United Nations Environment Programme
World Conservation Monitoring Centre
(UNEP-WCMC)

GEF project 'Climate Change and Protected Areas in West Africa'
(CCPAWA)

FINAL VERSION

Activity 1.1
Data review and gap filling strategy

Review of Baseline Study
(Identifying current data gaps and status of data acquisition for Climate Change and Protected Areas in West Africa)

English

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GEF

The UNEP World Conservation Monitoring Centre (UNEP-WCMC) was established in 2000 as the biodiversity assessment and policy implementation arm of United Nations Environment Programme (UNEP). The roots of the organisation go back to 1979, when it was founded as the IUCN Conservation Monitoring Centre. We are the custodians of the World Database on Protected Areas (WDPA), a joint project with IUCN – The World Conservation Union and their World Commission on Protected Areas. The WDPA is the only global database of marine and terrestrial protected areas, comprising GIS spatial data and spatial attribute data, in existence. It is used to report the progress towards targets such as United Nations (UN) Millennium Development Goal 7, the Convention on Biological Diversity (CBD), UN List of Protected Areas as well as providing support to policy and decision managers.

'GEF West Africa data review and gap filling strategy, prepared by Elise Belle, Programme Officer – Protected Areas Programme, with funding from Global Environment Facility (GEF) via UNEP.

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Available From: UNEP-World Conservation Monitoring Centre (UNEP-WCMC)
219 Huntingdon Road, Cambridge CB3 0DL, UK
Tel: +44 1223 277314; Fax: +44 1223 277136
Email: protectedareas@unep-wcmc.org URL: http://www.unep-wcmc.org

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GEF West Africa data review and gap filling strategy

Executive Summary

UNEP-WCMC is currently implementing a 5-year full-sized GEF project entitled "*Protected Areas and Climate Change in West Africa*". The geographic scope of the project covers 5 pilot countries in West Africa: Chad, Gambia, Mali, Sierra Leone, and Togo, and an additional 3 countries (Burkina Faso, Côte d'Ivoire and Ghana) will also participate in regional activities related to trans-boundary conservation. There are potentially huge benefits to the whole West Africa region from using the tools developed to increase the resilience of protected areas to climate change at a regional scale.

The aim of this review study is to revisit and update the conclusions of the baseline study 'Identifying current data gaps and status of data acquisition for Climate Change and Protected Areas in West Africa' in order to gain a more up-to-date overview of the current data availability situation and provide some additional material. The initial baseline study was carried out during the preparatory phase of this project and published in September 2009. It identified the current gaps and status of data acquisition of the available spatial (GIS) datasets on protected areas (PA) and impacts of climate change (CC) in the project region. A GIS geo-database was compiled, containing spatial attribute and available metadata about all data layers collated on protected areas, conservation priority areas and climate change for the study area. However, it was found that in country capacity issues have prevented the continuous and effective management of protected area information, and the acquisition of consistent and complete datasets was therefore a challenge.

Here, we were able to consolidate the findings of the baseline study. No total country update has been carried out in the World Database on Protected Areas (WDPA)[1] for these countries since 2009. However, we did change and improve the methodology used to compile and assess the quality of the data. We therefore present new bilingual maps of protected areas in West Africa, including new data (not included in the WDPA), as well as data quality maps. Out of the five core countries, Chad and Mali remain the countries with the highest recorded coverage of protection[2], whilst Togo and Sierra Leone have the highest number of recorded sites but a relatively low total recorded cover. Overall, out of the five core countries, Mali had the highest data quality.

Furthermore, an analysis of the UN Millennium Development Goals (MDGs) was carried out for each country. It highlighted the fact that for all countries except Togo the proportion of terrestrial and marine areas protected was less than 10%. However, this could be due to a lack of data fulfilling the necessary requirements to be included in the WDPA, therefore leading to a low recorded coverage. Finally, a number of additional socio-economic datasets were identified which could be used in the future for the production of additional maps.

This study confirmed the difficulty in acquiring good quality datasets due to a lack of capacity in country and difficulties in communication, as well as an absence or lack of funding for protected areas. This report will guide the determination of regional and national data priorities, which will be discussed at regional and national workshops. National consultants will subsequently be hired in each country to collect data suitable for future project phases. In addition, we will work with a range of technical partners with technological and research expertise in areas such as climate modelling, development of geospatial assessment tools and study of human impacts on the environment.

[1] The World Database on Protected Areas (WDPA) is the most comprehensive global spatial dataset on marine and terrestrial protected areas available. The WDPA is a joint project of UNEP and IUCN, produced by UNEP-WCMC and the IUCN World Commission on Protected Areas working with governments and collaborating NGOs.

[2] Calculated by summing up the reported areas.

1. Project Objective

UNEP-WCMC has received funds from the Global Environment Facility (GEF), through UNEP, to implement a project entitled "*Protected Areas and Climate Change in West Africa*" (CCPAWA).

The objective is to ensure the conservation and sustainable management of representative ecosystems and biodiversity by assisting countries to assess climate change related risks, develop guidelines for adaptation, and build capacity for mainstreaming risk based adaptation in protected areas. The specific aims are to undertake vulnerability assessment and develop risk reduction strategies for existing PA systems, carry out gap analysis studies and spatial planning related to the extension of PA networks, and build capacity at to ensure that all stakeholders can take advantage of the tools developed.

2. Study Region and Timeframe

The project runs over the period 2011-2015, and works in the following 5 pilot countries: Chad, Gambia, Mali, Sierra Leone and Togo; it will also involve 3 other countries (Burkina Faso, Côte d'Ivoire and Ghana) in the transboundary aspects of the project.

The inception meeting will take place in Banjul, The Gambia from 29th March to 1st April 2011, where the results of the review will be presented. Based on the findings of this study and following national workshops, national data collection will start, focusing on the identified priority data areas.

3. Baseline study aims

The aim of the baseline study was to identify the current gaps and status of data acquisition of the available spatial (GIS[3]) datasets on protected areas (PA) and impacts of climate change in the region. The work covered both existing protected areas and proposed as protected areas, including national and transboundary sites. A GIS geo-database was compiled, containing spatial, attribute and available metadata about all data layers collated on protected areas, conservation priority areas and climate change for the study region.

The following activities were carried out:

A. Collation of baseline GIS data detailing the existing protected areas in the study region from the World Database on Protected Areas (WDPA)

a) Coverage of protected areas in study region (extraction of existing national and international protected areas from the WDPA).
b) Current status of protected areas information in the WDPA (identification of incomplete spatial and attribute records on protected areas currently available).
c) Review and identification of data contact points for data verification and acquisition.

B. Collation of additional baseline GIS datasets detailing existing plans or proposals for protected areas and the extents of other biodiversity and conservation priority areas

[3] Geographical Information System: A system of computer hardware and software used for storage, retrieval, mapping, and analysis of geographic data that is references to a map projection in an earth coordinate system

a) Collation of existing information on conservation priority areas (e.g. Key Biodiversity Areas (KBAs), Important Bird Areas (IBAs), traditional conservation areas, community forests, and Biodiversity Hotspots).
b) Review and identification of data contact points for data acquisition.
c) Identification of existing opportunities to strengthen existing transboundary PA networks or conservation priority areas.

C. Collation of existing GIS layers and information on the impacts of climate change

a) Collation of existing information on scenarios of climate change and potential impact upon rainfall, sea level, habitat, vegetation, wildlife and human population.
b) Review and identification of data contact points for data acquisition.
c) Identification of data gaps within available data and suggested approaches for future data acquisition.

Using data layers collated so far, a range of maps were produced on the themes of protected areas, biodiversity and conservation priority areas, human population, and key areas of vulnerability (e.g. climate change).

Hard copy maps of the West Africa region have been prepared, with country level maps being available as digital image files (jpeg, tiff). An outline of the map documents and digital image files created are listed in Annex 1.

4. Review of baseline study

The aim of this report is to revisit the conclusions of the baseline study which was carried out during the preparatory phase of the project. By reviewing the current data availability situation and identifying 'data gaps', this study provides the basis for guiding the data collection activities. It will be presented at the project inception meeting, and will inform the national workshop to decide on a strategy to collect national data.

