



**GHANA COUNTRY WATER PARTNERSHIP
SUPPORT TO THE
WATER RESOURCES COMMISSION**



Republic of Ghana

AN INVESTMENT STRATEGIES REPORT

APRIL 2016

EXECUTIVE SUMMARY

This document presents an investment strategy for development of water resources and related infrastructure in the White Volta Basin. The document follows from the development and prioritization of *Investment Objectives* and programs geared towards enhancing the resilience of the natural and built systems to the impacts of increasing human induced and natural stresses. Three investment objectives were identified and programs were identified under each of the objectives and prioritized for implementation through a 20 year period (2015 – 2035). The objectives of the investments are listed in the *Investment Objectives Report*, whereas the prioritized programs are contained in the *Investment Priorities Report*, which both precede this current report. The analysis of the costs of implementation of the various programs and actions identified under the various objectives were based on analysis of historical data on investments in similar projects in the basin and other parts of the country. The analysis of implementation considered three main scenarios: Business as Usual Scenario, Realistic Scenario, and Optimistic Scenarios.

The estimates suggest that implementation of the five prioritized programs under the various objectives through the 20 year period would require total investments of approximately US\$ 333,074,912.51. The details of investments requirements under the various programs are presented in the table below. The programs are listed in order of priority.

PROGRAM	ESTIMATED INVESTMENT NEED			
	2015-2020	2020-2025	2025-2030	2030-2035
Strategic knowledge management and communication	14,175,000.00	14,883,750.00	15,627,937.50	16,409,334.38
Robust Governance for water resources infrastructure in the basin	1,135,000.00	918,750.00	964,687.50	1,012,921.88
Robust decision support systems for ground and surface water	27,000,000.00	27,000,000.00	27,000,000.00	27,000,000.00
Resilient Natural Environment	17,500,000	17,500,000	17,500,000	17,500,000
Resilient Water Resources Infrastructure	20,750,000.00	21,862,500.00	23,041,875.00	24,293,156.25

This is the expectation of the optimistic investment scenario whereby innovative techniques are adopted to obtain funding to support all suggested programs, projects and actions on incremental basis through the 20 year period. Since investment in water resources and general environmental governance are expected to translate into better living conditions and enhance resilience of communities in the basin to the impacts of climate change/variability, it is recommended that the strategies suggested in this text are adopted in addition to the traditional funding sources in order to acquire the requisite funding. Analysis of historical investment data

from 1969 – 2010 suggest that using the traditional sources of funding, approximately US\$200,000,000.00 over a similar period. However, interviews conducted with the technical directorate of the Community Water and Sanitation Agency, CWSA, suggests that the pattern of investment inflows has changed ever since the country attained lower middle income status. It is therefore unlikely the BAU scenario would attract up to US\$ 200,000,000.00 over the next 20 years in the form of grants due to these developments. Such investments may be available in the form of loans which have to be repaid with interest. The BAU scenario would therefore be unable to support any significant changes beyond the present situation and is thus not recommended.

The realistic scenarios would require strives beyond the BAU scenario and involves innovative sources of funding. Suggested realistic fund raising options include effective coordination of research institutions for the purpose of developing competitive grant winning proposals to fund projects and programs which will enhance governance and also develop a decision support system for managing water resources sustainably. In addition, a billing system is suggested on water resources infrastructure even in the rural areas. In such a case, collection agents will be required to ensure efficiency and value for money. However, a billing system should not so high as to be a disincentive to the patronage of clean potable water especially in the rural areas. The realistic scenario also suggests options for implementing the various programs in phases based on the availability of funds.

The optimistic scenario achieves all the funds required to cause the expected impact over the 20 year period and involves four major innovative sources of funding. These include:

- Development of Special Purpose Vehicle to attract investments for the development and continuous maintenance of water resources infrastructure in the basin;
- Imposition Special Tax/Levi on Mineral, Petroleum, and rock resources exploration companies which have direct bearing on water resources in the basin. Effective implementation of such a regime would prove to be the bedrock of water resources governance support and infrastructural development in the basin. It is recommended that similar endeavours are duplicated in other basins in the country.
- Revision of Water Resources Abstraction Fees. This strategy recommends revision of relevant aspect of the LI 1692 to pave way for increasing rates charged for using water resources for commercial purposes. The funds accrued would be directed towards enhancing water resources governance in the basin.
- Fund raising and proposal development secretariat: A fund raising secretariat with sole responsibility for identifying funding sources and working at winning such funding to support various projects and programs in the basin would prove very useful in the long run;
- Efficient use of District Assemblies' Common Fund: This strategy recommends the direct deposition of about 5% of the Assemblies' Common Fund of all the districts and municipalities within the basin to a central account established by the basin secretariat for use in developing and maintaining water resources infrastructure and for supporting the governance of the natural environment and built infrastructure in the basin.

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List of acronyms and abbreviations

AMCOW	African Ministers Council on Water
CWP	Country Water Partnership
CWSA	Community Water and Sanitation Agency
CIDA	Canadian International Development Agency
EU	European Union
GIDA	Ghana Irrigation Development Authority
GMet	Ghana Meteorological Agency
GoG	Government of Ghana
GSS	Ghana Statistical Service
GWCL	Ghana Water Company Limited
GWP	Global Water Partnership
HAP	Hydrogeological Assessment Project
HSD	Hydrological Services Department
ITFC	Integrated Tamale Fruit Company
IWRM	Integrated Water Resources Management
LI	Legislative Instrument
MDGs	Millennium Development Goals
MTDP	Mid-Term Development Plans
METASIP	Medium Term Agricultural Strategic Investment Plan
MMDAs	Metropolitan, Municipal and District Assemblies
MWRWH	Ministry of Water Resources, Works and Housing
NDPC	National Development Planning Commission
SADA	Savanna Accelerated Development Authority
SARI	Savannah Agricultural Research Institute
SEA	Strategic Environmental Assessment
USAID	United States Agency for International Development
WACDEP	Water, Climate and Development Programme
WB	World Bank
WRC	Water Resources Commission
WVBB	White Volta Basin Board
WVBS	White Volta Basin Secretariat
WVBS	White Volta Basin
WVI	World Vision International

1. INTRODUCTION

1.1 Context

The Country Water Partnership of GWP is supporting Water Resources Commission and its White Volta Basin Secretariat to review its White Volta Basin Integrated Water Resources Management (IWRM) Plan and to scale it up to an Investment Plan. The study responds to the Work Package 3 of the Water, Climate and Development Program (WACDEP), aimed to support national institutions to develop gender sensitive ‘No/low Regrets’ investment and financing plans/strategy that respond to climate resilience and water security. It is envisaged that this effort will enhance ecosystem integrity for sustained livelihoods and socioeconomic development of its people.

To this end, investment goal and objectives for the basin over the planning period from 2015 to 2035 have been formulated and validated by stakeholders in the area. Further, actions and/or projects were prioritized by stakeholders and targeted at addressing issues of water resources management and development identified in the consultation processes.

