Western African Water Centres of Excellence

National Strategy and Implementation Framework for Human Resources Capacity Development in Nigeria Water Sector.

O. C. Izinyon and J. O. Ehiorobo

University of Benin

Benin City, NIGERIA

April, 2018

LIST OF ACRONYMS

CEWST	Centre of Excellence in Water Science and Technology
COE	Centre of Excellence
CSO	Civil Society Organisation
EC	European Commission
EIA	Environmental Impact Assessment
EU JRC	European Union Joint Research Centre
EU	European Union
FCT	Federal Capital Territory
FEDPOLY	Federal Polytechnic
FET	Further Educational Training
FUTA	Federal University of Technology, Akure
GIS	Geographic Information System
HET	Higher Educational Training
KMS	Knowledge Management System
MDG	Millennium Development Goal
NCEE	National Centre for Energy and Environment
NDDC	Niger Delta Development Commission
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NIHSA	Nigeria Hydrological Services Agency
NPDC	Nigeria Petroleum Development Company
NUC	Nigerian Universities Commission
NWRI	National Water Resources Institute
RBDA	River Basin Development Authority
SADEC	Southern Africa Development Authority
UCAD	University of Cheikh Anta Diop
UN	United Nations
UNIBEN	University of Benin
UNILORIN	University of Ilorin
VC	Vice Chancellor
WA	West African

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. EXECUTIVE SUMMARY

1.1 Introduction

Nigeria is a country of diverse climatic, topographic, geological, cultural, economic, social, religious and ethnic features and heritage. The country with a population of over 160 million people is the most populous country in Africa, accounting for about $1/5^{th}$ of the population of the continent. The country's vegetation varies from the mangrove vegetation in the coastal areas followed by the rainforest region; this is preceded by savannah type of vegetation down to the semi desert region in the northern extremity. The country has several streams, creeks and rivers running from the east to west and north to south and vice versa. The primary source of water supply include surface water as well as ground water.

In order to meet the water needs of the people of the country, it is necessary to have the required expertise and skills in managing the available water resources. Technical challenges and lack of adequate training arrangement for participation in the water sector remains a challenge in the country.

Other factors militating against the development of the Nigerian Water sector that need to be addressed include:

- Lack of enforceable legislation for water practitioners in the country.
- Lack of awareness on the importance of hydrological data in the planning and management of the nation's water resources.
- Lack of adequately trained manpower in the sector
- Inadequate collaboration among all stakeholders in the water sector
- Inadequate funding of the water sector

Although there are institutional arrangements that appear to be well structured, there is need for improvement for functional and productive water resource management in the country. The present situation where there is no proper coordination in research and monitoring of water related activities in various institutions, both at the Federal, States, local government and even at non-governmental organisations (NGOs) levels need to be addressed.

At the moment, there exist a number of Engineers, Hydrologists, Scientific Officers, Technologists and Technicians serving at various levels within the water sector in the country.

There are also a number of well trained personnel at the state, local government and non-governmental agencies as well as the academia. Various short and long term courses both locally and internationally are also being organized yearly for serving officers to enhance their skills for increased productivity. In addition, the Nigerian universities, polytechnics and monotechnics are also helping in this regards through the training and production of Engineers, Hydrologists, Scientific Officers, Technologists and Technicians for the water sector. Despite all these, the country still lacks adequate manpower required for the management of its vast water resources.

The University of Benin represents one of the two centres of excellence in Water Science and Technology from Nigeria. At the moment, the university has a strong research base in Water science and Technology as well as Environmental Engineering. The university also intend to

work with other sister institutions in Nigeria in the area of knowledge sharing and research cooperation.

To this end and in line with the EU JRC initiative, the University as one of the Centres of Excellence in the West African Sub-region carried out a water sector stakeholder's analysis. The study was aimed at identifying the skill gaps, research and training needs in the Nigerian water sector and to provide recommendations on how the skills shortages and gaps in the sector could be effectively addressed.

The present phase (Phase II) of the NEPAD Centre of Excellence project on water sciences and Technology is intended to place emphasis on capacity building in the water sector with the support of UNESCO. The primary objectives include:

- Development of National capacity building strategies for Young professionals and technicians in the water sector.
- Establishment of a functional academic training programme.
- Strengthening of the technical capacity of water and sanitation services.

The secondary objectives include:

1. Identify the human resources gaps in the sector in terms of:
   (i) Management and Planning which require high level technical and management professionals and
   (ii) Services, Operations and Maintenance which requires artisanal skills
2. Identify the gaps which exist in the learning and capacity building institutions.

The main activities in the phase II to be carried out by COE for the human capacity gap analyses involved:

(i) Review of the gap analyses which were performed in the Western and Southern Africa Networks of COE during the Phase 1 and identification of which studies and surveys were done during that phase and at what scale and scope of the activities were carried out and the methodologies employed.

(ii) Identify which information and data gathering exercises addressed either Professional skills and Capacity needs or Technical skills need. And in addition assess the need to augment the initial studies, surveys or questionnaires either in quality or scaling out in order to achieve national representative data.

(iii) Performance of supporting desk and literature study to upgrade the information of the studies carried out by COE in Phase I and include in the desk study a review of regional and national training programmes and institutions which may be capable of addressing the human capacity gaps in the sector.

A two phase approach has been adopted for this study.

Phase 1:

1.1 Desk studies

- Review of existing studies on human capacity and training institution survey, skills gap and training needs analysis carried out in the sector including the report of the water sector stakeholder analysis (Phase 1), desk and literature survey to upgrade the information of the existing studies. These preliminary studies were based on available

records and reports from various organisations within the water sector and through the internet. This provided a platform for baseline data collection which was used for this study.

- A study of various institutions and organisations who are stakeholders in the Nigerian water sector was also done. The aim was to determine the approach by which they are to be contacted to participate in the surveys and workshops and to identify their resources and approaches for human capacity development.
- Conduct of consultative meeting/workshops on human resources capacity building with identified stakeholders/ actors within the water and sector at local, regional and national level.

Phase 2:

1.2 Development and administration of questionnaires:

Based on the outcomes of Phase 1 above, questionnaires were developed and checklists prepared for surveys and semi-structured interviews with heads of sector organizations in the South-South, South-East and South- Western regions of Nigeria. Copies of the Questionnaires developed were sent to institutions/organisations and identified experts by e-mail, post and by hand delivery.

Stakeholders contacted for participation in the surveys and represented in the workshops are:

- Universities
- Polytechnics
- Monotechnics
- Research Centres/Institutes
- Government Ministries, Agencies and Parastatals (State and Federal)
- Local Government Councils
- Non-Governmental Organisations (NGO)
- Private Organisations
- Consultancy companies
- Professional Bodies

1.3 Analysis of Survey Data:

The responses from the questionnaires were extracted and analysed using Microsoft Excel software and the results presented in tables and charts which were used in discussions at the National dialogue workshop and the workshop for validation of findings/results.

1.4 Quantitative Study:

Here, a study on the output of water related publications in Nigeria was conducted to ascertain the state of research and development in the water sector in Nigeria and also to obtain quantitative account of key research and development trends in the Nigerian Water Sector. Additionally, a quantitative study to examine the level of vacancies in

different water-related job categories in Nigeria was also conducted. From the study it was concluded that:

1.4.1 Available Skills:

Within the sectors/organisation under study,

- Majority of the skills are in civil engineering and hydrology
- There exist very limited skills in the area of sector governance, cultural and social sciences, forestry, geochemistry, industrial ecology and environmental law.

1.4.2 Training Needs - Areas where trainings are required and the personnel that needs them are listed below

- Agronomy – Botanist, Zoologist, Plant Biologists
- Conflict Resolution/Mediation
- Ecosystems – Environmental Engineering, Fishery, Marine Engineering, Safety, Ecosystem Management, Environmental Impact Assessment (EIA), Post Impact Assessment (PIA)
- Hydrologists
- IWRM / Water Resources Management
- Water supply Engineering
- Plant maintenance and Operation – Drillers, Artisans, Plant Operators and Technicians, Water Meter Specialists
- Communications – Information and Communication Technology (ICT), Information Scientists, System Analysts, Computer Operators
- Fresh Water System Specialists
- Marketing
- Cultural and Social Sciences – Liaison Officers, Public Administrators, Social Scientists, Water Orientation Agents
- Environmental Law
- Hydrochemistry
- Forestry – Forest Guards

1.4.3 Research Needs: lots of researches are still needed in the following areas

- Rain water harvesting at regional levels
- Sanitation; especially in the provision of safe and adequate toilets to the rural population
- Effective water treatment/distribution
- Climate change in relation to flooding
- Design of cost effective infrastructure for the water sector
- Meeting the water demand and supply of the people in the region
- Alternative energy source especially in the areas of renewable energy
- Effective waste disposal and management techniques
- Air pollution management and control.
- Effective database design and management

1.5 Recommendations

1. Research driven capacity building should and must become a major focus in Nigeria in order to address the challenges relating to the non-availability of skilled manpower and also bridge the gap created due to the limited number of skills in the Nigerian water sector
2. There is the need for public-private partnership especially in the provision of in-service training. More also adequate funding must be provided by the government at all levels.
3. There must be adequate networking between institutions in order to better share research findings and development strategies.
4. It is necessary for Government, Private Sectors, NGOs etc. to invest more in Research and Development in the water sector and sanitation.
5. The universities within the region should focus more on research that will add values to the living condition of the people in the area of water and sanitation.
6. The West African Centres of excellence should work more closely together in order to foster the much needed integrated regional development

2. INTRODUCTION

Nigeria is a country of diverse climatic, topographic, geological, cultural, economic, social, religious and ethnic features and heritage. The country with a population of 160 million people is the most populous country in Africa, accounting for about $1/5^{th}$ of the population of the continent. The country's vegetation varies from the mangrove vegetation in the coastal areas followed by the rainforest region; this is preceded by savannah type of vegetation down to the semi desert region in the northern extremity. The country has several streams and rivers running from the east to west and north to south and vice versa. The primary source of water supply includes surface water as well as ground water.

There exists disparity in the level of development between the northern part of the country and the southern part of the country mainly as a result of cultural and religious belief. As a result of the uncontrollable population growth rate, and economic development, water supply is increasingly becoming a problem not only in the rural areas but also in the large and densely populated urban centres such as Lagos, Ibadan, Kano, Port Harcourt, Benin city, Enugu, Kaduna etc. Coping with increasing water shortages and yet managing sufficient water for food, security, health, agriculture, hygiene industry is a critical challenge that needs to be addressed.

In order to meet the water needs of the people of the country, it is necessary to have the needed expertise and skills in managing the available water resources. Technical challenges and lack of adequate training arrangement for participation in the water sector remains a challenge in the country.

The United Nations development goal in reducing by 50% the population of people without sustainable access to safe drinking water by 2015 has not been realised as result of inadequately trained personnel in the water sector. Additionally, in order to deliver on the Sustainable Development Goals (SDG), it is necessary that a country such as Nigeria possess the necessary skill base for managing the water sector.

Although there are institutional arrangements that appear to be well structured, there is need for improvement for functional and productive water resource management in the country. The present situation where there is no proper coordination in research and monitoring of water related activities in various institutions, both at the Federal, States, local government and even non-governmental levels need to be addressed.

Other factors militating against the development of the Nigerian Water sector that need to be addressed include:

- Lack of enforceable legislation for water practitioners in the country.
- Lack of awareness on the importance of hydrological data in the planning and management of the nation's water resources.
- Lack of adequately trained manpower in the sector
- Inadequate collaboration among all stakeholders in the water sector
- Inadequate funding of the water sector

At the moment, there are a number of engineers, hydrologists, scientific officers, technologists, technicians and artisans serving at various levels within the water sector in the country. The Nigerian Hydrological Services Agency (NIHSA) currently has the highest number of trained personnel involved in hydrological activities. There are also a number of well trained personnel at the state level and at other government and non-governmental agencies as well as the academia. Despite all these, the country still lacks adequate manpower required for the management of its vast water sector.

In order to address the shortfall mentioned above, the Federal Ministry of Water Resources in 1976 established a training institution (The National Water Resources Institute) for the training of middle level manpower for hydrological data collection and water resources management. In addition to that, various short and long term courses both locally and internationally are being organized yearly for serving officers to enhance their skills for increased productivity. The Nigerian universities, polytechnics and monotechnics are yearly producing engineers, hydrologists, scientific officers, technologists and technicians for the water sector.

The University of Benin represents one of the two centres of excellence in Water Science and Technology from Nigeria for the West African COE. At the moment, the university has a strong research base in Water science and Technology as well as Environmental Engineering. The university currently runs several courses leading to the award of BSc/BEng, MSc/MEng and PhD in various water and sanitation related courses. Based on the current NEPAD and EC initiative, the university intend to establish strong collaboration with other Centres of

Excellence in both the West African sub region the SADEC region in the area of Research and Development in Water Science and Technology. The university also intend to work with other sister institutions in Nigeria in the area of knowledge sharing and research cooperation.

2.1 AIMS AND OBJECTIVES

The aim of the Phase II of the NEPAD Centre of Excellence project on water sciences and Technology is intended to place emphasis on capacity building in the water sector with the support of UNESCO. The objectives are as follows:

- Development of National capacity building strategies for Young professionals and technicians of the water sector.
- Establishment of a bright academic training programme.
- Strengthening of the technical capacity of water and sanitation services in Nigeria.
- Clarifying the human resources gaps in the sector in terms of:
  - (i) Management and Planning which require high level technical and management professionals and
  - (ii) Services, operations and maintenance which requires artisan skills.
- Identification of the gaps which exists in the learning and capacity building institutions.

2.2 SCOPE OF WORK

The main activities to be carried out in the phase II for the human capacity gap analyses include the following:

(i) Review of the gap analyses which were performed in the Western and Southern Africa Networks of COE during the Phase 1 and identification of which studies and surveys were done during that phase, what was the scale and scope of the activities and the methodologies employed.

(ii) Identifying which information and data gathering exercise address either Professional skills and Capacity needs or Technical skills need. And in addition the assessment of the need to augment the initial studies, surveys or questionnaires either in quality or scaling out with a view to achieving national representative data.

(iii) Performance of supporting desk and literature study to upgrade the information of the studies carried out by COE in Phase I

(iv) Provision of a list of all publications evaluated in (iii) above which shall be relevant in Phase II and the focus of such publications.

