Study on the establishment of a regional system for exchange of data and information on the Volta Basin

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List of abbreviations and acronyms

Acronyms	Definition
ABE	Agence Béninoise pour l'Environnement
ABN	Niger Basin Authority
ABV	Volta Basin Authority
ADT	Transboundary Diagnostic Analysis
BNETD	National Technical Study and Development Office
BNETD / CCT	BNETD – Mapping and Remote Sensing Centre
BUMIGEB	Mines and Geology Office of Burkina
BUNASOLS	National Soils Office
CBRST	Centre for Secientific and Technical Research of Benin
CENAGREF	National Wildlife Reserves Management Centre
CENAP	National Agricultural Geology Centre
CENATEL	National Centre for Remote Sensing and Vegetation Cover Surveillance
CERSGIS	Centre for Remote Sensing and Information Services
CNRA	National Agronomic Research Centre
CNTIG	National Commission for Remote Sensing and Geographical Information
CWSA	Community Water and Sanitation Agency
DAER	Directorate of Development and Rural Amenities
DAGRI	Directorate of Agriculture
DANA	Directorate of Food and Applied Nutrition
DE	Directorate of Environment
DFRN	Directorate of Forestry and Natural Resources
DG Eau	Directorate of Water Resources
DGEAP	Directorate of Spaces and Grazing Amenities
DGFRN	Directorate of Forestry and Natural Resources
DGGR	Directorate of Rural Engineering
DGHED	Directorate of Hydraulics and Energy
DGPSA	Directorate of Forecasting and Agricultural Statistics
DGR	Directorate of Rural Engineering
DGRA	Directorate of Animal Resources
DGRE	Directorate of Water Resources
DGRH	Directorate of Fishery Resources
DGSCN	Directorate of Statistics and National Accounting
DHAB	Directorate of Hygiene and Basic Sanitation
DIE	Directorate of Information on Water Resources
DISA	Directorate of Computer Processing Statistics and Documentation
DM	Department of Meteorology
DMN	Department of National Meteorology
DNA	Department of Agriculture
DNCN	Department of Nature Conservation
DNH	Department of Water Resources
DNI	Department of the Interior
DNM	Department of Meteorology

Acronyms	Definition
DNP	Department of Fisheries
DNPIA	Department of Production and Animal Industries
DNSI	Department of Statistics
DPIF	Department of Production and Forestry Industry
DRAHRH	Regional Department of Agriculture, Water and Fishery Resources
DRGM	Department of Geological and Mining Resources
DSID	Department of Statistics, Data Processing and Documentation
DUA	Department of Urban Planning and Sanitation
EPA	Environmental Protection Agency
FC	Forestry Commission
GIS	Geological Information Services
GMA	Ghana Meteorological Agency
GSS	Ghana Statistical Service
HSD	Hydrological Services Department
IER	Institute of Rural Economy
IGB	Geographic Institute of Burkina
IGM	Geographic Institute of Mali
IGN	National Geographic Institute
IGT	Institute of Tropical Geography
INERA	National Institute of Environment and Agricultural Research
INRAB	National Institute of Agricultural Research of Benin
INS	National Soils Institute
INSAE	National Statistical and Economic Analysis Institute
INSD	National Statistical and Demographic Institute
IRD	Development Research Institute
MOFA	Ministry of Food and Agriculture
NADMO	National Disaster Management Organisation
NDPC	National Development Planning Commission
ODEF	Office for the Development and Forestry Operations
SIG	Geographical Information System
SISE	Information System and Environmental Monitoring
SISEI	Information System and Internet Environmental Monitoring
SNIE	National Environmental Information System
SNIEau	National Water Information System
SNIST	National Earth Sciences Information System
SODEFOR	Forestry Development and Management Company
SODEXAM	Airport Meteorological and Aeronautical Operations Company
STP/CIGQE	Permanent Technical Secretariat of the Institutional Framework for Environmental Management Issues
UAA	University of Abobo-Adjamé
UAC	University of Abomey Calavi
UCP	Project Coordination Unit
UNOPS	United Nations Office for Project Support Services
VBIF	Volta Basin Information Facility
VBRIF	Volta Basin Regional Information Facility
VBRP	Volta Basin Research Project

Acronyms	Definition
VLTC	Volta Lake Transport Company
VRA	Volta River Authority
WRC	Water Resources Commission
WRI	Water Research Institute
WRIS	Water Resources Information Institute

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1 Introduction

1. The present proposal for a regional data and information exchange mechanism on the Volta Basin is within the framework of the implementation of the « GEF-Volta Project dubbed « Addressing transboundary concerns in the Volta Basin and its Downstream Coastal Area». This project which is a regional initiative was designed to facilitate integrated management, sustainable development and protection of natural resources in the Volta Basin within the six riparian countries (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo). The project was specifically designed to solve the main regional transboundary problems identified during a preliminary Transboundary Diagnostic Analysis (TDA).
2. This proposal becomes imperative in the Volta Basin in a situation where there is no mechanism of exchanging essential data and information for the management of the basin. However, the access to and use of data and information on the transboundary basin for divergent and multifaceted purposes by the riparian countries are important for the development of management tools, regional integration , the promotion of dialogue among the countries along the Basin, including the conduct of scientific activities. Information sharing has become an indispensable act of solidarity.
3. The stage referred to as « Stocktaking and analysis of existing national and regional data on the Volta Basin » was the first stage in the overall study « Establishment of a mechanism for national and regional data and information dissemination » It focused on the identification of the principal stakeholders (data and information providers) in the zone around the basin, including an analysis of the various databases and batches of data produced by these stakeholders, identification of the needs in terms of capacity building and proposal of a training scheme, identification of their expectations in relation to the regional information and data exchange mechanism to be established.
4. The essential outcomes expected during the first phase conducted by consultants at the national level are :

- An inventory and analysis of available national/regional data on the Volta Basin finalized and approved by the PCU and the National Focal Points ;
- The capacity building needs of national institutions in the area of data management are identified and the operational action plans for training are evolved and approved ;

5. The last stage in this volume 2 centres on the proposal for the establishment of a national and regional data and information exchange mechanism, particularly to :

- Define data and information aggregates to be exchanged at the national and regional levels
- Identify activities to be undertaken for the dissemination of data and information and to propose, if need be, an outline of a work plan.
- Define the structure to be put in place for the regional data and information exchange mechanism including the management plan required for such a mechanism
- Propose the implementation and monitoring strategy for the national and regional data and information dissemination mechanism
- Identify any potential bottlenecks and value addition to the data and information dissemination mechanism

6. In this volume II, the following issues are discussed:

- A common language for data description to be shared by the various stakeholders involved in the mechanism called the basin language ;
- The roles and responsibilities of national and local institutions responsible for producing data
- The organizational and technical solution to be advanced for the mechanism to be operational.

2 Proposed Data and Information Exchange Mechanism

2.1 Importance of the data and information exchange mechanism

7. One of the justifications of any cooperation activity necessitating intervention by dual or multinational technical institutions, commissions or committees is to get access to information with the view to facilitating efforts made by riparian States to cooperate among themselves – the need to know the nature of the environment – harmonize and reconcile the technical systems, policies and to ensure equity and justice in sharing the benefits and disadvantages relating to the separate or joint exploitation of the collective public heritage.

8. Currently, all the countries in the Volta Basin are aware that the availability of and accessibility to reliable environmental data is a sine qua non for the formulation of policies and strategies aimed at the rational management of natural resources for sustainable development.

9. In fact, the success of actions intended to stem soil and water degradation in the Volta Basin is highly dependent on the availability of relevant information to ensure a proper understanding of the state of resources, their dynamics, the status of their management and impact on their sustainability.

10. The development of an exchange mechanism is in keeping with the provisions enacted under the United Nations Framework Convention on the Fight against Soil Degradation (Article 16) in terms of collection, analysis and exchange of information. In the area of gains, such an initiative cannot but be helpful and beneficial for both the quantitative and qualitative monitoring of the basin. In fact, it will assist in :

- Technically, facilitating , access to, and exchange and circulation of data and information relating to the management of natural resources including information pertaining to on-going efforts and progress made in project and programme implementation ;
- Promoting exchange and dialogue;
- Improving information flow and the supporting tools for making relevant decisions in the fight against soil and water degradation in the basin,
- Consolidating coordination and dialogue at the institutional level between national, regional and international partners involved in resource management and monitoring within the basin,
- Through its documentation role, ensuring the reduction of risks associated with loss and repetition of data,
- Developing continuous dialogue with the users with the view to adapting the databases to their needs,

- Facilitating monitoring-evaluation of actions whose components dovetail into the fight against land and water degradation in the basin.
- Getting a knowledge base on conflicts in and around the basin will ensure prevention and anticipation of conflict resolution policies.

2.2 Objective of the data and information exchange mechanism

11. The establishment of a Volta Basin Regional Consultation and Information Exchange Mechanism (Volta Basin Regional Information Facility - VBRIF) satisfies a two-pronged concern :

- Establishment of a harmonized framework for the exchange of data and information on the environment so as to provide decision-makers with reliable and timely information that will help in decision-making regarding prudent choices of sustainable development strategy. The Mechanism will also contribute to the development of technical institutional networking at the local, national and regional levels aimed at working in close collaboration towards the formulation and dissemination of products and information for decision-makers, cooperation partners, technical experts and the rural communities, etc.
- Serving as a tool for both the Basin Observatory and regional and national policies to ensure information flow, monitoring and evaluation of environmental impact policies implemented in the sub-region.

2.3 Definition of the proposed mechanism for the Volta Basin

12. The definition and organization of the regional data and information exchange mechanism, inter alia, presents the various conceptual components of the mechanism to be established. These are the major stakeholders, the existing information flows between the components. The organization of the mechanism is based on an information processing cycle represented by the diagram (Figure 1) indicated below.

13. The Data Exchange and the Information Circulation Mechanism on the Volta Basin and Environmental Monitoring must be viewed as a Mechanism for the management of environmental information for the implementation of legal instruments relating to the basin environment based on information and communication technology. The VBRIF concept must therefore not be limited exclusively to the technical aspects as such a view will greatly undermine its success. In fact, the VBRIF is not a computer-based tool; it is above all a network of partners which depends on a computerized tool. Several projects on the establishment of information systems failed as they focused merely on the technical aspects. For this reason, the definition of the VBRIF must be based on the following key supporting factors :

- A coherent and effective institutional framework which will enhance on-going or projected collaborative efforts ;
- A technological tool for access, exchange and circulation of useful information relating to sustainable development in general, the environment in particular and for the benefit of the stakeholders, the Volta Basin, decision makers, Governmental and non-governmental institutions , civil society and the private sector.
- A common Language on data pertaining to the Volta Basin: with regard to cross-cutting issues, expertise and dialogue are necessary to develop an overall important picture about data management of the basin. The major basis of the mechanism to be put in

place should therefore be one of consensus on the different concepts used in the Volta Basin.

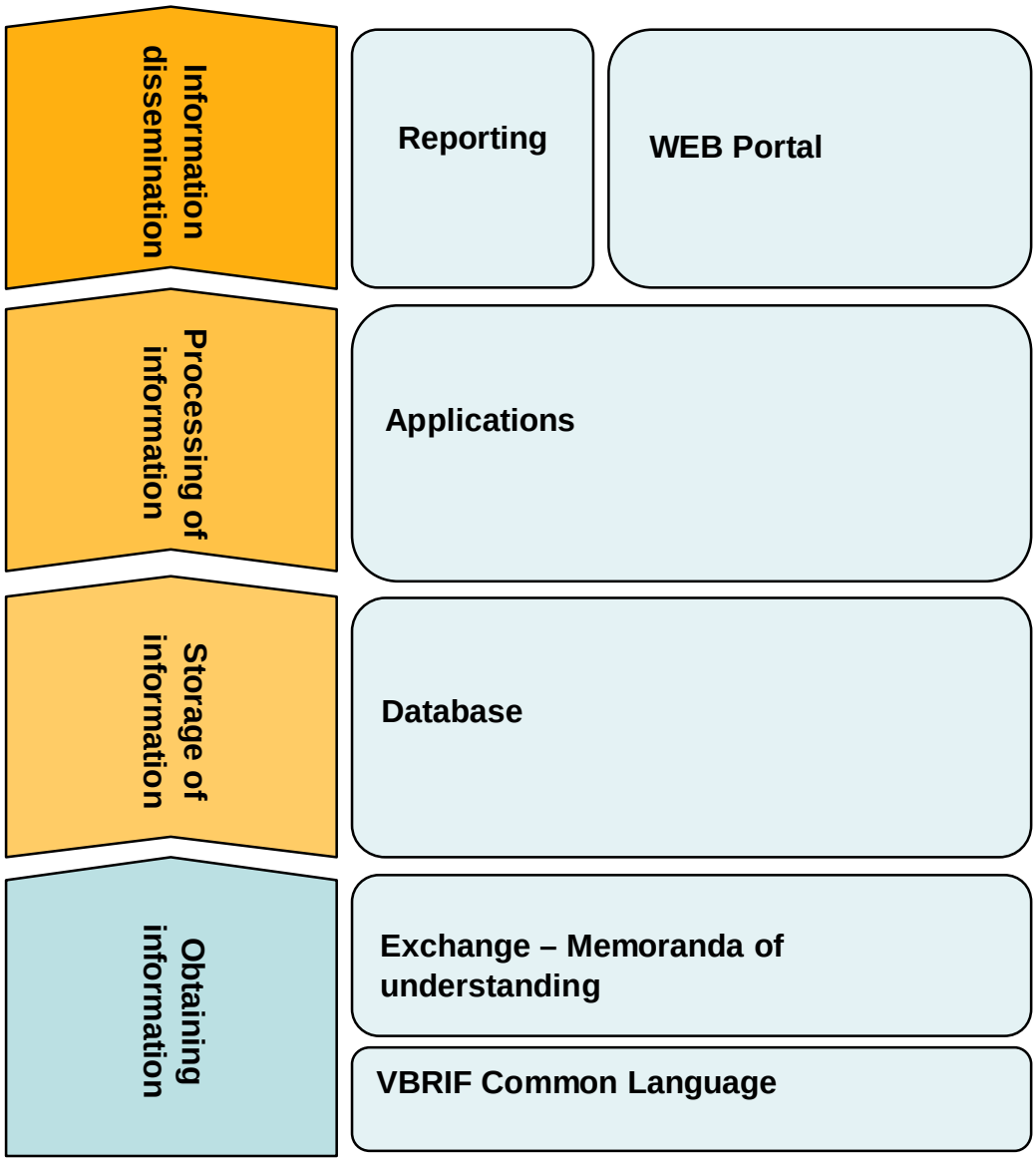

Diagram 1 : Data processing cycle of the VBRIF mechanism

2.4 Functional architecture of the mechanism

14. The ideal configuration to be considered within the framework of this data exchange mechanism at country level (Volta Basin Information Facility – VBIF) should be presented in the form of a network comprising a focal point on the basin within the countries, an information governance framework on the basin at the national level (for instance PNGIM in Burkina), producers and data holding agencies, data users, reliable communications infrastructure, products and services generated by such a network (Diagram 2). An initial analysis of VBIF stakeholders has already been carried out and presented in the first volume of this report.