1.2 Scope of assignment

The assignment has been divided into several interconnected tasks. This current activity follows from the definition of the investments objectives under Activity 1 of the assignment.

The current activity (Activity 3) enjoins the consultant to: **Develop a financing strategy.**

The specific tasks are as follows:

***Task 3.1** Identify existing financing sources (including public budget funding, donor funding, and user funding) and the levels of financial flows for water resources management and development in the basin.*

***Task 3.2** Estimate three financial scenarios for the period 2015-2025: (i) business-as-usual, (ii) realistic increase in financing, and (iii) optimistic increase in financing.*

***Task 3.3** Describe the financing gap under the business-as-usual scenario.*

***Task 3.4** Analyze how the financing gap could be closed (both through increases in funding and through narrowing the selection of prioritized projects, reformulating projects, or postponing projects).*

***Task 3.5** The consultant will present the results in a meeting of the WVB investment forum (see Work Methodology below) and finalize the “Financing Report” taking into account the feedback received.*

1.3 Methodology

The present study was carried out in four (4) phases:

- 1. Analysis of the estimated cost of each prioritized program:** The costs of the prioritized programs were subjected to analysis and projections were made through the 2015 – 2035 period. Estimates were made based on previous such projects in the area and other parts of Ghana. The projections took into account the effect of inflation and changes in the cost of living.

2. **Examination of existing and historical funding sources scenarios:** Historical financing sources were identified for each of the prioritized programs. The analysis were performed on the expected levels of cash flows based on the past, current trends and possible interests of the funding agencies. Although there were challenges in terms of acquiring realistic datasets from the funding agencies and the state beneficiary organizations, the project depended in information obtained from interactions with representatives of state organizations in order to assess financial inflows from historical donors.
3. **Determination of financing Scenarios:** On the basis of analysis of the projected financial flows from existing and historical sources in addition to other proposed innovative sources, three scenarios of financing were analyzed as follows:
 - **Business as usual scenario:** The business as usual projection was based on current trend of financial inflows into the water resources sector in the White Volta Basin and the absence of innovative sources of funding to augment the historical sources.
 - **Realistic Scenarios:** In addition to the existing sources of funding, this scenario considered additional, realistic innovative sources of funding can be realized during the project period, to obtain additional funds to support projects.
 - **Optimistic Scenario:** This scenario presents ambitious targets based on proposals outside of the traditional, indigenous sources. The difference between the optimistic and realistic financing scenarios is the fact that the optimistic scenario includes opportunities that are possible based on the general economic outlet and the economic returns from the utilization of water resources in the basin.
4. **Validate draft report:** The last phase involves validation of the financing strategy in an *investment forum* organized by the White Volta Secretariat.

2. ANALYSIS OF COSTS OF PRIORITIZED PROGRAMS

2.1 Prioritized Programs and Actions in the White Volta Basin

The prioritized programs and the procedures adopted in the prioritization are discussed in the *Investment Priorities Report*. Table 2.1 presents a summary of the prioritized programs and the ranked actions. The cost of implementing each of the programs through the listed actions was determined based on analysis of historical projects of a similar nature in Ghana and other parts of the world.

Table 2.1 Prioritized Programs and actions in the White Volta Basin for implementation during the 2015 – 2035 period

Program	Action
Strategic knowledge management and Exchange	Enhance creation of awareness on the sustainable management of water resources.
	Intensify public education on rain water harvesting, conservation and storage and water conservation strategies.
	Intensify public awareness raising activities concerning protection of river banks in local communities, and prescribe control activities for protection of river banks.
Resilient and healthy water resources systems (Natural)	Implement alternative livelihood schemes for prevention of inappropriate land use practices and pollution of water bodies, e.g. create designated sites for sand winning and other construction material for revenue generation.
	Conduct basin –wide survey and develop strategies on waste management and farming practices
	Develop and implement land use plans in communities (land tenure system).
Robust governance of water resources	Enhance institutional coordination for land and water resources.
	Introduce guidelines for waste disposal sites for District Assemblies (DAs) towards minimising the risk of ground water and surface water pollution.
	Enhance trans-boundary collaboration to water resources development and management.
	Establish and enforce bye-laws on fishing and fishing methods
Robust decision support systems for ground and surface water	Adopt best practices to enhance success in groundwater exploration and development in the basin.
Resilient water infrastructure (Built)	Optimal use of high yielding boreholes.
	Implement cost effective flood water harvesting systems such as the Bhungroo system to augment water supply system.
	Optimise utilisation of potential dam sites for storage of excess water in the rainy season to be used during the dry season.
	Plan, develop, implement and monitor basin-wide flood control measures.
	Develop rainwater harvesting and storage facilities to support irrigation activities.

2.2 Estimates of Costs of implementing Programs

The estimation and projection of costs for the actions under the prioritized programs are presented in terms of the objectives under which they were prioritized. Table 2.2 presents the cost estimates of the prioritized actions under the first investment objective. Details of the approach adopted in arriving at the estimates are presented in the *Investment Priorities Report* which preceded this report. However, the values were based on the cost of implementation of similar cases in the past. In the case of the program of Strategic knowledge management and communication, the actions are largely educational and as such, the estimates are based on organizing workshops and training programs throughout the period. The successful

implementation of the second program, *Robust Governance for water resources infrastructure in the basin*, was also evaluated and the costs were based on the development of training programs for water governance personnel and the acquisition of motorbikes to enhance mobility at the local levels in order to empower them to undertake effective governance of both built and natural water resources infrastructure in the basin. The implication is that, over the projected period of 20 years, successful implementation of the programs under the first prioritized objective would require a cumulative expenditure of approximately **US\$62,225,000.00**. This represents the optimistic development scenario whereby innovative sources of funding are exploited to meet investment needs. The activities of the actions under the program of Strategic Knowledge management and communication are much more extensive and have been planned to include wider audiences in order to have the desired impact. This is because, as indicated in the Investment Priorities Report, the successful implementation of this objective will certainly impact on the other programs and objectives. The actions under the second program, however, are designed to target district level WATSAN members and general environmental management personnel. The main challenge identified in relation to water resources governance in the terrain relate to the lack of sufficient capacity to

Table 2.2. Projected Estimates for programs under the first prioritized objective

Rank	Investment Objective	Prioritized Program	Cost (US\$)			
			2015-2020	2020-2025	2025-2030	2030-2035
1	<i>Enhancing institutional coordination, capacity and communication for water resources management</i>	Strategic knowledge management and communication	14,175,000.00	14,883,750.00	15,627,937.50	16,409,334.38
2		Robust Governance for water resources infrastructure in the basin	1,135,000.00	918,750.00	964,687.50	1,012,921.88
TOTALS			15,310,000.00	15,802,500.00	15,310,000.00	15,802,500.00

The cost estimates of the programs and actions under the second objective are presented in Table 2.3. Three large, implementable projects were identified under the single program of building a *Robust Decision Support System for Groundwater and Surface Water Resources*. The implementation of these projects will be based on research and the collation of available data which includes both natural scientific data and social science data. These three segments of research will produce outputs which will be essential in developing such a comprehensive integrated decision support system for effective water resources development, management, and governance in the basin. The estimates include field based investigations, installation of monitoring systems, management of the monitoring systems including data retrieval, numerical modelling, organization of workshops, and development of databases for the different aspects of the hydrological and water resources systems in the basin. Thus, implementing the

prioritized programs under the second objective, through the 20 year period (2015 – 2035) will require approximately ***US\$ 108,000,000.00*** under the optimistic scenario whereby resources are acquired from all available innovative sources.