(v) Review of regional and national training programmes and institutions which may be capable of addressing the human capacity gaps in the sector.

3 RESEARCH METHODOLOGY

For the purpose of fashioning out a National Strategy and Implementation framework for human resources capacity building in the water and sanitation sector in Nigeria a two phase methodological approach was adopted as follows:

3.1: Phase 1: Review of existing studies, desk and literature study and Inception Workshop

In this phase the following activities were carried out:

- Review of existing studies on human capacity and training institutions and sector organizations' surveys, skills gap and training needs analysis carried out in the sector including the report of the water sector stakeholder analysis (Phase 1) as well as desk and literature survey to upgrade the information of the existing studies. This was necessary to provide better understanding of the existing skills within the water sector in Nigeria and to provide baseline data for the study. These preliminary studies were based on available records and reports from various organisations within the water sector and through the use of internet resources.
- A study of various institutions and organisations who are stakeholders in the Nigerian water sector. The aim was to identify their organisational structure, human resources policies and succession plans, skills availability, resources and approaches to human capacity development and also to determine the approach by which they are to be contacted to participate in the various surveys and workshops.
- Conduct of consultative meetings/workshops on human resources capacity building with identified stakeholders/ actors within the water sector at local, regional and national levels.
-

3.2: Phase 2: Development, Administration and Analysis of questionnaires; conduct of oral interviews and Validation Workshop.

The phase 2 comprised of the development and administration of the questionnaires, conduct of oral interviews and the organization of the Consultative workshop for validation of results /findings arising from the study.

Based on the outcomes of Phase 1 above, questionnaires were developed and checklists prepared for surveys and semi-structured interviews with heads and responsible officers of sector organizations in the South-South, South-East and South- Western regions of Nigeria. Copies of Questionnaires developed were sent to institutions/organisations and identified experts by e-mail, post and by hand delivery. The questionnaire comprised structured questions aimed at eliciting stakeholders/actors' knowledge of the sector human resources capacity issues , skills type and availability to enable identification of the skills gap in the sector, major areas of human resources capacity building needs and the identification of priority and research needs in the sector to guide formulation of human resources capacity building strategy recognizing that capacity building is a key driver in the achievement of the

Sustainable Development Goals (SDG) 6 whose target is "*to ensure availability and sustainable management of water and sanitation for all"*.
Oral interviews were conducted with Heads of institutions and responsible officers in charge of relevant units in the water sector using checklists prepared for interviews. The focus of the interviews related to the main elements required for developing a holistic framework for capacity building in the water sector namely institutional capacity, managerial and financial capacity, technical capacity and creation of the enabling environment.
Stakeholders contacted for participation in the surveys and represented in the inception and validation workshops included:

- Universities
- Polytechnics
- Monotechnics
- Research Centres/Institutes
- Government Ministries, Agencies and Parastatals responsible for WASH matters (State and Federal)
- Local Government Councils
- Non-Governmental Organisations (NGO)
- Private Organisations
- Consultancy companies.
- Professional Bodies

3.3: Skills Availability and Survey of Water Related vacancies

The approach used to determine the human resources skills type and needs and skills gap which exists in the water sector in Nigeria involved survey of sector organisations and employees, analysis of the questionnaires, review of selected reports on water related job vacancies in addition to online reports and publications on national dailies and federal tender journals.

3.4: Analysis of Survey Data

The responses from the questionnaires were extracted and analysed using Microsoft Excel application and the results presented in tables and charts in addition to the collated oral interview responses. These were used in discussions at the workshop for validation of findings/results.

4 RESULTS AND DISCUSSIONS

4.1 Analysis of the skills gaps – respondent analysis

4.1.1 Respondent analysis

A total of 95 respondents from different organizations covering Government Ministries, Agencies and Parastatals (State and Federal), Local Government councils, Private Organisations, Non-Governmental Organisations, Professional bodies participated in the questionnaire survey (Appendix 1). The respondents also included experts in the water sector who were approached to complete the questionnaire based on their knowledge of the water sector and human resources capacity building issues of the sector in Nigeria and Western Africa at large.

By approaching the experts, informed answers from individuals who have valuable experiences and sound knowledge in the water sector was obtained. Details of respondents of the questionnaires are presented in table 4.1 below

Table 4.1: Details of respondents of the Survey

S/N	Name	Company/organization	Email/Website	Phone No.
1	Prof B. F. Sule	National Centre for Hydropower Research and Development, University of Ilorin	bfsuleiman@gmail. com	+2348037456689
2	Oladipo I. O.	Federal Polytechnic, Ado-Ekiti	oladipoisaac@gmail.com	+2348033888989
3	Prof John Obafunwa	Lagos State University, Epe Campus	Dean.engineering@lasunigeria.org	+2348037192842
4	Prof Ife Adewunmi	Niger Delta University	ifeadewunmi@mail.ndu.edu.ng	+2348034512583
5	A. J. Orobor	Edo State Ministry of Energy and Water Resources	oroboraj@yahoo.com	+2348098741483
6	Prof O. M. Sadiq	University of Lagos	Sadiq_om@yahoo.com	+2348023190371
7	Patience O. Edomioya	Edo State Institute of Management and Technology		+2347030863183
8	Prof. (Mrs) C Ikhile	Federal University of Petroleum Resources		+2348037611689
9	Prof Eghosa Osaghae	Igbinedion University, Okada	postmaster@iuokada.edu.ng	+234(0)52254942
10	Prof B. U. Anyata	University of Benin	benedictanyata@uniben.edu	+2347067538129
11	Prof. J. O. Ehiorobo	Jeffa Geosurveys and Technical Services Ltd	Jeffa_geos@yahoo.com	+2348032217426
12	Honourable Minister	Ministry Of Niger Delta Affairs		09-8703506
13	Dr (Mrs) Philipa Idogho	Auchi Polytechnic		+2348034478426

14	Engr Osawe Emmanuel	Ambrose Alli University	immosa2002@yahoo.com	+2348030946278
15	Engr Ighota James	Ministry of Works, Asaba, Delta state		046-281691
16	Engr. F. N. Ogbeide	Niger Delta Development Commission (NDDC), Port Harcourt.	nosakhderick@yahoo.com	+2348023509993
17	Dr C.S. Okoli	Federal University of Technology, Akure (FUTA)	okolics@yahoo.com	+2348034277819
18	Dr Chris Oboh	Niger Delta Development Commission (NDDC), Port Harcourt, Rivers State.	info@nddc.gov.ng	+234819941730
19	Engr. U. D. Omorede	Egor Local Government Area Council		+2348039200362
20	Engr. (Prince) Obanor O. Victor	Edo State Oil and Gas Producing Areas Development Commission		+2348077182442
21	Engr Zeb Uzebu	Zeb Nig Ltd		+2348023259242
22	Engr John Agori	Delta State University	www.delsu.edu.ng	+2348023200892
23	Dr Yusuf Momoh	University Of Port Harcourt	Yusuf.momoh@uniport.edu.ng	+2348035386799
24	Umoh Christopher Ini	University of Uyo	iniclassic@yahoo.com	+2348067814755
25	Engr Joshua Aizebeoje	Benin-Owena River Basin Development Authority	joshuaaizebeoje@yahoo.com	+2348034417937
26	Prof Tony Ebeigbe	Geiffon	toni_ebeigbe@yahoo.com	+2348058503192
27	Engr Ikhine	Oredo Local Government Area Council		
28	Engr (Dr) Tajudeen Lawal	Deenlaws Associates Ltd		+2348036668716
29	Engr. O.W Uzebu	Chris Epas Konsult Ltd	chrisepaskonsult@yahoo.com	+2348055655120
30	Dr Joseph E.S. Uujamhan	Oska-Jo and Partners Ltd	info@oskajoconsulting-ng.com	(+234) 52-250200
31	Engr John Adisa	Ikpoba-Okha Local Government Area Council		+2348034279626
32	Alhaji Sani Dangote	Dansa Holdings Ltd	sanidangote@dangote-group.com	
33	Prof Lawrence Ezemonye	National Centre for Energy and Environment, University Of Benin	info@ncee.org.ng	+2348023353847
34	Dr Briggs	Nigerian Petroleum Development Company Ltd (NPDC)	www.npdc-ng.com	+234(0) 52251900
35	Engr. Leslie	Niger Delta River Basin		+2348037546662

	Meindiyo	Development Authority, Port Harcourt	engr.leslie@yahoo.com	
36	Engr. Henry .O. Idama	Delta State Ministry of Water Resources , Asaba	idamaonwi@gmail.com	+2348037170678
37	Dr. (Mrs) .J. Aboloje	Delta State Ministry of Works		+2348033808875
38	Dr. Blessing Enamotor	Delta State Direct Labour Agency		+2348033129254
39	Engr. Blessing Edewor	General Manager Delta State Rural Water Supply Agency, Asaba	bedewor2014@yahoo.com	+2348030917163
40	Engr. Festus Akponovo	Delta State Ministry of Housing Asaba		+2348033800211
41	Engr Afe Edwin	Director of Works and Services College of Education , Warri, Delta State		+2348028304122
42	Dr. Hillary Owamah	Head of Department of Civil Engineering, Delta State University , Oleh-Campus	dahilla22@yahoo.com	+2348035705814
43	Mrs Helen Juwah	Department of Civil Engineering, Delta State Polytechnic, Ozoro		+2348060701373
44	Mrs Ebi Otuaro	Department of Civil Engineering, Delta State Polytechnic, Ozoro	e.otuaro@yahoo.com	+2348035536580
45	Prof. E. Ogujor	Provost, Delta State Polytechnic Otefe Oghara, Delta State		+2348062613984
46	Engr. Ifesinachi Mokweyei	Civil Engineering Department , Delta State University, Oleh Campus	www.delsu.edu.ng	+234 8034390138
47	Engr. Bright Akpomie	Director of Works, Delta State University, Abraka	www.delsu.edu.ng	+2348033110379
48	Prof. J. Babatola	Federal University of Technology, Akure	delebabatola@yahoo.com	+2348037145493
49	Engr. Bosun Fasipe	Energy Commission of Nigeria, Abuja	fasipeo@gmail.com	+234 8039632870
50	Dr. Matthew Aho	Federal University of Agriculture, Makurdi	Aho_ ped@yahoo.com	+2348065370357
51	Asemota Patricia Osaro	Physical Planning Division, University of Benin	asemotapatriciao@gmail.com	+2347019721953

52	Engr. Okey Nwosu	Federal University of Tehnology, Owerri		+2348037856285
53	Engr. Kalu Iroakazi Kalu	Environmental Compliance Engineer, FMM&SD	akazikalu@yahoo.com	+2348038457950
54	Mrs .E.S Isagba	Department of Civil Engineering, University of Benin, Benin City	ebuwa.isagba@uniben.edu	+2348033535582
55	Dr. Obasi .N.L	Enugu State University of Technology, Enugu		+2348036875068
56	Engr.Ufumwen Osemwenkhae(Mrs)	Edo State Urban Water Board, Benin City		+2348034488613
57	Mr Nicholas Uwadae	Energy commission of Nigeria – National Centre for Energy and Environment	info@ncee.org.ng	+2348058263303
58	Engr Edwin Omoregbe	Ovia South West Local Government council, Iguobazuwa		+2348033825204
59	Engr Emmanuel Ibhadode	Owan West Local Government council, Sabongida -Ora		+2348146664429
60	Engr Charles Morgan	Oredo Local Government council Benin city		
61	Engr A. I. Agbonaye	Director of Engineering, University of Benin	works@uniben.edu	+2348033781630
62	Engr Sarah. O. Omosigho	Engineer (Water Supply) Estate and Works Department University of Benin	Sarah.omosigho@yahoo.com	+2348166282223
63	Prof O. C. Izinyon	Professor of Water Resources Engineering University of Benin, B/City	izinyon2006@yahoo.com	08035038239
64	Dr. (Mrs) Ngozi Ihimekpen	Department of Civil Engineering University of Benin , B/City	n.ihimekpen@uniben.edu	+2348032646454
65	Dr (Mrs) Lulu Bobor	Department of Civil Engineering University of Benin, B/City		+2348144566392
66	Dr Mike Enaboifo	University of Benin ,Benin City	Michael.enaboifo@uniben.edu.	+2348037499208

67	Engr (Dr) Emmanuel Ufuah	HOD, Civil Engineering Dept. Ambrose Ali University Ekpoma	ejetrev@yahoo.com	+2347011685343
68	Engr (Mrs) MaryAnn Ezugwu	Igbinedion University Okada	mezeagu@yahoo.com	+2348038757355
69	Engr. M. C. Ezeh	Igbinedion University Okada		+2348062300870
70	Engr. Henry Dirisu	Auchi Polytechnic Auchi		+2348039523089
71	Engr Alhassan	Auchi Polytechnic Auchi		+2347032071120
72	Engr Fidelis Oamen	Auchi Polytechnic Auchi		+2348034478426
73	Engr Jonathan Ekhoedaehi	Nigerian Society of Engineers,Benin Branch		+2348035614955
74	Mr M. Imosemi	Nigerian Mining and Geosciences Society, Benin		+2348060386378
75	Engr Samuel Akhibi	LGA WASH Consultant (UNICEF), Ovia South West LGA.Edo State	sakhibi1962@gmail.com	+2348035606865
76	Engr S. I .O. Osara	Development Engineers/ Consultant, Benin City		+2348037104963
77	Engr. Gabriel Eromhonsele	Gayimi Limited		+2349039725917
78	Engr. Andrew Ehigiegba	Ministry of Infrastructure Benin City. Edo State		+234806873042
79	Engr. Osahon Idemudia	Ministry of Niger Delta Affairs. Abuja		+2348166121365
80	Engr.Adelowo. Adereti	Federal Ministry of Water Resources. Abuja		+2348063242256
81	Engr(Mrs) Izegbua Iyalekhue	Deenlaws Associates Ltd, Benin City	osazuwai2002@yahoo .com	+2348025728126
82	Dr Rudolph Ilaboya	Water Engineering Unit, Dept. Of Civil Engg, University of Benin, Benin City	rudolph.ilaboya@uniben.edu	+2348038027260
83	Engr. Nelson Onwo	Niger Delta Dev. Commission P/Harcourt		+2348032721201
84	Engr. Chinelo Ezema	UNICEF WASH Programme. Edo state		
85	Engr. Nosa Okoh	GM, Delta state Water Board Asaba	nosakhoro@yahoo.com	+2348034089768
86	Engr. Tonnevsky Unuafe	GM, Small towns Water supply Agency Asaba	engrtonnevsky@yahoo.com	+2348032686975
87	Engr Emma. Odogun	Director, Water supply, Ministry of Water Resources, Asaba	odogunemma@yahoo.com	+2348037421072
		Director, Technical	dafiovor@yahoo.com	+2348035705025