15. The VBRIF is viewed as a networking of networks. In fact, it seeks to promote more or less collaboration of organized national institutions into a network as indicated in diagram 2.

2.4.1 Description of the major stakeholders according to countries

16. We understand by stakeholder, public institutions or agencies responsible for the production or custody of data and information. Within the framework of the regional mechanism, priority is given to public institutions responsible for the management of existing information and digital data. In the volume I, information was gathered on key stakeholders in the basin. The summary is presented in Table 1 below. A very detailed description of the various institutions in terms of definitions and role of every stakeholder, of resources, constraints and expressed needs would be added this table of **stakeholders.**

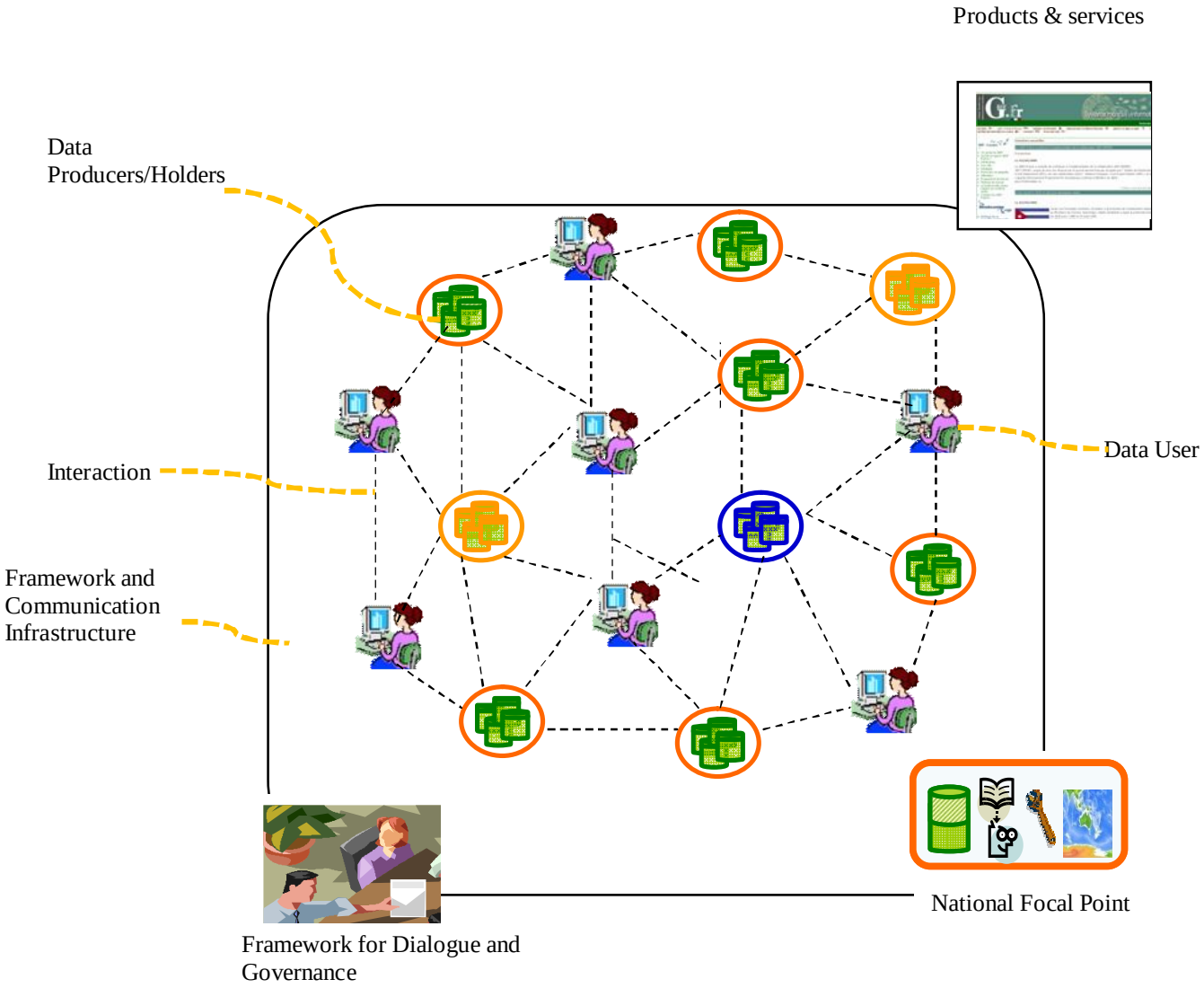
Products & services
Data
Producers/Holders
Interaction
Framework and
Communication
Infrastructure
Data User
National Focal Point
Framework for Dialogue and
Governance

Diagram 2 : VBIF Configuration

Table 1 : Major stakeholders in countries

Number	Country	No.	Major stakeholders
1	Burkina Faso	1	Directorate of Water Resources (DGRE)
		2	Directorate of Meteorological Services (DM)
		3	Forecasting and Agricultural Statistics Directorate (DGPSA)
		4	Geographical Institute of Burkina (IGB)
		5	National Statistical and Demographic Institute (INSD)
		6	National Soils Office (BUNASOLS)
		7	Directorate of Forecasting and Animal Husbandry Statistics (DG
		8	Permanent Secretariat of the National Council for the Environm and Sustainable Development (SP/CONEDD)
		9	Directorate for Ecological Monitoring (DSE)
		10	Office of Mines and Geology of Burkina (BUMIGEB)
		11	Environment and Agricultural Research Institute (INERA)
2	Benin	1	Environmental Agency of Benin (ABE)
		2	Directorate of Water Ressources (DGE)
		3	Directorate of Agriculture (DA)
		4	Directorate of Cattle-rearing (DE)
		5	Department of Fisheries (DP)
		6	Forestry and Natural Resources Department - DGFRN
		7	National Institute of Statistics and Economic Analysis - INSAE
		8	National Remote Sensing and Vegetation Cover Monitoring Cer CENATEL
		9	National Geographic Institute(IGN)
		10	Meteorological Services Department - DNM
3	Cote d'Ivoire	1	National Environmental Agency (ANDE)
		2	Water and Forest Resources Department (DGEF)
		3	Human Water Management Department - DHH
		4	Department of Animal Resources - DGRA
		5	Department of Statistical Data Processing and Documentation DISA
		6	Department of Production and Forest Industry - DPIF
		7	Department of Water Resources (DRE)
		8	Department of National Parks (DPN)
		9	Department of Mines and Geology (DMG)
		10	National Geographical Data Processing Centre (CNTIG)
		11	National Statistical Institute (*INS*)/ Ministry of Finance/Econom Planning
		12	Airport and Aeronautical Operations Company for Meteorolog (SODEXAM)
		13	Geological Services Department (DG)

Number	Country	No.	Major stakeholders
		14	National Office for Technical and Development Studies – Mapp and Remote -Sensing Centre - BNETD / CCT
4	Ghana	1	Ghana Meterological Agency
		2	Hydrological Services Division of the Ministry of Water Resourc Works and Housing
		3	Water Research Institute (WRI)
		4	Ghana Irrigation Development Authority.
		5	Survey Department.
		6	Forest Services Division and Wild Life Division of the Forestry Commission
		7	Geological Survey Department.
		8	Ghana Statistical Services
		9	SRID of Ministry of Food and Agriculture (MOFA)
		10	Environmental Protection Agency
		11	Centre for Remote Sensing and Information Services (CER
		12	Water Resources Commission
5	Mali	1	Meteorological Services Department (DNM)
		2	Nature Conservation Department (DNCN)
		3	Department of Animal Production and related Industries (DNPI
		4	Department of Statistics and Data Processing (DNSI)
		5	Department of Water Resources (DNH)
		6	Directorate of Agriculture (DNA)
		7	Agricultural, Animal Husbandry and Fisheries Planning and Stati Unit (CPSAEP)
		8	Permanent Technical Secretariat for Environmental Issues Management Institutional Framework (STPCIGQE)
6	TOGO	1	National Soils Institute (INS)
		2	Meteorological Services Department (DGMN)
		3	Water Resources Planning Department (DPRE)
		4	Department of Mines and Geology – (DGMG)
		5	Mapping and Land Registry Department (DCNC/IGN)
		6	Statistical Services Department (DGS)
		7	Department of Agriculture (DA)
		8	Department of Animal Husbandry and Fisheries (DEP)
		9	Agronomic Research Institute of Togo (ITRA)
		10	Department of Games and Wildlife (DFC)
		11	Department of Water Resources and Forestry (DEF)
		12	Department of the Environment (DE)
		13	UL/Faculty of Sciencees (UL /FC)

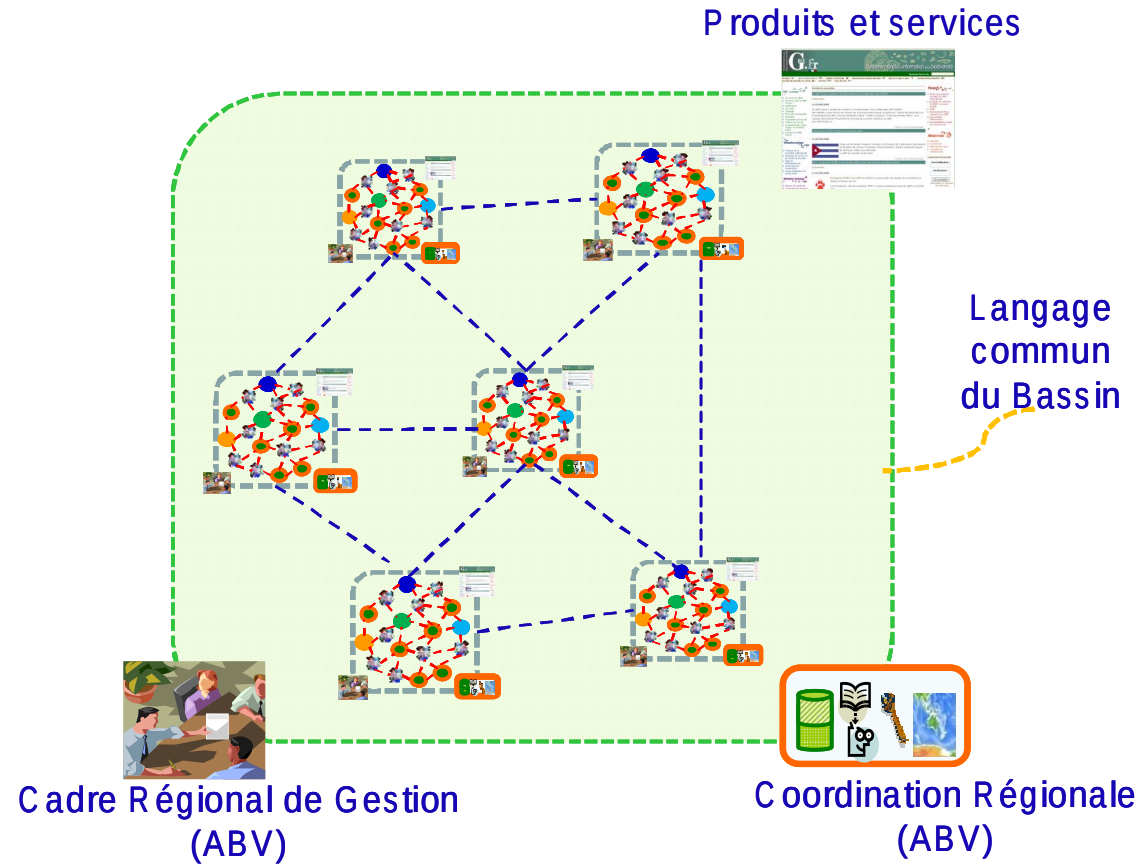

Diagram 3: Configuration of the VBRIF

2.4.2 Data and aggregates of data to be exchanged within the framework of the VBRIF (proposal)

17. The information (data and metadata) to be incorporated gradually into the mechanism must be geared towards a greater and wider participatory approach; and in addition and especially the information exchange mechanism shall depend, to a large extent, on what is in existence. Towards this end, the six countries involved in the mechanism must appoint a focal point and present a list of key partners for the operational phase of the mechanism.

