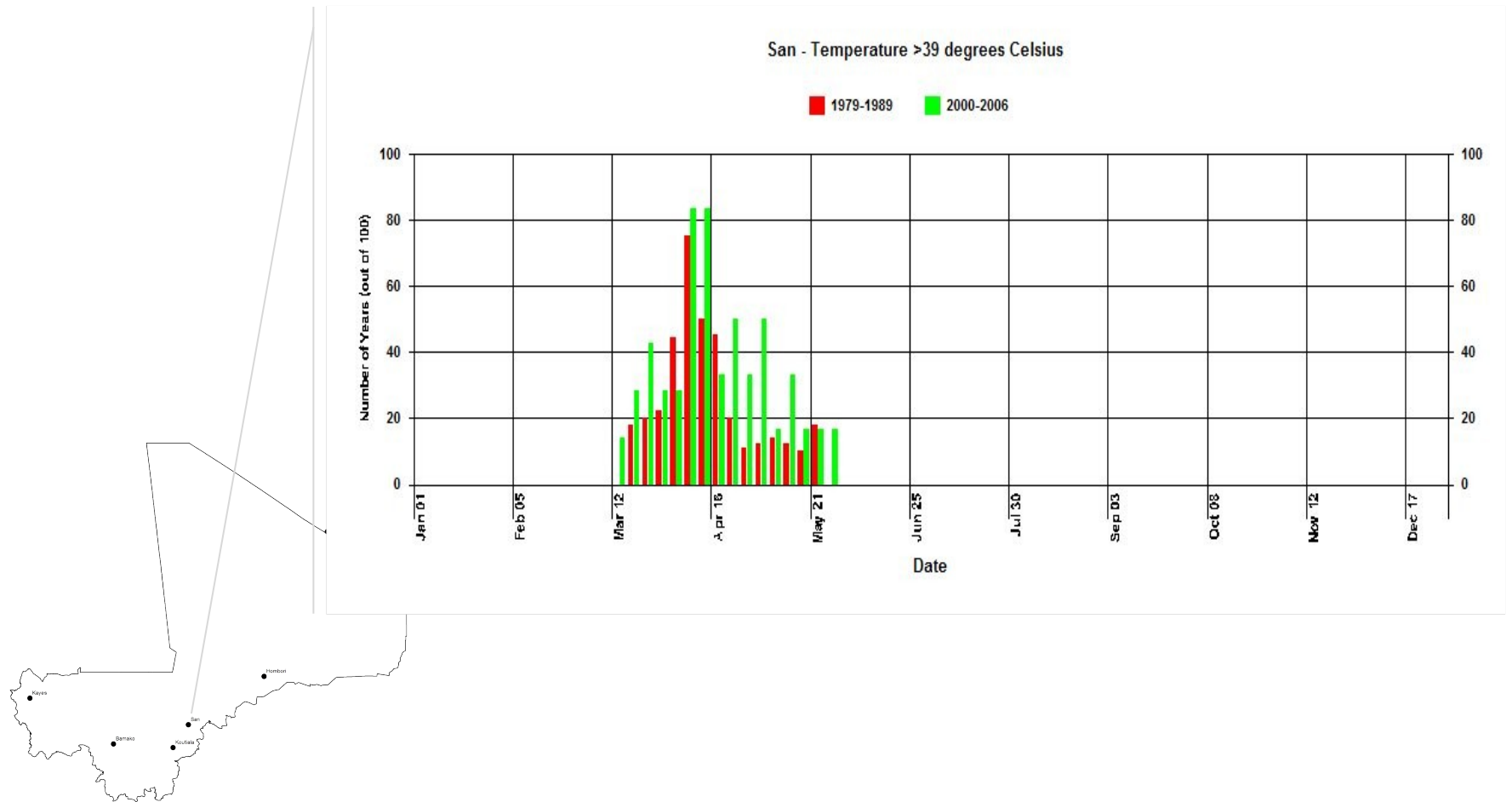


FIGURE 16: KOULIKORO, DISTRIBUTION OF THE NUMBER OF TIMES MAXIMUM TEMPERATURES EXCEEDED 39 DEGREES

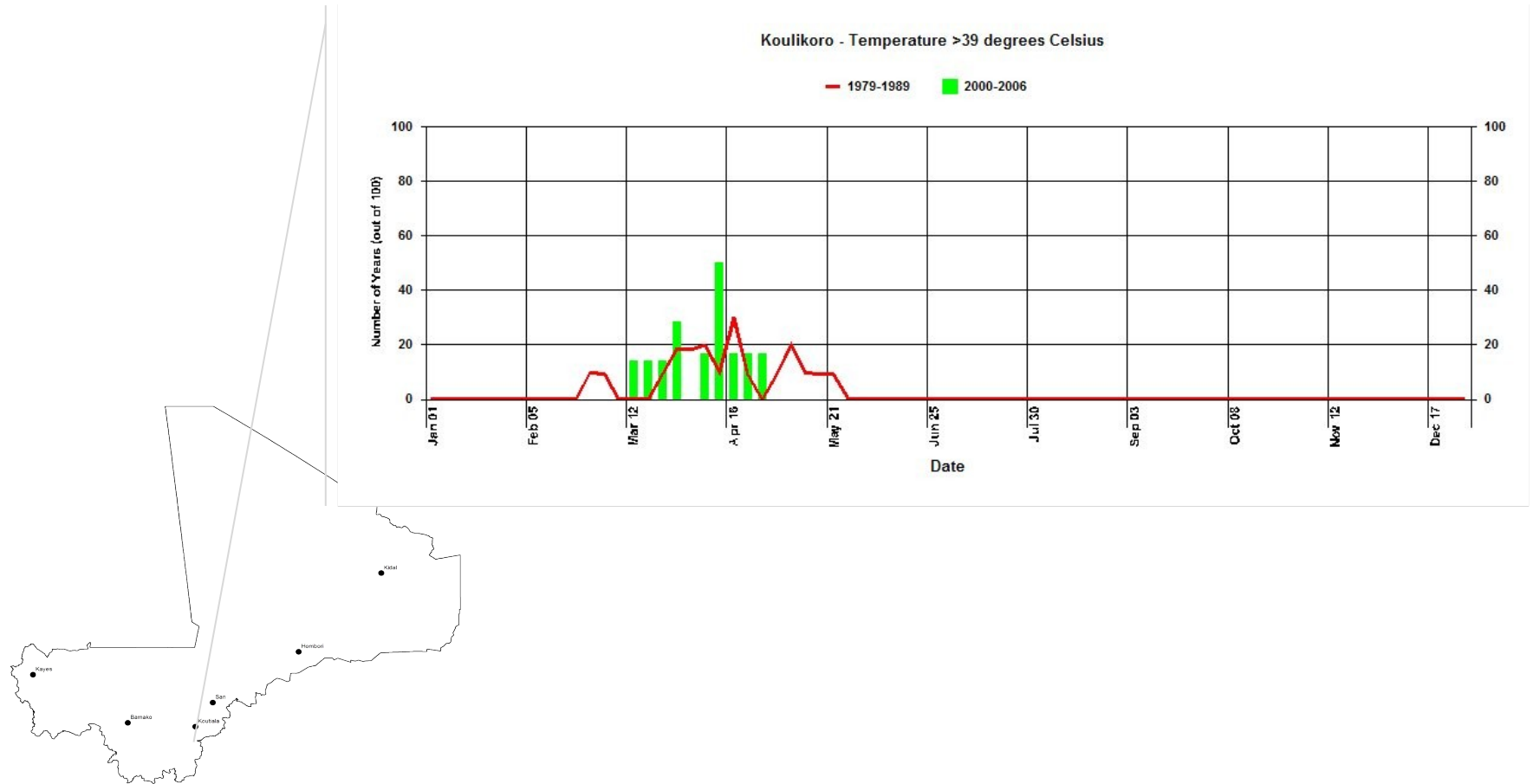
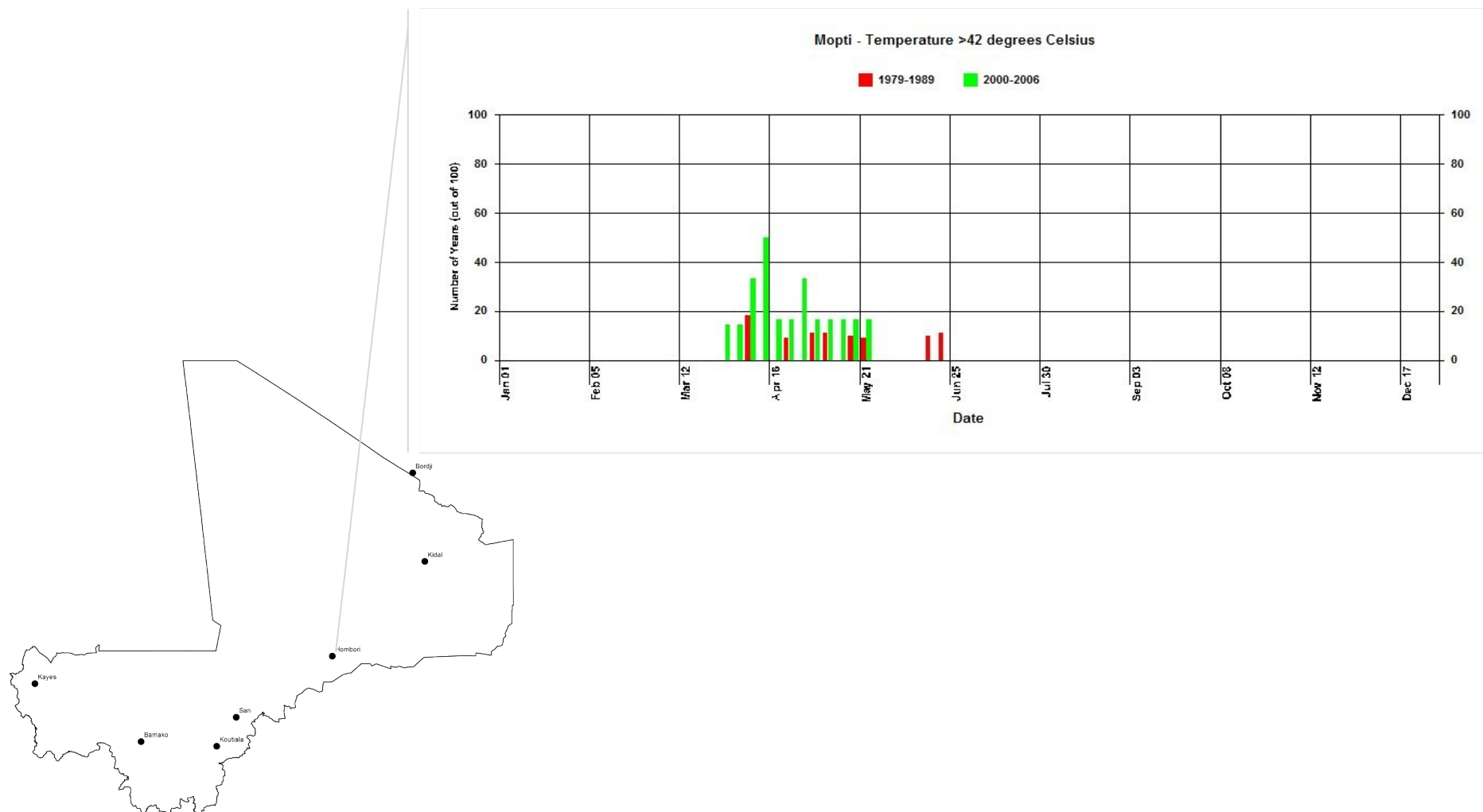


FIGURE 17: MOPTI, DISTRIBUTION OF THE NUMBER OF TIMES MAXIMUM TEMPERATURES EXCEEDED 42 DEGREES



ANALYZING THE IMPACTS OF CLIMATE CHANGE

Climate related stresses can cause major adverse impacts on several sectors, including food production and agriculture, human health, and water availability, quality and accessibility, among others.