89	Engr. H Dafiovor	services, Ministry of Water Resources, Asaba		
90	Engr.Ugbogbo Supreme	Consultant Water Engineer, Benin City	Ugbogbolovelysupreme@yahoo.com	+2348163368326
91	Engr. Aremu Emmanuel	Water Resources Expert, Benin City	Olorunyomi.emmanuel@gmail.com	+2347069341112
92	Engr. Nwachukwu Stephen	Research fellow, Water Resources Engineering, University of Benin	stephen.nwachukwu@eng.uniben.edu	+2347064246421
93	Engr. Solomon Okonofua	Research fellow, Water Resources / Geomatics Engineering, University of Benin	ehizonomhen.okonofua@uniben.edu	+2348134826148
94	Engr. Vincent Omoise	Water Engineering Contractor, Benin City		+2348033916290
95	Engr.Osagie Osarenren	Water Engineering Capacity Building Expert. Abuja Nigeria	osagieosarenren@yahoo.com	+2348036122656

4.1.2 Analysis of the type of business/organization of respondents

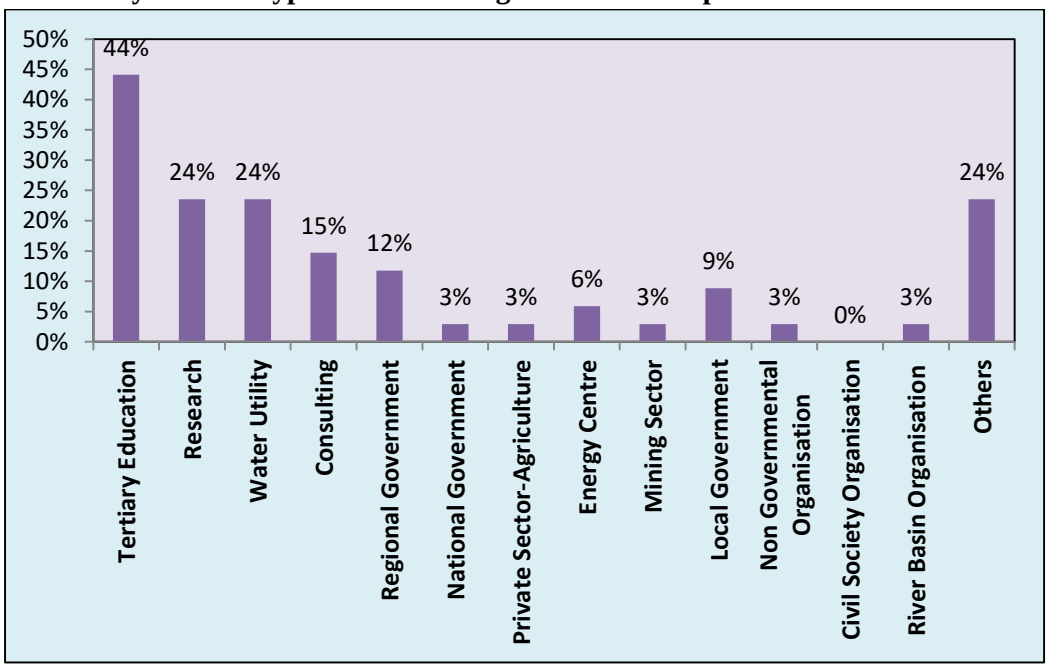

Figure 4.1: Business or organization type of respondents according to question 1 of the survey

Figure 4.1 shows that the primary business or organisation type of respondents is tertiary education which is ranked 44%. This is closely followed by Research, Water Utility and others with 24%, consulting (15%), regional government (12%), local government (9%), energy (6%) while all others including national government, private Sector agriculture; mining sector, NGO and River basin organisation were 3% each.

The overall summary of result reveals that the major business of the respondents was tertiary education/training (44%) as compared to the limited respondents as seen in mining sector, Non-Governmental Organisation, River Basin and national government which were ranked 3% respectively. This distribution is expected for a region with at least one to two tertiary institutions per state with a national government only at the seat of power (Abuja) and other major sectors located in areas where there are available raw materials.

4.1.3 Analysis of all activities of Respondents

On the bases of the respondent activities (Figure 4.2), a cumulative assessment of all the activities including the primary and secondary activities was done. The results indicated that the main/primary activities of the respondents were mainly teaching/training (53%) followed by research (47%), operations and utility management (44%), planning (41%) while communication and policy making is (3%) respectively. The percentage for Finance was zero percent (0%) since none of the respondent's organisation had finance as its primary or secondary activity.

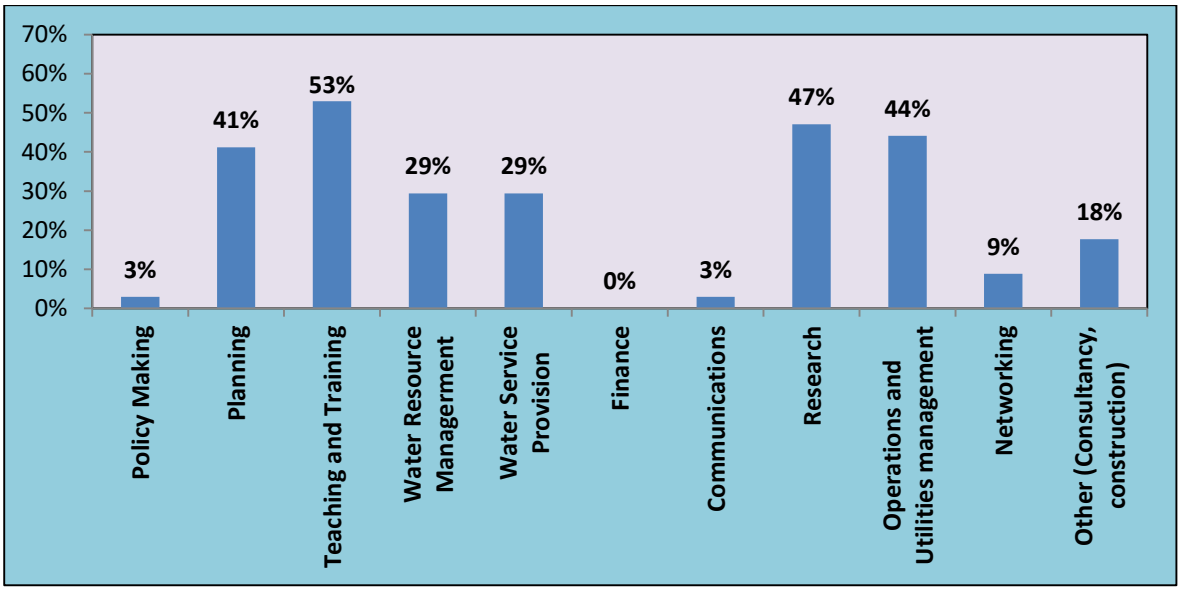

Figure 4.3: All Activities of Respondents according to question 2 of the survey

4.1.4 Analysis of Primary Activity of Respondents

On the bases of the primary activity (Figure 4.3) emphasis was placed on the primary activity of the individual organizations of the respondents. Results obtained reveals that 44% of the total respondents have their primary activity as teaching/training, next to this is planning 26%, operations and utility management has 24% with policy making, water resources management, communications and research all having 3% respectively. No respondent organisation had networking or finance as their primary activity hence the percentage for these two indicators was recorded as 0%.

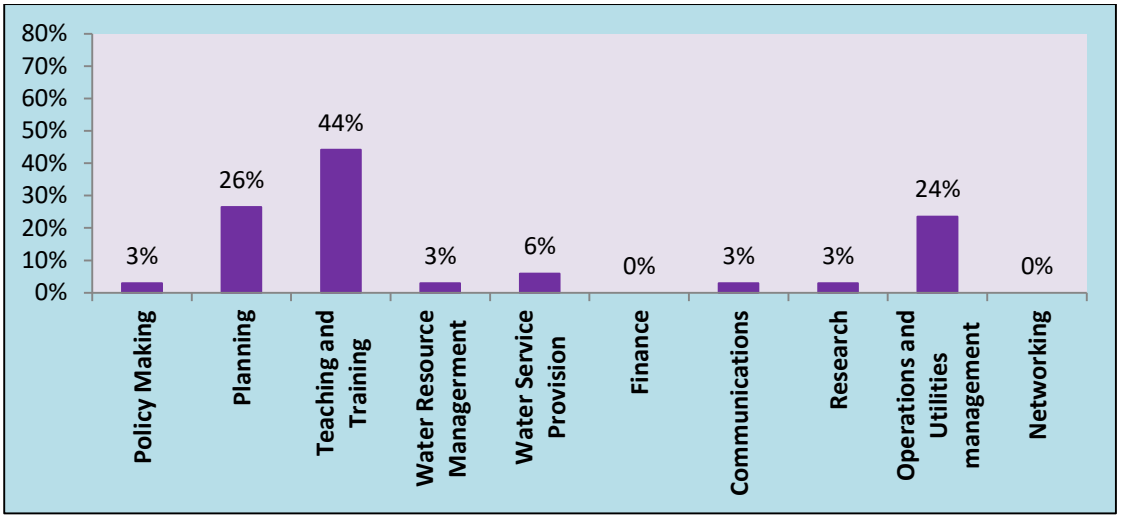

Figure 4.3: Primary business where the respondents had only one choice

4.1.5 Analysis of the Sector Existing Skills

The existing skills in the water sector in Nigeria as indicated by the percentages of respondents that have existing skills on the bases of the measurement indicators are given in table 2.

Table 4.2: Ranking of Existing Skills

Measurement Indicators	Percentage of Respondents with Existing skills	Availability (Remarks)
Civil Engineering	97%	Very High
Hydrology	68%	High
Data Management	62%	High
Geographic Information Systems	62%	High
Information Management Systems	62%	High
Planning	62%	High
Project Management	59%	High
Artisans and Technicians	56%	High
Groundwater	56%	High
Environmental	53%	High
Water Treatment	53%	High
Geography	50%	High
Research and Development	50%	High
Construction Project Managers	47%	Average
Environmental Health	41%	Average
Human Resources	41%	Average
Chemical Engineering	38%	Average
Water Conservation	32%	Average
Agriculture and Agricultural	29%	Average

Engineering		
Coastal Engineering	29%	Average
Geology / Geophysics	29%	Average
Waste Disposal	29%	Average
Financial Management	26%	Average
Policy	24%	Average
Waste Handling	24%	Average
Climatology	21%	Average
Occupational Health and Safety Skills	21%	Average
Sanitation	21%	Average
Agronomy	18%	Below Average
Conflict Resolution/Mediation	18%	Below Average
Ecosystems	18%	Below Average
Institutional Management	15%	Below Average
Plant Maintenance and Operation	15%	Below Average
Rainwater Harvesting Technologies	15%	Below Average
Communications	12%	Below Average
Freshwater Systems	12%	Below Average
Marketing and Communications	12%	Below Average
Cultural and Social Science	9%	Below Average
Environmental Law	9%	Below Average
Hydrochemistry	9%	Below Average
Forestry	3%	Below Average
Geochemistry	3%	Below Average
Industrial Ecology	3%	Below Average
Sector Governance	0%	Below Average

Availability Ranking: (Very High; 80 – 100%), (High; 50 – 79%), (Average; 20 – 49%), (Below Average; 0–19%)

Table 4.2 presents skills that currently exist in Nigeria Water Sector according to the responses obtained from the participants and the percentage spread of a particular skill in the region. The result revealed that 97% of the total respondents possess very high skill capacity in Civil Engineering which is attributed to the fact that Civil Engineering is pivotal especially for water and water related issues. Hydrology was ranked as high with construction project managers as Average and agronomy as below average. The ranking is as specified under table 4.2.

Using 20% as a baseline, the results suggest that there is high level shortage of necessary skills in Agronomy, Conflict Resolution/mediation, Ecosystems, Institutional Management, plant maintenance and Operation, Rainwater Harvesting technologies, communications,

cultural and social science, environmental law, Hydrochemistry, Forestry, Geochemistry, Industrial Ecology and Sector Governance in relation to water and water related matters.

4.2 Analysis of the Sector Skills Gaps

This analysis was carried out in order to determine the level of skills available and the skills gap in sector organisations and vacancies which exist in different water-related job categories in Nigeria. The specific objectives were to: determine which skills are available in the sector; evaluate the water related vacancies that are available in Nigeria and also to highlight the various sectors/organisations where these skills and vacancies exist and determine skills gap so that approaches and recommendations to address the shortfalls in the sector can be proffered. The approach used involved Analysis of the questionnaires, organisation and employee surveys, review of selected reports on water related vacancies in addition to online reports and publications on national dailies and interviews with sector organisations.
The data generated from the exercise and results are presented in the table 3.

Table 4.3: List of Water Related Sectors with vacant position Advertised

S/No	Sectors	Vacant Position	Total Number of Vacancies
1	University of Benin	Lecturers, technologist, Technical officers, Engineers, Lab Assistance, Administrative officers	88
2	Egor Local Government	Engineers, Technicians, Artisans, Administrative Officers, Auditors, Accountants, Craftsmen	36
3	Delta State Ministry of Works and Edo State ministry of Energy and Water Resources	Engineers, Technicians, Artisans, Administrative Officers, Auditors, Accountants	62
4	Research Institutions	Research officers technologist, Technical officers, Engineers, Lab Assistance, Administrative officers	34
5	Federal Parastatals	Engineers, Technicians, Artisans, Administrative Officers, Auditors, Accountants	165
6	River Basin Dev. Authority	Engineers, Technologist Research officers, Craftsmen, Administrative Officers	17

The need for adequate human resource capacity and appropriate skills in the water and sanitation sector is a major issue that requires the combined efforts of local, state and national government of Nigeria especially considering the failure to meet the MDG 7 target which had required that the right number of people with the right skills are in the right place at the right time to deliver services to the people at affordable cost. Results from the various respondents and from various reports reviewed indicate generally a downwards trend in the availability of

skilled manpower in water and water related sectors at all levels (financial systems capacity, public institutions, local government staff capacity, private operator and civil society). Other issues such as skills mismatch, retirements without recruitment for replacements, and no incentive to work in remote / less attractive areas have also led to rural/ urban imbalance in the distribution of public sector workers thereby contributing to dwindling skills in the sector. In addition, demands for engineering manpower from other better paying sectors which are not water related (financial sector for example) and emigration has also reduced availability of skilled manpower in the sector. This calls for additional funding from the National government especially in the areas of capacity building and job creation and for better pay and working conditions in the sector.