We first updated the information presented under each study tasks, A, B and C. Notably, we carried out the following activities:

- A new map of protected areas in West Africa, including data not included in the WDPA.
- A review of the methodology used to assess the quality of data for each country, and a new data quality map.
- An additional section on the use of spatial data to report progress towards the UN Millennium Development Goals (MDGs) and the 2010 Biodiversity Target of the Convention on Biological Diversity (CBD).
- The identification of new datasets on socio-economic data which could be used in the project.

5. Methodology

The GIS software used to store and map the data collated for this study (and the original baseline study) is ESRI ArcGIS 9.3. An outline of the data collated during both the baseline and review studies is can be found in Annex 1.

6. Updated Results

Study task A: Summary and Update

The World Database on Protected Areas (WDPA) is the only global database of marine and terrestrial protected areas, comprising GIS spatial data and aspatial attribute data in existence. Using the information currently available in the 2010 WDPA Annual Release, a number of tables and maps have been produced.

a) Coverage of Protected Areas in Study Area

Each table created in the baseline study contained key attributes such as site name, designation or convention, IUCN protected area management category, legal status, establishment date, total area as well as the data source.

Using the WDPA December 2010 release, the number of protected areas in the region and their total reported area have been updated in the tables below. Protected areas have been divided between nationally designated and internationally recognised. A list of all national and international protected areas extracted from the WDPA for the study area is presented in Annex 2.

One of the aims of this review was to look at the national effort, rather than possibly confusing the picture by including areas that have an international recognition. These internationally recognised protected areas are therefore not included in the subsequent analyses. However, as a matter of fact, the boundaries of national protected areas and internationally recognised sites often overlap.

In this review, we excluded degazetted PA as these areas are no longer included in the WDPA. Furthermore, we did not include proposed protected areas, as these do not provide a reliable indication of the current protected areas network; in addition, the information related to proposed sites is sometimes outdated, and therefore no longer relevant. Therefore, at the national level, only designated protected areas will be considered.

Table 1 also includes data on proposed protected areas for information purposes. It can be seen that out of the five core countries, Togo and Sierra Leone have the highest number of protected areas. However, Chad has by far the highest total coverage[4], followed by Mali.

Table 1. Number and reported area of nationally designated and proposed protected areas per country.

Country	Status	Number of PAs	Total Reported Area (km^2)
Gambia	Designated	5	142
	Proposed	*2*	*230*
Mali	Designated	10	26,004
	Proposed	*3*	*5672*
Sierra Leone	Designated	39	2,923
	Proposed	*19*	*2252*
Chad	Designated	9	114,940
	Proposed	*4*	*14203*
Togo	Designated	90	6,041

[4] Calculated using total reported area

Burkina Faso	Designated	72	38,226
	Proposed	*1*	*450*
Côte d'Ivoire	Designated	240	39,219
Ghana	Designated	302	36,660
	Proposed	*11*	*790*

For a better understanding of the protected area network, Table 2 shows the distribution of IUCN categories for each country. It can be seen that the IUCN category of most protected areas in West Africa has not been defined.

Table 2. Number and reported area of nationally designated protected areas per country by IUCN category**.**

Country	**Number of PAs**	**IUCN Category**	**Total Reported Area (km^2)**
Gambia	2	II	25
	2	IV	7
	1	Not Reported	110
Mali	1	II	1,878
	7	IV	23,034
	2	Not Reported	1,093
Sierra Leone	4	II	1,436
	1	IV	12
	1	VI	86
	33	Not Reported	1389
Chad	2	II	4,140
	7	IV	110,800
Togo	3	II	3,573
	6	IV	719
	81	Not Reported	1,749
Burkina Faso	3	II	5,343
	9	IV	23,209
	60	Not Reported	9,674
Côte d'Ivoire	2	Ia	1,280
	6	II	17,405
	1	IV	950
	1	VI	621
	230	Not Reported	18,963
Ghana	1	Ia	386
	7	II	10,927
	3	IV	71
	5	VI	1,352
	286	Not Reported	23,925

Information on international protected areas is summarised in Table 3, while details with regards to the international conventions are available in Table 4.

Table 3. Number and reported area of internationally recognised protected areas per country.

Country	Number of international PAs	Total Reported Area (Km^2)
Gambia	3	312
Mali	3	69,469
Sierra Leone	1	2950
Chad	6	124,051
Togo	4	12,104
Burkina Faso	5	8,312
Côte d'Ivoire	11	33,987
Ghana	7	1,862

Table 4. Total number and reported area of internationally recognised protected areas per country by convention.

Country	#	International Designation	Total Reported area (Km^2)
Gambia	3	Wetlands of International Importance (Ramsar)	312
Mali	1	UNESCO-MAB Biosphere Reserve	25,000
	1	Wetlands of International Importance (Ramsar)	41,195
	1	World Heritage Site (v)(vii)	3,274
Sierra Leone	1	Wetlands of International Importance (Ramsar)	2,950
Chad	6	Wetlands of International Importance (Ramsar)	124,051
Togo	4	Wetlands of International Importance (Ramsar)	12,104
Burkina Faso	2	UNESCO-MAB Biosphere Reserve	5,320
	3	Wetlands of International Importance (Ramsar)	2,992
Côte d'Ivoire	2	UNESCO-MAB Biosphere Reserve	17,700
	6	Wetlands of International Importance (Ramsar)	1,273
	2	World Heritage Site (ix)(x)	11,714
	1	World Heritage Site (vii)(x)	3,300
Ghana	1	UNESCO-MAB Biosphere Reserve	78
	6	Wetlands of International Importance (Ramsar)	1,784

For inclusion in the WDPA, data submissions must meet a number of requirements[5] including the following:

- All protected areas must fit the IUCN definition of a protected area as a 'clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values'.[6]
- Spatial data *must* be provided. The spatial boundaries of protected areas in the WDPA are represented by ArcGIS shapefiles in polygon format. Where boundary data is unavailable, a geographic location (latitude and longitude) can be given as a reference point for the

[5] UNEP-WCMC. 2010. Data Standards for the World Database on Protected Areas, UNEP-WCMC.

[6] Dudley N. Editor. 2008. Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN.

protected area. A data submission is only accepted if a geographic location is provided, preferably as a spatial boundary.

- A number of 'minimum' attributes for each protected area *must* be included. Attributes represent essential pieces of information about the spatial data that aid in the analysis, reporting and tracking of trends in the growth and coverage of the world's protected areas. A data submission will only be accepted if the minimum attribute information is provided.
  Minimum attributes include the following: official name, country, sub-national location, designation, IUCN Protected Area Management Category, reported area (km^2), current legal or 'official' standing of the site, year created, governance type, management authority, and management plan.
- Source information *must* be provided for both spatial and attribute data. Sources of data may vary for multiple polygon datasets or even attributes. A data submission will only be accepted if the minimum source information is provided.
  Source information include the following: ownership/authorship of the data, responsible party and contact details, date at which the data was created, Spatial Reference System, scale of the dataset if known, and original language.

Following the baseline study, additional protected area datasets were identified, which did not fulfil all the necessary requirements to be included in the WDPA. However, they were included in the new map and indicated with different shading (Figure 1).

b) Current status of protected areas information in the WDPA for the study area

By examining the spatial data coverage, attribute completeness and the data source of the protected areas information in the WDPA, we can identify data gaps and propose an approach for data improvement.

During the baseline study, the completeness of each attribute was assessed for each country, when it was last updated, who was the data source (e.g. governmental or non-governmental source), and whether boundary (GIS) data was present and how detailed that boundary was. This assessment on the data was performed on the data available in the WDPA 2009 release for each country.

In this review, we used a different methodology to assess the quality of the data in the World Database on Protected Areas (WDPA), as outlined below.

The Protected Areas Programme at UNEP-WCMC developed a methodology to assess the quality of the data contained in the WDPA per country. It is recognised that the level of quality per country mainly depends on three factors: (a) the percentage of boundary data for each country; (b) the recency of the data; (c) the completeness of the attributes. The next section will explore in detail each of these quality criteria and the way the quality index was calculated.