Guiding questions:

- Where are these impacts known to occur?
- Where are the impacts of these hazards likely to be felt?

The purpose of addressing these questions is to assess and summarize the impacts of climate-related hazards on a specific region, country or sector. This step can provide the basis for defining both the measurable outputs and the implementation issues, particularly with respect to monitoring and evaluation in project activities. It also provides an opportunity for the risk assessment team to pay particular attention to sectoral studies at both regional and national levels, where data and information can be found concerning the critical climate values relevant to these sectors (e.g. rainfall values at which point agriculture becomes unfeasible). For example, poverty reduction and food security profiles and reports will generally include information on necessary caloric intake, the duration of the growing seasons etc. In addition, there exist national and regional reports on hazardous climate phenomenon in relation to food security. A list of potential data sources available in the assessment of impacts is presented in Table 2.

TABLE 2: IMPACTS DATA SOURCES

Information on the impacts of hazards can be drawn from:

- Communities
- Disaster preparedness and action plans.
- Inventories, maps and data related to the impact of past hazards.
- IPCC Assessment Reports

Impacts on the population can be mapped to show the number of people potentially affected by specific hazard events, as in the following example:

FIGURE 9: NUMBER OF PEOPLE AFFECTED BY DROUGHT ?

In order to better define project priorities and outputs, it is necessary to specify the impacts of climate-related hazards on target sectors/areas. The characterization of adverse effects should follow the treatment of issues, whether by sector or vulnerable group, or otherwise. Characterization of climate-related effects could be carried out by sectors: Food Production and Agriculture, Human Health, Water availability, quality and accessibility, and Loss of Life and Livelihood. Table 3 provides an example summary table for impact assessment using this categorization for Mali.

TABLE 3: CATEGORIZING THE ADVERSE EFFECTS OF CLIMATE-RELATED HAZARDS. EXAMPLES PROVIDED IN THIS TABLE ARE DRAWN FROM THE ACCCA STUDY.

CLIMATE RELATED HAZARD	DESCRIPTION	Adverse Effects				
		Loss of life and livelihood	Human Health	Food Security and Agriculture	Water availability, quality and accessibility	Environmental effects (Biological diversity, forestry)
Flood	<ul style="list-style-type: none"> - Bamako, Segou and Koulikoro (along Niger river) due to torrential rains - August, 1989 - Heavy rains and high water levels on the Niger river - May, 2001 	<ul style="list-style-type: none"> - 10000 people affected (left homeless), 17 killed. - 2 killed, 2300 affected 	high risk of waterborne disease in the flooded areas (cholera, yellow fever, paludism and meningitis) which may increase as floodwaters recede	Washed away 870 ha of agricultural lands		Contamination of water sources
Drought	Very low rainfall, desertification, erosion and bush fires in Gao, Koulikouro, Segou and Mopti	Over 2 million people affected, large scale migrations leading to regional food imbalances	Nutrition- percentage of children 0-5 years below norm of weight-height ratios very low	Insufficient harvests and food aid required	Loss of ferry crossings near Gao leaving the region isolated from the rest of the country	
Seasonality	Northern regions	Changing rainfall patterns leading to outmigration into agricultural areas in the southern regions	Increased incidence of diseases from overcrowding in areas in the south	Food aid required		Land degradation

UNDERSTANDING TRENDS

A first step in assessing these potential impacts is to highlight or estimate the major current and expected trends (direction, magnitude, and extent) of climate-related hazards. The purpose of addressing the following questions is to assess the range of future conditions. This step provides a link between the current vulnerability (hazards experienced so far), trends in hazards and the need for urgent action. If the trends observed above are consistent with the range of scenarios for future climate change, then the rationale for urgent action is much stronger.

Guiding questions:

- What are the documented historical trends in these hazards?
- Is the nature and location of these hazards changing, and if so, how?
- What kinds of predictions have been made on these hazards for the area in question?

TABLE 4: DATA SOURCES TO DEFINE TRENDS

Information regarding changes in frequency and spatial extent of climate related events, as well as changes in coping thresholds will aid in answering this question. Information sources can come from:

- Climate change scenarios
- Analysis of historical changes in key variables
- National Communications on Climate Change

Supplementary data can also be derived from:

- Climate variability data
- GCM (Global Climate Models) outputs (especially regional) and scenarios (2000-2050)
- IPCC Assessment Reports

The choice method and data to be used to offer validation and support for observed and predicted trends in climate-related hazards will among countries and sectors, reflecting data quality and availability, as well as the time constraints of the project. A useful starting point for evaluating climatic trends is to map key variables and then to categorize these trends as those conforming either to: deviations from normal values (Figures 18, 19 and 20), or geographic/temporal shifts in occurrences. An example, drawn from a preliminary analysis of the ACCCA project, is available in Table 5.