A review of the various sectors indicators was done to assess the various skill gaps that exist and the affected areas of specialization. The result of the review as shown in table 4.4 below indicates that skills considered limited and most needed in the sector had **high percentage shortage** (i.e. 71% and above) and required urgent intervention. Those within the range of 51% to 69% are classified as **averagely available** and needs attention. In addition, skills with scores of less than 50% percentage shortage are relatively available.

Table 4.4: Analysis of Sector Skills Gap and Areas where it Exist

Skills	Percentage Shortage
Civil Engineering	3%
Hydrology	32%
Data Management	38%
Geographic Information Systems	38%
Information Management Systems	38%
Planning	38%
Project Management	41%
Artisans and Technicians	44%
Groundwater	44%
Environmental	47%
Water Treatment	47%
Geography	50%
Research and Development	50%
Construction Project Managers	53%
Environmental Health	59%
Human Resources	59%
Chemical Engineering	62%
Water Conservation	68%
Agriculture and Agricultural Engineering	71%
Coastal Engineering	71%
Geology / Geophysics	71%
Waste Disposal	71%
Financial Management	74%
Policy	76%
Waste Handling	76%

Climatology	79%
Occupational Health and Safety Skills	79%
Sanitation	79%
Agronomy	82%
Conflict Resolution/Mediation	82%
Ecosystems	82%
Institutional Management	85%
Plant Maintenance and Operation	85%
Rainwater Harvesting Technologies	85%
Communications	88%
Freshwater Systems	88%
Marketing and Communications	88%
Cultural and Social Science	91%
Environmental Law	91%
Hydrochemistry	91%
Forestry	97%
Geochemistry	97%
Industrial Ecology	97%
Sector Governance	100%

4.3 Analysis of Sector Skills development and Training offer

Capacity is the organizational and technical abilities, relationships and values that enable countries, organizations, groups and individuals at any level of society to carry out function and achieve their development objectives over time (IICBA, 2006).

Capacity refers not only to skills and knowledge but also to relationships, values and attitudes and many others (Morgan, 1998) hence it is crucially important to take account of levels of capacity in a system context. This can be done at three levels namely Individual, organizational and environment. Capacity at individual level refers to the willingness and ability of an individual to set objectives and to achieve them using one's own knowledge and skills (JICA, 2004). Capacity at individual level includes knowledge, skills, values, attitudes, health, awareness etc. individual capacity can be developed through various ways such as formal, non-formal and/or informal education, training on –the- job (OJT) and independent reading. This is also referred to as human resources development.

In this section a description of the nature and type of training provision already existing in the region and the potential capacity building activities and interventions required to address the human resources capacity challenges in the sector is presented. The analysis of the skills development and trainings in the sector as presented in figure 4.4 below shows that 80% and 66% of the respondents to the questionnaires indicated that skills improvement in the sector is by In-service and Capacity building strategy and Financing respectively. This could be attributed to the fact that most employers are not willing to release their skilled workers for full time further education training (FET) and higher education training (HET) except in tertiary institutions where (FET) and (HET) are the preferred means of skills development. Further Education Training (FET) and Higher Education Training (FET) were rated as 48% and 42% respectively while Bursary support was rated by 13% of the respondents as the current approach adopted by them for skills improvement. The rating of Internship.

Mentorship, Recognition of Prior Learning (RPL) Short courses as approaches to skills development by respondents was 48%, 53% and 34% respectively while others was rated as 5%.

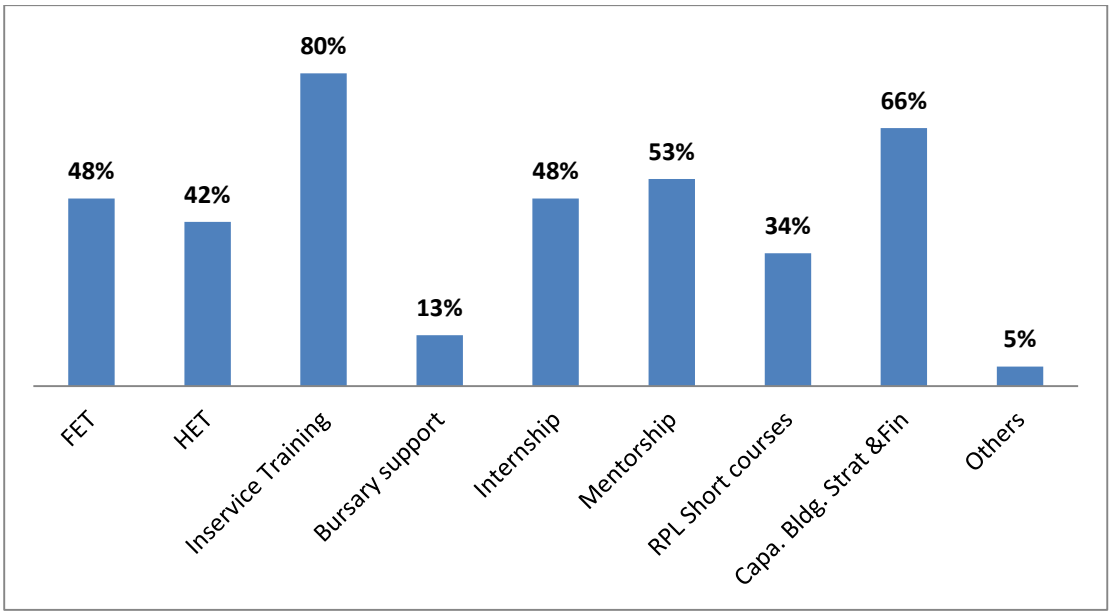

Figure 4.4: Existing Approach to Skills Development

In Figure 4.4, 4.5 and 4.6, it can be seen that the existing and needed approach are fairly well distributed. For instance, in figure 4.4, existing approach by In-Service Training approach stand at 80% while the needed approach is 65% as seen in figure 4.5. In the case of capacity building strategy and financing, the existing approach is 66% as shown in figure 4.4 while the needed approach is 68% as revealed in figure 4.5. For Further Educational Training (FET), the existing approach stands at 48% as seen in figure 4 while the needed approach is 56% as seen in figure 4.5. For Higher Educational Training (HET), the existing approach stands at 42% while the needed approach is at 53% as shown in figure 4.4 and 4.5 respectively.

It can be seen from Figure 4.6 that only in the case of In-Service Training and Internship are the existing approaches higher than the needed approaches. Thus there is the need for investment in these approaches to skills development in Nigeria. The development of an effective capacity building strategy should consider existing alternatives. Such alternative choices include the different dimensions of capacity building, the different domains (knowledge and information, skills and attitudes) covered by the capacity building effort, and consequently the different instruments and activities. Examples of capacity building instruments and activities identified in the literature to have produced satisfactory results include: Information and knowledge management, Facilitation of processes by external experts, Training (Courses, Workshops, Seminars, on the job), Networking, Education (Vocational, Scientific, Post graduate, etc.), Project and Counterpart arrangement).

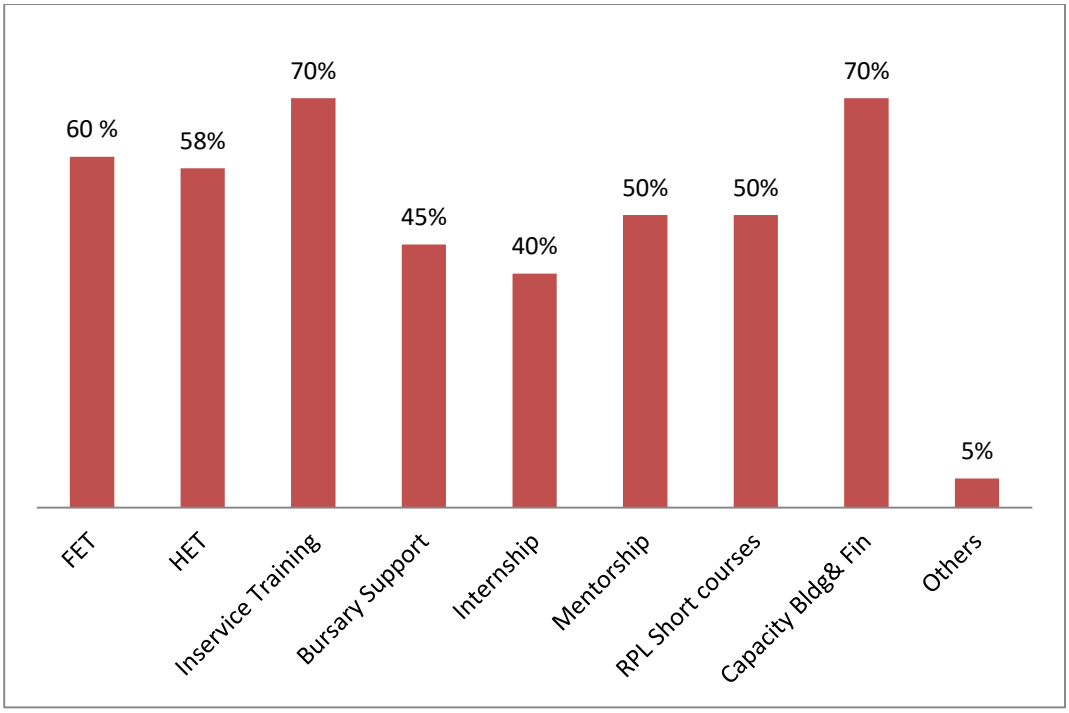

Figure 4.5: Needed Approach to Skills Development

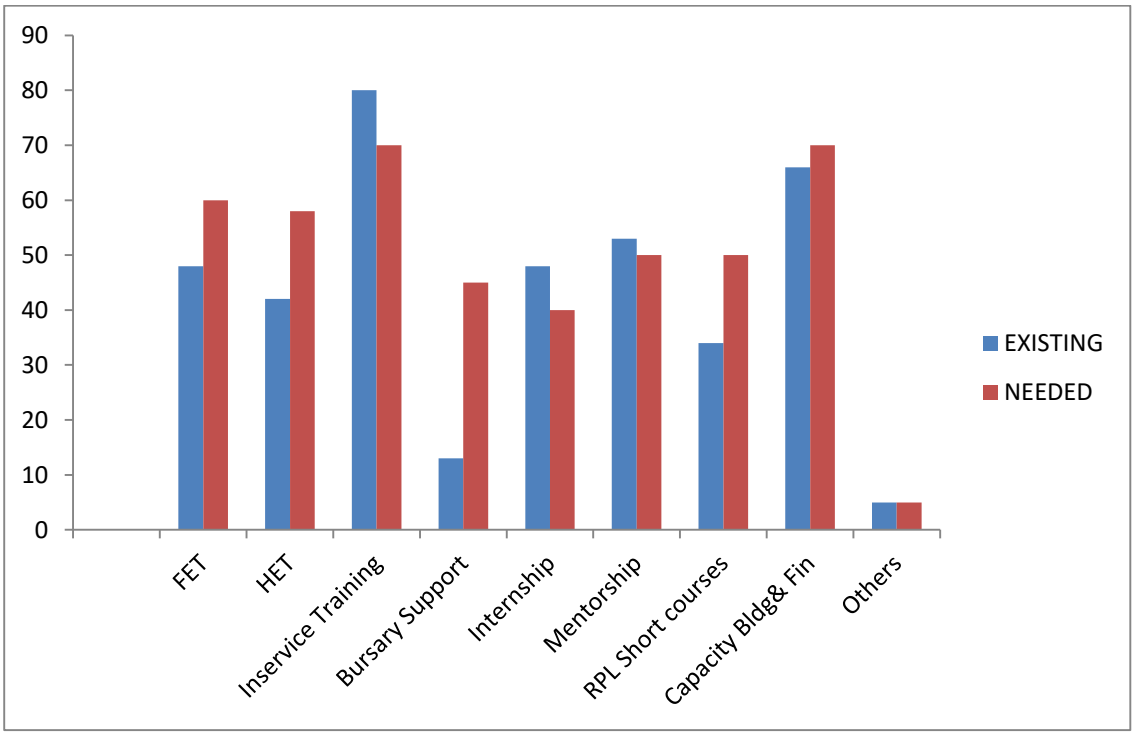

Figure 4.6: Existing and Needed Approach to Skills Development

Existing approach
Needed approach

Analysis of Figure 4.7 shows that respondents received training from multiple types of institutions. Thus, while 56% of the respondents received one form of training or the other from Further Educational Training Institutions, 53% received training from Higher Educational Training Institutions, 56% from Accredited Service Providers and 21% from other types of training institutions which include but not limited to Non-Governmental Organisations, In-house Training, and Federal Government's training consultants.