(a) Percentage of national protected areas represented by boundary data over the country's dataset

The WDPA is a georeferenced dataset which holds both geographic and descriptive information. The geographic data illustrates the location of a site and it is represented as either a point (the coordinates of the central point of the protected area) or a polygon (the precise boundary of the site). In a high quality dataset, each protected area is represented by its boundary, rather than by a point. Table A illustrates how scores have been assigned to each country's dataset according to the percentage of polygons. The higher the percentage, the better the dataset. Because of the greater importance of this criterion compared to the other two, it was weighted by 50%.

Table A. Score system for quality criteria A - Percentage of national protected areas represented by boundary data.

% of boundary data	Score A	Score A05 (weighted)
0-10%	1	1.5
10.1- 60%	0.5	0.75
60.1-90%	0.25	0.38
90.1-100%	0	0

(b) *Recency of the dataset for each country's dataset*

The WDPA has been compiled with data provided by national governments, NGOs, international organisations, researchers, academics and other contributors for the past 30 years. While some countries have been regularly submitting updates, the lack of an established communication channel prevented others to regularly submit their most recent data. This criterion identifies the date of the last total country's update, and assigns a different score depending on this factor, as illustrated in table B.

Table B. Score system for quality criteria B - Year of last complete update for each country.

Year of last complete update	Score B
Prior to 2000	1
2000-2004	0.5
2005-2008	0.25
2009-2010	0
not available (na)	1

(c) *Completeness of the attribute data in each country's dataset*

The boundary data submitted to the WDPA must be accompanied by attribute data, information that describes specific features of the protected areas. The WDPA distinguishes between minimum, core and enhanced attributes, depending on the importance of each attribute for both accurate identification of the site and analysis purposes. If the dataset lacks of minimum information (i.e. name, designation, status, year of establishment, size information) the attribute quality is considered low. When this is information is complete, the quality of the attributes is medium. If the dataset also has enhanced information (IUCN category, sub-location, governance and management authority) it obtains a high score in terms of attributes. Scores and quality of the attributes are explained in Table C.

Table C. Score system for quality criteria C - Level of completeness of the attributes for each country.

Completeness of the attributes	Score C
Low (minimum attributes incomplete)	1
Medium (minimum attributes complete)	0.5
High (enhanced attributes complete)	0

The overall quality of a country's dataset is given by the sum of these three indicators as shown in Table D. As a general rule, 'Very poor' are those datasets that have a high score in all three quality criteria, while 'Poor' are those that are high in two out of three. Dataset are classified as 'Good' when they obtain a medium to low score in two quality dimensions, and 'Very Good' when they scored low in all three indicators.

Table D. Score system for WDPA quality assessment.

Quality assessment	Total
Very poor	3.00+
Poor	2.01 – 2.99
Good	1.01 – 2.00
Very Good	0.00 – 1.00

Table 5 and Figure 2 show the quality of protected areas in the WDPA by country, current to December 2010, based on the methodology described above.

Table 5. Quality of data on protected areas held in the WDPA by country, current to December 2010.

Country	Total Number of points	Total Number of Polygons	Total Number of sites	Percentage of polygons	Score A	Score A +50%	Recency	New date	Score B	Attribute quality	Score C	Total 05	TOTAL	Quality
Gambia	3	4	7	0.57	0.50	0.75	1980	1980	1.00	low	1.00	2.75	2.50	Poor
Mali	3	10	13	0.77	0.25	0.38	2003	2003	0.50	medium	0.50	1.38	1.25	Good
Sierra Leone	24	34	58	0.59	0.50	0.75	1999	1999	1.00	low	1.00	2.75	2.50	Poor
Chad	4	9	13	0.69	0.25	0.38	1987	1987	1.00	low	1.00	2.38	2.25	Poor
Togo	31	59	90	0.66	0.25	0.38	1987	1987	1.00	low	1.00	2.38	2.25	Poor
Burkina Faso	*1*	*72*	*73*	*0.99*	*0.00*	*0.00*	*2003*	*2003*	*0.50*	*medium*	*0.50*	*1.00*	*1.00*	*Very Good*
Côte d'Ivoire	*6*	*234*	*240*	*0.98*	*0.00*	*0.00*	*1980*	*1980*	*1.00*	*low*	*1.00*	*2.00*	*2.00*	*Good*
Ghana	*59*	*254*	*313*	*0.81*	*0.25*	*0.38*	*1999*	*1999*	*1.00*	*low*	*1.00*	*2.38*	*2.25*	*Poor*

When re-examining the data quality for the five countries, we confirmed the results of the baseline study and concluded that:

- In-country capacity issues have prevented effective and continuous management of protected areas information.
- Acquisition of up to date spatial (GIS) data from the government is unlikely to be possible in the near future.
- A review of the existing information with national consultants, and mapping support from UNEP-WCMC, should improve the quality and suitability of the datasets for future project phases.

During the initial baseline study, a number of contact points in government agencies responsible for protected area data management or within NGOs were identified and contacted (Annex 3). However, most contacts did not provide any suitable additional data.

Therefore, as already planned in the project, national consultants will be hired to undertake data collection activities for each country. Prior to the start of the data collection, national workshop will be held in each country to decide on the best national data collection strategy. Some of the national data collection activities and information gathered could include: PA boundaries, PA category, management effectiveness, type of PA financing, conservation goals, species and habitat distribution.

c) Identification of data contact points for data verification and acquisition

Our experience of protected area data management and the methods employed in the coordination of, and communication with, data providers has led us to undertake the following methodology for the baseline study:

i. Review of existing data contact information in the WDPA.
ii. Identification of additional points of contact within NGO and intergovernmental organizations

The government points of contact identified in the baseline study for protected areas information are outlined in Annex 3. The WDPA had no active point of contact regarding protected areas data management. During the baseline study, some initial letters of request were sent to Protected Areas departments; however, none of these have resulted in a regular collaboration with the WDPA.

In addition to these official points of contacts, a network of contacts from NGOs and intergovernmental organizations was also compiled (Annex 4). It is hoped that some of these points of contact will be able to assist in the data acquisition process.

As recommended in the baseline study, after the preparatory phase of the project, contacts were made with the IUCN Regional Office in West Africa. IUCN PAPACO is now our main regional partner for the implementation of the project. Contacts have also been initiated with IUCN WCPA West and Central Africa vice Chair. In addition, more contacts with NGOs and intergovernmental organizations will be made.

Figure 1. Protected Areas within West Africa, including data from the WDPA and additional data.