Table 2.3. Budget estimates for improving knowledge base in water resources in the White Volta Basin

Number	Investment Objective	Prioritized Program	Proposed Projects	Cost (US\$)			
				2015-2020	2020-2025	2025-2030	2030-2035
1	Improving knowledge base in water resources for managing floods and drought in the Basin	<i>Robust decision support systems for ground and surface water</i>	Characterization of the hydro stratigraphy and recharge regimes of aquifers in the White Volta Basin	20,000,000.00	20,000,000.00	20,000,000.00	20,000,000.00
2			Determination of the impacts of climate change on groundwater resources sustainability in the White Volta Basin	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00
3			Evaluation of the Socioeconomic impacts of large scale groundwater abstraction for commercial activities in the White Volta Basin	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00
TOTALS				27,000,000.00	27,000,000.00	27,000,000.00	27,000,000.00

The third set of estimates are expected to lead to the implementation of actions and projects that will achieve the third prioritized investment objective. Table 2.4 presents the estimates and projections made under each program. The third objective is based on ensuring resilient natural environment and the development of water resources infrastructure to facilitate abstraction of water resources (groundwater and surface water) for domestic and irrigation purposes. A number of possible scenarios have been proposed and discussed in the *Investment Priorities Report*. The cost estimates and the procedure for arriving at these estimates are presented in the *Investment Priorities Report*. However, cost estimates were based on interviews with experts and institutions with experience in implementing some such infrastructure in the past, especially in Northern Ghana.

Table 2.4. Cost estimates for implementing activities towards achieving the third investment objective

Number	Investment Objective	Prioritized Program	Proposed Projects	Cost (US\$)			
				2015-2020	2020-2025	2025-2030	2030-2035
		Resilient Natural Environment		17,500,000	17,500,000	17,500,000	17,500,000
1.00	Improving infrastructure base for water resource development and management in the Basin	Resilient Water Resources Infrastructure	Optimal use of high yielding boreholes	20,000,000.00	21,000,000.00	22,050,000.00	23,152,500.00
2.00			Flood water harvesting and storage systems	150,000.00	172,500.00	198,375.00	228,131.25
3.00			Rainwater harvesting	600,000.00	690,000.00	793,500.00	912,525.00
	TOTAL			38,250,000.00	39,362,500.00	40,541,875.00	41,793,156.25

2.3 TREND ANALYSIS OF THE PROGRAM COSTS

The projected estimates of the costs of the programs are presented in Figure 2.1. The most costly program appears to be the projects listed under the category of developing a robust decision support system for the management of water resources in the basin. The costs appear to be high but flat throughout the 20 year period. This is because, although the cost per monitoring system is expected to increase through the years, the number of such systems that would be required, would be decreasing and the extra expense is on carrying out effective collection of data and replacing faulty devices. The expenditure on physical infrastructure has persistently been increasing throughout the period. This is because both the numbers and the cost of implementing water infrastructure have been projected to increase almost on a yearly basis. The lowest cost programs appear to be within the categories of the prioritized objective. These relate to communication and governance of water resources infrastructure.

It follows then from this analysis that in addition to the fact that these programs are the most preferred in order of priority, the projected cost of their implementation is also relatively lower than the other programs, suggesting that even on the basis of their costs, they would have been the easiest to be implemented. The analysis and the presentations in Figure 2.1 would suggest that the order of ranking would not differ significantly if they were ranked purely on the basis of their cost of implementation.

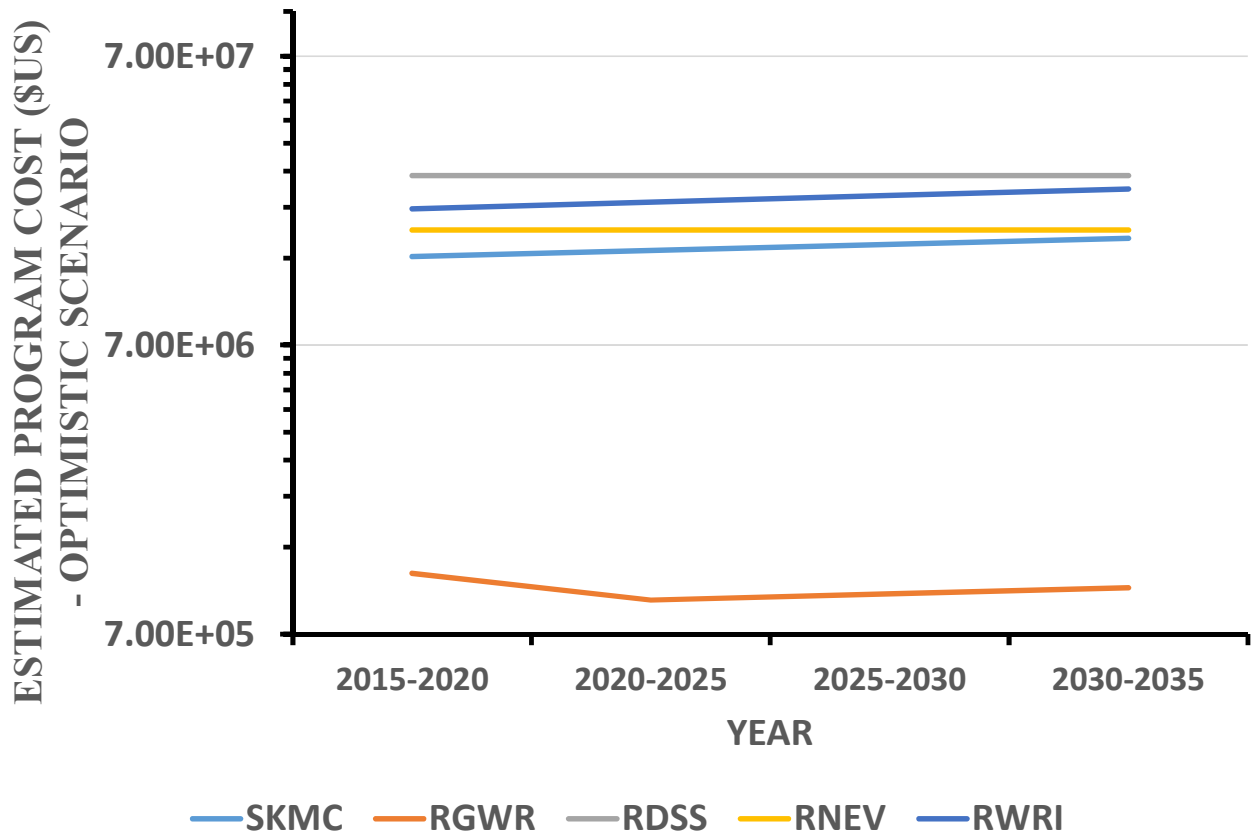


Figure 2.1. Graphical presentation of the costs of implementation of the various programs. SKMC = Strategic Knowledge Management and Communication; RGWR= Robust Governance of Water Resources infrastructure; RDSS= Robust Decision Support System; RNEV=Resilient Natural Environment; RWRI= Robust Water Resources Infrastructure.