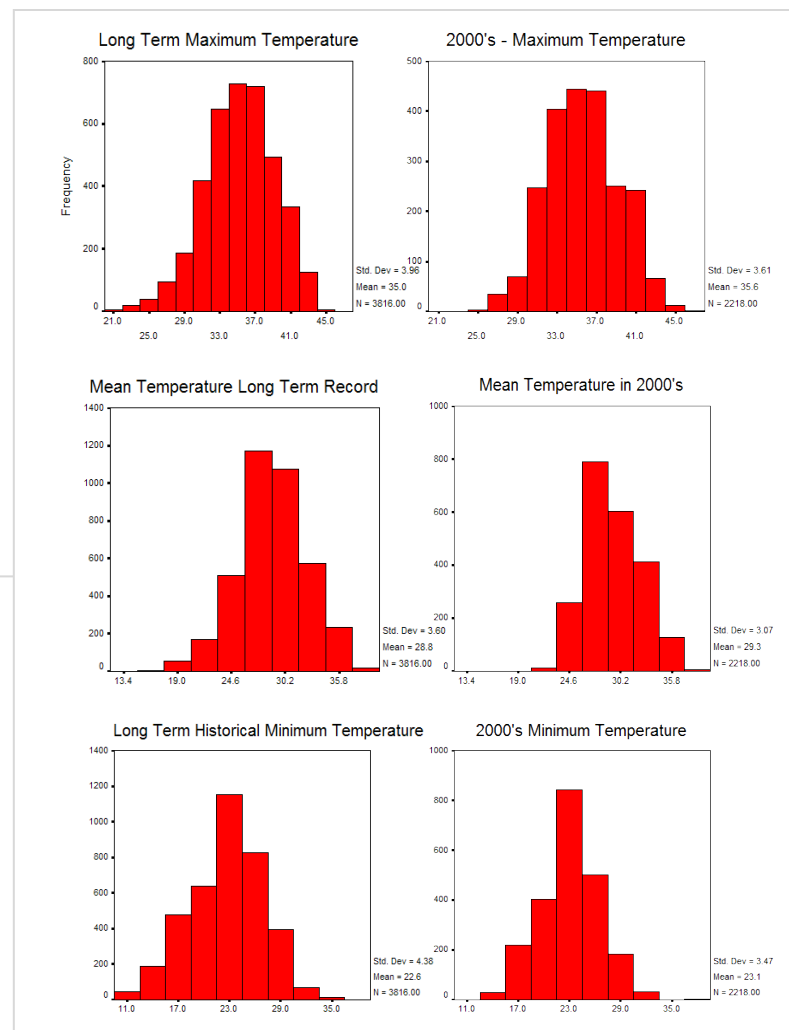
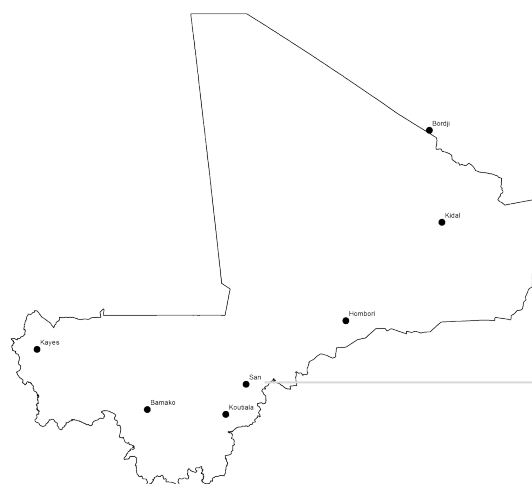


FIGURE 18: CHANGES IN THE TEMPERATURE DISTRIBUTION FOR SAN STATION IN SOUTHERN MALI, COMPARING THE HISTORICAL RECORD TO THE YEARS ON RECORD BEYOND 2000.

The data suggest a light distributional shift in all temperature variables, with a mean change of 0.6°C in Maximum temperatures, 0.5°C in Minimum temperatures, and 0.5°C in mean temperature.

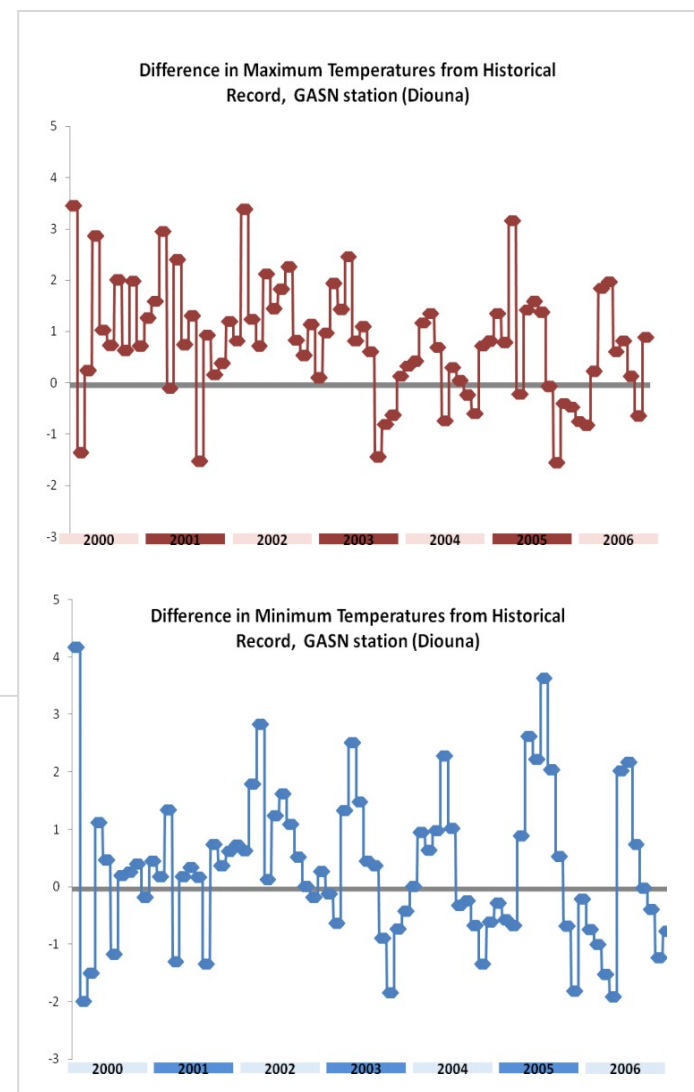
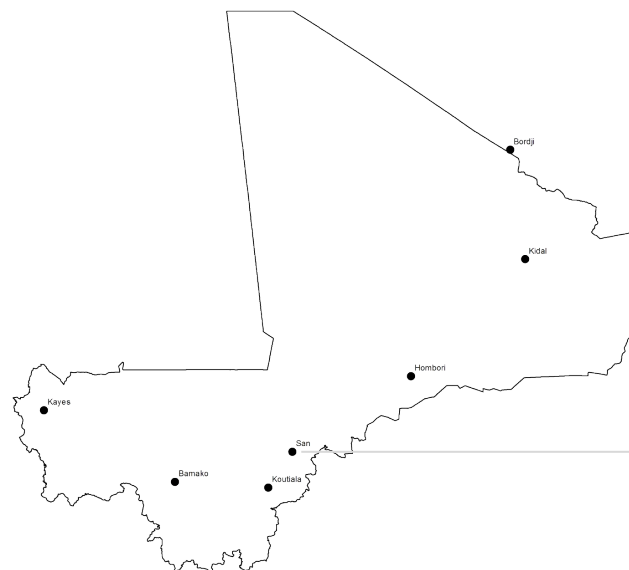