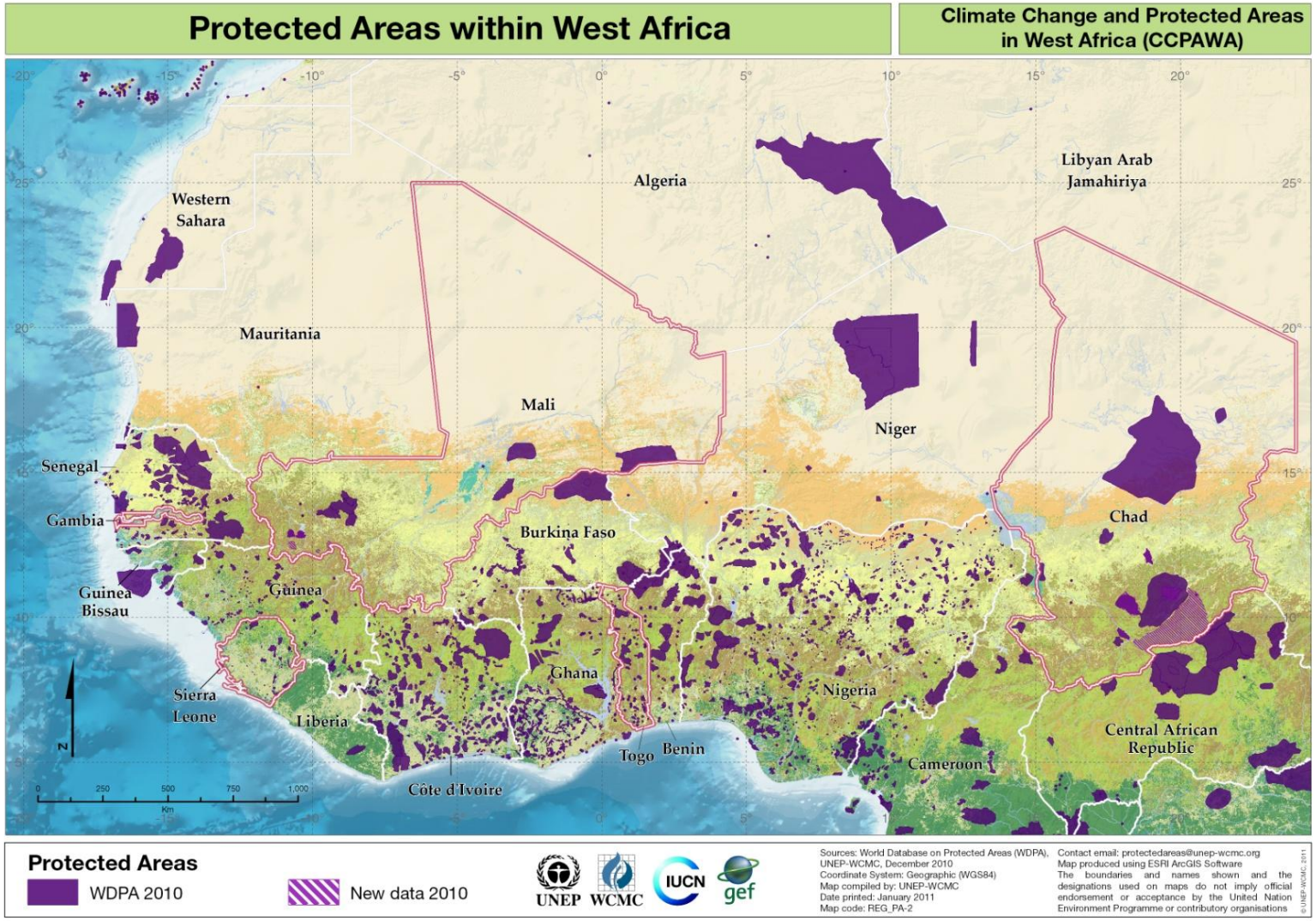
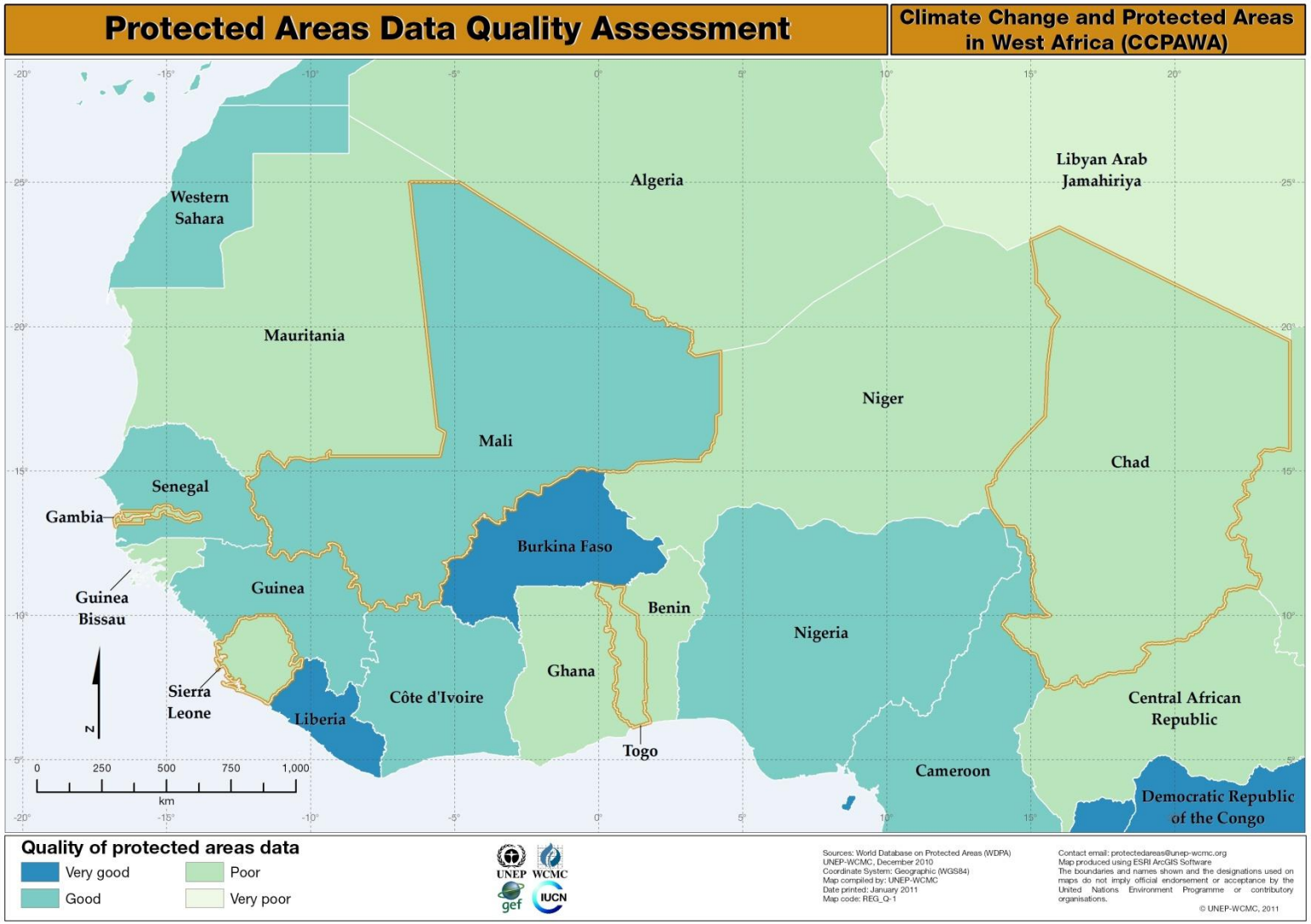


Figure 2. Quality Assessment map for protected areas in West Africa.



Study task B: Summary and Review

UNEP-WCMC has a number of key biodiversity and conservation priority datasets already in-house, as well as key contacts within NGO partners who can assist in data acquisition.

a) Collation of key biodiversity and conservation priority datasets

Annex 2 outlines the datasets collected, grouped under common study themes such as protected areas, biodiversity, conservation priority and climate change.
Figure 3 shows key biodiversity and conservation priority layers collated during the baseline study for the West Africa region. The map includes BirdLife International's Important Bird Areas, WWF G200 Terrestrial Ecoregions, Conservation International's Biodiversity Hotspots and the Last of the Wild dataset from the Columbia University Centre for International Earth Science Information Network (CIESIN) and Wildlife Conservation Society (WCS).
Country level maps were also created and are detailed in Annex 1.

b) Identification of contact points for biodiversity and conservation priority datasets held by external organizations/partners

Annex 4 outlines the contact points identified during the baseline study to potentially provide additional biodiversity and conservation priority datasets. Contacts will be initiated or reinitiated with these different organisations.

As recommended in the baseline study, contacts were initiated with Birdlife International's African Partnership in West Africa. Birdlife will constitute one of our partners in the project.

c) Identification of existing opportunities to strengthen existing transboundary protected area networks or conservation priority areas

As Table 6 shows, there are currently two transboundary protected area projects in the study area. In 2007, UNEP-WCMC developed a list of transboundary protected areas (TBPA)[7]. TBPAs were incorporated that fit entirely into the IUCN definition (confirmed international cooperative or sympathetic management through legal or other effective means) and internationally adjoining protected areas that may still require development of collaborative efforts or further formalizing of ongoing cooperation.

Table 6. Internationally Adjoining and transboundary Protected Areas in the study region.