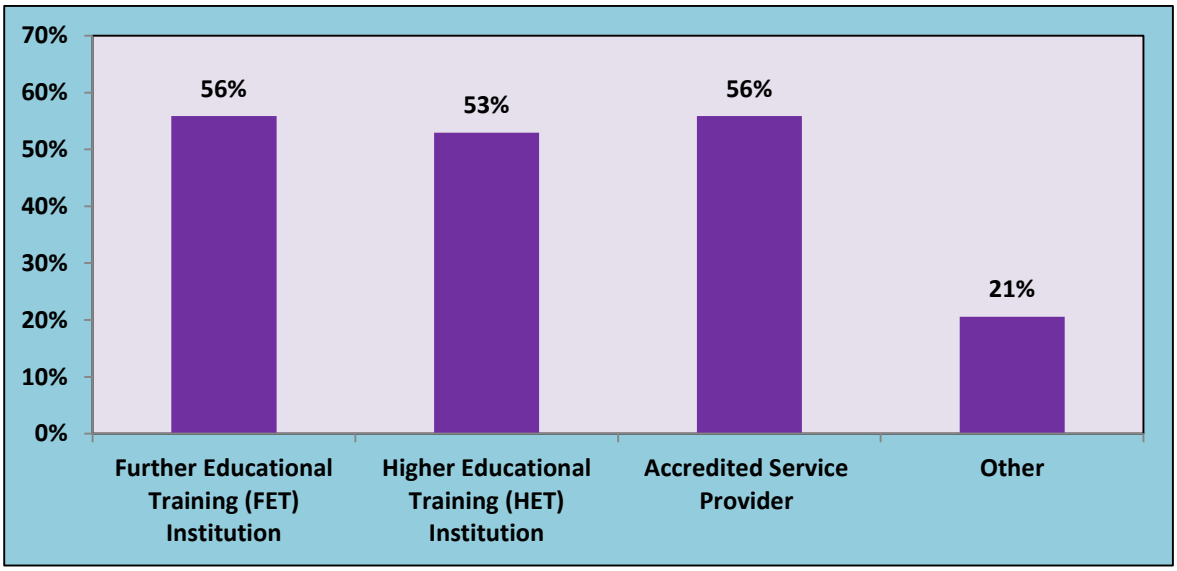

Figure 4.7: Different Types of Training Institutions

4.3.1 Current Accredited Educational Offering in Nigeria for the Water Secto

A large number of existing accredited courses are offered by different training institutions in Nigeria and are presented in Tables 4.6 – 5.10. The institutions include accredited water sector training institutes and centres, research institutes, public universities, specialised institutions, and public polytechnics and monotechnics. There is a fairly even spread of these training institutions all over the country with all the six geopolitical zones of the country well represented. The geopolitical zones are South-South, South-East, South-West, North-West, North-East, and North-Central.

Table 4.5: Geopolitical Zones of Nigeria and their States
North-Central: Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and Federal Capital Territory, Abuja.
North-Eastern: Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe.
North-Western: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara.
South-Eastern: Abia, Anambra, Ebonyi, Enugu, and Imo.
South-South: Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers.
South-Western : Ekiti, Lagos, Ogun, Ondo, Osun and Oyo.

Table 6: Water Related Research and Training Institutes in Nigeria

S/N	WATER RELATED RESEARCH INSTITUTES
1	Arable Crops Research Institutes
2	National Agricultural Extension Research and Liaison Services (AERLS)
3	Institute for Agricultural Research (IAR)
4	Institute of Agricultural Research and Training (IAR&T)
5	National Cereals Research institute (NCRI)
6	Lake Chad Research Institute (LCRI)
7	National Root Crops Research Institute (NRCRI)
8	National Stored Products Research Institute (NSPRI)
9	Forestry, Horticulture and Tree Crops Research Institutes
10	Forestry Research institute of Nigeria
11	National Horticulture Research Institute (NIHORT)
12	Cocoa Research institute of Nigeria (CRIN)
13	Nigerian Institute for Oil Palm Research (NIFOR)
14	Rubber Research institute of Nigeria (RRIN)
15	Animal Production, Fisheries and Oceanography Research Institutes
16	National Animal Production Research Institute (NAPRI)
17	National institute for Freshwater Fisheries Research (NIFFR)
18	Nigerian institute for Oceanography and Marine Research
19	Animal Health Research Institutes
20	National Veterinary Research Institute (NVRI) – Vom
21	Nigerian Institute for Trypanosomiasis Research (NITR)
22	Edo State Institute of Management and Technology, Usen, Edo State

Table 7: Accredited Monotechnics and Specialised Institutions in Nigeria

S/N	FEDERAL MONOTECHNICS/SPECIALISED INSTITUTIONS
1	Air-Force Institute of Technology, NAF, Mando, Kaduna
2	Federal College of Chemical & Leather Technology, Zaria, Kaduna State
3	Federal Cooperative College Ibadan, Oyo State
4	Federal Cooperative College Kaduna
5	Federal Cooperative College, Oji River, Enugu State
6	Federal College of Statistics, Enugu
7	Federal College of Statistics, Ibadan, Oyo State
8	Federal College of Statistics, Kaduna
9	Federal School of Mines, Jos, Plateau State
10	Federal School of Survey, Oyo
11	Federal Training Centre, Calabar
12	Federal Training Centre, Enugu
13	Federal Training Centre, Kaduna
14	Federal Training Centre, Maiduguri
15	Maritime Academy of Nigeria, Oron, Akwa Ibom State
16	Metallurgical Training Institute, Onitsha, Anambra State
17	National Water Resources Institute (NWRI), Mando, Kaduna
18	Nigerian Army School of Engineering, Makurdi, Benue State
19	Nigerian Army School of Finance, Administration, Apapa, Lagos State
20	Nigerian Army School of Signals Apapa, Lagos State
21	Nigerian Naval Engineering College, Sapele, Delta State
22	NITEL Training School, Oshodi, Lagos State
23	Petroleum Training Institute, Effurun, Delta State
24	National Centre for Hydropower Research and Development, UNILORIN, Kwara State.
25	National Centre for Energy and Environment (NCEE), UNIBEN, Edo State
26	River Basin Development Authorities (RBDA) (In all Geopolitical Zones)
27	Nigeria Hygrological Services Agency (NIHSA), Abuja
28	Regional Training Centre in Remote Sensing and GIS, Ile-Ife
23	Nigerian Army School of Supply and Transport

Table 8: Accredited Public Federal Universities in Nigeria Offering Water Related Courses

S/N	FEDERAL UNIVERSITIES	WEBSITE ADDRESS	YEAR FOUNDED
1	Abubakar Tafawa Balewa University, Bauchi	http://www.atbu.edu.ng/	1988
2	Ahmadu Bello University, Zaria	http://www.abu.edu.ng/	1962
3	Bayero University,Kano	http://www.buk.edu.ng/	1975
4	Fed. Univ. of Petroleum Resources, Effurun		
5	Federal University of Technology Yola.	http://www.futy.edu.ng/	1988
6	Federal University of Technology, Akure	http://www.futa.edu.ng/	1981
7	Federal University of Technology, Minna.	http://www.futminna.edu.ng/	1982
8	Federal University of Technology, Owerri	http://www.futo.edu.ng/	1980
9	Micheal Okpara University of Agriculture, Umudike	http://www.moua.edu.ng/	1992
10	National Open University of Nigeria, Lagos.	http://www.nou.edu.ng/	2002
11	Nigerian Defence Academy,Kaduna	http://www.nuc.edu.ng/pages/www.nigeriandefenceacademy.edu.ng	
12	Nnamdi Azikiwe University, Awka	http://www.unizik.edu.ng/	1992
13	Obafemi Awolowo University,Ile-Ife	http://www.oauife.edu.ng/	1962
14	University of Abuja, Gwagwalada	http://www.uniabuja.edu.ng/	1988
15	University of Agriculture, Abeokuta.	http://www.unaab.edu.ng/	1988
16	University of Agriculture, Makurdi.	http://www.uamakurdi.edu.ng/	1988
17	**University of Benin**	**http://www.uniben.edu.ng/**	**1970**
18	University of Calabar	http://www.unical.edu.ng/	1975
19	University of Ibadan	http://www.ui.edu.ng/	1948
20	University of Ilorin	http://www.unilorin.edu.ng/	1975
21	University of Jos	http://www.unijos.edu.ng/	1975
22	University of Lagos	http://www.nuc.edu.ng/pages/www.unilag.edu.ng	1962

23	University of Maiduguri	http://www.unimaid.edu.ng/	1975
24	University of Nigeria, Nsukka	http://www.nuc.edu.ng/pages/www.unn.edu.ng	1960
25	University of Port-Harcourt	http://www.uniport.edu.ng/	1975
26	University of Uyo	http://www.uniuyo.edu.ng/	1991
27	Usuman Danfodiyo University	http://www.udusok.edu.ng/	1975

Source: NUC, 2008

Table 9: Accredited Public State Owned Universities Offering Water Related Courses in Nigeria

S/N	STATE UNIVERSITIES	WEBSITE ADDRESS	YEAR FOUNDED
1	Abia State University of Uturu.	http://www.nuc.edu.ng/pages/www.absu.edu.ng	1980
2	Adamawa State University Mubi	http://www.nuc.edu.ng/pages/www.adamawastateuni.net	2002
3	Adekunle Ajasin University, Akungba.	http://www.nuc.edu.ng/pages/www.ajasin.edu.ng	1999
4	Akwa Ibom State University of Technology, Uyo	http://www.nuc.edu.ng/pages/www.akutech.edu.ng	2004
5	Ambrose Alli University, Ekpoma,	http://www.aauekpoma.edu.ng/	1980
6	Anambra State University of Science & Technology, Uli		2000
7	Benue State University, Makurdi.		1992
8	Bukar Abba Ibrahim University, Yobe		
9	Cross River State University of Science &Technology, Calabar		
10	Delta State University Abraka	http://www.nuc.edu.ng/pages/www.delsunigeria.net	1992
11	Ebonyi State University, Abakaliki	http://www.ebsuportal.com/	2000
12	Enugu State University of Science and Technology, Enugu	http://www.nuc.edu.ng/pages/www.esut.edu.ng	1981
13	Gombe State Univeristy, Gombe	http://www.nuc.edu.ng/pages/www.gomsu.org	2005

14	Ibrahim Badamasi Babangida University, Lapai		2005
15	Imo State University, Owerri	http://www.imsu.edu.ng/	1992
16	Kaduna State University, Kaduna	http://www.nuc.edu.ng/pages/www.kasuportal.net	2004
17	Kano State University of Technology Wudil		2000
18	Katsina State University, Katsina		
19	Kebbi State University, Kebbi		
20	Kogi State University Anyigba		1999
21	Ladoke Akintola University of Technology, Ogbomoso	http://www.lautech.edu.ng/	1990
22	Lagos State University Ojo, Lagos.	http://www.lasunigeria.org/	1983
23	Nasarawa State University, Keffi	http://www.nuc.edu.ng/pages/www.nsukonline.com	2002
24	Niger Delta University, Yenagoa	http://www.nuc.edu.ng/pages/www.ndu.edu.ng	2000
25	Olabisi Onabanjo University Ago-Iwoye	http://www.oou-ng.com/	1982
26	Osun State University, Oshogbo	http://www.nuc.edu.ng/pages/www.uniosun.org	
27	Plateau State University, Bokkos		2005
28	Rivers State University of Science & Technology	http://www.rsust.edu.ng/	1979
29	Tai Solarin Univ. of Education, Ijebu-Ode		
30	University of Ado-Ekiti	http://www.nuc.edu.ng/pages/www.unadportal.com	1988
31	University of Education, Ikere Ekiti		2008

Source: NUC, 2008

Table 10: Approved Polytechnics, Agricultural Colleges and Other Tertiary Educational Institutes in Nigeria offering Water related Courses

S/N	State	Name	Type	Location	Status
1	Abuja FCT	Dorben Polytechnic	Polytechnic	Abuja	Private
2	Adamawa State	Adamawa State Polytechnic	Polytechnic	Yola	State
3	Adamawa state	Federal Polytechnic, Mubi	Polytechnic	Mubi	Federal
4	Akwa Ibom State	Akwa Ibom State Polytechnic	Polytechnic	Ikot Ekpene	State

5	Akwa Ibom State	Akwa-Ibom College of Agriculture	Agricultural		
6	Akwa Ibom State	Maritime Academy of Nigeria	Miscellaneous	Oron	Federal
7	Anambra State	Ekwenugo Okeke Polytechnic	Polytechnic		State
8	Anambra State	Federal Polytechnic, Oko	Polytechnic	Oko	Federal
9	Bauchi State	Abubakar Tafari Ali Polytechnic	Polytechnic		State bauchı
10	Bauchi State	Federal Polytechnic, Bauchi	Polytechnic	Bauchi	Federal
11	Bayelsa State	Bayelsa State College of Arts and Science	Polytechnic		State
12	Benue State	Benue State Polytechnic	Polytechnic		State
13	Benue State	Akperan Orshi College of Agriculture	Agricultural	Gboko	State
14	Borno State	Borno College of Agriculture	Agricultural		
15	Borno State	Ramat Polytechnic	Polytechnic	Maiduguri	State
16	Cross River State	Ibrahim Babangida College of Agriculture	Agricultural	Obubra	
17	Cross River State	The Polytechnic, Calabar	Polytechnic	Calabar	State
18	Delta State	Delta State College of Agriculture	Agricultural		
19 20	Delta State	Delta State Polytechnic: (three institutions)	Polytechnic	Ozoro Ogwashi-Uku	State
21				Otefe-Oghara	
22	Delta State	Petroleum Training Institute	Miscellaneous	Effurun	Federal
23	Ebonyi State	Akanu Ibiam Federal Polytechnic	Polytechnic	Unwana-Afikpo	Federal
24	Ebonyi State	Federal College of Agriculture, Ishiagu	Agricultural	Ishiagu	Federal
25	Edo State	Auchi Polytechnic	Polytechnic	Auchi	Federal
26	Edo State	Shaka Polytechnic	Polytechnic	Benin city	
27	Ekiti State	Federal Polytechnic, Ado-Ekiti	Polytechnic	Ado Ekiti	Federal
28	Enugu State	Federal School of Dental Technology & Therapy	Miscellaneous	Enugu	Federal