3. SCENARIOS OF FUND RAISING TO IMPLEMENT PROGRAMS

In this chapter, the various scenarios of fund raising to support the various programs. Three scenarios are evaluated as follows. The implementation of each of the prioritized programs will be discussed under each of the three main scenarios.

3.1 Business As Usual Scenario

The baseline situation benefits from significant donor support in the water resources sector. Such support has sharply declined since 2011 following apparent improvement in the economic conditions and the country became a lower middle income country. Following this development, grants for water projects in the country have dwindled over the years. Interviews with the technical directors at the Community Water and Sanitation Agency, CWSA, suggest very limited access to such grants to implement physical water resources infrastructure. There are, however, low interest loans, which suggest that the consumers or would-be beneficiaries of such facilities which will be implemented, will be required to pay.

3.1.1 Strategic knowledge management and Exchange

Aspects of funding for the actions proposed under this program have hitherto been accessed through donor support to the water sector. However, the main aspects of awareness creation on the protection of water courses, rainwater harvesting, and environmental management have traditionally been conducted from Government of Ghana budget support to district assemblies, ministries and agencies. Reliance on Government of Ghana support for such activities will not achieve the expected results during the project period and beyond. The status quo has not resulted in the dramatic change of behavior that is expected to lead to informed management of water resources infrastructure in the basin. None of the strategies suggested in the current exercise for improving public awareness and behavior regarding water resources infrastructure is available at such a scale in the basin. This suggests that the business as usual scenario would not succeed in effecting the needed change. The analysis of data in the *Investment Priorities Report* suggest that about 10% of historical investments in water resources and related infrastructure in the basin were spent on governance and communication issues in the basin. The observed trend between 1969 and 2010 suggested an increasing pattern of donor support. However, due to the changes in the economic status of Ghana as indicated above, such grants will not be available anymore. Instead, investments will be given as loans which have to be repaid. Therefore, relying on the business as usual scenario will not attract any significant investments in this area, and the objectives will not be achieved. Even if the investment inflows had continued in the fashion discussed above under the business as usual scenario, it would be challenging to achieve the targets of ensuring effective communication and empowerment of communities for appropriate change in behavior regarding the management of water resources infrastructure in the basin. This is due to the lack of effective coordination amongst institutions.

3.1.2 Robust Governance for water resources infrastructure in the basin

The governance structures for water resources infrastructure have largely been implemented through Government of Ghana and donor assisted support in the basin and other parts of the country. However, at the local beneficiary level, the communities are in charge of maintaining their facilities. They do this through contributions so that funds are available for the repair and maintenance of infrastructure. However, in most cases, due to the insufficiency of such funds, broken down equipment such as pumps remain in a state of disrepair for such a long time that communities are unable to access water resources. In addition, there have been situations whereby the damage caused to equipment is beyond the capacities of the local technicians. The actions suggested under the governance program are therefore outside of the prevailing situation and will therefore not be attended under the business as usual scenario. It therefore goes without saying that the implementation of the suggested actions will require innovative sources of funding beyond the status quo. Training programs are rare and the water and sanitation officers in the basin do not have sufficient mobility to monitor, inspect and maintain facilities. The business as usual scenario will therefore not be effective in addressing these challenges, although the data suggests significant investments in these areas in the past.

3.1.3 Robust decision support systems for ground and surface water

The implementation of aspects of this program over the years has largely been supported by grants from donor agencies. Most of them have been supported by merit based competitive grant proposals. Based on the information gathered on a few projects over the past 10 years, it appears that approximately \$1 million is applied to the White Volta Basin in terms of the research that leads to the type of data inputs for the suggested integrated decision support

system. This was sourced from donors such as the Danish International Development Agency, DANIDA, Canadian International Development Agency, CIDA, the European Union, EU, the German Government, the World Bank through its agencies, and the United States Agency for International Development, USAID. There have also been projects with funding from local Ghanaian institutions such as the universities through internally generated funds. Funding from DANIDA and CIDA may not be forthcoming due to political changes and reorientation of programs in Denmark and Canada respectively. Thus, some of the traditional sources of funding for research leading to the development of such a system may not be available in the coming years. Although there have been efforts by institutions to undertake water resources research in the basin, the results have not led to the required impact on sustainable abstraction and management of water resources. Moreover, there is insufficient coordination amongst researchers and there is no robust central database for results of such research activities. Relying on the current state of affairs will therefore not guarantee any future of improved water resources management and enhanced livelihoods in the basin.

3.1.4 Resilient Natural Environment

The estimated funding inflows for the support of activities that enhance the resilience of the natural environment in the basin appear to be significant. However, the impact has not been as impressive as would have been expected. There have been investments along the lines of afforestation and the de-silting of dams in the area. However, in recent times, increased sand wining, illegal surface mining, and associated environmental practices have compounded the fate of water bodies in the basin due to inadequate monitoring and supervision. Under the business as usual scenario where insufficient resources are available and supervision, and there is little education and communication, progress in achieving the objectives of resilient natural environments will be very minimal.

3.1.4 Resilient water infrastructure (Built)

Funding for water resources infrastructure within the basin and other parts of the country have largely been achieved through donor support and the involvement of Non-Governmental Organizations within the basin. As indicated above, donor support for water resources infrastructure within the basin has declined following the lower middle income status of the country in 2011. Development of domestic water supply infrastructure in the form of grants has dwindled. However, information from the CWSA suggests that there are low interest loans which are accessible for such infrastructure in the basin and the rest of the country. This suggests that even for the domestic water supply projects, the consumers will be required to pay for the infrastructure and also make provisions for maintenance. The implication is a complete departure from the status quo whereby projects are funded from donor support and consumers in the rural areas pay only for the maintenance. The situation is even more challenging with infrastructure that will be put in place to support irrigation activities in the basin. In terms of the domestic water supply facilities, the basin will still benefit from support of NGOs such as the World Vision International. However, there are indications that such support may not continue through the 20 year period. This means that there will be a huge deficit in terms of funding for water resources infrastructure in the basin if the business as usual scenario is to be implemented. Even with significant donor support in the forms of grants, for the basin's domestic water infrastructure, demand has outpaced supply in the country. The costs of the suggested infrastructure indicated in Figure 2.1 for resilient infrastructure cannot

be implemented under the business as usual scenarios and innovative strategies must be put in place to ensure swift implementation.