Country	Internationally Adjoining Protected Areas	Name of Protected Area	Category	Size (Ha)	Total Area (Ha)
Cameroon		Kalamaloue National Park	II	6,696	368,294
Chad		Mandelia Faunal Reserve	IV	138,000	
Nigeria		Chad Basin National Park	II	230,000	
Sierra Leone	Sierra Leone - Liberia Transboundary Peace Park	Gola North Forest Reserve	Not Known	75,000	255,000
		Gola East Forest Reserve	Not Known		
Liberia		Lofa Forest Reserve	Not Known	80,000	
		Foya Forest Reserve	Not Known	100,000	

[7] UNEP-WCMC Transboundary Protected Areas Inventory (30 April 2007) see www.tbpa.net/tpa_inventory.html.

In May 2009, the Presidents of Sierra Leone and Liberia announced the establishment of a new Trans-boundary Peace Park[8], to protect one of the largest remaining blocks of intact forest in the Upper Guinea area of West Africa. The Peace Park unites the Gola Forest Reserve in Sierra Leone (75,000 ha) and the Lofa and Foya Forest Reserves in Liberia (80,000 ha and 100,000 ha respectively), with additional forest to provide corridors for the movement of wildlife between them. The work to establish the Peace Park has involved several conservation organisations in the BirdLife International Partnership, working together with the Forest Development Authority (FDA) of Liberia, and the Forestry Division in Sierra Leone. This project may provide the opportunity to strengthen these existing transboundary protected area initiatives. In 2010, the governments of Liberia and Sierra Leone started the formal processes of designating the Gola Rainforest as a shared National Park and Protected Area[9], and establish the 'The Across the River transboundary Peace Park' project to protect the Gola Rainforest.

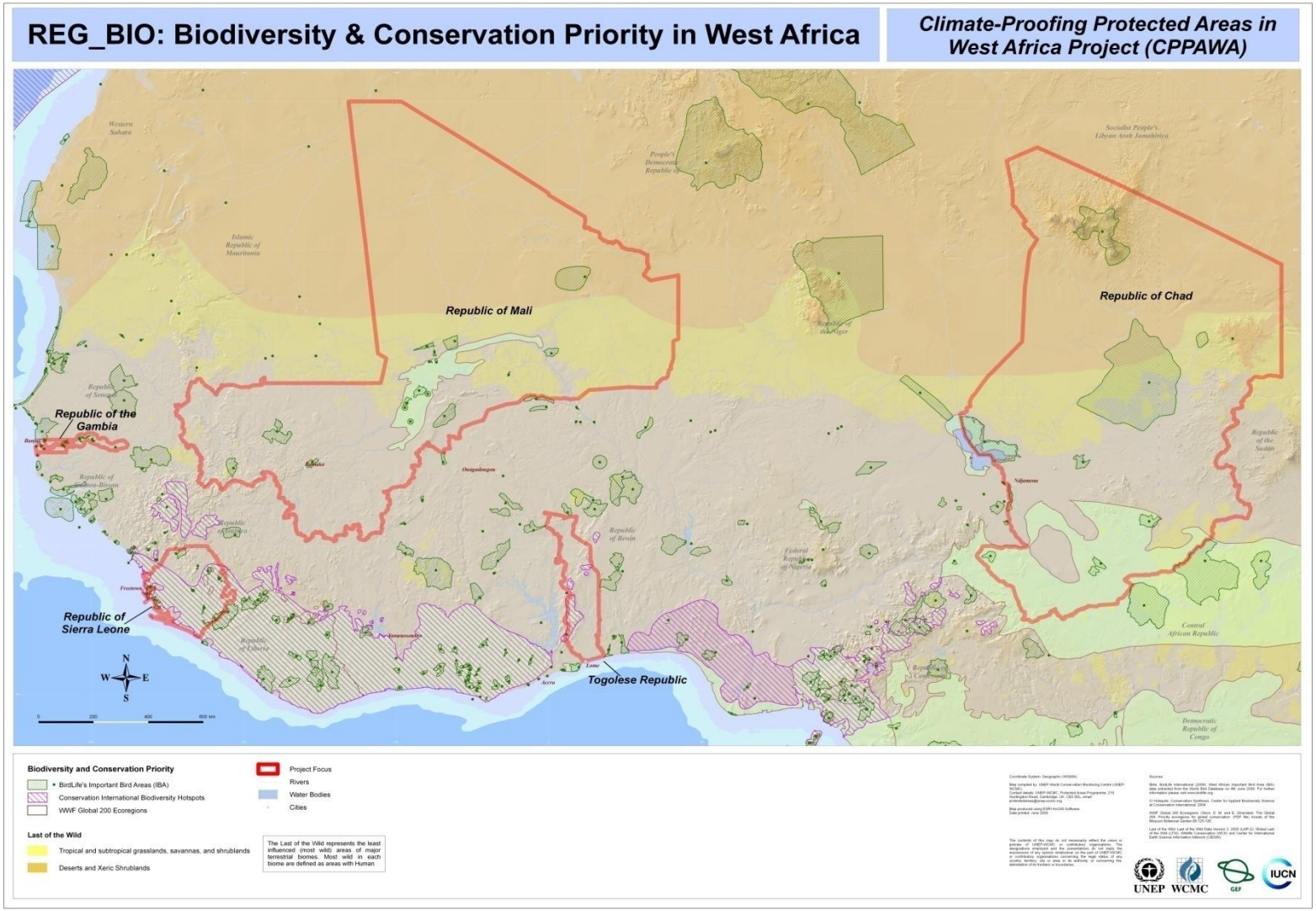
There are potentially important opportunities to develop additional transboundary protected areas in West Africa. These opportunities have been listed and classified by Van der Linde et al. (2001) for the African continent in the following categories: Ecological (e.g. linkages for ecological processes, sustainable use of natural resources), Social and Cultural (e.g. cooperation between communities, improved social security and welfare), Economic and Financial (e.g. tourism, private sector), Political (e.g. cooperation between neighbouring communities), and Institutional (e.g. enhanced capacity and ability to respond to changing situations).

An important part of the project will consist in the creation of new transboundary protected areas and/or corridors within the West Africa region.

[8] Extracted from BirdLife International Press Release entitled 'Trans-boundary Rainforest Park will be a symbol of peace and stability' (15/05/2009) http://www.birdlife.org/news/pr/2009/05/peace_park_west_africa_pr.html.

[9] Extracted from BirdLife International Press Release entitled 'Liberia and Sierra Leone move to designate Gola Rainforest as National Park' (22/11/2010) http://www.birdlife.org/community/2010/11/liberia-and-sierra-leone-move-to-designate-gola-rainforest-as-national-park/.

Figure 3. Biodiversity and Conservation Priority within West Africa.



Study task C: Summary and Review

UNEP-WCMC has a number of key contacts within NGO partners and research institutions that can assist in the acquisition on climate change related data.

a) Collation of existing information on scenarios of climate change and potential impact upon rainfall, sea level, habitat/vegetation, wildlife demographics and human population.

Annex 2 outlines the datasets collected, grouped under common study themes such as protected areas, biodiversity, conservation priority and climate change.
Figures 4 and 5 illustrate some of the data collated on human population for the study, including population density in 2000 and the Human Influence Index (HII), which is a measure of direct human influence on terrestrial ecosystems, produced by WCS and CIESIN. Country level maps were also created and are detailed in Annex 1.
In addition, the National Adaptation Programme of Action (NAPA) documents have been collected for each core country (Mali, Chad, Sierra Leone, Gambia and Togo).

b) Review and identification of data contact points for data acquisition on climate change

Annex 4 outlines the contact points identified during the baseline study to potentially provide additional biodiversity and conservation priority datasets. Contacts will be initiated or reinitiated with these different organisations.

c) Identification of data gaps within available data and suggested approaches for future data acquisition

The baseline study (and the present review) faced a number of problems when trying to acquire consistent up to date datasets on climate change or climate impacts. Even where datasets existed for the West Africa region, often those datasets themselves had gaps or missing information (particularly in Chad and Mali) or were in non-GIS data formats. In a number of climate publications collected for this study, the common reason cited as to why climate models had missing information was due to the lack of individual and institutional capacity within many Africa countries to carry out climate change research.

There is no short term solution to this problem. However, by first working directly with in-country agencies and institutions through this project, a better understanding of their capacity (technical, manpower, and hardware) could be obtained along with an indication of where resources or capacity development projects could be focused in the long term. Second, with the support of UNEP-WCMC, and by working with a range of partners, it is hoped that better data could be obtained.