18. However, a proposal has been provided below regarding data to be managed under the mechanism at the national and basin levels and they are grouped in broad thematic areas as follows :

- Data on water resources
  - Meteorological data
  - Surface water quantitative data
  - Quantitative data on underground water
  - Data on water quality

- Data on water uses and engineering structures
  - o Data on monitoring, management and characteristics of engineering works and existing and future operational sites
  - o Data on levies regarding existing and foreseeable resources
  - o Data on uses and water partnerships
- Data on monitoring networks and mechanisms for data collection on water resources
- Data on water-related risks
- Geographical data (relief, climate, soil, vegetation, hydrography, fauna, flora, protected areas, geology, geomorphology, pedology, agro forestry parks, grazing lands, topography, etc.)
- Data relating to documentation (institutional, legal and regulatory framework, national stakeholders, water, basin etc.)
- Socio-economic and demographic data
  - o Identification data on administrative entities
  - o Data on population, household and housing
  - o Agricultural statistical data
  - o Statistical data on health
  - o Social infrastructural data
  - o Data on economic infrastructure
  - o Economic data

19. Data on water resources necessary for the implementation of the following management functions :

- Knowledge on the availability and effectiveness of water resources
- Knowledge of climatic impact on water resources
- Knowledge on the state of the environment (particularly on wetlands)
- Identification of envisaged water protection and restoration measures.

20. Data on water uses and engineering structures relating to water can be sub- divided into four types of data.

- The existing and projected operational sites (that is the engineering structures and their characteristics) ; the knowledge about this data is for planning and regulation
- The impact of the existing and projected levies on water resources ; the knowledge about this data is for the water resource sharing functions, impact studies, calculation of the financial contribution in accordance with the user/payer and polluter/payer principles
- The water users (villages, industries, mines, irrigators etc.); the knowledge about this data is for land planning management schemes.
- The partners of all kinds who have an interest in the water sector (entreprises, suppliers, maintenance personnel, laboratories, research outfits, banks, donors etc.); this data is also necessary for planning purposes.

21. However, the under - mentioned data is the ideal configuration during the full VBRIF operational phase. Table 2 below attempts to make an inventory of existing digital, tabular or mapping data that could automatically be an integral part of the mechanism.
22. The metadata as presented in this table remain incomplete in terms of the preparation date, periodicity, format etc. It would be proper that during the definition and operations phase of the mechanism, it would be completed at the same time.

Table 2 : Description of the major stakeholders and data to be exchanged

N°	Theme	Details of data	Countries	Stakeholders
1	Climate	- Temperature - Pluviometry - Winds - Humidity - Period of sunshine - Evaporation - Climatic Zone	Benin	Directorate of Meteorology (DNM)
			Burkina	Department of Meteorology (DM)
			Cote d'Ivoire	Airport and Aeronautical Operations Company for Meteorology (SODEXAM)
			Ghana	Meteorological Services of Ghana
			Mali	Department of Meteorology (DNM)
			Togo	Department of Meteorology (DMN)
2	Water	- Water system - Piezometric system - Hydrometric system - Hydrogeology - Watershed - Water level - Water point	Benin	Water Resources Department (DGE), SONEB
			Burkina	Water Resources Department
			Cote d'Ivoire	Water Resources Department (DRE),
			Ghana	Hydrological Services Division / Community Water and Sanitation Division (CWSD)
			Mali	National Hydrology Department (DNH)
			Togo	Water Resource Planning Department
3	Types of Soils	- Composition - Structure - Type	Benin	ORSTOM
			Burkina	National Office for Soils, Institute for Development and Research, IRD
			Cote d'Ivoire	Institute for Development and Research IRD/ National Remote Sensing and Geographicla Information Centre (CNTIG)
			Ghana	Soil Research Institute of the Council for Scientific and Industrial Research (CSIR)

N°	Theme	Details of data	Countries	Stakeholders
			Mali	Institute for Rural Economy
			Togo	INS/ ORSTOM Advanced School of Agronomy
4	Vegetation/Occupation of Lands	Major units of land occupation - Agricultural zone - Wet land - Irrigated zone - Grass savannah - Savane arbustive - Tree and bush savannah - Rock formation - Thicket - Steppe - Water level - Degraded zones - Dwellings zone - Vegetation-free surface - Sandy zone - Plantation zone - Forest - etc	Benin	National Remote-sensing and Vegetation Cover Monitoring - Centre CENATEL
			Burkina	Geographical Institute of Burkina National Lands Management Programme Directorate of Water and Forests
			Cote d'Ivoire	National Remote-sensing and Geographical Information Committee (CNTIG)
			Ghana	Environmental Protection Agency
			Mali	Department of Nature Conservation (DNCN)/Institute of Rural Economy (IER)
			Togo	University of Lomé (FS)
5	Demography	Population: - Size, - Distribution by gender - Age, - Marital status - Households, - Rate of increase, - Density	Benin	National Statistical and Economic Analysis Institute (INSAE)
			Burkina	National Statistical and Demographic Institute - INSD
			Cote d'Ivoire	National Statistical Institute
			Ghana	Ghana Statistical Service (GSS)
			Mali	
			Togo	Department of Statistics, Data Processing and Documentation (DSID)
			Benin	National Geographic

N°	Theme	Details of data	Countries	Stakeholders
6	Topography	- Contour lines - Spot elevation - Geodetic point - Sea level measurement - Hydrography - Communication channel - Locality - Etc.		Institute -IGN
			Burkina	Geographic Institute Burkina
			Cote d'Ivoire	National Technical Research and Development Office – Centre for Mapping and Remote Sensing : BNETD/CCT
			Ghana	Centre for Remote Sensing and Geographic Information Services (CERSGIS)
			Mali	Geographic Institute of Mali (IGM)
			Togo	Department of Mapping and Land Registry
7	Reserves/ conservation areas	Units of conservation zones - Land surface area - Flower composition - Wildlife composition - Localisation	Bénin	Department of Water and Forestry Centre National de Télédétection et de Surveillance du couvert Végétal
			Burkina	Department of Water and Forestry / Department of Ecological Monitoring
			Cote d'Ivoire	Department of Water Resources and Forestry (DGEF)
			Ghana	Forest Services Division and Wild Life Division of the Forestry Commission
			Mali	Department for the Conservation of Nature (DNCN)
			Togo	Department of Water Resources and Forestry
8	Division and Territorial	- Territorial Limits	Bénin	National Geographic Institute Department of Water Resources and Forestry National Remote-sensing and Vegetation Cover

N°	Theme	Details of data	Countries	Stakeholders
	Administration	- Regional limits - Departmental limits - Limits of communes - Municipal Limit		Monitoring - Centre
			Burkina	Geographic Institute of Burkina
			Cote d'Ivoire	National Technical Research and Development Office – Centre for Mapping and Remote Sensing : BNETD/CCT
			Ghana	Survey Department.
			Mali	Geographic Institute of Mali (IGM)
			Togo	Department of Mapping and Land Registry
9	Data on documentation.	- Institutional framework ; - National stakeholders, water, basin etc	Benin	ABV Focal Point Benin
			Burkina	ABV Focal Point Burkina
			Cote d'Ivoire	ABV Focal Point Cote d'Ivoire
			Ghana	ABV Focal Point Ghana
			Mali	ABV Focal Point Mali
			Togo	ABV Focal Point Togo
10	Socio-economic data	Agricultural statistical data Health statistical data Socio-infrastructural data Data on economic infrastructure Miscellaneous economic data	Benin	Department of Agriculture National Statistical and Economic Analysis Institute - INSAE
			Burkina	National Statistical and Demographic Institute (INSD) Department of Forecasting and Agricultural Statistics (DGPSA) Directorate of Health
			Cote d'Ivoire	National Statistical Institute (*INS)*
			Ghana	Ghana Statistical Service
			Mali	National Statistical Department
			Togo	Department of National Statistics (DGSN)

3 Diagram on data circulation, collection and dissemination

3.1 Overall diagram of the proposed mechanism

23. The diagram below (figure4) is the overall configuration of the VBRIF. It basically comprises three components, regional coordination (the Volta Basin Observatory), national focal points in the countries, and national stakeholders in the countries. In such a plan, existing information exchange mechanism between nations like the one between Burkina and Ghana on water-related issues should be incorporated. The description of the roles and missions of each component is done in the chapter on implementation of the mechanism.

24. Without anticipating the software configuration architecture and development tools, it would be appropriate for the selected components be open source or free to reduce the costs.

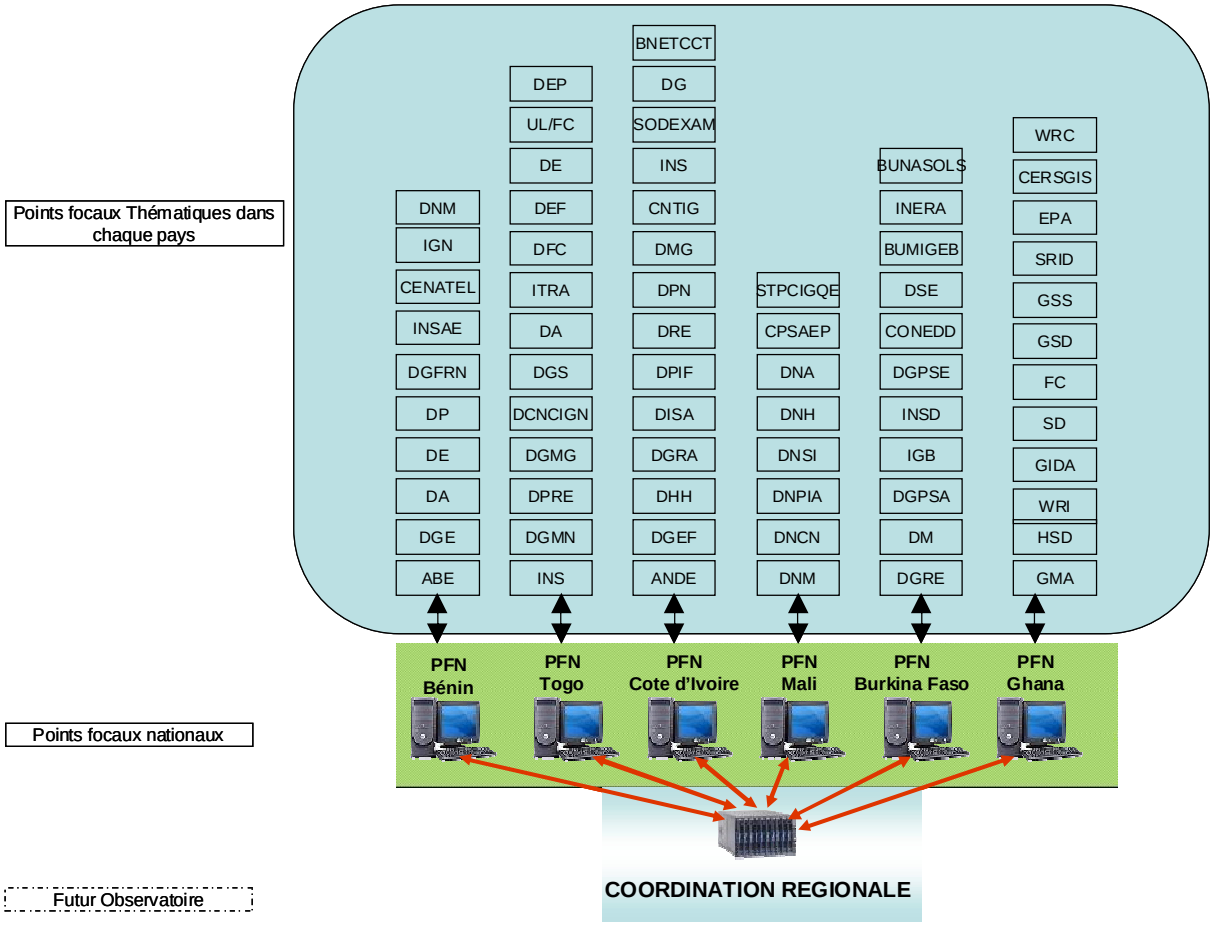

Diagram 4: Generalized technical architecture block diagram of the mechanism

3.2 Hardware configuration of the proposed mechanism

25. The hardware architecture comprises three parts :

- **Regional Coordination for the Volta Basin Authority**: The nucleus of the mechanism is expected to be located at the VBA. It is at this location that the various servers will be

located. It is proposed that two physical servers with flexible configuration, the server housing the data base and the various files must have a very powerful configuration because the quickness and the user-friendliness of the web portal will depend more on the server's response time.

- **National Focal Points in the countries**: Their function is to ensure coordination at the local or country level and as an interface between the national institutions including regional coordination. In this particular instance, it is being suggested that average capacity servers are acquired for local data handling purposes. These servers ensure physical linkages with the main VBA server and it is possible to automatically carry out an update between the regional and national levels. With regard to the thematic focal points, it is not expressly projected to acquire work stations at this point in time. This issue will be considered at a later stage taking into account the financial resources available. For this reason, the exchanges between the national focal points and the thematic focal points could be done on mutual basis in these early stages by e-mail, Flash drives, CDs etc.
- **External users**: This requires a minimum standard PC configuration with a standard type web browser.