The trend in investments inflows through the business as usual scenario suggest significant investments in water resources infrastructure in the basin in the past. Most of these investments were applied to the drilling of boreholes and the development of other groundwater based infrastructure to supply water for rural communities. Whereas this has led to significant improvement in at least two districts (Bongo and Kasena-Nankana Districts), there have been serious challenges in other districts. The estimated investments requirements outlined in the *Investment Priorities Report* appear to be within reach if the estimated inflows were to continue. However, as indicated earlier, due to current economic standing of the country, most of the pro-poor investments which were donated as grants are no more available for water resources infrastructure. It will therefore appear that the business as usual scenario may not be sustainable and innovative strategies need to be devised to repay loans contracted for infrastructure especially for domestic water supply in the basin.

In the case of the infrastructure required for commercial irrigation in the basin, the major irrigation firms in the basin have been footing the bills for the development of infrastructure relevant to their operations. However, the intention of this project is to enhance irrigation practice as a climate change adaptation strategy by assisting poor farmers to develop the needed infrastructure for irrigation activities in the basin. As such part of the estimates involve procuring irrigation assisted infrastructure on a continuous basis. These infrastructure will not be successful under the business as usual scenario.

3.2 Realistic Scenario

The realistic scenario considers opportunities that have not yet been explored internally and externally to generate funds to fill the financing gap between the business as usual scenario and the project needs for the 20 year period. The strategies for meeting the budgetary requirements for the various prioritized programs under the realistic scenario are as presented below:

3.2.1 Strategic knowledge management and Exchange

i. Competitive research grants from Development Partners

There are competitive research grants that support aspects of knowledge management and information decision in the form of conferences and workshops. However, these have to be incorporated into larger projects whose primary goal is to undertake human resource development and training. Such competitive research grants are still available to researchers and practitioners who sufficiently demonstrate the need for a given set of actions to be undertaken. Aspects of strategic knowledge management and communication may be considered as part of larger projects or as standalone projects. Based on the historical trends and interests of development partners, possible funding agencies which have demonstrated considerable consistency in funding projects of this nature include:

International Development Research Corporation, IDRC of Canada

The IDRC offers a number of options for receiving grants for innovation research and to support capacity building projects. One of the options is to consider advertised grants that are available almost all the time on their website, focusing on specific themes such as the

environment, climate change, and water resources, amongst others. Aspects of research on the environment, water resources and climate change will certainly incorporate human resource development through training and workshops. The second option is to develop and innovative idea for improving life and the environment and submitting for funding. The basin secretariat can work actively with researchers in the Universities and other institutions to organize competent teams comprising social scientists and hydrologists as well as water resources managers to develop such targeted proposals which have significant budgetary allocations for human resources development. The secretariat can encourage a rewarding program for researchers by encouraging salaries or honoraria as components of project budgets. Although grantmanship is not new among scientists in the various research institutions in Ghana, this proposal places the onus on the basin secretariat and the WRC to take the initiative to assemble competent teams to work for the basin whilst advancing their careers and fields. A consortium of researchers with diverse, multidisciplinary backgrounds is more likely to be effective at winning such grants. The urgent need to enhance communication and knowledge/information exchange in the basin offers an opportunity to request funds for training. An additional motivation is the fact that this is intended to enhance the adaptive capacity of the communities to the impacts of climate change/variability in the terrain.

Danish Agency for International Development, DANIDA

The Danish Government, through DANIDA, offers opportunities for development research and human resource development in priority developing countries. Over the years, Ghana has been listed among the priority countries and local Ghanaian researchers have benefitted from such grants. Recent political changes in Denmark may have an impact on the future orientation of DANIDA. However, the secretariat can engage with the Danish embassy for assistance in terms of human resource development. Training programs may include Danish professionals with expertise in key aspects of water resources and general environmental management, to serve as resource persons on training programs.

United States Agency for International Development, USAID

The USAID has several programs under which they offer support to developing countries in the area of human resource development. The programs are similar to those explained the IDRC opportunities above. It is incumbent upon the basin secretariat and the WRC as wells as the other stakeholders to engage the USAID on the possibilities of supporting training programs in the basin with the objective of improving water resources management and governance issues in the basin. The USAID assist in areas such as land tenure, fighting deforestation, among others. There are copious such examples on the website of the USAID, and they are willing to engage state agencies to provide such support. This is a realistic source of funding support which hitherto not been explored in the basin.

World Bank and Affiliate Agencies

The World Bank has supported research activities especially in relation to flood vulnerability mapping and the training of personnel at the regional and local levels within the White Volta Basin. Some similar projects could be developed targeting human resource development in the basin.

European Commission

Historically, the European Commission has supported human resource development projects in relation to water resources and general environmental management in Ghana and other parts of the world, so long as the research will yield obvious, tangible and impactful results, especially in relation to the adaptability of communities to changing climate.

ii. Funding from internal sources

There are several local sources of funding which have hitherto been overlooked. For instance mineral exploration and mining in general have had a toll on water resources in terms of its quality and spatial distribution. There are other companies such as the large scale irrigation companies and industries which make use of water and water-related infrastructure within the basin. These companies could be given a special levy which will be utilized to submit training programs for water resources and environmental managers within the basin.

It is reasonably possible to access enough funds from the above referenced sources in order to achieve the objectives of setting up training programs to enhance knowledge sharing and communication as indicated in the *Investment Priorities Report*. However, regarding the general global economic situation and the possibility that some of the funding agencies may not be operating at their normal optimal capacities, it is realistically possible to fund workshops involving 20 participants from each sub-catchment every year. This means that the cost would have been reduced by 80% annually. Funds for such workshops could be accrued from a mix of targeted proposals and internally generated funds which include allocations from the Assemblies' Common Fund and a percentage of tariffs on water resources infrastructure in the basin. Effective training of at least 20 carefully selected individuals from each sub-catchment every year will imply that over a period of 20 years (2015 – 2035), 3,600 people would have been trained on various aspects of water conservation, best practice irrigation water resources management, flood disaster management, among others. Such trained persons will then be able to influence and cause changes in their respective areas.

3.2.2 Robust Governance for water resources infrastructure in the basin

The actions that were proposed under this program could also be implemented through the suggested sources of financing in section 3.2.1. In addition to these, the following strategy has also been proposed.