FIGURE 19: CHANGES IN THE TEMPERATURE DISTRIBUTION FOR SAN METEOROLOGICAL STATION IN SOUTHERN MALI, COMPARING THE HISTORICAL RECORD TO THE YEARS BEYOND 2000. THE RESULTS INDICATE AN INCREASING TREND IN BOTH MAXIMUM AND MINIMUM TEMPERATURE VALUES FOR THE YEARS SINCE 2000.

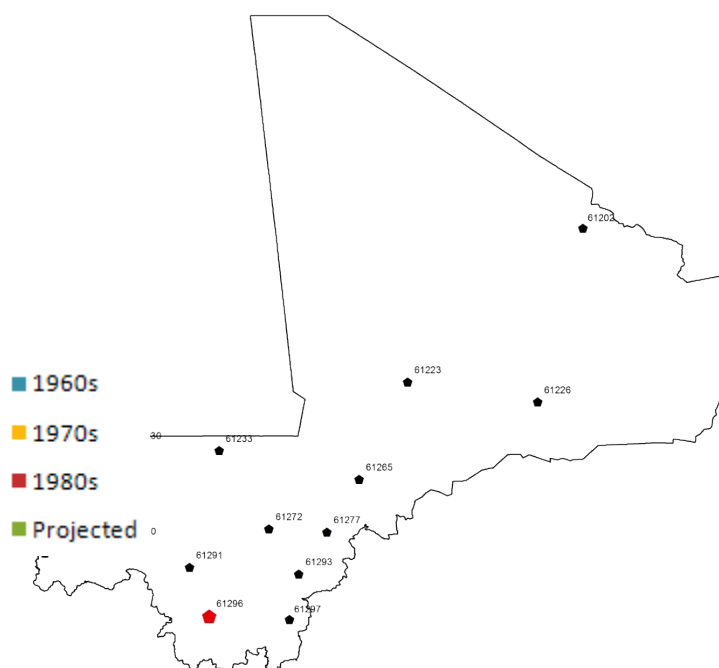
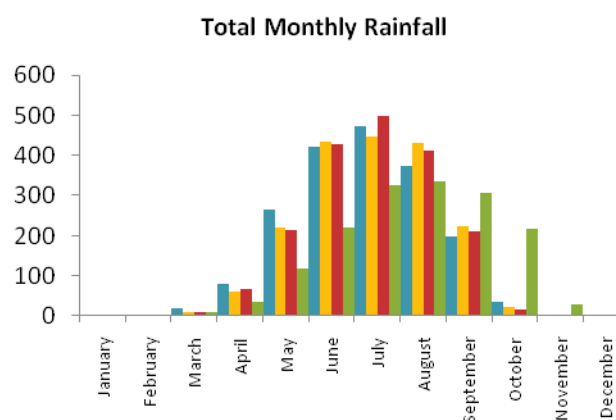
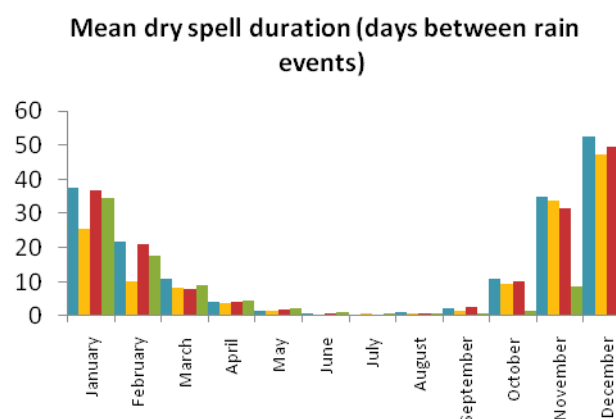
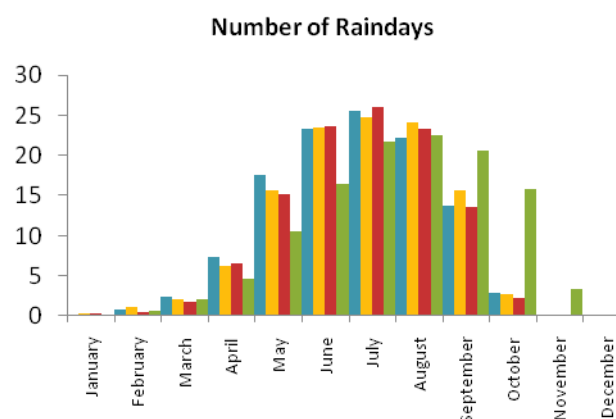
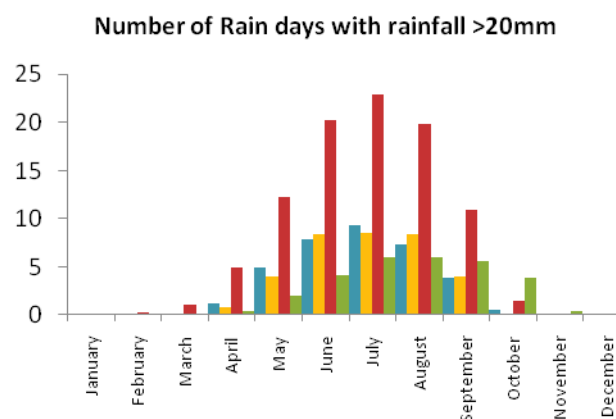
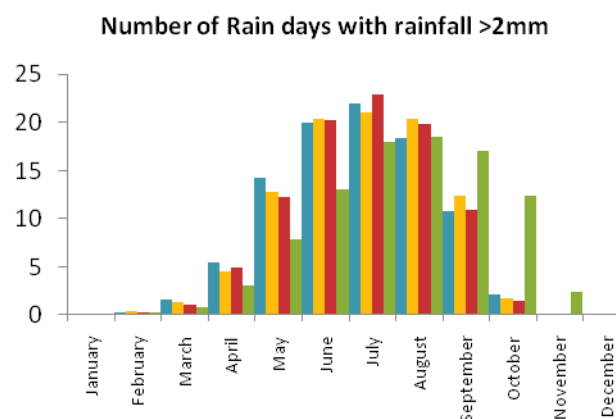