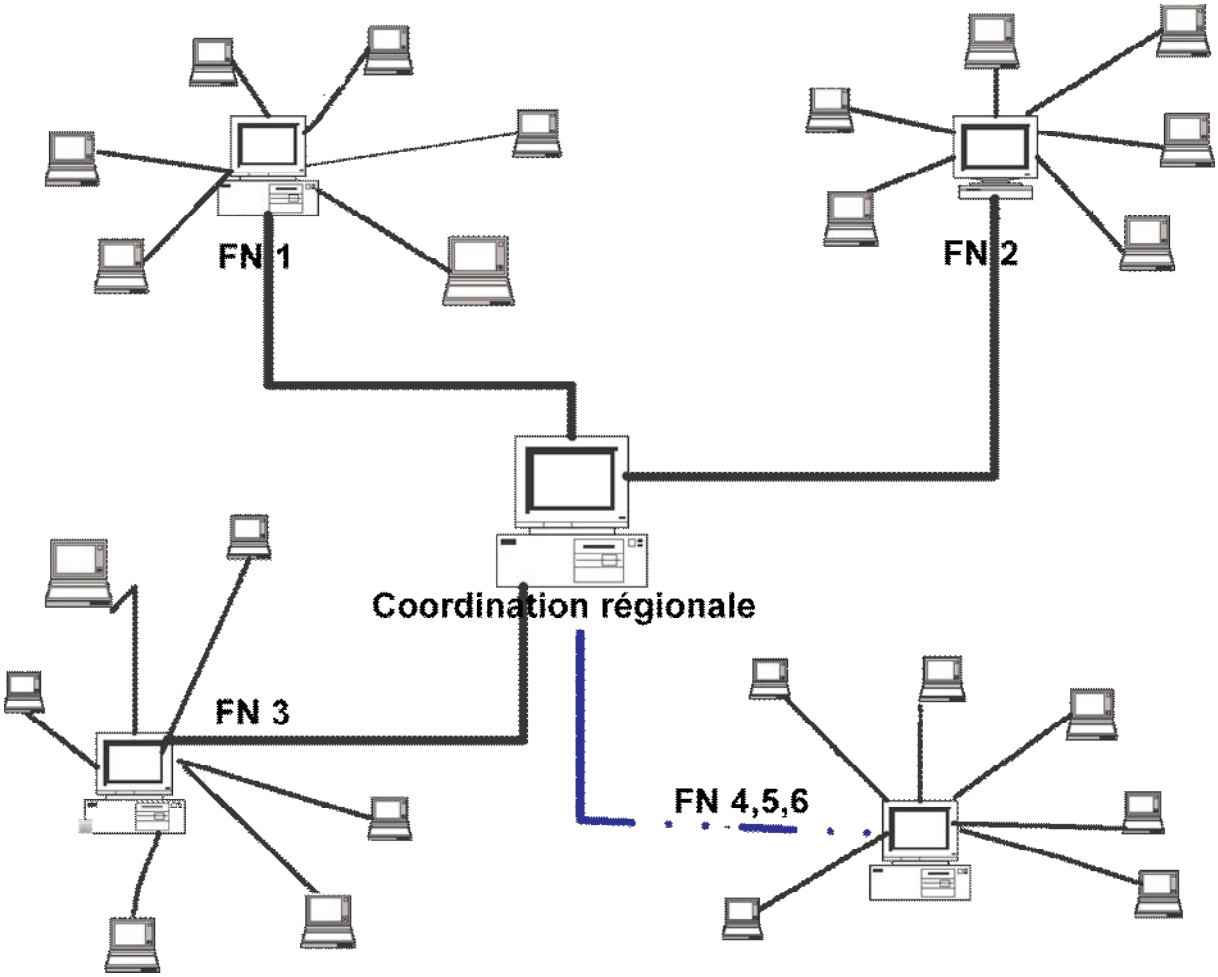

Diagram 5 : VBRIF Hardware configuration

3.3 Data collection and circulation

26. The VBRIF must create a production dynamic and data exchange between the stakeholders of the basin. To achieve this, data collection must be done by national institutions within the framework of their core mandate. With regard to the VBRIF framework, these institutions here are to be referred to as thematic focal points. Each theme corresponds to an actor as indicated in Diagram 6 above.

27. However, for the communication aspects between the stakeholders, the same language must be spoken. When a tool or data processing configuration like the VBRIF is implemented, it is necessary to define an understandable vocabulary that is common to all stakeholders.

28. When data is exchanged between users, it is necessary to transmit information in a format; especially the contents should be understood by the interlocutors. Having the same reading grid (format, tag, procedures, codes and common system of references) is an essential factor in the mechanism without which it would be impossible to have any coherent exchange or data summary from the various producers.

29. (The common language of the VBRIF meets these concerns. Defining and publishing the vocabulary in respect of all data to be shared between actors is the objective of the common language of the VBRIF. They are meant for public agencies and institutions concerned with data production, collection and dissemination, the national focal points and regional coordination.

3.4 Data storage and processing

30. The VBRIF is called upon to handle data from different sources and from different partners. These digital data or data to be digitalized will in most cases be presented in the form of :

- Alphanumeric data (very often in Excel table form or databases)
- Geographic Information
- Background Information
- Statistical Information or summary (graphs ...)

31. The collected data must meet the common procedures for assembling data (VBRIF language), and their storage must also meet the criterion of confidential information etc.

32. The "Web" channel is one of the modes of interaction to be prioritized under the VBRIF. The Web portal will be the entry point for users and partners for any search for information. This portal shall include the necessary functionalities to meet the expectations of the users and partners.

33. The access to data is organized via the Internet. The exchange and the enhanced use of data and information shall therefore be carried out by focusing on :

- The VBRIF partners' network by using the Internet and its diverse protocols (html, ftp, XML,)
- A Web portal at the regional level providing access to the various functionalities (management of the rights of access , mapping on the Internet (Web mapping, background information search, broadcast of news flash ...)

4 Implementation of the VBRIF

4.1 Guiding Principles of the VBRIF

34. The project on the establishment of a regional data and information exchange mechanism in respect of the Volta basin (VBRIF) must be based on the following guiding principles :

- The economies of scale
- Must not be a substitute for the States
- Rather ensuring a federative role, as facilitator of catalytic actions
- Building the capacity of national institutions
- Promoting complementarities and/or synergy between actions at the national level and at the level of the basin
- Contributing to solving transboundary concerns
- Promoting data and information exchange at the national level and within the framework of the basin
- Contributing to the preparation of information on the state of the environment in the basin
- Establishing a mechanism for the sustainability of action

35. The implementation of the VBRIF is structured around four (4) components :

- Component 1: Organisation of the institutional environment
- Component 2: Organisation of the technical environment
- Component 3: Data production programmes and dissemination of information
- Component 4 : Mechanism for monitoring /evaluation of the VBRIF

4.2 Component 1: Organisation of the institutional environment

36. This component brings together all the necessary activities to organize the management of the VBRIF and promotion of the development of institutional cooperation at both country and regional levels.

4.2.1 Organisation of the mechanism

37. The organizational structure of the mechanism is subdivided into :

- Six (6) National Components
- One (1) Regional component

38. With regard to the national components, details can be found in the first volume. The basic fact to be noted is that: the national components constitute the key feature of the mechanism. They contribute among others to the :

- Deepening of the basic environmental knowledge of the basin
- Improvement of the effectiveness and scope of the information gathering process
- Generation of support from the institutions

39. The national components comprise national stakeholders and a national focal point. For each national component, a national coordination unit or focal point must be established or invigorated. There is no point creating a new institution when a coordination body such as the VBA is already in existence.

40. This body (VBA focal point) shall be responsible for :

- Being also the focal point for the mechanism, that is, initiate, organize and guide the participation of national stakeholders,
- Assisting and guiding the actors in the participatory process of information exchange,
- Serving as a framework for dialogue in respect of policy harmonization, methodologies for collection, data and information standardization, processing, dissemination on the basin,
- Ensuring that decisions taken on the basin regarding national actions shall be implemented on a timely basis
- Reinforcing the implementation of its national component
- Representing the national component of the mechanism at regional meetings or at the basin level
- Passing on vital national information concerning the basin and vice versa(interface)

41. Eventually and within the framework of the establishment of the observatory, the coordination unit shall create specialized working groups; a group shall brainstorm specifically on the harmonization standards in terms of data collection, format and processing to be incorporated into the mechanism.

42. The other organizational aspects centre on the definition of the official status of the mechanism, the definition of the memoranda of understanding at country level and in respect of the regional coordination, the official texts on the designation of actors or stakeholders of the mechanism, the measures on information and sensitization of the authorities in the broad sense of the word including key personnel for the establishment of the mechanism. Having identified the eligible institutions, a working and information partnership should be concretized to provide a feedback of the first proposals and to launch the process for the formalization and finalization of the mechanism.

43. The regional component (VBRIF) shall be less cumbersome in its structure and incorporated into the department or service in charge of the observatory. It could serve as a spring board for the operations of the observatory of the basin.

4.2.2 Organizational aspect on regulation in terms of data exchange

44. It is the common language of the basin to be adopted and which should include :

- The establishment of a regulatory framework for the standardization of data exchange.
- The design of a single format for information exchange of all stakeholders
- The formulation of standards for data exchange
- The definition of responsibilities of the various institutions to provide data to their national focal point (VBA) through protocols for the exchange and circulation of data and information.

45. The sustainability of the mechanism for information exchange will depend on the success of the institutional foundation (network of focal points, partner organizations) as well as the relevance of the products (data, information, analyses) that it will transmit.

46. As the regional data exchange mechanism (VBRIF) and the observatory of the basin are closely related; it is proposed that the mechanism be managed at the VBA level.

4.3 Component 2: Organisation of the technical environment

47. This component brings together activities for the establishment of a favourable technical environment for the smooth functioning of the VBRIF. These are mainly in the form of :

- Assistance to national focal points ;
- Assistance for the establishment of an Internet medium of communication between the focal points and the Regional Coordination
- Definition of a common language for the VBRIF
- Acquisition of an effective data processing environment
- The gradual establishment of a Web portal with a multiplicity of services like
- Information sharing
- A directory of stakeholders of the basin
- Web mapping
- A catalogue of sources of information with opportunities for downloading according to the rights of access
- Online database on background information
- VBRIF common language
- Etc

4.4 Component 3: Programme for the production and dissemination of information

48. This component brings together the VBRIF production programmes. It is based essentially and in the first place on data and information produced in each member country of the basin. From then on, it will be important to ensure proper coordination with the thematic focal points of each member country of the basin in the area of regional coordination (VBRIF), and also between the national focal points and the thematic focal points at country level. (VBIF).

49. The second level of this component is the regular update of this Catalogue of sources of information and the Web portal though dependent on the data produced at country level. But it expected that a consistent support mechanism would ensure collection and regular data and information production in both time and space.

50. The Web portal will be the main window of presentation and the key information access point of the VBRIF. The information will be updated based on the thematic area and the frequency of collection.

4.5 Component 4: Mechanism for monitoring/evaluation of the VBRIF

51. The mechanism for monitoring and evaluation will be based on existing arrangements and/or to be created in order to periodically take stock of the implementation of the

mechanism and to carry out ample readjustments.

52. Modes and tools of data gathering shall be used with the aim of capitalizing the progress made and the environmental impact assessment of the Basin.

53. The organization of the monitoring /evaluation mechanism shall be done according to the following levels :

- At the national level (local) (public services, national focal points, etc.) ;
- The regional level (Basin) (Basin Authority, Regional Coordination, GEF-Volta Project etc) ;
- Concerning the monitoring/evaluation framework, three (3) categories of indicators will be defined:
- Quarterly measurable indicators indicating the status of implementation of the mechanism ;
- The measurable indicators on annual basis; these will impact on the state of the environment and the environmental knowledge of the basin ;
- The measurable indicators covering several years of information on the cumulative effect of the state of the environment and knowledge of the basin environment, conflict reduction, and the dynamics of cooperation and information exchange of data.