One of the recommendations of the baseline study was to develop a collaborative partnership with the Center for International Earth Science Information Network (CIESIN) at Columbia University, and with the School of Geography and the Environment (Oxford University Centre for the Environment), who prepared the UNDP Climate Change Country Profiles.

These options have not been pursued yet. However, the project will now involve a close collaboration with the Hadley centre, which developed a regional climate modelling system, PRECIS, which is user-friendly and freely available to developing countries.

Figure 4. Population Density and Protected Areas within West Africa.

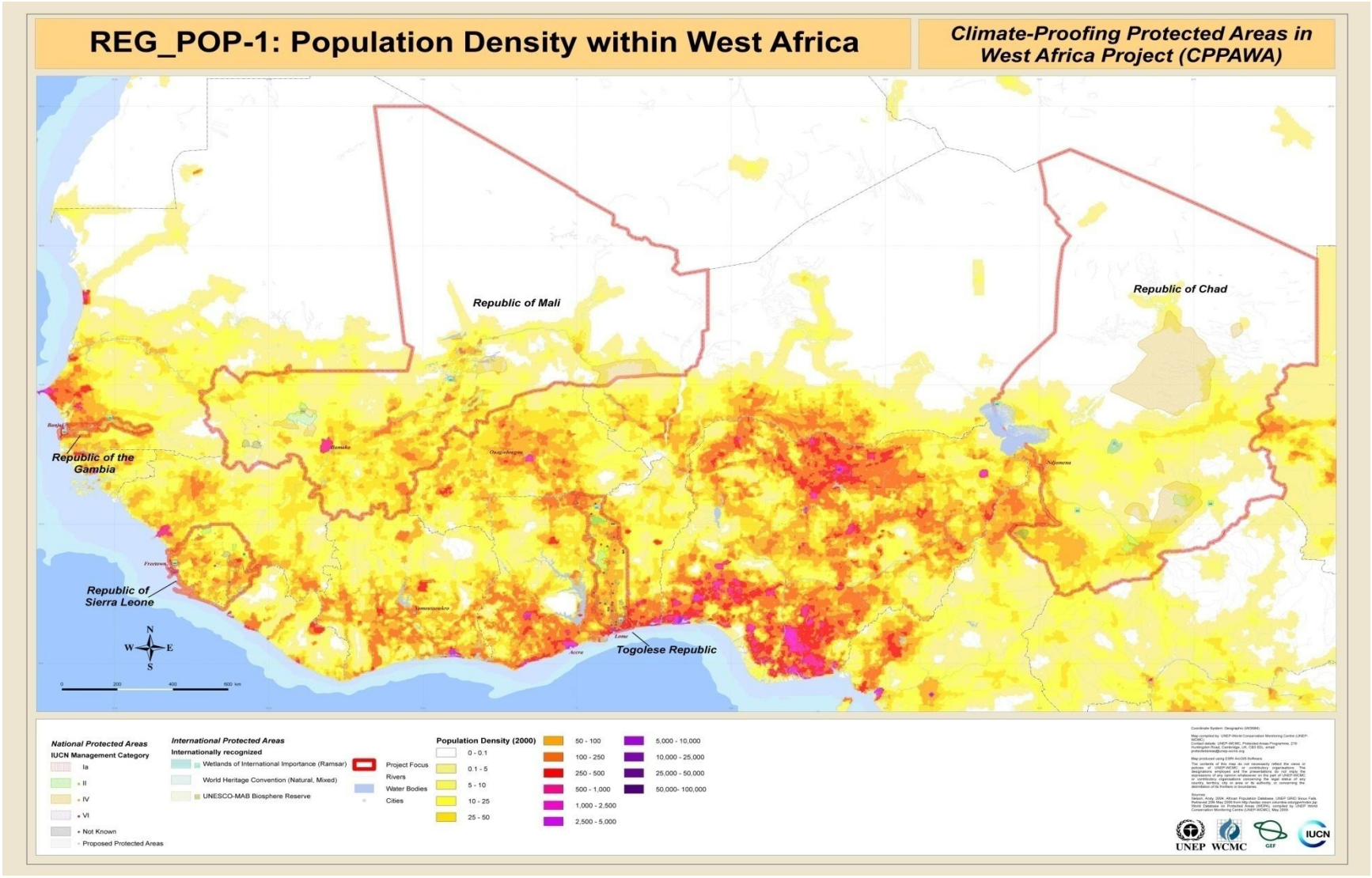
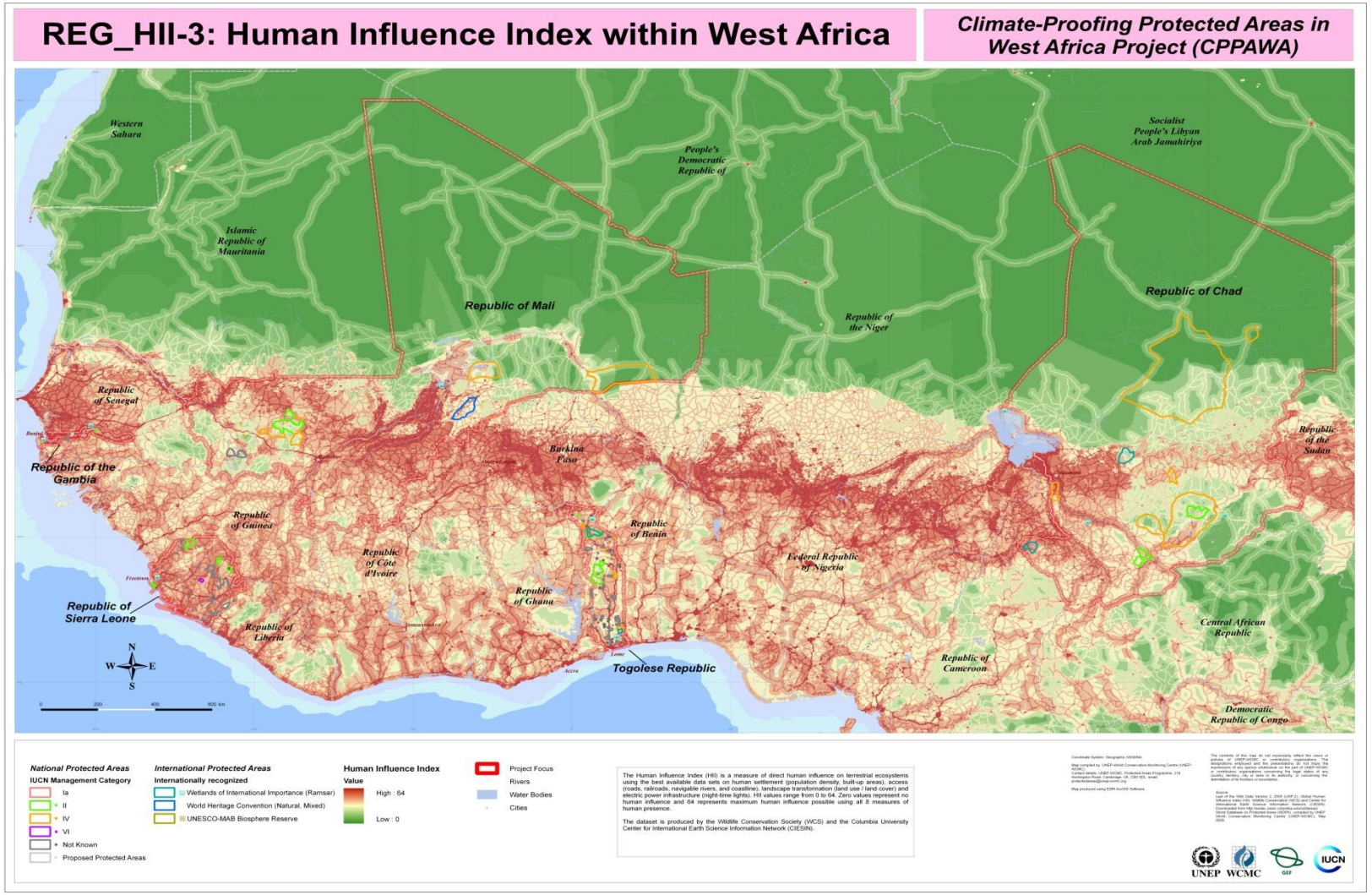


Figure 5. Human Influence Index within the West Africa Region.