FIGURE 20: CSIRO STATION 61296, DECADEAL CHANGES IN VARIOUS RAINFALL-RELATED EVENTS.

Notes: the distribution of total monthly rainfall continues to shift towards later in the year the rainy season from April-May to May-June. In addition, the CSIRO model data suggest a reduction in total monthly rainfall during critical cultivation and harvest periods in August to November.

Source: CSAG.

TABLE 5: SUMMARY TABLE OF TRENDS IN CLIMATE-RELATED THREATS

THREAT	EXAMPLE	LOCATION	OBSERVED TRENDS				
			Likelihood	Trend in likelihood	Trend in magnitude	Trend in location	Other trends / descriptors
Heat waves	Increased monthly minimum and maximum temperatures	San Station (see Figure 6)		Increasing frequency? (more years where mean temperatures are exceeded)	Increasing by at least 0.5°C, number of times the 39°C threshold was exceeded (for Southeastern Mali) increased during the 2000's, and 42°C for central eastern (Mopti-see figure 8)		Trend associated with the months of March through May
Droughts	Water deficits	Southern and Western Mali including Kayes, Bamako and the Niger River area (see figure 5)					Increased frequency of large storm events and delayed onset of the primary rainy season from April to Mid-June (see Figure 5) Trend associated with months of January and March
Floods	Along banks of Niger and... xxx rivers	Southern and southeastern Mali (especially Sikasso, Segou, Koulikoro, Bamako)	12 years since 1985	Yearly?			Trend associated with the month of August primarily, with occasional floods occurring between June-September
Erratic Rainfall	Changing seasonality-drought conditions during agriculturally critical periods ¹ (Eastern Mali	?	(?	?	?	Prior to sowing: april-may