A billing system for all water resources facilities: This will be a departure from the status quo whereby the consumers in the rural areas pay for only the maintenance of the infrastructure. This option will consider the possibility of metering water infrastructure and applying a billing system per litre of water abstracted. The CWSA is currently pursuing this option in order to raise funds to pay any loans contracted for water resources infrastructure. Whereas there is a limit of the billing beyond which poor domestic consumers may not be able to afford, it is imperative that this option be considered for cost recovery regarding the implementation of appropriate infrastructure and the provision of governance structures in the basin.

In addition, regarding the significance of water resources in the development of the basin in almost all its aspects, the basin secretariat could work with the relevant district assemblies to increase allocation from their respective assembly's common fund to support governance programs such as the training of technician and enhancing the mobilities of the governance officers and technicians.

Although the entire budget suggested under this program can realistically be achieved through extensive grantsmanship and effective coordination of institutions, there may be challenges in setting up an effective and efficient team to raise the needed capital. However, it is realistically possible to procure the required motorbikes for the WATSAN members and the general environmental monitors to carry out effective monitoring and perform their governance roles. Funds can be mobilized from the Assemblies' Common Fund and aspects of the billing systems that will be applied to water infrastructure. In addition, since strengthening governance institutions forms an integral aspect of ensuring sustenance and longevity of all other investments in water resources and related infrastructure, providing periodic training of personnel is critically important. It is realistically possible to undertake training of technicians and environmental officers once every five years rather than having sessions every year as suggested in *Investment Priorities Report*. In this respect, the budget for training would be reduced by 80%. Moreover, the stakeholders can further reduce the burden of the cost by sharing costs amongst stakeholders. For instance the district assemblies can supply venues and training materials while the other stakeholders supply personnel as facilitators.

3.2.3 Robust decision support systems for ground and surface water

All the projects suggested under this program for developing a decision support system would be achieved through financing from sources listed in (i) and (ii) in section 3.2.1. For instance, the erstwhile Hydrogeological Assessment Project, HAP, of the Water Resources Commission was funded by the Canadian Government through the vehicle of the Canadian International Development Agency, CIDA. The HAP project has provided baseline data for hydrogeological assessment of the basin. There is also an active hydrogeological project in the basin with funding from DANIDA. This particular program and its objectives can be optimized by engaging with researchers in the various institutions who may have ongoing sponsored projects in the basin. The costs could drastically be reduced by effectively coordinating ongoing research to channel research findings into a centralized database. In addition, the following are new sources of financing for this program:

i. Funding from National Research Fund

The Government of Ghana is setting up a fund to support all kinds of research in the country. The national research fund, when completed will constitute a realistic source of financing for all the projects in this program. As indicated above, the basin secretariat and the WRC can establish collaborative relationships among key researchers in the research institutions to develop interdisciplinary proposals targeting the projects listed under this program in the Investment Priorities Report.

ii. Climate Change Support Funds

The African Development bank and the European Union have competitive funding opportunities to support climate change/adaptation projects in Africa. These opportunities are available almost every year and the basin can access funds through competitive proposals to be able to undertake research which underscores the impacts of climate change/variability on water resources in the basin, and also makes provides options for effective adaptation to the impacts of climate change.

iii. *United Kingdom's Department for International Development, DFID*

The UK DFID has been providing support for research in the areas of building decision support systems for managing water resources under climate change conditions. They have funded similar projects in parts of the White Volta Basin in the past and will support more elaborate projects which are targeted towards making the desired impacts through the integration of the social dimension of climate change into a water resources management decision support system.

iv. *United Nations Development Program, UNDP & United Nations Environment Program, UNEP*

The UNDP and UNEP have supported similar projects/programs in other parts of sub-Saharan Africa. Their respective websites suggest promising opportunities for supporting research on climate change adaptation strategies. The UNEP supported similar research in the Keta Basin where the research assessed the impacts of increased groundwater abstraction from the shallow aquifer system in the basin.

v. *The German and Netherlands Governments*

The German Government has provided funding for the larger Volta Basin Research, and aspects of hydrological research in the larger White Volta Basin in the past. The Netherlands Government has also been involved in the provision of support for water resources and related research in other parts of Ghana. They will thus support innovative projects which provide opportunities for better adaptation to the impacts of climate change/variability on water resources availability in space and in time in the basin.

vi. *United States National Science Foundation and NASA hydrological and water resources research Programs*

There are aspects of the US NSF and NASA hydrological and water resources research projects which target international audiences and subjects. The main requirement for application is to have a researcher from the credible institution in the USA who is willing to partner with the basin secretariat and/or the project team.

vii. *Local Banks, Telecommunications companies, Petroleum Companies*

The basin secretariat can also work with the telecommunications, petroleum companies, and the local banks to support specific limited projects such as the organization of workshops and more focused research within smaller catchment or more localized areas.

The analysis in the *Investment Priorities Report* suggest approximate US\$ 27 million every five years. Whereas this would lead to significant progress in the understanding of the local hydrology and place the domain in good stead to phase surface and groundwater resources conjunctively for sustainable development, a budget of over US\$ 5 million annually (distributed amongst the various sectors outlined in the *Investment Priorities Report*) may appear far-fetched. However, it is realistically possible to achieve half of this estimate through coordination of research from the various institutions including the universities. Funds can be sourced internally from local banks, telecommunication industries among others.

3.2.4 Resilient Natural Environment

The suggested budget for maintaining resilient environmental systems in the basin were based on estimates from investment inflows and can be realistically achieved. The various aspects of the natural environment are shared by the EPA, the WRC, Minerals Commission, amongst others. On an annual basis, these institutions, especially the Minerals Commission and EPA have budget allocations for undertaking most of the actions suggested under this program. The key to achieving optimal results is effective institutional coordination which may pose a challenge.

3.2.5 Resilient water infrastructure (Built)

The type of built water resources infrastructure for meeting domestic water resources needs has been groundwater based. They are in the forms of boreholes and groundwater based small town water systems. As indicated earlier, the traditional sources of funding for water infrastructure has been donor funds and NGOs. Currently, due to the lower middle income status of the country, such funds are no longer available as grants but as loans which have to be repaid with interest. This suggests that there has to be a local strategy for repaying loans contracted to develop physical water resources infrastructure in the basin. As indicated earlier, in the past, the community contributions were largely focused on repairs and the maintenance of governance structures for water resources infrastructure.

Introduction of a billing system for water resources infrastructure

One of the main strategies for meeting the investment needs for water related infrastructure in the basin is to institute a more elaborate billing system for all water infrastructure. In this way, the users will eventually pay for the cost the infrastructure while making provisions for maintenance. The billing system should be consistent with but much lower than that used by the Ghana Water Company Limited for urban dwellers. Prohibitive prices will discourage consumers and rather encourage unsafe water usage in the rural areas where poverty is already endemic. It suggested that a billing system which applies of GhS 0.10 per bucket (17 litres) may appear satisfactory. With a water supply system that serves a community with per capita water demand of 34 litres, the implication is that each individual will be contributing GhS 0.20 per day for water consumed. This suggests that for a community with a population of approximately 5000 individuals, approximately GhS 1,000.00 would be raised a day from such a billing system. This amounts to about GhS 30,000.00 per month. This is substantial enough to pay for the maintenance and cost of the infrastructure. Although an amount of GhS 0.20 per person per day may appear low, it will be a challenge in most parts of the basin where poverty levels are high. In such areas, there must be a safety net for the District Assemblies and NGOs to support with the provision of infrastructure so that the communities contribute towards maintenance of such infrastructure. An effective and efficient billing system would significantly contribute towards raising the required funds to repay loans contracted and for servicing the maintaining the infrastructure in good condition. A billing system is already in place in some of the communities but the objectives of such systems are to raise funds for only the maintenance of the infrastructure.