Additional information and analyses

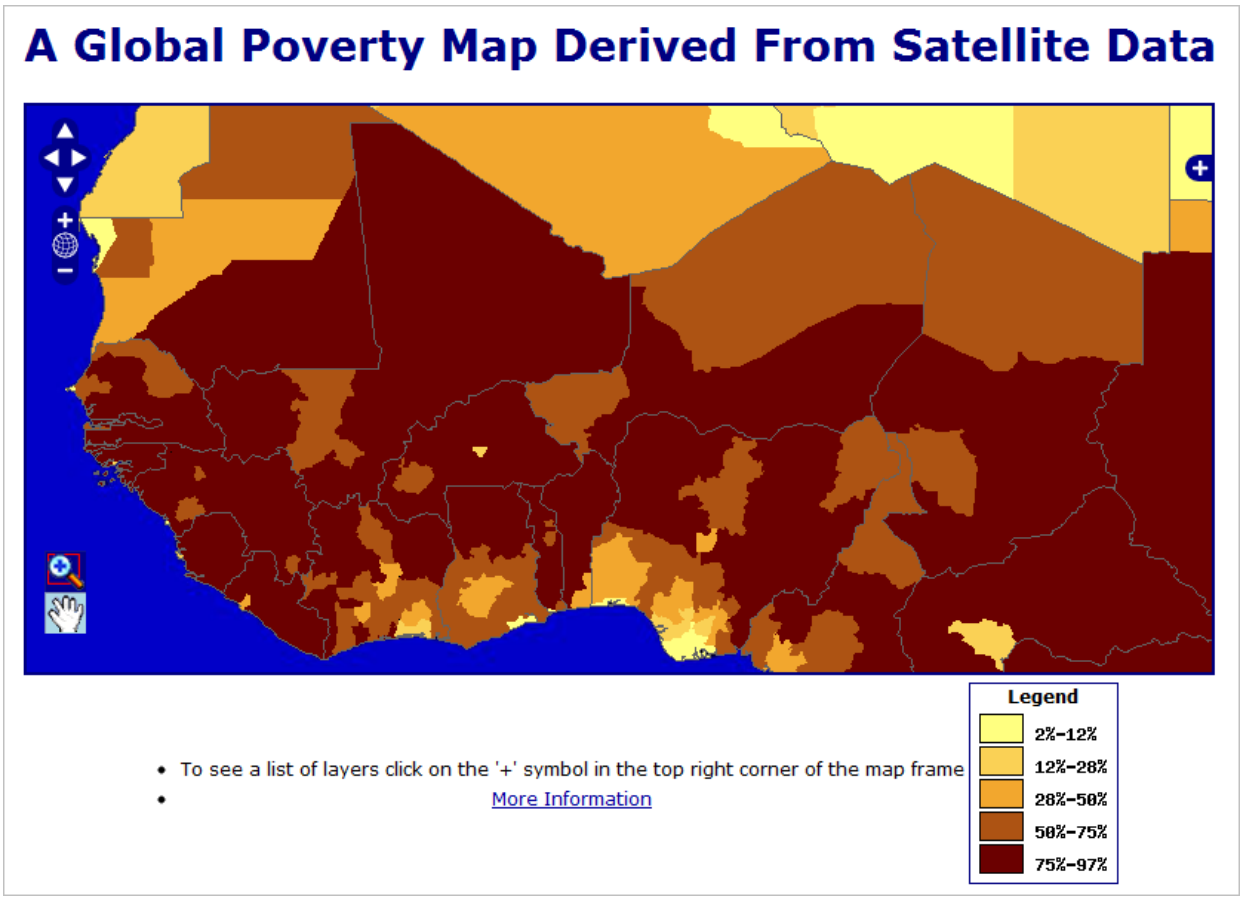
Socio-economic indicators available for West African countries

In addition to data reported in the baseline study, the following datasets have been identified for poverty related analyses.

a. Poverty index derived from satellite data[10]

This index combines two spatially disaggregated data sources: population count (LandScan 2004) and brightness of satellite observed lighting (DMSP nighttime lights), as extent and brightness of DMSP nighttime lights have been noted to have a linkage with wealth. The poverty index has also been calibrated using the World Development Indicators 2006 (percentage of people living with $2 or less per day). Figure 6 shows the screenshot of a map produced using the poverty index.

Figure 6. Screenshot of the interactive map of poverty levels for sub-national administrative units estimated based on satellite data-derived poverty index in West Africa[11].



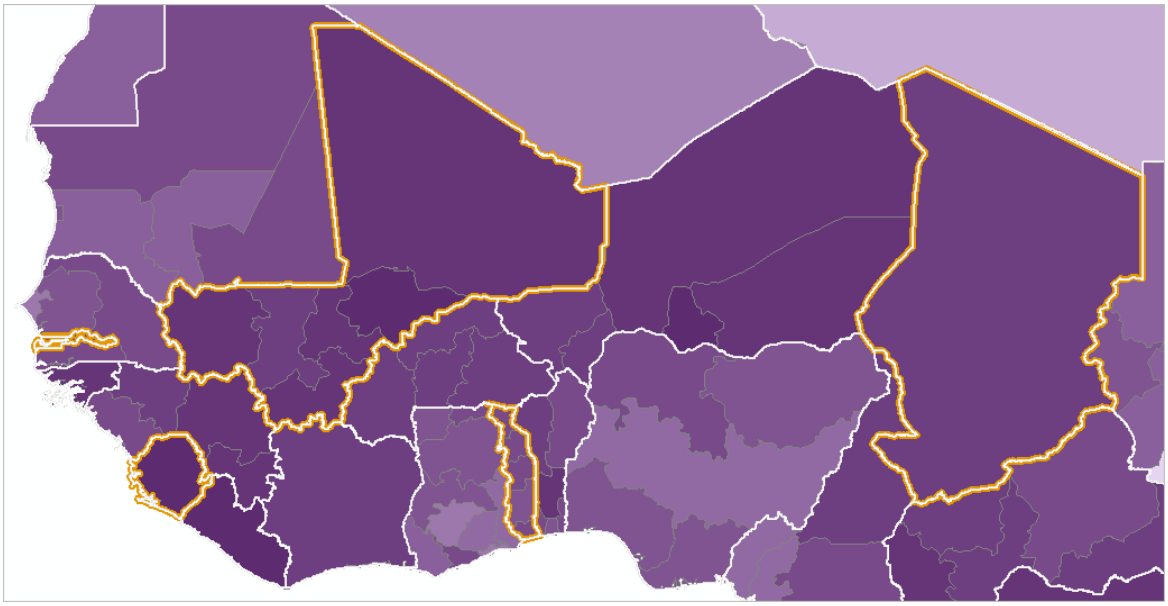
[10] Elvidge d. et al. (2009). A global poverty map drived from satellite data. Computers and Geosciencies 35 (2009) pp. 1652-1660. Data available at: http://www.ngdc.noaa.gov/dmsp/download_poverty.html [downloaded on 21 March 2011]

[11] http://mapserver.ngdc.noaa.gov/cgi-bin/public/ms/poverty/viewer

b. Global Subnational Infant Mortality Rates (CIESIN)[12]

This indicator represents the infant mortality rates for 2000. It is defined as the number of children who die before their first birthday for every 1,000 live births. Combined with malnutrition indicator it is extensively used as proxy for poverty. Figure 7 shows a possible representation of the distribution of infant mortality rates in West Africa.

Figure 7. Infant mortality rates (CIESIN 2005) in West Africa (Screenshot of UNEP-WCMC internal working map)[13]. The lightest colour represents areas where the mortatlity rate is the lowest (0-6.7), whereas the darkest colour represent areas where it is the highest (143.6-182.9).



c. Global Subnational Prevalence of Child Malnutrition (CIESIN)[14]

This indicator aims at providing estimates of the prevalence of underweight children. It represents the estimates of the percentage of children with weight-for-age z-scores that are more than two standard deviations below the median of the NCHS/CDC/WHO International Reference Population[15]. Combined with infant mortality rate it is extensively used as proxy for poverty. Figure 8 shows a possible representation of the distribution of child malnutrition in West Africa.