29	Enugu State	Institute of Management Technology, Enugu	Polytechnic	Enugu	State
30	Enugu State	Our Saviour Institute of Science and Technology	Polytechnic	Enugu	Private
31	Imo State	Federal College of Land Resources Technology, Owerri	Miscellaneous	Owerri	Federal
32	Imo State	Federal Polytechnic, Nekede	Polytechnic	Nekede	Federal
33	Imo State	Imo State Polytechnic	Polytechnic	Umuagwo	State
34	Imo State	Imo State Technological Skills Acquisition Center	Polytechnic		
35	Jigawa State	Hussaini Adamu Federal Polytechnic	Polytechnic	Kazaure	Federal
36	Jigawa State	Hussani Adamu Polytechnic	Polytechnic		State
37	Kaduna State	College of Agriculture and Animal Science	Agricultural	Kaduna	Federal
38	Kaduna State	Federal College of Chemical and Leather and Technology	Miscellaneous	Zaria	Federal
39	Kaduna State	Federal College of Forestry Mechanisation	Miscellaneous	Afaka	Federal
40	Kaduna State	Kaduna Polytechnic	Polytechnic	Kaduna	Federal
41	Kaduna State	Nigerian College of Aviation Technology	Miscellaneous	Zaria	Federal
42	Kaduna State	Nuhu Bamalli Polytechnic	Polytechnic	Zaria	State
43	Kaduna State	Samaru College of Agriculture	Agricultural	Zaria	Federal
44	Kano State	Audu Bako School of Agriculture	Agricultural	Dambatta	State
45	Kano State	Kano State Polytechnic	Polytechnic	Kano	State
46	Kano State	Mohammed Abdullahi Wase Polytechnic	Polytechnic		State
47	Katsina State	Hassan Usman Katsina Polytechnic	Polytechnic	Katsina	State
48	Kebbi State	College of Agriculture, Zuru	Agricultural	Zuru	State
49	Kebbi State	Federal Polytechnic, Birnin-Kebbi	Polytechnic	Birnin Kebbi	Federal
50	Kebbi	Kebbi State Polytechnic	Polytechnic		State

	State				
51	Kogi State	College of Agriculture, Kabba	Agricultural	Kabba	Federal
52	Kogi State	Federal Polytechnic, Idah	Polytechnic	Idah	Federal
53	Kogi State	Kogi State Polytechnic	Polytechnic		State
54	Kwara State	Federal Polytechnic, Offa	Polytechnic	Offa	Federal
55	Kwara State	Kwara State Polytechnic	Polytechnic		State
56	Lagos State	Federal College of Fisheries and Marine Technology	Miscellaneous	Lagos	Federal
57	Lagos State	Grace Polytechnic	Polytechnic	Lagos	Private
58	Lagos State	Lagos City Polytechnic	Polytechnic	Lagos	Private
59	Lagos State	Lagos State Polytechnic	Polytechnic		State
60	Lagos State	School of Agriculture, Ikorodu	Agricultural	Ikorodu	
61	Lagos State	Wavecrest College of Catering and Hospitality Management	Miscellaneous	Lagos	Private
62	Lagos State	Wolex Polytechnic	Polytechnic	Lagos	
63	Lagos State	Yaba College of Technology	Polytechnic	Lagos	Federal
64	Nasarawa State	College of Agriculture, Lafia	Agricultural	Lafia	State
65	Nasarawa State	Maurid Institute of Management & Technology, Nasarawa	Polytechnic	Nasarawa	Private
66	Nasarawa State	Federal Polytechnic, Nassarawa	Polytechnic	Nasarawa	Federal
67	Nasarawa State	Nasarawa State Polytechnic	Polytechnic		State
68	Niger State	Federal College of Fresh Water Fisheries Technology	Miscellaneous	New Bussa	Federal
69	Niger State	Federal College of Wildlife Management	Miscellaneous	New Bussa	Federal
70	Niger State	Federal Polytechnic, Bida	Polytechnic	Bida	Federal

71	Niger State	Niger State College of Agriculture	Agricultural	Mokwa	State
72	Niger State	Niger State Polytechnic	Polytechnic	Zungeru	State
73	Ogun State	Allover Central Polytechnic	Polytechnic	Sango-Ota	Private
74	Ogun State	Federal Polytechnic, Ilaro	Polytechnic	Ilaro	Federal
75	Ogun State	Gateway Polytechnic Saapade	Polytechnic		State
76	Ogun State	Marvic Polytechnic	Polytechnic	Odeda	Private
77	Ogun State	Moshood Abiola Polytechnic	Polytechnic	Abeokuta	State
78	Ondo State	Rufus Giwa Polytechnic	Polytechnic	Owo	State
79	Osun State	Federal Polytechnic, Ede	Polytechnic	Ede	Federal
80	Osun State	Osun State College of Technology	Polytechnic	Esa-Oke	State
81	Osun State	Osun State Polytechnic	Polytechnic	Iree	State
82	Osun State	The Polytechnic Ile-Ife	Polytechnic	Ile-Ife	Private
83	Oyo State	Federal College of Animal Health & Production Technology	Polytechnic	Ibadan	Federal
84	Oyo State	Federal College of Animal Health and Production Technology, Ibadan	Agricultural	Ibadan	Federal
85	Oyo State	Federal College of Forestry, Ibadan	Miscellaneous	Ibadan	Federal
86	Oyo State	The Polytechnic, Ibadan	Polytechnic	Ibadan	State
87	Oyo State	Tower Polytechnic, Ibadan	Polytechnic	Ibadan	Private
88	Plateau State	Federal College of Animal Health and Production Technology, Vom	Agricultural	Vom, Nigeria	Federal
89	Plateau State	Federal College of Education, Pankshin	Miscellaneous	Pankshin	Federal
90	Plateau State	Federal College of Forestry. Jos	Miscellaneous	Jos	Federal
91	Plateau State	Federal College of Land Resources Technology, Kuru	Miscellaneous	Jos	Federal
92	Plateau State	Plateau State College of Agriculture	Agricultural		State

93	Plateau State	Plateau State Polytechnic	Polytechnic		State
94	Rivers State	Rivers State College of Arts and Science	Polytechnic	Port Harcourt	State
95	Rivers State	Rivers State Polytechnic	Polytechnic	Bori	State
96	Taraba State	College of Agriculture, Jalingo	Agricultural	Jalingo	State
97	Yobe State	Federal Polytechnic, Damaturu	Polytechnic	Damaturu	Federal
98	Yobe State	Mai Idris Alooma Polytechnic	Polytechnic	Geidam	State
99	Zamfara State	Abdul Gusau Polytechnic	Polytechnic		State
100	Zamfara State	Federal Polytechnic, Namoda	Polytechnic	Kaura-Namoda	Federal

4.4 Analysis of Respondents Awareness of Capacity Development Strategies in Nigeria

According to question 7 of the questionnaire administered, the respondents were asked to provide information on their awareness of any capacity development strategies in Nigeria. Their responses are presented in figures 4.8 – 4.11.

From figure 4.8, it is seen that 65% of the total respondents are unaware of the existence of any capacity development strategy in Nigeria, 20% of the respondents declared that they are aware of capacity development strategies existing in Nigeria while 15% are neither aware nor unaware of any development strategies in Nigeria. It is important that capacity building strategy for the sector should be framed around three themes of: education and training, continued professional development and the creation of enabling environment for service delivery.

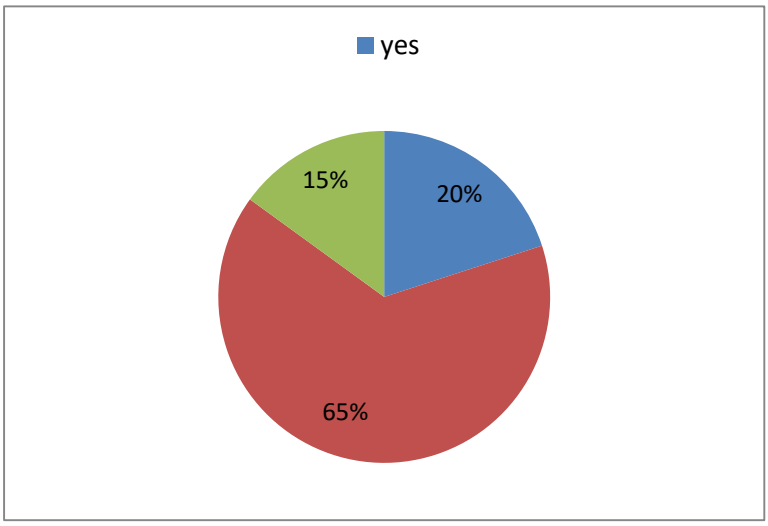

Figure 4.8: Awareness of any capacity Development Strategies in Nigeria

On the existence of a formalized Knowledge Management System (KMS), 72% of the total respondents declared that they are unaware of the existence of a formalized KMS, 15% are aware of the existence of KMS while 13% are neither aware nor unaware of the existence of KMS as depicted in figure 4.9 below.

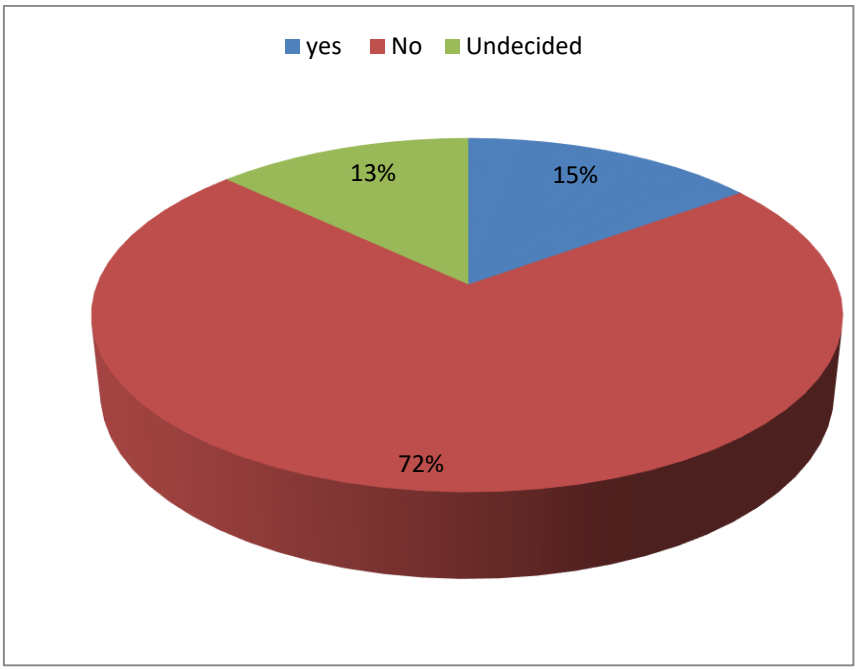

Figure 4.9: Existence of a formalized Knowledge Management System (KMS) at Respondents organizations

On the use of electronic and/or other platforms as KMS strategy, 80% of the total respondents declared that they have a formal knowledge on the use of electronic sources and/or other platforms as KMS strategy while 10% does not have any prior knowledge on the use such media/platform as KMS strategy. 10% were undecided in this regard as shown in figure 10 below.

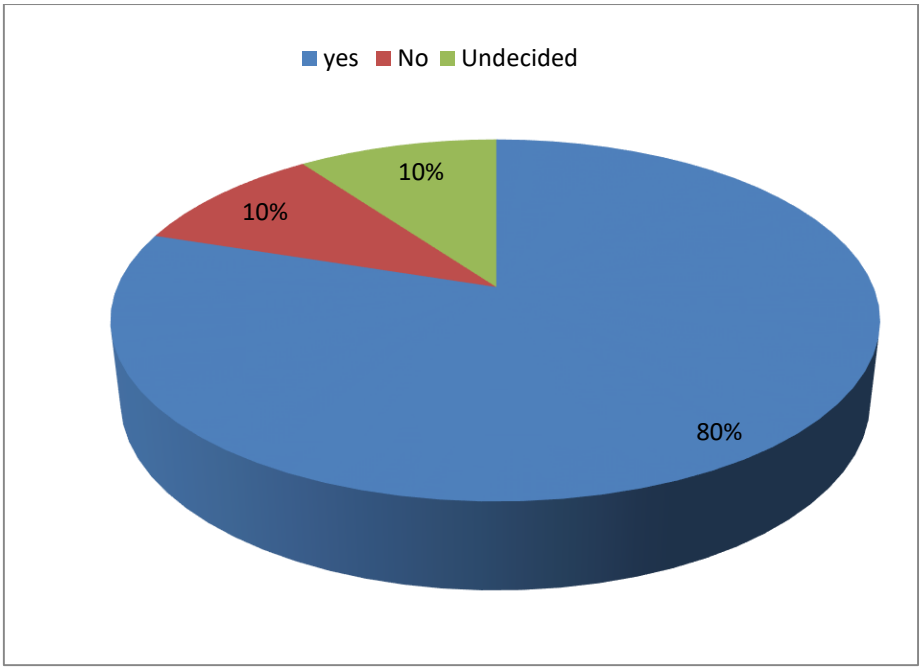

Figure 4.10: Usage of Electronic and/or other platforms (e.g workshops, conferences, publications etc.) as their KMS

An adequate capacity building strategy should consider the different domains (knowledge and information, skills and attitude) covered by the capacity building initiative.

On the need for a West Africa wide knowledge information system, 72% of the respondents agree that there is need for a West Africa wide knowledge information system. According to the respondents, it will not only enhance information update and promote research skills; it will also enable rapid development of the sub-region and in addition, for effective sharing of knowledge especially on water situation in the sub-region. 8% of the respondents however do not support this assertion while 20% of the respondents were undecided in this regard as shown in figure 4.11.

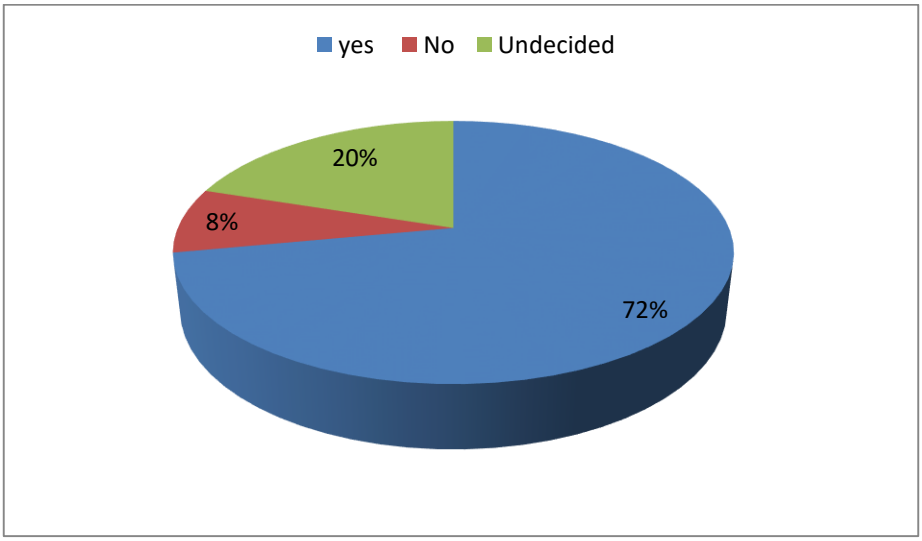

Figure 4.11: Need for a West African Wide Knowledge Information System

4.5 Analysis of Staff strength and Main Constraints of Respondent's Organizations

An assessment of the qualified numbers of staff working in the institution/organizations under review couple with the main constraints faced by the respondents in the various organizations was also done. The results are presented in figures 12 and 13.