Tableau 3 : Cadre logique simplifié du système

Specific Objectives	Activities	Performance Indicators	Sources for cross-checking	Risk assumptions
Contribute to the understanding and inventory of the main data , sources of data and information in the countries and ensure their update	Determine the main sources of information and data in the countries	The sources of information and data are recorded on yearly basis	Country report	Lack of resources
	Circulate the main sources of information and data on the Internet	The VBRIF platform is made operational	VBRIF database	Non functioning of the VBRIF platform
Contribute to the establishment of an effective framework for the collection, processing , analysis and storage of environmental information in the countries within the basin	Propose a strategy for data collection	75% des acteurs du bassin ont adopté et utilise cette stratégie	Existence of the strategy	Lack of collaboration between the national institutions and focal points
	Harmoniser les outils de collecte au niveau du bassin	75 % of the stakeholders in the basin have adopted the same collection tools	Collection record, report and feedback documents	Uncooperative collaborative attitude of the different information-bearing agencies
	Adopter un langage commun du Bassin	75 % of the stakeholders in the basin use the same language	Report and common basin language document	Lack of dialogue

Specific Objectives	Activities	Performance Indicators	Sources for cross-checking	Risk assumptions
To gradually render the basin observatory operational	Rethink the institutional context and the technical, logistical and material conditions for the implementation of the Basin Observatory	A study is conducted to that effect	Fact-finding report	Lack of resources
	Design the hardware and software components of the observatory.	A study is conducted to that effect	Fact-finding report	Lack of resources
	Acquire and install equipment in the appropriate offices.	90 % of the Observatory equipment are acquired	Evaluation report	Lack of resources
	Adopt an information charter between the producers and stakeholders in the Basin	90 % of the partners have signed the charter	Evaluation report	Uncooperative attitude in terms of collaboration
	Ensure the functioning of the mechanism	90 % of the potentials of the Observatory are functional	Evaluation report	Défaillance du management

Table 4 : VBRIF Objectives and Components

Main objectives and components of the VBRIF			
Component 1: Organisation of the institutional environment	**Component 2:** Organisation of the technical environment	**Component 3:** Programme for the production and dissemination of information	**Component 4 :** Mechanism for monitoring and evaluation of the VBRIF
Organisation of national focal points	Storage and communication tools and hardware – Regional Coordination	Data posted on the Web portal	Monitoring indicators
Coordination/Dialogue with the thematic focal points – Protocol (VBIF)	Web Portal	Catalogue of metadata	Performance indicators
Precise inventory of thematic data	Common Basin Language	Thematic data summary	
Assistance for data collection	Hardware Assistance in terms of the focal points	Update of web Portal	

4.6 Human resource requirements and equipment

54. Regional component

- With regard to the exchange mechanism, a database developer and specialist is necessary including a Web portal manager or an Expert in Information Technology.
- For the observatory, the skills required are quite immense but this does not come within the purview of this study.
- The hardware and software architecture shall be defined during the operational phase. The proposals made in the budget are only for purposes of guidance.

55. National component

- At the country level, local databases will be managed, that is why a database developer and specialist is necessary for each national component.
- The hardware and software architecture shall be defined during the operational phase. The proposals made in the budget are only to serve as a guide.

4.7 Three-year VBRIF Budget and work plan

56. At this stage of the study, it is not possible to assess in very specific terms the financial commitments involved in the VBRIF implementation process. The figures presented here are only estimates which have to be upgraded during the operational phase (Table 5)

57. The budgetary headings concern the recruitment of permanent personnel (2 persons at the regional Coordination, a person per country, meaning six at the of national focal points level) and equipment in terms of central servers, Web servers, work stations, communications expenses, recurrent expenses on national focal points and regional coordination etc.

Table 5: Three-year VBRIF Budget Estimates

Description of budgetary heading	Cost Year 1	Cost Year 2	Cost Year 3	Total Cost over 3 years
Personnel				
Regional Level	16 800 000	16 800 000	16 800 000	50 400 000
National Level	36 000 000	36 000 000	36 000 000	108 000 000
Sub total personnel	**52 800 000**	**52 800 000**	**52 800 000**	**158 400 000**
Equipment				
Regional Level	17 000 000	-	-	17 000 000
National Level	3 500 000	-	-	3 500 000
Sub total Equipment	**20 500 000**	**-**	**-**	**20 500 000**
Recurrent + assistance to national institutions				
Regional Level	35 000 000	45 000 000	55 000 000	135 000 000
National Level	50 000 000	55 000 000	60 000 000	165 000 000
Sub total Recurrent	**85 000 000**	**100 000 000**	**115 000 000**	**300 000 000**
Communications and Maintenance of Equipment + consumables				
Regional Level	15 000 000	17 500 000	20 000 000	52 500 000
National Level	7 500 000	10 000 000	12 500 000	30 000 000
Sub total Communications	**22 500 000**	**27 500 000**	**32 500 000**	**82 500 000**
TOTAL IN CFA	**180 800 000**	**180 300 000**	**200 300 000**	**561 400 000**
TOTAL IN EURO	**275 610**	**274 847**	**305 336**	**855 793**

Table 6 : VBRIF Implementation Plan

Tasks	YEAR 1				YEAR 2				YEAR 3			
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
Component 1: **Organisation of institutional environment**												
Organisation of national focal points												
Coordination/Dialogue with thematic focal points (VBIF)												
Precise inventory of thematic data												
Assistance for data collection												
Component 2: **Organisation of the technical environment**												
Storage and Communication Tools and Equipment – Regional Coordination												
Web Portal												
Common Basin Language												
Equipment assistance for focal points												
Component 3: **Information production and dissemination Programme**												
Data posted on the Web portal												
Catalogue of metadata												
Thematic summary of data												
Update of Web portal												
Component 4 : **VBRIF Monitoring and Evaluation Mechanism**												
Monitoring Indicators												
Performance indicators												

4.8 Viability of the VBRIF

4.8.1 Key assumptions

58. The key assumptions are important factors which are not under the direct control of the team responsible for the implementation of the exchange mechanism, but which can significantly influence the realization of the objectives and outcomes of the latter.

59. It is important that the following assumptions are verified :

- The data authorities comply with agreements and their political commitments
- The donors lend their support to the mechanism
- That standards be formulated and a basin language be adopted for data sharing
- International agreements be signed on information circulation within the basin
- The participating countries own the mechanism and accept the responsibility to support this mechanism with personnel and other necessary resources, to exchange data collected and the information produced.
- The regional coordination is capable of managing the changes to be made in the implementation of the mechanism in accordance with events and developments likely to affect the VBRIF.
- The officials of public institutions who may have received training under the VBRIF or those recruited shall be maintained in their positions; failing that, other officials will be trained early enough to ensure a transition that will not be a hindrance to the advancement of the VBRIF.

4.8.2 Risks

60. The VBRIF may be exposed to the following major risks:

- Risk 1: Lack of cooperation between the various national public agencies and the national focal point. The potential problems would be easily handled first of all within the framework of the national coordination (focal point) and the Regional management Framework which has a mandate for this task,
- Risk 2: The national focal points could be absorbed by other tasks rather than those defined within the framework of this mechanism and therefore not sufficiently available to participate in the activities of VBRIF. The strategy consists of bringing on board other officials from the same unit who are available including consultants to successfully carry out certain activities under the mechanism.
- Risk 3: Reluctance in the exchange of data and information: The acceptance of the principle of exchange of data and information collected from the national institutions is a fundamental principle of the VBRIF and a pre-requisite for participation. The signing of a specific agreement for the implementation of the VBRIF with the countries of the Basin and the protocols relating to exchange shall centre on these aspects.
- Risk 4: Lack of management: The risk of lack of management is multi-dimensional; the key one being the non implementation of monitoring tools for the mechanism (warning benchmarks, dynamic performance indicators). They are important in order to avoid any deviations. It is therefore necessary to establish performance indicators; together with

their warning benchmarks (for example indicators on the performance rate within the set time frames). Simplified versions of these performance indicators should be made available for consultation on the web site and they should also be updated on regular basis.

- Risk 5: Non functioning of the platform: It concerns the existence of infrastructure for accommodation, minimum equipment and minimum communication infrastructure.
- Risk 6 : Lack of validated content : The lack of validated content represents a critical risk, the added value of the VBRIF being mainly to have access to data and information on the six (6) member countries of the basin in real time and being a catalyzing agent for other basins in Africa and elsewhere. Without a validated content, the VBRIF platform has little chance of attracting

  decision-makers, partners and researchers and also playing its catalytic role. The credibility of the VBRIF will be highly undermined.
- Risk 7: Limited partnerships: The expanded financial partnerships should allow for the sustainability of the effects of the VBRIF. The GEF-Volta Project is the first stage. It is meant to define and implement the enhanced strategy regarding potential partners in relation to the resources they represent. A first stage consists of establishing a map of financial partners and establishing contacts with active donors in the field of information, science and technology, at country level including the central level (Volta Basin Authority)

5 Conclusion and recommendations

61. In order to concretize and implement an effective and operational, updated and dynamic regional data and information exchange mechanism on the Volta Basin, certain types of information that constitute important factors for success have been put forward:

- Participatory approach : The identification of key national actors as well as their role in the future system that has been developed - What has to be done now is to generate a constructive process for the strong involvement of the key actors through the strengthening of communications and their active involvement in all phases of design and implementation in order to arrive at a consensus on all decisions taken and choices made. This consensus is essential for the ownership of the mechanism by future users and for their future use and active participation;
- Support for the policy and decision-makers: An information programme and the involvement of decision-makers are also very important issues which should be pursued by the Project and ABV in collaboration with the authorities and identified key partners;
- Analysis and consideration of similar experiences in the exchange mechanism : in-depth analysis of the causes and origins of « failures » or the ineffectiveness of certain exchange mechanisms for national, regional and international data should be finalized quickly in order to accurately identify risks of failure, avoid recurrent errors in the deployment of the information mechanism, and to preempt them by looking for and proposing suitable and innovative solutions ;
- Simple and progressive modular system: The design of a simple and « modest »system dealing with the following principles:
- An organization centred on the ABV as a manager of the regional data and information exchange mechanism due to its sustainability vis-à-vis the project.
- A content focused on existing, reorganized, remodeled and harmonized data on the basis of a common language referred to as the language of the basin;
- A progressive structure - first with a restricted number of modules and integrated data bases which are however evolving gradually in accordance with the needs expressed by the regional coordination outfit and national actors:
- Metadata catalogue: in order to complement the inventory of batches of data produced by the actors of each country, the Project will send improved inventory cards to the countries for a detailed inventory of structures in terms of missions, roles, produced batches and data base, formats, available human resources provided for data management, data management hardware and software, constraints and needs, expectations, etc. The metadata catalogue aims at answering the basic questions that every potential user asks himself when dealing with a set of data values that he does not know:

o What does this set of data values really entail?

o What can I do with it? At what levels can I use it?

- How was it created? What is its quality?
- Who owns it? What are my user rights?
- Who should I contact to acquire it? Where is it stored? Is it remotely loadable?
- What does it look like?
- Etc.

- Sharing and authorization of access to data: the issue of the authorized sharing and provision of certain batches of data should be discussed and regulated quickly between the Project and the authorities of the data concerned because it is an important risk factor for the loading of the contents of the exchange system. Indeed, if data is not shared due to the lack of an official exchange protocol, the system cannot be loaded and updated. Even if the right to the data should be respected and sources always specified, the principle should be that it should belong to the public data domain; that is to say, it should be publicly available to decision-makers and other data users ;
- Human, material and financial resources: Deficiencies and failures with regard to human and material resources as well as the operational methods of several stages, particularly data collection and capturing were brought up. The system should first be based on what is available and take full account of these problems; it should offer solutions and not depend on hypothetical improvements or future decisions in order to be able to be promptly operational on the basis of the existing circumstances.

6 Annexes

6.1 Annex 1: Summary of the group of data collected by the Institutions in the countries

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
BENIN	**Agriculture**	- Agricultural Statistics - Statistics on agricultural inputs	- Field Investigations - Inventory	MAEP, DANA, CENATEL, INSAE, INRAB, DAGRI, Directorate of Livestock Production, Directorate of Water and Forest Resources.
	Water	- Statistics on rural water resources - Statistics on urban water resources - Hydrology and hydrogeology - Physico-chemical qualities of water resources - Statistics on pondages	- Inventory - Measuring devices - Scales programmes - Sampling and physico-chemical tests - Inventory	Directorate of Water Resources, SONEB
	Energy	- Statistics on the consumption of hydrocarbons and electricity	- Measuring devices - Meters - Inventory	SBEE, Directorate of Energy Resources, SONACOP.
	Meteorology	- Climatological statistics - Statistics on the parameters of air navigation	- Measuring devices - Scales programmes	ASECNA
	Basic information on remote sensing and mapping	- Inventory of basic relief maps - Inventory of satellite images - Inventory of aerial photographs - Inventory basic thematic maps	- Mapping Funds - Ecological and Forest Inventories - Inventory	IGN, CENATEL, CENAP OBRGM
		- Statistics on biodiversity	- Inventory	Directorate of Water

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
BENIN	**Land allocation and Forestry**	- Statistics on land occupation	- Field investigations - Ecological and Forest Inventories	Resources and Forestry, INSAE, CENATEL, UAC
	Socio-Economy	- Population statistics - Statistics on economic analysis - Studies	- Inventory - Field investigations - Activity records	INSAE, MAEP and other key ministries, UAC, UP
	Hygiene	- Information on hygiene ; Promotion of private sewage disposal - Supervision of standards and directives relating to hygiene and drainage ; - Control of power-driven vectors.	- Inventory - Carrying out of drainage works	DHAB, CREPA
MALI	Hydraulics	- Statistics on the flow of water courses, extent of rise of the water level, - Technical characteristics of modern water points (modern boreholes and wells, underground tanks, carriage of potable and basic water with standpipes) - Socioeconomic data - Statistical data on the quality of water sources	- measures, observations - Field investigations	DNH
	Agriculture	- Agricultural Statistics - Statistics on agricultural inputs	- Field investigations	CPS/MA – DNA, DNPIA, DNSI
	Stock breeding	- Pastoral statistics - Statistics on animal production	- Field investigations	CPS/MA – DNPIA, DNSI

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
			- Inventory	
	Forestry	- Statistics on plant formations, and on the production and productivity of the latter - Timber scaling - Volume et number of timber available	- Inventory - Studies	DNCN
	Climatology	- Pluviometry - Temperature - Humidity - Insolation - Wind - Evaporation	- Measures Observations	DNMétéo
	Environment, forestry, institutional framework of the policy and management of environmental and water resources ; environmental impact study	- Surface area of the plant formations - Type of soil occupation - Species – reforested/degraded surface areas - Evaluation of water resources	With the institutions in possession of data	Ministry of the Environment, Water Resources and Forestry DRE -DPIF – DISA ANDE
	Hydrometric measures Human Hydraulics	Flow, temperature, drained waterway	Analogical surveys by on-site stations	Ministry of Economic Infrastructure (MIE) DHH (Directorate of Human Hydrology)
	Agricultural data, development of a	Surface areas, production,-soil occupation rate	Field investigations	Ministry of Agriculture (PNR)