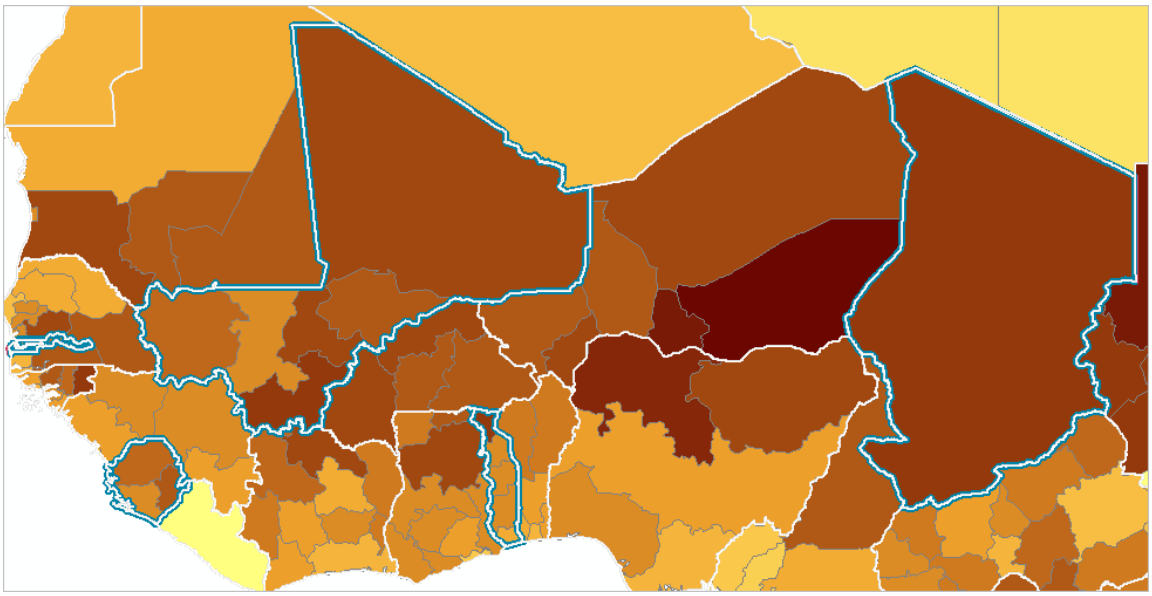
[12] Center for International Earth Science Information Network (CIESIN), Columbia University; 2005 Global subnational infant mortality rates [shapefile]. CIESIN, Palisades, NY, USA. Available at: http://www.ciesin.columbia.edu/povmap/ds_global.html [downloaded on 04 February 2011].

[13] Ibid.

[14] Center for International Earth Science Information Network (CIESIN), Columbia University; 2005 Global subnational rates of child underweight status [shapefile]. CIESIN, Palisades, NY, USA. Available at: http://www.ciesin.columbia.edu/povmap/ds_global [downloaded on 4 February 2011]

[15] National Centre for Health Statistics (NCHS); Centres for Disease Control and Prevention (CDC); World Health Organization (WHO): http://www.who.int/nutgrowthdb/about/introduction/en/index3.html

Figure 8. Malnutrition rate (CIESIN 2005) in West Africa (Screenshot of UNEP-WCMC internal working map)[16]. The lightest colour represents areas where malnutrition is the lowest (0-3.9), whereas the darkest colour represent areas where it is the highest (49.9-56.7).



UN Millennium Development Goals analysis

The WDPA is used to report progress towards the UN Millennium Development Goals (MDGs), specifically Goal 7, which aims at ensuring environmental sustainability. For this, the WDPA team carries out an updated analysis of protected area coverage in the beginning of each year, using the latest version of the WDPA available[17]. The results of the analysis are published in the annual MDG report[18], its statistical annex, and on the MDG Indicators webpage.
Table 7 shows the proportion of terrestrial and marine areas protected in territorial waters (up to 12 nautical miles from the coast), as defined by the IUCN, for each country studied. These indicators were calculated using all the nationally designated protected areas recorded in the World Database on Protected Areas (WDPA) whose location and extent is known.

A GIS analysis is used to calculate terrestrial and marine protection. For this a global protected area layer is created by combining the polygons and points recorded in the WDPA. Circular buffers are created around points based on the known extent of protected areas for which no polygon is available. Annual protected area layers are created by dissolving the global protected area layer by the known year of establishment of protected areas recorded in the WDPA. The annual protected area layers are overlaid with country boundaries, coastlines and buffered coastlines (delineating the territorial waters) to obtain the absolute coverage (in km^2) of protected areas by country per year from 1990 to present. The total area of a country's terrestrial protected areas and marine protected areas in territorial waters is divided by the total area of its land areas (including inland waters) and territorial waters to obtain the relative coverage (percentage) of protected areas.

[16] Ibid.

[17] See 'Short summary of the methodology used for the 2010 MDG analysis' and 'National stats for 1990-2009 from the 2010 MDG analysis' on http://www.wdpa.org/Statistics.aspx.

[18] The Millennium Development Goals Report 2010. UN Department of Economic and Social Affairs.

Table 7. Proportion of terrestrial and marine areas protected by country.

Country	Proportion of terrestrial and marine areas protected (%)
Chad	9.39
Gambia	1.28
Mali	2.43
Sierra Leone	4.96
Togo	11.26
Burkina Faso	13.91
Cote d'Ivoire	21.82
Ghana	13.31

Of all the West African countries which are part of the project, Cote d'Ivoire appears to have by far the greatest percentage cover of protected areas, followed by Burkina Faso and Ghana. Gambia had the lowest coverage with less than 2% of its territory protected.
The extent to which the land areas, including inland waters and territorial waters of a country, are protected is a useful indicator of Government's will to protect biodiversity. However, it is neither an indication of how well managed the terrestrial and marine protected areas are, nor confirmation that protection measures are effectively enforced. Furthermore, the indicator does not provide information on non-designated or internationally designated protected areas that may also be important for conserving biodiversity.
In addition, as already highlighted throughout this report, there are important data and knowledge gaps in West Africa due to a lack of capacity and therefore difficulties in reporting national protected area data to the WDPA and determining whether a site conforms to the IUCN definition of a protected area. Therefore, these indicators do not necessarily reflect accurately the actual level of protection of these areas.

The WDPA is also used to report progress towards the 2010 Biodiversity Target of the Convention on Biological Diversity (CBD), specifically subsidiary Targets 1.1 and 1.2, which aim at protecting at least 10% of each of the world's ecological regions as well as protecting areas of particular importance to biodiversity. These analyses underpin the protected area indicators that form part of the 2010 Biodiversity Indicators Partnership (2010 BIP). This global Partnership is a CBD mandated initiative bringing together a suite of biodiversity indicators, allowing for a more comprehensive and consistent monitoring and assessment of global biodiversity, with a view to measuring progress towards the CBD's target to reduce the rate of biodiversity loss by 2010.
Therefore, by providing higher quality data to the WDPA, countries will be able to calculate more accurately the proportion of terrestrial and marine areas which are protected and hence measure and report their progress towards the UN Millennium Development Goals (MDGs) and the CBD's targets.

7. Conclusion

During the baseline study, several maps were created and a number of contacts initiated. In the collation of data, issues in the following areas were identified: Acquisition of current data sources, Data consistency and format, Data availability.

In this review, we have updated the main map showing protected areas in West Africa, based on the WDPA December 2010 release, and adding additional non WDPA data identified in the preparatory phase of the project.

The acquisition of consistent and complete datasets, especially on climate change, remains a particular challenge. Therefore, the project will greatly benefit from collaboration with external partners and institutions that have the in-country contacts and/or the technological and research expertise in project areas such as climate modelling or assessment of human influence on the ecosystem.

A number of organisations, such as IUCN PAPACO and Birdlife, have already been contacted and will play a crucial role in the project. Others will be contacted in order to ensure that all possibilities are explored to work with the best data quality available.