The results reveal that only 15% of the respondents claimed that the staff strength is adequate, while 50% of the respondent asserted that the staff strength though not adequate but are acceptable, 35% responded that the staff strength is not enough and need to be improved upon. It is important to have the number of staff required (quantity) as well as ensuring that the staff are well trained to meet sector mandate. The study also showed that where staff may exist they may possess the wrong skills hence it is important that sector organisations develop job descriptions specifying skills and competency levels required for the job.

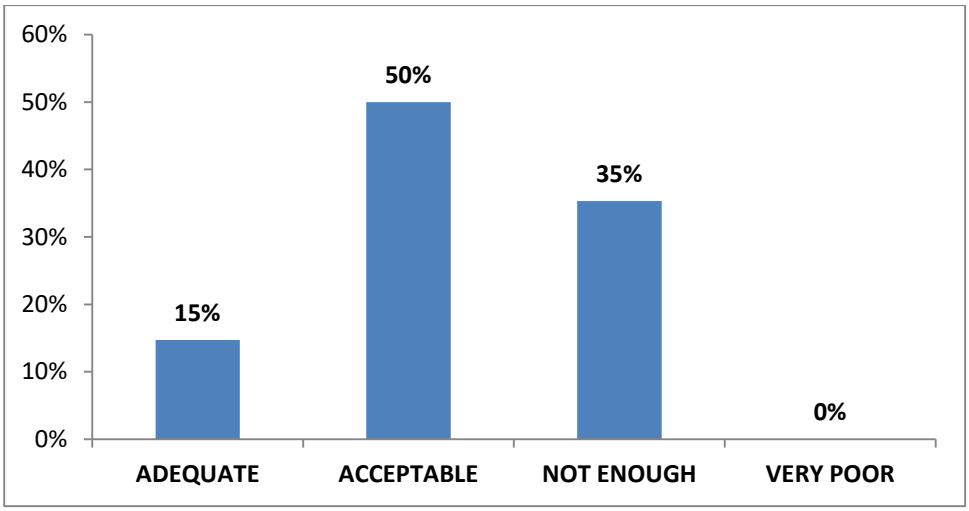

Figure 4.12: Respondents organizations Staff Strength

On the main constraints faced by the organization, 68% of the total respondents agrees that the main constraint faced by the organizations are mainly caused by inadequacy of resource materials, 68% says it is limited technical capacities while 29% of the total respondent listed other constraints to include poor funding, delay in approval and release of funds and political interference. This is presented in figure 4.13 below.

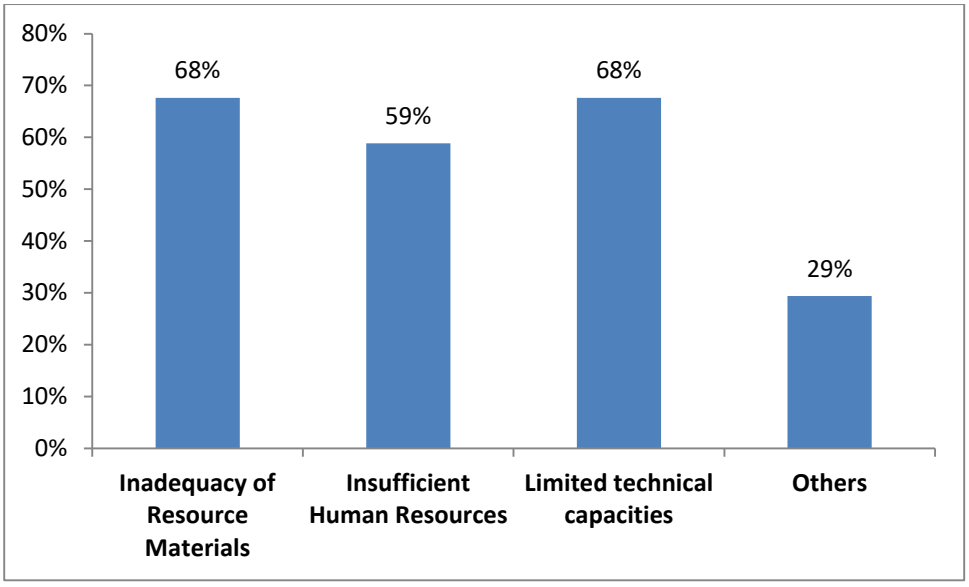

Figure 4.13: Respondents organizations main Constraints

Provision of adequate service in sector will require improved funding for human resources development in the sector which is currently characterised by low level of financing and priority. Increasing capacity in the sector will need guaranteed long term and sustainable funding, funding to accommodate additional recruitment of qualified manpower and strengthened budget and payroll management.

4.6 Analysis of Coverage of Water and Sanitation Themes by Training Institutions in Nigeria

The response of the respondents to the question asked relating to *if training institutions in Nigeria cover all Water and Sanitation Schemes* is presented in Figure 14.

From figure 14, it can be seen that majority of the respondents (82%) were of the view that training institutions in Nigeria do not cover all water and sanitation themes while only 18% of the total respondents says Nigeria's training institutions cover all water and sanitation themes. According to the 82% of the respondents which said that all water and sanitation themes are not been covered, areas to be covered include but not limited to: sanitation, climate change, water treatment, environmental law, waste treatment, public health and coastal engineering management.

The result suggests that training institutions in Nigeria needs to be properly equipped and empowered in order to be able to cover all water and sanitation themes in the country and in West Africa at large and be able to provide needed and adequate training to all types of organisations at all levels.

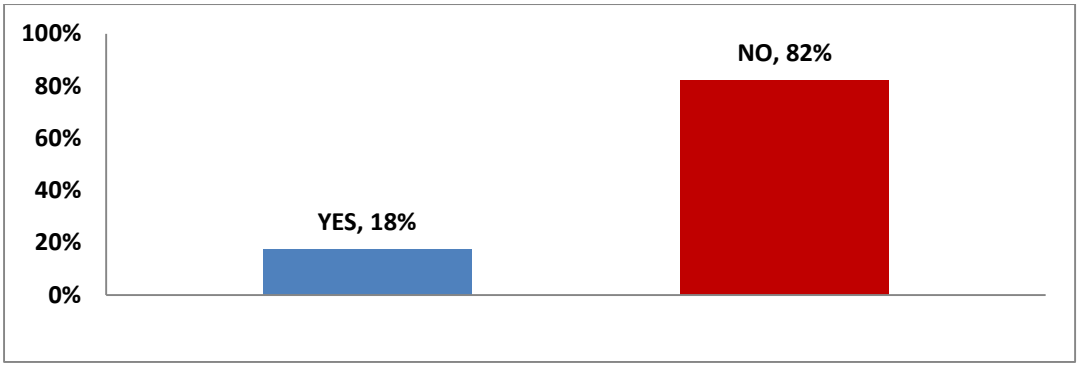

Figure 4.14: Coverage of Water and Sanitation Themes by Training Institutions in Nigeria

4. 7: Training Needs of the Water sector in Nigeria.

Based on the desk study, literature review and the analysis of the responses to the questionnaires and interviews conducted, the following areas of training as summarized in Table 11 were identified as being needed in the Nigerian water sector.

Table 11.a: Summary of Identified training needs in the Water sector- Junior Professional level

S/N	Area of Training Need
1	Water supply/ Environmental Engineering
2	Dam design ,construction and Operation
3	Borehole Drilling Technology
4	Borehole Maintenance and Rehabilitation
5	Design and Operation of Water treatment plants
6	Integrated Water Resources Management (IWRM)
7	Design and Operation of Water Distribution System
8	Water Quality Analysis/ Monitoring
9	Remote Sensing and Geographic Information System
10	Water Treatment techniques
11	Project Monitoring and Evaluation
12	Procurement and Contract Management
13	Finance and Accounting for Water sector
14	Billing and Collection
15	Rural and Urban sanitation technologies

Table 11.b: Summary of Identified training needs in the Water sector- Technician /Artisan level

S/N	Area of Training Need
1	Operation and maintenance of pumps
2	Operation and Maintenance of water distribution system s
3	Maintenance of Electromechanical Equipment
4	Borehole Drilling and Construction
5	Stream Gauging and Hydrometry
6	GIS training and ICT skills
7	Operation and Maintenance of Pipe networks and appurtenances
8	Hygiene and Sanitation Promotion

Table 12.a: Identified Priority training needs in the Water sector - Junior Professional level

S/N	Area of Training Need
1	Water supply/ Environmental Engineering
2	Remote Sensing and Geographic Information System
3	Water Treatment techniques

Table 12.b: Identified Priority training needs in the Water sector- Technician /Artisan level

S/N	Area of Training Need
1	Operation and maintenance of pumps
2	Operation and Maintenance of water distribution systems
3	Borehole Drilling and Construction

4.8: Review of Publications and Existing Reports

In carrying out this study the following and reports listed in Table 13 were reviewed.

1	Report on Presidential Summit on Water sector in Nigeria. Published by Federal Ministry of Water Resources. 2013	Information on contribution of water sector (including Water Resources Management and Sanitation) to national development.
2	Water supply and Sanitation Monitoring Report 1990 (Baseline year). Published by WHO, WSSCC and UNICEF. 1991	Water and Sanitation Monitoring System (WASAMS)- including monitoring mechanism
3	Emmanuel Akpabio, Water Supply and Sanitation Services Sector in Nigeria, Working paper series 96. Published by Center for Development Research, University of Bonn. July 2012	Policy trend and practice constraints in the Nigerian water supply and sanitation services sector.
4	Guide to Evaluating Capacity Development Results. Published by World Bank / World Bank Institute. 2012	Guidance notes for assessment of capacity development efforts.
5	Towards Effective Capacity Development. Published by UNESCO. 2013	Capacity Needs Assessment Methodology (CAPNAM) for Planning and Managing Education
6	UNDP Report of the Workshop on Goals and Indicators for Monitoring and Evaluation for Water Supply and Sanitation. Geneva Switzerland. 1990	Goals and Indicators for M& E for Water supply and Sanitation.
7	Mevyin Kay, Tom Franks and Sonia Tato, Capacity Needs Assessment Methodology and Processes. Published by FAO	Capacity needs assessment methods and processes.
8	Ibrahim Mohammed Mahmoud, Institutional Mapping to assess capacity needs for the development of Water Boards at District level in Egypt. Published by FAO	Institutional mapping for capacity needs assessment in the water sector of a developing country.
9	UNESCO International Institute for Capacity Building in Africa (IICBA) Strategic Plan 2005 -2010	Strategic plan for capacity building in Africa.
10	Capacity Building Framework, UNESCO- IICBA. Published by UN Economic Commission for Africa, Addis Ababa, Ethiopia. 2006	Philosophy and systematic approaches to capacity building.
11	Jacques Prescott, Challenges in connecting traditional capacity building models to new Agenda and knowledge. United Nations Office for Sustainable Development. March, 2013.	Expert presentation on Knowledge and capacity needs for sustainable development.
12	Annette Bos, Capacity Building in Water and Sanitation sector at times of the MDGs. UNESCO- IHE, January, 2006.	Lessons learned in capacity building in the water and sanitation and the possibilities and difficulties for application of the lessons.
13	Cavill, S. and Sayell, D., The capacity gap in the water and sanitation sector. 34th WEDC International Conference, with the theme; Water, Sanitation and Hygiene: Sustainable Development and Multi- sectoral approaches. Addis Ababa, Ethiopia. 2009.	Extent of capacity gap in the water and sanitation sector in sub Saharan Africa and issues and potential capacity building activities appropriate to address the challenges.
14	Monitoring and Evaluation Framework for Continuing Professional Development (CPD). 2012	A guide for the use of proposed M& E plan for Continuing Professional Development (CPD).

15	Nigeria Water Sector Road Map , Federal Government of Nigeria, 2011	Objectives of the Federal Government of Nigeria in the development of the nation's water resources in the actualization of the sector priorities over short term , medium term and long term.
16	WMO Capacity Development Strategy and Implementation Plan. World Meteorological Organization, 2015 WMO. Report No.1133	Capacity development strategy and implementation plan for providing weather, water and climate services which contribute to the safety and wellbeing of society.
17	Water, Sanitation and Hygiene, Country brief on Achieving the SDGs targets for water, sanitation and hygiene. Federal Ministry of Water Resources.	Overview of the vision and targets for the Water, Sanitation and Hygiene sector in Nigeria
18	Manpower and Training Committee Report on the Nigerian water sector prepared for the National Water Rehabilitation Project (NWRP). 1992	Status of the manpower and training situation in the Nigerian water sector.
19	Report of the Training Needs Assessment for River Basin Development Authorities (RBDAs) in Nigeria conducted by NWRI.	Assessment of training needs in the River Basin Development Authorities in Nigeria.
20	Nigeria Water Sector Road Map, Federal Government of Nigeria, Federal Ministry of Water Resources. 2015	Objectives of the Federal Government of Nigeria in the development of the nation's water resources in the actualization of the sector priorities over short term , medium term and long term

5 CONCLUSIONS/RECOMMENDATIONS

5.1 CONCLUSIONS

An overview of the overall analysis shows that there exists a serious shortage of skilled manpower in most water sector organisations in Nigeria, hence the need for an effective capacity building initiative and programmes that will help upgrade the level of knowledge and awareness in the Water sector. The need for a West Africa wide knowledge must also be encouraged and well-funded since it will help promote research and development especially in the area of capacity building.

On the distribution of skills among respondent's organisations, it was seen that

- The majority of the skills are in civil engineering and hydrology
- There exist very limited skills in the area of sector governance, cultural and social sciences, forestry, geochemistry, industrial ecology and environmental law.
- On the constraint faced by the organizations, human resources, technical capabilities and lack of resource materials were identified as most paramount constraint.