¹ although average conditions may not indicate drought

APPENDICES

BASEMAPS

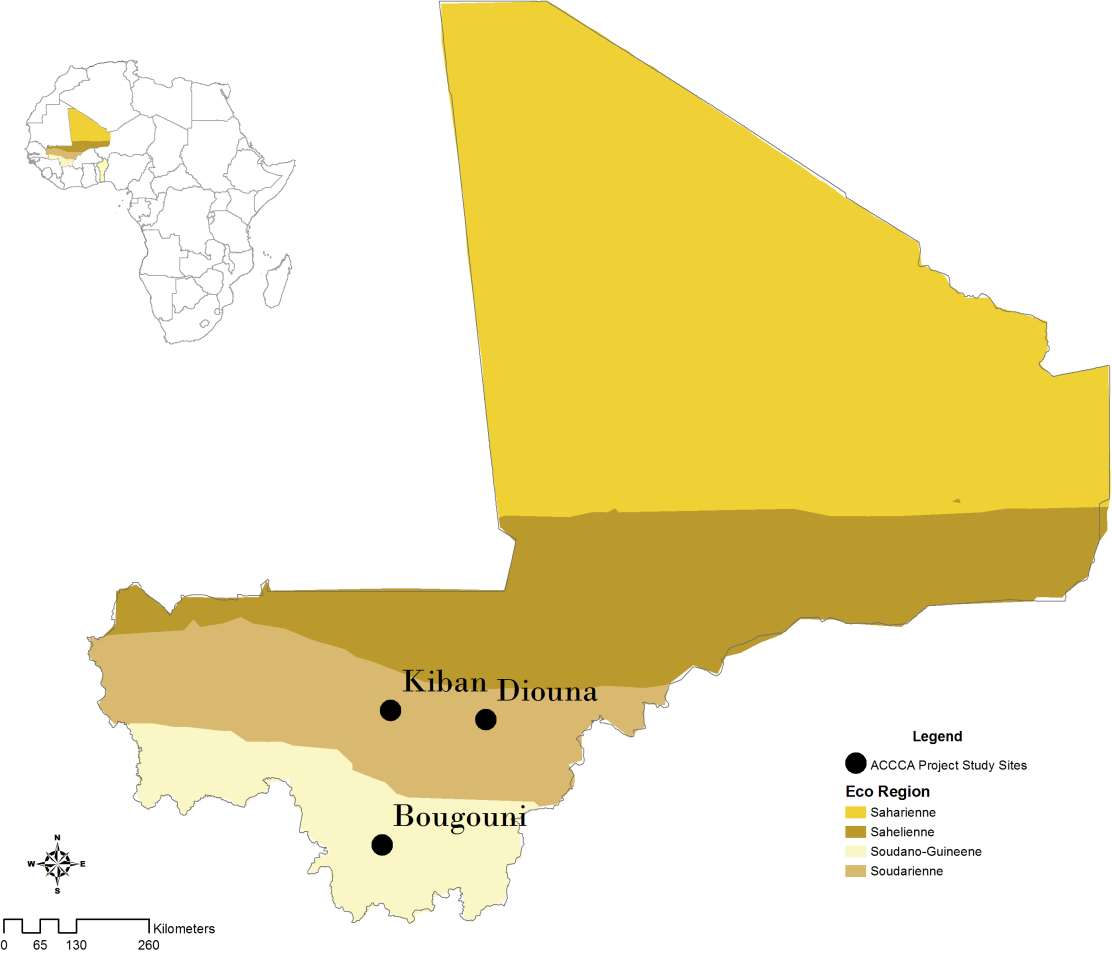


FIGURE 3: ECO-REGIONS

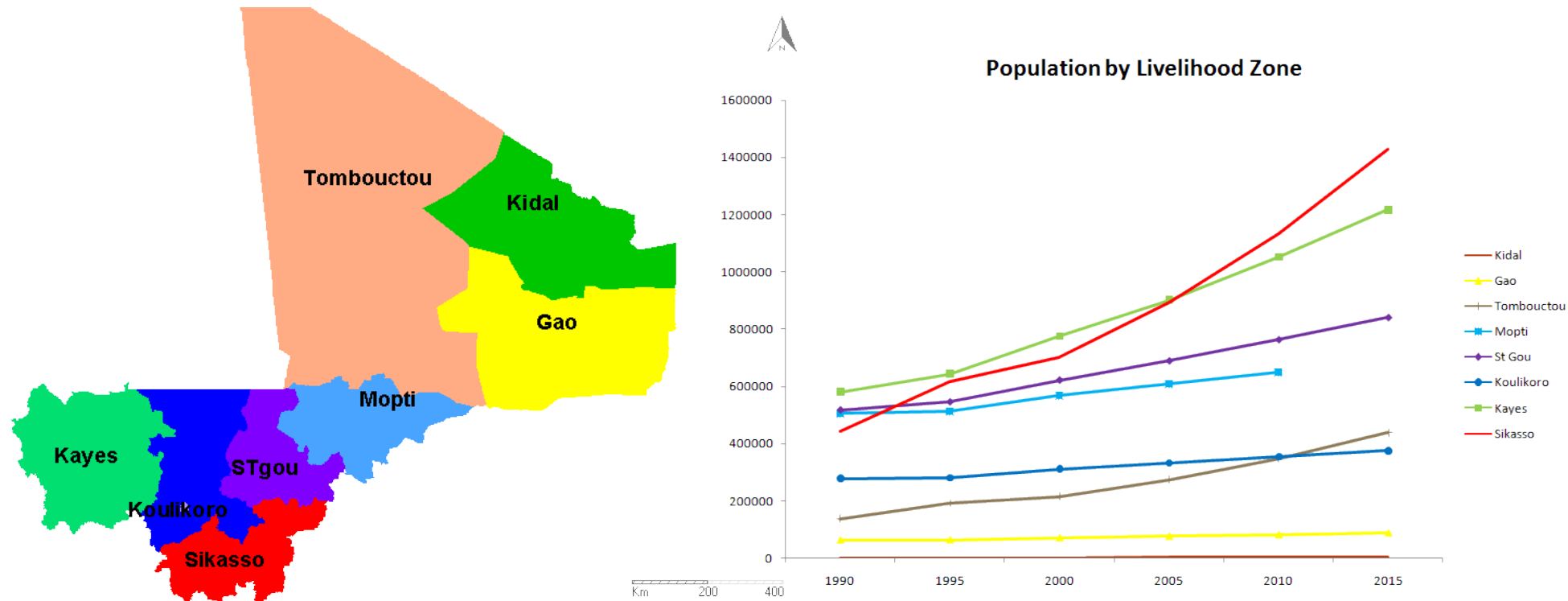


FIGURE 4: POPULATION BY REGIONS

Mali lies in the Saharo-Sahelian zone of Africa. A hot and semi-arid zone of desert environments with limited rainfall and the dependence of a large pastoralist population living on poor quality pasture lands. Factors such as climate, soil, and access to markets influence the patterns of livelihood, which clearly vary from one area to another.

Anthropogenic pressures are continually leading to habitat destruction, particularly in areas where water resources are less erratic. Declining fish catches and overpopulation in vulnerable flood plains of the Niger river is an increasing problem. Water contamination and damage to riparian habitat is already severe. Reduced water quality is already a factor, due to urban development activities such as excessive exploitation of surface and groundwater for municipal use, as well as lack of sewage treatment plants.

Projected population growth rates indicate that difficult times lie ahead for the country. Increasing population pressures are likely to pose more severe threats on already limited resources, further degrading the ecosystem services upon which livelihoods depend. Source, Gridded Population of the World, 2002

CLIMATE CHANGE ANALYSIS ²

Description	Threshold for initiation	Observed (20th century) ³	Predicted (21st Century) ⁴	Impacts	Graphics	Key references
<i>Simple extremes based on climate statistics</i>						
Higher maximum temperatures	Kiban	San				
More hot summer days ⁵						
Higher minimum temperatures						
Fewer frost days						
More heavy 1-day precipitation ⁶						
More heavy multi-day precipitation events ⁷						
<i>Complex event-driven extremes</i>						
More drought ⁸						
More heat waves ⁹						
More floods						
More wet spells						
More tropical storms						
More intense El Niño events						
Changes in growing season ¹⁰						

² Modified from Easterling et al. 2007 and Keller et al. 2006

³ Probability ranges: Virtually Certain, >99%; Very likely, 90 to 99%; Likely, 67 to 90%; Possible, 33 to 66%; Unlikely, 10 to 33%; Very unlikely, 1 to 10%; Improbable, <1%.