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
COTE D'IVOIRE	sustainable agricultural system			
	Animal and fish production	Livestock	Field data, site visit	Ministry of Animal Resources and Fisheries (DGERA)
	Economic Activities	Project data	Field data	Ministry of Finance and Economic Planning
	General Administration	Administrative Data	Field investigations (collection from the people)	Ministry of the Interior and Decentralization (DISA)
	Design, formulation and planning of the national policy on development programmes	Statistics on social and economic life (schools, health, agriculture, stockbreeding…)	Field investigations (collection from the people)	Ministry of Planning and Development (DPP)
	Mining resources	Mining tonnage of gold, diamond,	Field data	Ministry of Mines
	Health Infrastructure-capacity, level of patronage, rate of coverage	Disease prevalence of the region, number of births, mortality rate, morbidity rate	Field data	Ministry of Public Health and Population (INSP)
	Forestry – Environment	Species-types	Field data	University of Abobo-Adjamé
	Environment, socio-economy, climate	Theses, dissertations, research work	Evaluation, field investigations	University of COCODY (IGT) (FSE) (CURAT) (IES)
	Forestry – water – land Socio-economy	Quantitative and Qualitative Evaluation of Resources (Surface areas of plant formations – Type of soil occupation)	By satellite imagery Field investigations Aerial photographs	National Committee for Remote Sensing and Geographical Information (CNTIG)

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
	Forestry – Change in allocation of land, water, socio-economic factors	Surface area of plant formations	By satellite imagery	BNETD / CCT
	Forestry	Species – reforested/degraded surface areas	By satellite imagery Field investigations	SODEFOR
	Climatic factors	Pluviometry-temperature-wind	Field investigations	SODEXAM
	Population	Census (socio-economic data of the population)	Surveys	INS
	Socio-economic data			CIRES
	Agricultural research-agricultural statistics training	Rate of coverage- rate of production	Survey and field data	ANADER
	Mining research	Location of deposits	prospecting	SODEMI et Géologie
	Research: Climates-vegetations-land-water Socio-economic factors	Surface areas of the plant formations – Soil occupation	By satellite imagery – field data	IGT
	Forestry – Change in land allocation	Species – reforested/degraded surface areas	Field	CNRA
	Change in land allocation	environmental	Field	CRE - LAMTO
	Forestry	Species – surface areas	Field	CNRA (ex IDEFOR)
	Vegetation – Pedology	Surface areas of the plant formations - pedology	Field	CNRA (ex-IDESSA)
	Forestry/ biodiversity	Species – surface areas	Field Research	CRE
	Foresterie - Agriculture	Species – surface areas	In situ	INHP/ENSEA
	Forestry – water level	Species – surface areas	Field investigations	CRO

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
	Change in allocation of land and socio-economic factors	Research into Human Development and Natural Resources	Field data	CSRS
	Water Pollution	Sampling	Field Terrain	CIAPOL
	Forestry, water, land, environment, socio-economic factors	Reports, statistical material, outcomes of publications	Field data by a network of structures (partners)	NGO for the environment or socio-economic assistance
	Forestry, water, land, environment, socio economic factors	Reports, statistical material, outcomes of publications	Field data by a network of structures (partners)	Research centres (IRD)
				Research and consultation departments
				Regional international organizations
GHANA	**WATER CYCLE**	Rainfall, Temperature, Evapotranspiration, Humidity, Wind, Soil Temp.	-	Ghana Meteorological Agency
		River water level & discharge	-	Hydrological Services Dept.
		Surface water quality	-	Hydrological Services Dept. & Water Research Institute (WRI)
		Sediment discharge	-	Hydrological Services Dept.
		Soil moisture	-	Water Research Institute
		Groundwater data	-	Water Research Institute
		Flora & fauna in aquatic ecosystems	-	Water Research Institute
		Groundwater quality	-	WRI/CWSD
		Topography	-	Survey Dept.

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
	PHYSIO-GRAPHIC	Drainage, lakes, reservoirs	-	Survey Dept.
		Plant & Animals species	-	Forestry Commission
		Soils	-	Soil Research Inst.
		Land cover/land use	-	Forestry Commission, CERSGIS, EPA
		International, National, Regional and district boundaries and river basin boundaries.	-	Survey Department; CERSGIS
		Geology	-	Geological Survey Dept.
	SOCIO-ECONOMIC	Population	-	Ghana Statistical Services of MFEP
		Settlements (urban & rural)	-	Ghana Statistical Services of MFEP
		Roads	-	Ghana Highway Authority, Dept of Urban & Feeder Roads
		Water Infrastructure (water supply, irrigation, hydropower, & navigation)	-	GWCL, CWSA, GIDA, VRA, VLTC.
		Agriculture – Crop, livestock, fisheries	-	
		Energy sources and utilization	-	
		Waste disposal and environmental sanitation	-	
		Employment, agriculture, industry and mining, services	-	
		Traditional, tribal areas	-	National House of Chiefs /Lands Commission

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
	CULTURAL			
		Land ownership and tenure	-	Traditional Authorities, Families, Individuals/Lands Commission
		Farming systems		
BURKINA FASO	**Forestry and tree seeds**	- Data on pluviometry, temperature, humidity, radiation and wind, - Data on water content of plants, - Data on seeds, forest species - Characteristics and location of settlements Dynamics of the vegetation , - Data on the impact assessment of anthropogenic activities on the flora and vegetation	Field research	National Centre on Tree Seeds (CNSF)
	Forestry	- Strategy on the popularization of forest techniques; - Data on the methodology for the formulation of forest management and forest plantation plans	Field research Aerial photographs Satellite images	Ecological Monitoring Directorate
		Data on forest and fauna resources: map of lands of listed areas and soils ; distribution map of Accacia Senegal	Inventory Field Aerial Photography	Directorate of Forestry

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
	Mapping	Basic topographical data - national topographical data base – BNDT- aerial photographs – Geological Network - BDOT	Field research Aerial Photography Satellite Images	Burkina Geographical Institute (IGB)
	Land/Land Occupation	Soil data – soil maps and soil capability in Burkina Faso – soil occupation maps – land degradation maps	Field research Aerial Photography Satellite Images	National Soil Bureau
	Socio-economic factors	Administrative, population and socio-economic data, national accounts – data base on communities in Burkina Faso- BDLB	Field research, Electronic data development Research	National Statistics and Population Institute
	Soil occupation/ Vegetation	Analysis and use of GIS data;	Field research Aerial Photography Satellite Images	National Environment and Agricultural Research Institute
	Physical Geography	Physical and human geography data – soil occupation map	Field research Aerial Photography Satellite Images	Departement of Geography of the Université de Ouagadougou
	Management	Management plans, regional plans and economic regions	Field research	
	Water resources	Data on surface water, groundwater, distribution and potential	Field research Aerial Photography Satellite Images	Directorate of Water Resources
	Socio-economic mapping	Soil management data Mapping data Vegetation data Aerospace support	Field research Aerial Photography Satellite Images	National Soil Management Programme

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
		Data base on communities in Burkina Faso		
	Grazing lands/animal resources	Data on biomass, grazing lands, pastoral planning, follow-up of transhumance	Field research	Directorate of Pastoral and Land Planning
	Agriculture	Agricultural statistics, production and yield	Field Survey	Directorate of Agricultural Statistical Planning
	Climate	Data on climatic parameters (Pluviometry, temperature, humidity, wind, atmospheric pressure, radiation, insolation, vapour pressure, evaporation, evapotranspiration, phenology, quality of air, visibility, nature of clouds, hydrometry)	Field	Directorate of Meteorology
	Mines	Geological, mining, geophysical, atmospheric, soil and geochemical data	Field	Bureau of Mines and Geology of Burkina Faso
	Urban planning	Data on landscape management and drainage	Field Research	Directorate for the Improvement of the Local Environment
	Infrastructure	Data on road infrastructure	Field	Directorate of Road and Sea Transports
	Urban statistics	Digital data and definition of standards relating to human settlements	Field research	Directorate for the Analysis of Urban Statistics
	Mapping / Hydrology	Research data on natural resources (water, land, vegetation)	Field research Aerial Photography Satellite Images	Research and Development Institute

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
	Biodiversity	Data on the conservation of biodiversity	Field	NATURAMA
	Agronomy	Agricultural research data	Field	CIRAD
	Santé	Health data	Field	UNICEF
TOGO	Planning	Data on the management plans and equipment standards for a rational utilization of resources ;	-	Ministry of Agriculture, Livestock and Fisheries Directorate of Planning and Rural Equipment (DAER),
	Mapping / Land	Inventory of the study, and mapping of the conservation and restoration of land, the analysis of soil, plant, water and fertilizer samples ;	-	Directorate of Laboratories of the Togolese Agricultural Research Institute (Pedology and Mapping Division) – ITRA
	Agricultural statistics	documentation of agricultural statistics	-	Directorate of Statistics, Information and Documentation
TOGO	Hydrogeology	Studies and research on groundwater and physico-chemical analysis	-	Directorate of Geological and Mining Research (DRGM) and the Directorate of Mining and Petroleum Laboratories (DLMP)
	Climate	Meteorological assistance to all economic actors in Togo; formulation of an overall meteorological development policy;	-	National Meteorological Directorate (DMN),

Country	Activity Sector	Data and Information produced	Data Collection System	Structure
		management and use of the entire national meteorological policy network and the coordination and harmonization of all manner of meteorological action programmes.		
	Urban Statistics	Data on topographical mapping and building plots ;	-	*Directorate of Cartography and Cadastral Survey*

6.2 Annex 2: Summary of a few experiences

International Experiences

Over the last several years, several innovative initiatives have been rolled out at the international level. These initiatives are interesting sources of information in terms of structure and introduction of nomenclature, reference models, etc. Reference is made below to some interesting programmes:

FAO's AQUASTAT[1] programme is a significant initiative both in terms of relevance on a national scale and the ability to provide more inclusive assessments of the uses of water.

Initiated by the World Meteorological Organization [2](WMO), the « Whycos [3]» programme (World Hydrological Cycle Observing System) aims at improving the precision and continuity of field measures. Where necessary, it would use advanced technologies with the ultimate objective of establishing regional information bases.

A number of regional whycos programmes are on-going or have reached the qualification stage. (Mediterranean, Southern Africa, West Africa, Central Africa, Equatorial Africa, Caribbean Region, etc.)

The GEMS[4] (Global Environment Monitoring System) « Water » programme carried out under the auspices of UNEP[5],

The « FRIEND [6]» (Flow Regimes from International Experimental and Network Data) programme organized as part of UNESCO's International Hydrological Programme (IHP[7]), deals with the major issues concerning the flow regimes of rivers addressed in accordance with regional methods: data base, inflows, minimum flows, floods, strong rains as well as physical flow processes, trends, and hydrology of integrated water management.

The European Framework on Water directive[8] introduces the construction of a reference model to ensure that genuine assessments of the situations and strategies of member States are carried out.

Regional and basin experiences

Among the regional projects for inter-State collaboration for the establishment of new information system, mention can be made of the following:

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[1] AQUASTAT FAO portal : http://www.fao.org/nr/water/aquastat/main/indexfra.stm
[2] Website of the World Meteorological Organization : http://www.wmo.int/
[3] Web portal of the WHYCOS programme : http://www.whycos.org/
[4] Portal of the GEMS UNEP programme : http://www.gemswater.org/
[5] UNEP – PNUE website : http://www.unep.org/
[6] Portal of the FRIENDS-IHP-UNESCO programmes : http://typo38.unesco.org/en/about-ihp/ihp-partners/friend.html
[7] UNESCO-IHP Portal : http://www.unesco.org/water/ihp/index.shtml
[8] European Reference water framework directive : http://europa.eu/scadplus/leg/fr/lvb/l28002b.htm

The « **SEMIDE**[9] » (Euro-Mediterranean System of Information on Knowledge relating to Water) programme whose implementation was decided at the 1996 Marseille Ministerial Conference and brings together the 27 signatory States of the Barcelona Agreement and the European Commission.

The **Sahara and Sahel Observatory** (**OSS**[10]) offers various on-line resources through its activities relating to the collection, processing, storage and development of information on water;

The **European Water Information System** (**WISE**[11]) which is compiling data and themes (statistical indicators, mapping, etc.) as well as water policies and projects in Europe.

The **European Water Network** (**EUROWATERNET**) which will ultimately ensure that useful information is collected to establish the status of the environment in this sector for the member States of the European Union.

The **International Network of the Basin Organs** (**RIOB**[12]) has the following objectives:

- Develop permanent relations between organs interested in an overall management of water resources and big watershed catchment basins, and encourage exchanges of experiences and expertise among them;
- Promote, as part of the programmes of cooperation, the principles and means of rational water management for sustainable development ;
- Facilitate the formulation of institutional and financial tools as well as programming, data bank organization and needs-based models tools ;
- Promote information and training programmes for town councillors, representatives of users and various actors involved in water management as well as the managers and staff of basin member organizations ;
- Encourage the education of the people, particularly the youth, and
- Evaluate initiated actions and ensure the dissemination of their outcomes.