District Assemblies Common Fund

On an annual basis, the Central Government allocates funds for development projects at the local level through the District Assemblies. The basin secretariat can liaise with the assemblies to increase the percentage allocated to the development of water resources infrastructure through the projected period. It has been noted that in most districts within the basin, much of the district assemblies' common fund is applied to water resources and sanitation infrastructure.

Coordination of NGO contributions

The basin has benefitted tremendously, from the contributions of NGOs such as the World Vision International, Conservation Alliance, Churches, amongst others, in the provision of Water Resources Infrastructure in the past. For instance World Vision has drilled several boreholes in various parts of the basin. Within the next 10 years, the basin secretariat and the CWSA can work with World Vision, Church of Christ and other NGOs to focus activities in areas of significant need especially where contributions from the communities will not be sufficient to implement the needed infrastructure.

Development Partner Support for Irrigation facilities

Infrastructure intended to support irrigation activities in the basin can be funded with low interest loans from the Development Partners such as the World Bank and affiliate institutions. Since these infrastructure will supply water for irrigation and other activities that will generate income, a higher billing system would be applied to raise funds for the repayment of the loans and other facilities contracted.

Support from Local banks and financial Institutions

Financial support for the development of irrigation infrastructure within the basin could be procured in the forms of loans, from the Agricultural Development Bank and Ghana Commercial Bank. However, the farmer groups and other interest associations within the basin, need to mobilize into recognizable groups for such support to be easily coordinated. Support from the local financial institutions would be able to meet most of the infrastructure needs for irrigation in the basin. However, such support will be in the forms of loans which have to be paid back. The Ghana Irrigation Development Authority, GIDA, and the Savannah Accelerated Development Authority, SADA, can coordinate to take ownership of these facilities and then work with farmers and farmer groups intended to use such facilities to pay through a metering system. The SADA has been coordinating similar endeavours in the basin. For instance SADA facilitated and played a key role in the sponsorship of the Integrated Water Management and Agricultural Development, IWAD, unit in parts of the White Volta Basin. Similar arrangements can be made for farmer and other interest groups to abstract surface or groundwater resources, depending on the location, for use for irrigation.

As indicated earlier, investments in water resources infrastructure remain consistently high every year and so much resources have been expended on expanding the infrastructure in the basin. The optimistic scenario suggested in the *Investment Priorities Report* recommend the development of 20 large scale groundwater based water systems at an average cost of approximately \$100,000 each. Whereas this would significantly improve the situation and lead to 100% coverage by 2035, access to funding may pose a challenge. A billing system would be an effective strategy for cost recovery. However, due to the generally difficult economic

conditions in the area. A strict billing system might compound the domestic water supply situation as poor communities which can't afford the billing might resort to unsafe water sources. Realistically, 50% of the suggested infrastructure can be implemented through the period. The diverse sources of funding suggested in this section can be relied upon to raise funds the requisite investment to meet an objective of procuring 10 large systems every year.

Regarding the irrigation water supply systems, all the facilities can be realistically achieved by establishing farmer groups and associations. These groups will be mobilized at the local sub-basin level and assisted to obtain facilities from local banks and African Development Bank. The SADA can assist in facilitating the procurement of loans so that the farmers can repay the investments and claim ownership and maintenance of the infrastructure from the proceeds of their farming activities.

Other realistic option is to compare with or without project scenarios. Here, we simply select a combination of the prioritised programmes.

1. Enhancing institutional coordination, capacity and communication for water resources management
2. Improving knowledge base in water resources for managing floods and drought in the Basin
3. Improving infrastructure base for water resource development and management in the Basin

First option:

1. Enhancing institutional coordination, capacity and communication for water resources management
2. Improving knowledge base in water resources for managing floods and drought in the Basin

Second option:

1. Enhancing institutional coordination, capacity and communication for water resources management
3. Improving infrastructure base for water resource development and management in the Basin

Third option:

2. Improving knowledge base in water resources for managing floods and drought in the Basin
3. Improving infrastructure base for water resource development and management in the Basin

3.3 The Optimistic Scenario - Closing the financing

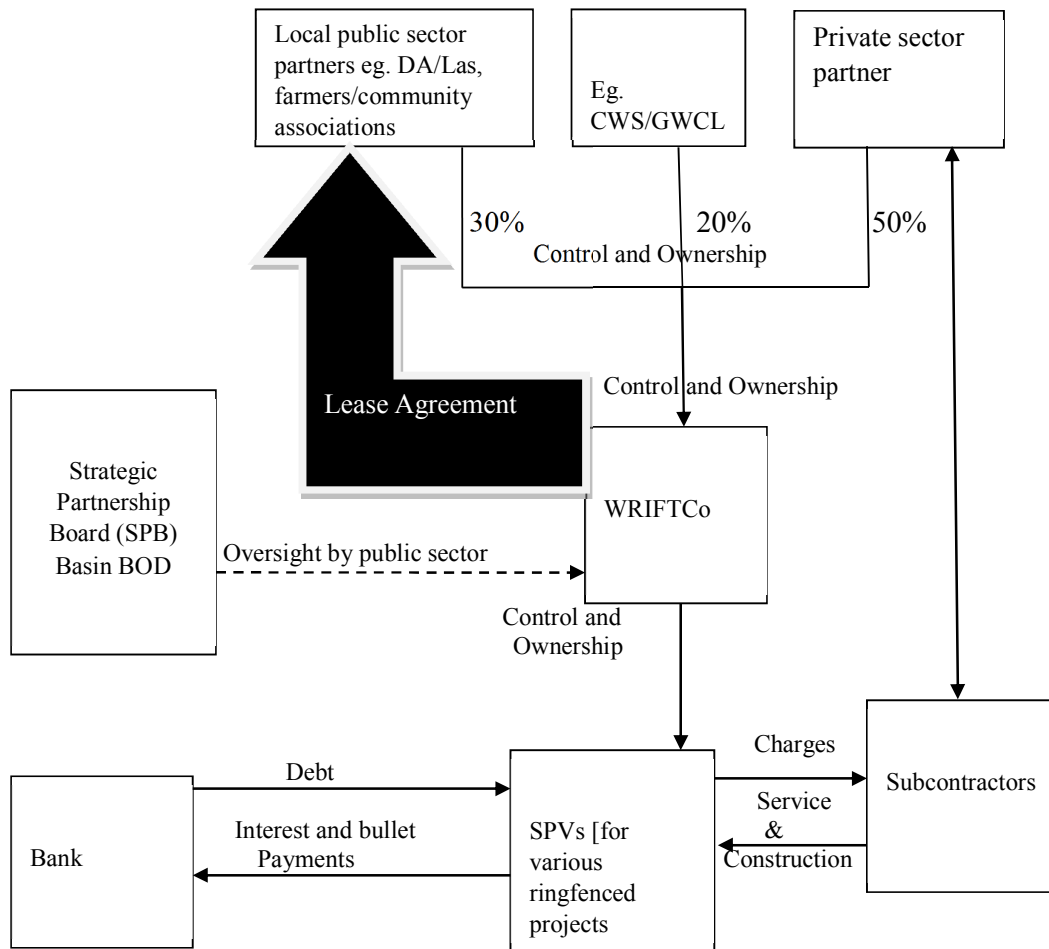
The procurement of sufficient funds to meet the objectives outlined in the *Investment Priorities Report* constitute the Optimistic Scenario whereby almost all the major issues in the basin would have been achieved during the 20 years. The main sources of financing are expected to include: local community contribution, - national public contribution (grants or capital subsidies at central, regional and local government level); - national private capital (i.e. private equity under a type of PPP; and other resources (e.g. bank loans, loans from other lenders).