⁴ Degree of model agreement or plausibility: virtually certain, many models analyzed have shown such a change and all show it; very likely, a number of models show the change, or it is physically plausible; Possible, only a few models demonstrate this, results mixed; unlikely, not shown in models nor physically plausible; very unlikely, not shown in model output; improbably, not shown in model output.

⁵ Intra-annual extreme temperature range, defined as the difference between the highest temperature of the year and the lowest

⁶ Number of days with precipitation greater than XXX (i.e. 10) mm; Simple daily intensity index, defined as the annual total precipitation divided by the number of wet days

⁷ Maximum 5-day precipitation total

⁸ Maximum number of consecutive dry days; Drought conditions are the effect of prolonged and complex sets of conditions, involving months- to years-long precipitation deficits and soil moisture characteristics that this simple index cannot represent. Rather, the index may be apt to measure the tendency – already hypothesized – towards longer dry spells separating intensified wet events, as suggested by the precipitation indices, and this particular association may be in fact more relevant to flood-related vulnerability studies due to heavy rainfall events such as have been observed over the continental U.S. (Kunkel, 2003).

⁹ Heat wave duration index, defined as the maximum period of at least 5 consecutive days with maximum temperature higher by at least 5° C than the climatological norm for the same calendar day

¹⁰ Growing season length, defined as the length of the period between the first spell of five consecutive days with mean temperature above X (e.g 5)° C and the last such spell of the year

BASIC STATISTICS

[illegible]

Historical Long Term Precipitation	January	0	0	0	0	0	0	1	1	1
	February	0	0	0	0	0	0	2	1.58	1
	March	5	3.486	3	2	1.204	1	14	11.333	9
	April	9	6.889	5	9	7.714	6	46	41.494	37
	May	32	27.208	23	37	32.776	28	97	91.926	86
	June	100	91.208	83	89	83.653	79	163	157.642	152
	July	192	181.93	174	183	177.85	173	255	248.333	241
	August	257	244.16	232	239	232.65	226	339	332.42	326
	September	147	135.25	124	130	124.14	119	241	229.333	217
	October	34	28.833	24	25	22.327	20	102	92.568	83
	November	3	2.611	2	2	1.653	1	19	15.802	13
	December	0	0	0	0	0	0	3	1.852	1
Historical Long Term Minimum Temperature	January	13.9	13.36	12.9	13.3	12.782	12.3	17	16.83	16.5
	February	17	16.364	15.8	16.8	15.969	15.1	19.6	19.532	19.3
	March	20.6	19.957	19.4	20.4	19.678	18.9	22	21.774	21.5
	April	23.6	23.108	22.6	23.7	23.088	22.4	23.6	23.147	22.7
	May	25.2	24.928	24.4	25.4	25.055	24.7	23.3	22.717	22.1
	June	24	23.724	23.2	24.1	23.822	23.5	22.3	21.784	21.3
	July	22.2	21.986	21.4	22.3	22.206	22.1	21.5	21.256	20.9
	August	21.7	21.463	20.9	21.7	21.647	21.6	21.3	21.095	20.8
	September	21.8	21.51	20.9	22.2	22.067	22	21.1	20.854	20.5
	October	20.9	20.614	20	21.5	21.292	21	21	20.723	20.4
	November	17.4	16.971	16.5	17.7	17.435	17.2	19.3	19.281	19.1
	December	14.6	14.063	13.6	14.4	14	13.6	16.9	16.804	16.6
Historical Long Term Maximum Temperature	January	33.1	32.789	32.2	33.1	32.886	32.7	33.4	33.246	32.9
	February	36.2	35.897	35.4	36.3	36.11	35.9	35.4	35.062	34.7
	March	38.4	38.178	37.7	38.5	38.394	38.3	36.5	35.978	35.4
	April	39.4	39.085	38.5	39.5	39.363	39.3	36.4	35.791	35.2
	May	39.4	39.05	38.5	39.1	38.837	38.6	35.4	34.751	34.1
	June	36.6	36.178	35.6	36.4	36.122	35.9	33	32.484	32
	July	32.9	32.551	32.099	32.7	32.496	32.3	30.8	30.509	30.3
	August	31.1	30.814	30.3	31.1	30.876	30.7	29.9	29.723	29.5
	September	32.2	31.939	31.4	31.9	31.771	31.6	30.7	30.453	30.2
	October	34.9	34.601	34	34.6	34.469	34.4	32.7	32.3	31.9
	November	34.9	34.692	34.1	34.8	34.676	34.6	33.4	32.939	32.5
	December	32.7	32.312	31.8	32.7	32.451	32.2	32.8	32.549	32.2

Population	Population 1990	55555	48164. 5	40774	163183	163183	163183	77828	77828	77828
	Population 1995	60879	52916. 5	44954	169957	169957	169957	106499	106499	106499
	Population 2000	73071	63669. 5	54268	193836	193836	193836	121862	121862	121862
	Population 2005	84576	73872	63168	213177	213177	213177	154098	154098	154098
	Projected Population 2010	97746	85583	73420	233988	233988	233988	194650	194650	194650
	Projected Population 2015	112228	98468. 5	84709	255113	255113	255113	244443	244443	244443
Elevation	Elevation	456	349.56 9	303	294	278.77 6	270	379	333.741	316

ADDITIONAL MATERIALS

Project Proposal - <http://www.acccaproject.org/evolution/modules/knowledgebox/io/file.php?entry=267&field=10>

Supporting documents -