The **African Network of the Basin Organs** (ROAB[13])

Integrated water resource management (GIRE) is a sure way of ensuring the sustainable development of Africa and, indeed, the world. It is in this perspective that the African Network of the Basin Organs (ROAB) saw the light of day. It is very much like the International Network of the Basin Organs (RIOB), of which it is an effective fulcrum in the region.
ROAB's objectives are as follows:

[9] International portal of SEMIDE-EMWIS : http://www.semide.net
[10] OSS portal : http://www.oss-online.org
[11] WISE portal: http://water.europa.eu/
[12] RIOB portal : http://www.riob.org/
[13] RAOB portal : www.raob.com/

- develop relations between the concerned partners (exchanges of experiences and expertise);
- Promote the principles of GIRE, and
- Support the programmes of information and training of actors involved in water resources at all levels.
-

The **Permanent Inter-State Committee on Drought Control in the Sahel** (**CILSS**[14]) and the **AGRHYMET**[15] **Regional Training and Research Centre**

At the level of the basins

European and African observatories

The system of information on the water of the Rhin-Meuse (**SIERM**[16])
The system of information on the water of the Rhone-Méditerannéen (**SIEau**[17]) basin
The Artois-Picardie water agency and its on-line data[18]
The Poitou Charente Environmental Observatory (**ORE**[19])
The Niger Basin Authority (**ABN**[20])
The Nile Basin Initiative (**NBI**[21])
The department of the environmental observatory (**SOE**) in the valley of River Senegal (**OMVS**[22])

Organized exchanges of harmonized data within the **International Commissions**; for example, put in place for the protection of Lake Léman (International Commission for the Protection of the Waters of Lake Léman, the Franco-Swiss **CIPEL**[23]) or the waters of the Rhine, the Meuse and the Escaut (Germany, Belgium, France and Holland).

National Experiences

In France, the National Water Information System (**SIE**[24]), which depends on the National Water Resource Data Administration Secretariat (**SANDRE**[25]), ensures the exchange of data between banks and creates an interactive relationship between the twelve or so preexisting specialized or thematic data banks both at the national level and for the six (6) national basins ;

In Senegal, the Millennium Potable Water and Drainage Programme (**PEPAM**[26]);

[14] CILSS portal: http://www.cilss.bf
[15] AGRHYMET website : http://www.agrhymet.ne/
[16] SIERM portal: http://rhin-meuse.eaufrance.fr
[17] SIEau portal: http://www.rhone-mediterrnee.eaufrance.fr/
[18] Web portal of the Artois-Picardie Water Agency : http://www.eau-artois-picardie.fr
[19] ORE portal: http://www.observatoire-environnement.org/
[20] ABN website: http://www.abn.ne/
[21] Portal of the Nile Basin Initiative : http://www.nilebasin.org/
[22] River Senegal Environmental Observatory : http://www.omvs-soe.org
[23] CIPEL website: http://www.cipel.org/sp/
[24] Eaufrance, portal of the French water provider : http://www.eaufrance.fr
[25] Sandre portal: http://sandre.eaufrance.fr
[26] PEPAM web portal: http://www.pepam.gouv.sn

In Brazil, the National Water Resource Data System **SNDRH**;

In Mexico, the National Water Information System (**SINA**) and Regional Water Information Systems (**SIRA**[27])

[27] « SINA » and « SIRA » in Mexico : http://www.conagua.gob.mx

6.3 Annex 3: Details of the main batches of data on a country-by-country basis

N°	Country	Main batches of data	Format	Mapping Scale	Date of Formulation	Frequency
1	Burkina Faso	Meteorology - Temperature - Rain - Wind - Humidity - Sushine - Evaporation	Text	National	1902-2008 1902-2008 1953-2008 1961-2008	Daily Monthly
		Piezometric	Text		1980-2008	
		hydrometric			1950-2008	
		Lands	Digital	1/100.000	At finalization stage	
		Agricultural statistics (Agristat)	Text	- National	1993-2006	Yearly
		Land occcupation data base	Digital	1/200.000	1992 and 2002	
		Animal Resource/Livestock Information System	Digital Text	-	1970-2008	10 years, (5 years, normal)
		National Water Information System	Digital	-	2008	
		Population	Text	-	1975, 1985, 1996, 2006	Every 10 years
		Listed forest/reserve	Digital		1992 and 2002	
		National Topographical Data Base	Digital	1/200.000	1956-1960 1978-2000	
		National administrative data	Digital	1/200.000		
		Geomorphology	Digital	National	2002	
2	Benin	Population	Text		1979, 1992	
		Vegetation	Digital		1994	
		Land occupation	Digital			
		Hydrogeology	Digital	1 /500 000		
		Meteorology - Temperature - Rain - Wind	text	National	1950-2008 1950-2008 1950-2008	Daily

N°	Country	Main batches of data	Format	Mapping Scale	Date of Formulation	Frequency
		- Humidity - Sunshine Evaporation			1950-2008 1950-2008 1950-2008	Monthly
		hydrometric	text		1952 1961 2007	
		Piezometric	text		2003-2008	
		Listed forest/reserve	digital		1999	
		Town and country planning	digital			
3	Cote d'Ivoire	Meteorology - Pluviometry - Temperature - Humidity - Insolation - Wind - Evaporation	GPS		1961-2008 1081-2008 1955-2008 1968-2008 1994-2008	Daily Monthly
		hydrometric	digital			
		Piezometric			1976 1983	
		Town and country planning (regions, départements)	digital	1/ 200 000		
		Types de Soil				
		Pedology	digital	1/ 200 000		
		Geology	Digital	1/ 200 000	1995	
		Land cccupation	digital	1/ 200 000	2002	
		Vegetation				
		Socioeconomic	digital		2000	
		Forestry maps	digital			
		Relief maps	digital		Before 1990	
4	Ghana	Meteorology - Temperature - Rain - Wind - Humidity - Insolation - Evaporation	Text			Daily Monthly
		Data Hydrometric	digital			

N°	Country	Main batches of data	Format	Mapping Scale	Date of Formulation	Frequency
		HYDATA				
		Piezometric				
		National administrative data	digital	1/50.000 to 1/2.500		
		Land data	digital	1/250.000		
		Geological data	digital			
		Population	Text			
		Agricultural data	digital			
		Vegetation	digital			
		Livestock	digital			
5	Mali	Meteorology - Pluviometry - Temperature - Humidity - Insolation - Wind - Evaporation			 1921-2008 1925-2008 1932-2008 1071-2008 1950-2008 1951-2008	
		Piezometric			1998-2008	
		Hydrometric			1995-2008	
		Geology		1 /200 000		
		Types of soils		1/500000		
		Soil occupation		1 /200 000		
		Agricultural statistics				
		Vegetation				
		National Administration		Multi scale		
		Hydrography				
		Topography		1 /200 000		
		Agricultural maps		1 /200 000		
6	Togo	Meteorology - Pluviometry - Temperature - Humidity - Insolation - Wind - Evaporation	Text		 1960-2007 1971-2007 1971-2007 1961-1992 1971-2007 1961-1990	
		Piezometric				
		Hydrometric			1953 - 2000	
		Geological		1/50000 and 1/200000		

N°	Country	Main batches of data	Format	Mapping Scale	Date of Formulation	Frequency
		Pedology		1/50 000	1969	
		Vegetation		1/500000	2003	
		National Administration				
		Land degradation		1/500.000		
		Hydrography				
		Land occupation			1975 2000	
		Agricultural Statistics				
		Topography			1/50000 and 1/200000	

6.4 Annex 4: Terms of reference of the study on the establishment of a regional data and information exchange system in the Volta basin

Context

The GEF-Volta project entitled « Addressing Transboundary Concerns in the Volta Basin and its Downstream Coastal Area » is a regional initiative designed to facilitate the integrated management, sustainable development and protection of the natural resources of the Volta basin in the six riparian countries (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo). The project was specially designed to address the transboundary regional priority issues that were identified in the course of a preliminary Diagnostic Transboundary Analysis (ADT). It is also meant to develop a more coordinated management approach based on the GIRE principles at the national and regional levels, and taking into account the participation of all major actors.

The long term objective of the GEF-Volta is to improve the ability of the countries to plan and manage the environmental resources of the Volta basin in a sustainable manner.

This project has three components which are linked with specific objectives identified during the formulation of the initial project document and updated during the start-up phase as follows:

- Specific objective n°1: Strengthen capacity, enhance knowledge and participation of the public in order to sustain the effective management of the Volta basin.
- Specific objective n°2: Develop legal, regulatory and institutional frameworks as well as tools for the management of the basin in order to address the transboundary concerns of the Volta River basin and its downstream coastal area.
- Specific objective n°3: Implement national and regional measures to check the degradation of the transboundary environmental resources of the Volta basin.

The project seeks to contribute to regional integration, promote dialogue between the basin riparian countries and encourage the participation of the local people and stakeholders involved in the management and use of the resources of the Volta basin.

Up till this day, there is unfortunately no mechanism for the exchange of environmental data and information essential for the sustainable management of the basin. The access to and use of data and information on transboundary basins for diverse and varied purposes by riparian countries are indispensable for the development of management tools and the conduct of scientific activities.

In order to achieve this, it is envisaged as part of the GEF-Volta project that differentials of data series will be compiled, a project data base will be established and a system facilitating access to data and information by decision-makers and other users will be put in place.

Activities

The overall objective of the study is the development of a regional system for the exchange of data and information together with recommendations on the mechanism required to ensure the effectiveness of the management of the information system. Six country experts selected by each of the basin riparian countries and a regional expert selected by the Project Coordination Unit (UCP) will be engaged by UNOPS as consultants for the conduct of the detailed analysis of the national and regional institutions (including the identification of needs and the proposal of a training plan) and the formulation of the collaborative plan with the on-going or planned projects and programmes. In order to attain the targeted objectives, the consultants will carry out the following activities in close collaboration with the UCP and the national coordinators:

1. Inventory and analysis of national and regional data for the entire Volta basin:

- Inventory and analysis of institutions, projects and programmes which carry out activities for the production and management of data and information ;
- Inventory and analysis of data, data bases and other forms of relevant national and regional information (including the GIS, maps, documents, etc.) to address the transboundary concerns in the Volta basin;
- Review of the structure of the existing information systems and formulation of concrete proposals to improve them ;
- Inventory and analysis of national and regional resources for the collection and management of data and information ;
- Identification and classification of potential users of the information systems at the national and regional levels ; and
- Identification of needs relating to the data and information of each user group and involvement of the same in the definition of required formats for similar data.

2. Development of the plan for the training of the national institutions in data management:

- Evaluation of national institutional capacity in data and data base management ;
- Identification of training needs relating to the management and analysis of the data of the Volta basin at the local and national levels;
- Priority training needs relating to the management and analysis of the data of the Volta basin ;
- Development of the operational plan of action for the training activities of national institutions in data management and analysis ; and
- Overview of the various types of information; management and data analysis training manuals which can help in the development of training modules.

3. Introduction of the national and regional data and information circulation system:

- Define the groups of data and information to be exchanged at the national and regional levels ;
- Consult the main institutions responsible for the collection and analysis of data and information, and define the means by which national and regional actors will access data and information ;

- Identify measures required for the harmonization and circulation of data ;
- Identify activities to be undertaken in the area of data and information circulation and propose, where possible, a draft work plan ;
- Define the structure of the regional data and information exchange system to be put in place as well as the management plan required for the system ;
- Propose the implementation and monitoring strategy of the mechanism for the circulation of national and regional data and information ; and
- Identify the potential bottlenecks and the value addition of the data and information circulation mechanism.

The regional consultant will be responsible for the coordination of the consultancy mission. He should ensure the quality of country reports, summarize country reports and develop the mechanism for the circulation of data and information based on the activities described in these ToR.

The national consultants will be responsible for the national studies and production based on the activities described in the ToR: i-) the report on the analysis of the available national/regional information on the Volta basin and, ii-) the data management training plan of the national institutions.

Main expected outcomes of the study

- The inventory and analysis of available national/regional data and information on the Volta basin have been finalized and approved by the UCP and the National Focal Points ;
- The data management capacity strengthening needs of the national institutions have been identified and the operational action plan for training has been developed and approved , and
- The system of circulation of national and regional data and information has been developed and approved by the UCP and the National Focal Points.

Key Considerations:

The consultants should propose a detailed methodology which is clear enough and able to achieve the objectives of the study and to achieve the expected outcomes. To this end, the information below is furnished to ensure an effective direction of the study.

The consultants should take note of on-going studies and activities (more specifically data collection and management activities). This should help to factor in the synergies and complementarities required for the preparation and implementation of the data and information circulation system as well as national institutional strengthening plans.

The consultants should maintain regular contact with the national and regional institutions, national project coordinators and certain stakeholders or groups of stakeholders. The involvement of the national consultants is not only necessary for factoring in distinctive national features, but also for the development of linkages and ownership of the collaborative and training plans by the national actors during its implementation.

All the documents available to the UCP will be put at the disposal of the consultants. The UCP will also provide the consultants with a list of institutions involved or which could be involved in the management of data relating to the Volta basin.

Required experiences and qualifications of consultants

The study will be led by a regional consultant and an expert from each basin riparian country with more than 10 years' experience in the expertise required for the study. The consultants should also have led activities of a similar nature and complexity, especially within the framework of other projects financed by the GEF.

The consultants should have the following qualifications and experiences:

- Regional consultant: post-graduate degree in land management, environmental resources or statistics and experience in data management, institutional development and GIRE, and
- National consultants: post-graduate degree in environmental sciences or statistics and experience in data management, institutional development and GIRE.