3.3.1 Development of Special Purpose Vehicle

We expect to use a Special Purpose Vehicle (SPV) that we describe as Water Resources Improvement Finance Trust (WRIFT). This is briefly described as follows:

Water Resources Improvement Finance Trust (WRIFT)

Figure 1: A basic WRIFT corporate structure



Under the WRIFT scheme, an equity capital shareholding joint venture WRIFT Company (WRIFTCo) would be established. The WRIFTCo would be owned by local public sector entities, usually, eg. District Authorities (DAs) [local level partners] and Community Water and Sanitation, Ghana Water Company (GWCL), [national level partners] and a private sector partner. The WRIFTCo's objective is to plan, secure finance, build/refurbish [not sure whether we have existing infrastructure to refurbish] and operate usually small, but community-based water resource facility and related facilities within the White Volta basin. These facilities (WRIFT facilities) would be mainly water resource infrastructure, although would incorporate some sustainability issues.

There would be some Lease Agreement (LA), which would regulate the use and management of the WRIFT facilities particularly, the rights and responsibilities under the lease. Users of these facilities make payments to cover the cost of both the capital (debt and equity) and service elements.

The private sector partner in the WRIFTCo may be a consortium or a joint venture or a subsidiary of a much larger company [if any NGO(s) is/are interested that would be great as well). The WRIFTCo would set up a number of SPVs, which are largely reliant on for example, bank debts, donor funds, NGO supports and, which may have no recourse to any of the parent companies, the WRIFTCo or indeed, the private partner [to make the scheme more attract to potential partners], even though the private sector partner by its majority equity share capital ownership would be a majority holding partner and, thus, would control both the WRIFTCo and the SPVs [again to make the arrangement more attractive to potential partners.

3.3.2 Special Tax/Levi for water resources Governance

It is proposed that the basin, through the WRC, EPA, and the relevant ministries advocate the imposition of special tax on small scale mining operations, rock quarry operators and other commercial ventures which have a direct impact on water resources in the basin. This includes petroleum companies and all companies undertaking exploration activities (petroleum and mineral resources). The operations of these companies will directly affect the availability water resources of appropriate quality for use. In addition, the basin would benefit a levy on the operations of drilling firms and water resources consulting firms in the basin. They will be required to pay such levies when they bid for projects within the basin. Such funds will be directed to a central fund controlled by a secretariat within the basin and applied to effective water resources governance in the terrain. The Ghana National Petroleum Corporation, GNPC, has been undertaking detailed exploration programs within the basin in search of petroleum. Their activities will certainly impact upon groundwater resources. It will therefore be prudent for the basin secretariat to make a case for payment of a levy to cushion the basin and enhance its readiness to absorb the shocks of future development of the resource. Several mineral exploration companies have been operating within the Voltaian and Birimian parts of the basin in search of various kinds of mineral, rock, and petroleum resources, and should pay a levy to assist in the governance of water resources infrastructure in the basin. The WVBS, working with the WRC and affiliate agencies and ministries can set up a committee to devise strategies for these special levies and the modalities. This would be one of the major sources of funding if properly implemented.

The petroleum retail companies are significant stakeholders as their operations have the tendency to impact upon the quality of groundwater resources. The WRC can work out a strategy for imposing a special levy on the petroleum companies to be applied to water resources development and governance. The payment of such a levy should be decentralized and paid at the local areas of operation.

3.3.3 Revision of Water Resources Abstraction Fees

The LI 1692 provides the framework for acquiring license for abstracting water resources for commercial ventures. The current abstraction rates are too low and appear insignificant. The income raised will be insufficient to provide the needed support for effective governance. There are several companies in the basin and other parts of the country abstracting both surface and groundwater resources for commercial purposes including water packing the processing

companies, mining companies among others. This will also apply to the large irrigation firms operating in the basin. The funds accrued should be ploughed back to assist resource governance programs. It is recommended that the abstraction fee be increased significantly from the current level (which is denominated in the old Ghanaian currency). Realistic fees for commercial water abstraction will assist in the implementation of the programs suggested in this document.

3.3.4 Fund raising and proposal development secretariat

The basin secretariat and WRC, in coordination with other basins in the country, should consider establishing fund raising and proposal development secretariat headed by competent professionals in the areas of fund raising to support various kinds of research and water resource governance activities. Their remuneration and benefits should be directly linked with their success on annual basis. It will be the duty of these secretariats to identify and lobby for funds to support projects in the basin. They will also identify competent personnel in the Universities and other research institutions to develop grant winning proposals for submission funding agencies.

3.3.5 Efficient and targeted application of District Assemblies Common Fund

The various District Assemblies allocate resources from their respective shares of the assemblies' common fund to develop water resources infrastructure. However, in most of the cases, there are serious challenges with the application of the funds and the effect usually falls below expectation. It is therefore recommended that since water and sanitation, and general environmental management constitute the most important developmental issues in the basin, the various district assemblies in the basin agree to cede about 5% of their annual allocation to a central fund to be applied to address water resources related issues in their district. The fund will be controlled an accounting unit of the fund-raising secretariat that would have been established. The funds received may be invested and proceeds will be applied to developmental projects in the basin.

4. NEXT STEPS...

The consultants will present this document for discussions at an Investment Forum to be organized by the Water Resources Commission. Inputs from the stakeholders will be incorporated towards developing a final investment strategy report and will provide information for the development of the final *White Volta Basin Investment Plan*.