Additionally, the following qualifications are an asset:

- Previous experience in the development of data and information circulation mechanisms
- Experience in the implementation of natural resource management projects
- Familiarity with GEF objectives and procedures
- Experience in working and producing documents in French and English

Duration of the mission, reports to be produced and schedule

The consultants will have to produce the reports presented in the following table. The regional consultant is expected to do so in a total of 20 days, while each national consultant is expected to do so in 30 days. The study is expected to be completed before the end of January, 2008 and in accordance with the following schedule:

Task	Deadline	Authority in charge
Signing of contract	1 November, 2008	UNOPS, Consultants
Preliminary report describing the plan of work and methodology	15 November, 2008	Consultants, UCP
1st draft of the reports of the consultants submitted to the UCP/UNOPS	15 December, 2008	Consultants
Evaluation of the consultancy reports	30 December, 2008	UCP, GEP, PFNI
Final version of the consultancy reports	20 January, 2009	Consultants
Validation of the final version of the consultancy reports	29 January, 2009	UCP, PFNI
End of contract	29 January, 2009	UNOPS, Consultants

This schedule for the execution of the mission may be revised upon agreement between the Consultants and UNOPS.

The consultants will submit to the UCP/UNOPS, the soft copies of the reports in French and English in accordance with the schedule presented above.

Submission of applications

Qualified candidates for the position of national expert should forward their applications, including a covering letter, proposed methodology and curriculum vitae, in accordance with the instructions contained in the call for bidders of each basin riparian country.

Qualified candidates for the position of regional expert should forward their applications, including a covering letter, proposed methodology and curriculum vitae, to
Madam Angelika Quaye, via e-mail to angelikaq@unops.org.

6.5 Annex 5: Estimated cost for the development of the VBRIF

Source code used for web pages:	PHP 5, procedural
Content Manage Tool:	sNews
Databases used:	MySQL 5, PostgreSQL
Web server used:	Apache 2
OS:	Mac OS X 10.4 or newer / Windows Server 2003 or newer
Hardware Mac:	A normal modern web server setup (XServe with Intel processor, 4 GB Ram. 2 hard disks (min. 2 x 160 GB, 4 partitions)
Hardware Windows:	Xeon processor (dual or quad), 4 GB RAM, 100MB/1GB network card, 2 hard disks (min. 2 x 160 GB, 4 partitions)
Network connection:	ADSL 8000/1024 or faster.

N°	Headings	Unit	Quantity	Unit Price	Total Price
1	Development/Programming				
	- At the level of the (6) countries	Hj	180	250 000	45 000 000
	- At the regional level	Hj	120	350 000	42 000 000
2	Installation of the Web portal and administration /installation manual	Hj	15	250 000	3 750 000
3	Travel/Accomodation	j	15	1 500 000	22 500 000
	Total Development / Installation				113 250 000

6.6 Annex 6: Example of the Terms of Reference for the formulation of the VBRIF

Context and Justification

This proposed regional data and information exchange system for the Volta basin comes within the framework of the implementation of the GEF-Volta project entitled « Addressing Transboundary Concerns in the Volta River Basin and its Downstream Coastal Areas ». This project is a regional initiative designed to facilitate integrated management, sustainable development and protection of the natural resources of the Volta basin in the six riparian countries (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo). The project was specially designed to address the transboundary regional priority concerns that were identified in the course of a preliminary Transboundary Diagnostic Analysis (ADT).

This proposal with regard to the Volta basin is coming up at a time when there is no data and information exchange mechanism essential for the management of the basin. However, access to and use of data and information on the transboundary basin for diverse and varied purposes by the riparian countries are indispensable for the development of management tools, regional integration, promotion of dialogue between the basin riparian countries and the conduct of scientific activities. Information sharing has become an imperative exercise of solidarity.

The « Inventory and analysis of existing national and regional data on the Volta basin » stage was the first phase of the overall study, i.e. « Introduction of the system for the circulation of national and regional data and information ». It sought to identify the main actors (producers of data and information) of the basin area, analyse the various data bases and batches of data produced by these actors, compile capacity strengthening needs, propose a training plan and list their expectations with regard to the regional information exchange mechanism to be put in place.

-
- The second stage of the study focussed on the proposed introduction of the system for the circulation of national and regional data and information. It seeks to particularly achieve the following:
- Define the groups of data and information to be exchanged at the national and regional levels;
- Identify activities relating to the circulation of data and information to be undertaken and, where possible, propose a draft work plan;
- Define the structure of the regional data and information exchange system to be put in place as well as the management plan required for the system ;
- Propose the strategy for implementing and monitoring the mechanism for the circulation of national and regional data and information, and
- Identify the potential bottlenecks and the value addition of the data and information circulation mechanism

-

The third and last stage which is the subject of these ToR focusses on the operationalization of the "Volta Basin Regional Information Facility" (VBRIF).

The VBRIF will be an indispensable tool for consultations among central, national, local actors and the organs of the basin. It will facilitate the collection, processing as well as dissemination and use of scientific, technical, environmental and socio-economic data and information.

Yet, the strategy to incorporate a multiplicity of information from different sources under a common tool is very complicated. In order to be successful, the formulation of the VBRIF tool needs extensive consultations among the various actors as well as a very elaborate design so that the data bases can be accessed by a many users, including users at country level. The establishment of the VBRIF should, therefore, be done through a pragmatic, adaptable and progressive project based on consultations with all the actors.

Objectives

Introduce a harmonized data and information exchange framework on the environment in order to provide decision-makers with reliable and timely information to help in decision-making with regard to the judicious choice of sustainable development strategies. Thus, the system will contribute to the promotion of a network of technical institutions at the local, national and regional levels. These institutions should be organized to work in synergy so as to formulate and disseminate products and information for decision-makers, cooperation partners, technicians, rural communities, etc.

Serve as a tool for regional and national policies to provide information and to ensure that the impact of the environmental policies implemented in the sub-region is monitored and assessed.

A- Missions and tasks to be carried out:

1- Establishment of the regional exchange system for data and information on the water resources and environment of the Volta basin:

- Establish the status of the existing situation with regard to the GIS and data bases on the Volta basin: study and analysis of the existing situation and definition of needs to complement work already initiated for the establishment of a Volta basin regional data and information system.
- Design and define the structure of the system.
- Prepare a report on the phase and organize a validation workshop for the proposed system.

2- Establishment of the regional exchange system for data and information on the water resources and environment of the Volta basin:

Following the validation of the proposed structure, the research consultancy will

carry out the technical formulation of the system. This will mainly have to do with the following:

- Programme the various modules of the data base by incorporating the retained themes
- Formulate the geographic information system. The GIS will be dynamically interactive and ensure a user-friendliness and timely updating of data ; adequate modules for the capture and transfer of data from other specialized software will be created ;

3- Deployment of the system and training programmes:

- Preparation of the preliminary and final versions of the tools;
- Preparation of the final versions of the User Manual, Technical Manual and Management Manual ;
- Installation of the software and training sessions for the focal points.

B- Expected qualifications and skills:

The project requires a combination of several skills. The bidding research consultancies should have proven experience in the design and provision of tools similar to the water and/or environmental information system (data base interfaced with a GIS for use in the water and/or environmental sector at the national, regional and international levels). Bidders should provide a detailed description of this experience in their proposals by stating executed projects and studies.

As part of the preparation of their offer, bidders should have the following expertise in their teams:

- Specialist in relational data bases with a minimum of 10 years' experience.
- Specialist in geographic information systems with a minimum of 5 years' experience.
- Specialist in design and development of on-line GIS
- Teaching skills to carry out the training of the focal points.

C-Duration of the mission:

8 months

Annex 7: Bibliography

- CILSS/UNEP, 1997. Environmental Information System in the Sahelian sub-region: Volume II – Strategy for the implementation of a sub-regional EIS project – Final Report.
- Document for the implementation of the Information and Monitoring System of the Environment in Burkina Faso, SP/CONAGESE, 1996
- Study on the evaluation of national environmental and socio-economic data and their quality in the Niger Basin, Hubert ONIBON et al, 2007
- Guide for the national information exchange mechanism on the implementation of the global plan of action for the conservation and sustainable use of phytogenetic resources for food and agriculture, FAO, 2004
- Louis Blanc TRAORE, Strategy Document for the implementation of the African Environmental Information Network (RAIE) in Burkina Faso, May 2005
- Regional water observatory in West Africa, 2006 final report
- Sub-regional Programme of Action for the fight against desertification in West Africa and Chad, CILSS/ECOWAS, 1999
- African Environmental Information Network, Directives for Implementation
- African Environmental Information Network, Implementation Strategy, stage one 2003 - 2004
- SENEGAL-HYCOS, Strengthening of national and regional capacity for observation, transmission and processing of data in order to contribute to the sustainable development of the basin of the River Senegal - 2007
- National Water Information System – Structure of the system, CAAGI & I-Mage, 2008
- Tristan MULLER, Yamba YERBANGA, Louis Blanc TRAORÉ, Alfred SAWADOGO, Djibrilou TAMBOURA, Hamadou SAVADOGO, Jean-Louis ANTOINE, 2003; Proposals for the implementation strategy of the centre for reference and information on the environment (CRIE)
- Study on the introduction of the monitoring and evaluation system for the implementation of the rural development strategy by 2015, MAHRH 2005

6.7 Annex 8: Spatialization of the technical structure of the VBRIF

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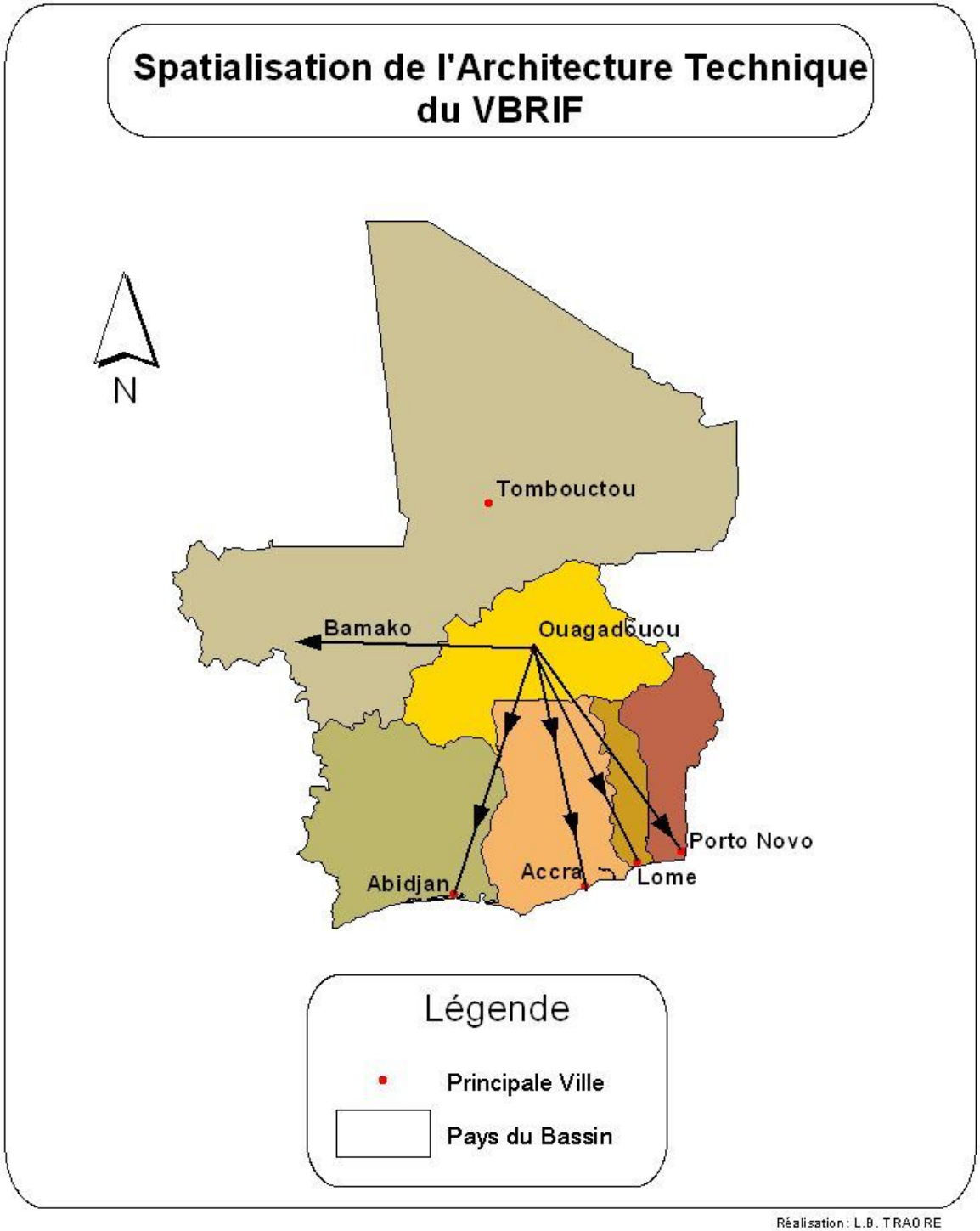
TRANSLATION:

Spatialization of the technical structure of the VBRIF

Riparian countries shown in map

Key:
Red dot for main cities

Triangle for countries of the basin


Spatialisation de l'Architecture Technique du VBRIF
N
Tombouctou
Bamako
Ouagadougou
Porto Novo
Abidjan
Accra
Lome
Légende
Principale Ville
Pays du Bassin
Réalisation : L.B. TRAORE

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