Training Needs Analysis of the Water sector in Nigeria

The analysis of the questionnaires and the results of various stakeholders' engagements, desk studies and literature review carried out indicate the need for human resources capacity building in water sector in Technical, Management and Finance and in Social development. The areas where training is required and the personnel that needs them are listed below

- Water supply Engineering.
- Agronomy – Botanist, Zoologist, Plant Biologists
- Conflict Resolution/Mediation
- Ecosystems – Environmental Engineering, Fishery, Marine Engineering, Safety Officers/Professionals, Ecosystem Managers, Environmental Impact Assessment (EIA) Specialists, Post Impact Assessment (PIA) Specialists
- Plant maintenance and Operation – Drillers, Artisans, Plant Operators and Technicians, Water Meter Specialists
- Communications – Information and Communication Technology (ICT), Information Scientists, System Analysts, Computer Operators
- Fresh Water System Specialists
- Marketing

- Cultural and Social Sciences – Liaison Officers, Public Administrators, Social Scientists, Water Orientation Agents
- Environmental Law
- Hydrochemistry
- Forestry – Forest Guards

Generally, Government of most developing nations including Nigeria will need to be proactive in building capacity for water and water related organizations. In addition, adequate funding is also needed to meet the following research needs in the region.

- Rain water harvesting
- Sanitation; especially in the provision of safe and adequate toilets to the rural people
- Effective water treatment/distribution
- Climate change in relation to flooding
- Design of cost effective infrastructure for the water sector
- Meeting the water demand and supply of the people in the region
- Alternative energy source especially in the areas of renewable energy
- Effective waste disposal and management techniques
- Air pollution management and control.
- Data collection, storage and management

5.2 RECOMMENDATIONS

It is recommended that:

1. Research driven capacity building should and must become a major focus in Nigeria in order to address the major constraints relating to the availability of skilled manpower and also bridge the gap created due to the limited number of skills in the Nigerian water sector
2. The need for public-private partnership especially in the provision of in-service training must be encouraged. More also adequate funding must be provided by the government at all levels.
3. There must be adequate networking between institutions in order to better share ideas and development strategies.
4. It is necessary for Government, Private Sectors, NGOs etc. to invest more in Research and Development in the water sector and sanitation.

5. The universities within the region should focus more on research that will add values to the living condition of the people of the region in the area of water and sanitation.
6. The West African Centres of excellence should work more closely together in order to foster the much needed integrated regional development

6 STRATEGIC AND IMPLEMENTATION PLAN FOR CAPACITY BUILDING THE WATER SECTOR IN NIGERIA

The capacity to provide services effectively and efficiently is critical for the long term sustainability of the water and sanitation sector in Nigeria. Major constraints to accelerated delivery of services are traceable to capacity problems at all levels of management and implementation.

The assessment of the skills gap and training needs in the sector indicated that there is serious shortage of skilled manpower in most water sector organizations in Nigeria. Hence, there is the urgent need to enhance the capacity of the sector institutions through human resources development and training. This will ensure the renewal of skills and expertise of sector staff and build a workforce that has the capacity needed to deliver services effectively and efficiently and such capacity development efforts should cover not only government agencies but should also include knowledge institutions, relevant private sector companies, NGOs, community based organisations and individual stakeholders that contributes and adds value to the sector's work.

Therefore, capacity development in the sector should be holistic and should cover the three dimensions of capacity building namely (Alaerts et al, 1996):

- Creating enabling environmental with appropriate policy and legal framework
- Institutional development including community participation
- Human resources development and strengthening of managerial systems

This effective capacity development in the sector should in addition to individual professional development and training be accompanied by institutional strengthening (improvement of the governance and management of the institution) and efforts made to offer opportunities and incentives to retain sector staff within the country. The overall goal being to have strong institutions staffed by skilled manpower with capacity to deliver effective and efficient service.

The human resources capacity building strategy for the sector should be based on the analysis of the intervening factors, set long term goals that should be achieved (or how performance should be achieved or improved), device a plan, determine the methods, activities, instruments and funds by which the capacity will be built and monitor and evaluate the results and impacts.

An effective human resources capacity development strategy should ensure in a holistic way that all actors at all levels (federal, state and LGAs) have adequate capacity to provide

efficient and effective service critical to the long term sustainability of the water and sanitation sector in Nigeria. The strategic framework developed should ensure that a range of relevant considerations are factored into the capacity building strategy and subsequently the capacity building implementation plan. Women being an important group should be targeted by capacity building programmes and in professional and managerial positions. Capacity development should consider existing capacities with emphasis on a more holistic approach and national ownership of the development process and should be informed by existing and planned capacities.

6.1 GUIDING PRINCIPLES FOR SUSTAINBLE CAPACITY BUILDING STRATEGY FOR THE WATER AND SANITATION SECTOR

The following principles guide sustainable capacity building strategy in the sector.

1. Allocation of adequate funds for capacity building efforts. Investments should be in both technical solutions and provision of adequate budget for capacity building.
2. Local ownership and local implementation of capacity development actions. Ownership, leadership and empowerment of local stakeholders are crucial issues in capacity building programmes and are thus considered in the design of strategies to develop the knowledge and local capacities in a sustainable manner.
3. Capacity building in the sector should be a continuous process and holistic due to the multi-disciplinary nature of the problems of the sector.
4. Capacity building should be based on coherent and coordinated approach, hence capacity building strategies should consider the different dimensions of human resources development, organisational and institutional development in an integrated manner.
5. Capacity building strategy in the sector should consider promotion of change attitudes and building of new capabilities.
6. Capacity building strategy should consider the development and introduction of appropriate system for information sharing and knowledge management in the sector.
7. Development and implementation of appropriate monitoring and evaluation frameworks and tools. The development of good monitoring and evaluation framework requires good and smart indicators for capacity building.

6.2 THE STRATEGY

The strategy for capacity development in the sector includes:

- Build up comprehensive personnel information system in institutional level in order to assess the available technical and managerial capacities and to plan and implement training programmes on a periodic basis.
- Develop succession plan for sector staff in accordance with the manpower requirements as established in national plans.
- Empower communities with skills and knowledge required for management of water resources schemes.
- Develop infrastructure training facilities for on the job training.
- Strengthen NWRI to provide coordination for manpower development in the lower and middle level cadres.
- Establishment of training network in various states under the coordination of NWRI

Table 6.1 presents the strategic and implementation plan for the human resources capacity development framework for the water and sanitation sector in Nigeria.

Table 6.1: Strategic and Implementation Plan for Human Resources Capacity Building Framework

No.	Implementation Plan	Activities	Expected Output	Assumptions	Time Frame	Responsible and Cost Implication
A	Carry out preliminary consultative meetings with relevant stakeholders/ actors in the sector including government institutions, civil society (NGOs), and the private sector and user communities.	(i)Organise consultations through regular sector working group, meetings, workshops, seminars and review meetings on human resources capacity building at state regional and national levels. Deliberate efforts being made to involve women alongside with men in the consultations. (ii)Advocacy communication and buy-in towards the human resources capacity building strategy for the sector.	(i) Reports on the consultative meetings with stakeholders (ii)Stakeholder' commitment to partner for the implementation of the human resources capacity building strategy	(i) Relevant stakeholders are sensitized and willing to partner with NEPAD CoE (ii) Allocated funds are released as and when required.	December, 2017 May,2018	

No.	Implementation Plan	Activities	Expected Output	Assumptions	Time Frame	Responsible and Cost Implication
B	Advocacy for incorporating human resources capacity building into state and National plans and adequate funding for human resources capacity	(i)Enhance closer cooperation between government ministries, departments and agencies incharge of water and sanitation sector and departments responsible for planning at the state and national levels (ii)Inclusion of funds for human resources capacity building along with project costs (iii)Enhance outreach to end users and decision makers (iv)Advocacy for sustainable financing to accommodate new recruitments of qualified and skilled staff to fill identified gaps in	(i)Higher priority for capacity building in the sector as reflected in state and national budgetary allocations. (ii) Increase in project funds for capacity building			

No.	Implementation Plan	Activities	Expected Output	Assumptions	Time Frame	Responsible and Cost Implication
		the sector. (v)Explore new funding opportunities for capacity building activities (vi)Develop leadership and management capacity				
C	Development of Succession Planning for Sector Staff	• Develop and maintain mentoring policy • Recruit Staff with right Skills • Organize exchange programme • Encourage on the Job and counterpart training arrangement • Offshore training through short courses		(i)Existence of high Skilled and efficient work force (ii)There is no political interference in the recruitment process (iii)Fund is allocated for new recruitments (iv)Adequate motivations and incentives to retain skilled staff is available	Continuous Process	All water sector organization

No.	Implementation Plan	Activities	Expected Output	Assumptions	Time Frame	Responsible and Cost Implication
D	Increased Education and Training opportunities for Sector Staff	i. Advocate for increased opportunities for education and training of sector staff at Junior professional, technical and vocational, Scientific and post graduate levels as identified in the training needs assessment. ii. Advocate for the use of capacity building networks to support continued professional development	Production of appropriately skilled manpower with competences relevant to service delivery in the water and sanitation sector	(i)HET and FET institutions exist with relevant and accredited courses with adequate curriculum design needed for service delivery and sustenance and the sector	Continuous	Universities, polytechnics, NWRT and other training Institutions
E	Optimize knowledge management in the sector	Networking: Encourage establishment of	(i)Participation of stakeholders in social learning	(i)Communication support is available		

No.	Implementation Plan	Activities	Expected Output	Assumptions	Time Frame	Responsible and Cost Implication
		(electronic) network groups, visits, secondments, de-conferencing, newsletters and regional workshops	networks			
F	Development and Implementation of Human Capacity Development Strategy	Organise workshop for the review and validation of the draft strategy for man resource capacity development				
G	Build up comprehensive personnel Information system at Institutional level	(i)Update periodically, skills gap assessment and training needs for implementation of training programme				
H	Establish Monitoring and Evaluation Framework for Human Resource Capacity Building in the sector	Develop procedure and indicators for the effective monitoring and evaluating the performance of the trained staff				UNIBON CoE

REFERENCES

Alaerts G.J. (1996), Capacity building as knowledge management purpose definition and instruments, in: Water sector capacity concepts and instruments, Proceedings of the second UNDP symposium on water sector capacity building, Alaerts, G.J., Hartvelt, F.J.A., Partoni, F.M(Eds), A.A. Balkema, Rotterdam.

Akpabio, E.M. (2012), Water supply and Sanitation Services Sector in Nigeria: The policy trend and Practice constraints. ZEF working paper series 6, Universitat Bonn, Bonn.

Beyer W (2002), Developing a capacity building strategy for forest certification through RAAKS methodology, STOAS International, EC-BMZ-DFID.

Bos, A (2006), Capacity Building in the Water and Sanitation Sector at times of the MDGs. Discussion paper prepared for the Round Table Meeting organized by WaterLinks and PSO, January 2006

Cavill S and Saywell D (2009), The capacity gap in the water and sanitation sector, Proceedings of the 34th WEDC International Conference, Addis Ababa, Ethiopia

Ehiorobo J.O, Izinyon O.C and Ilaboya I.R, (2012), "Effects of Climate Change on River Flow Regimes in the Mangrove and Tropical Rainforest Region of West Africa", Paper presented at a Workshop on Exchange of Experiences in Water Resources Management Between Europe/China/Africa/Latin America, Joint Research Centre- Ispra, Italy.

Ehiorobo J.O, Izinyon O.C and Ilaboya I.R, (2012), "Balancing water demand and water supply within the Niger Delta Region of Nigeria; Problems, progress and prospects", Paper presented at a Workshop on Exchange of Experiences in Water Resources Management Between Europe/China/Africa/Latin America, Joint Research Centre- Ispra, Italy, 2012.

Federal Ministry of Water Resources (FMWR) (2011), Road Map for Nigeria Water Sector. Federal Government of Nigeria.

International Water Association (IWA) (2013), Mapping human resources capacity gaps in the water supply and sanitation sector, Country briefing note (Tanzania)

Pinford J (2010), Uganda: Assessing Performance of the Water and Sanitation Sector, MIDR Principles in Action: Sourcebook on Emerging Good Practices

UNESCO (2013), Towards Effective Capacity Development: Capacity Needs Assessment Methodology (CAPNAM) for planning and Managing Education. Published by UNESCO, Paris, France

UNICEF (2015), Sanitation, Hygiene and Water in Nigeria project (SHAWN, II)- March 2014 – February 2015: UNICEF Annual report for UK-DFID Grant SC140236.

World Bank, 21012, Guide to Evaluating Capacity Development Results: A collection of guidance notes to help development practitioners and evaluators assess capacity development efforts.

Federal Republic of Nigeria, (2000), "Water Supply and Sanitation Interim Note"

Nigeria Universities Commission (NUC), (2008), "List of Approved Nigerian Universities"

Nigeria Hydrological Services Agency (NIHSA), (2012), "Overview of Hydrological Activities in Nigeria.

USAID, (2008), "Nigeria Water and Sanitation Profile"

Water Aid, (2008), "Urban Issues in Nigeria Water and Sanitation Sec

APPENDIX

APPENDIX 1: Sample of Questionnaire used in the study

APPENDIX

APPENDIX 1: Sample of Questionnaire used in the study

University of Benin

West African Water Centres of Excellence

University of Benin Centre of Excellence in Water Science and Technology (CEWST) Benin City, NIGERIA

APPENDIX I
The Questionnaire

UNIVERSITY OF BENIN, BENIN CITY, NIGERIA
NEPAD CENTRE OF EXCELLENCE IN WATER SCIENCES AND TECHNOLOGY

Questionnaire on Skills Gap and Human capacity development in Water sector.

Background of the Survey.

The University of Benin, Benin City Centre of Excellence in Water Sciences and Technology is a member of the NEPAD West African Network of Centres of Excellence in Water Sciences and Technology. In the framework of the second phase of NEPAD Centres of Excellence project, it is intended to place emphasis on capacity building of the water sector. Key mandates include the development of National capacity building strategies for Young professionals and technicians of the water sector, the establishment of a bright academic training and strengthening of the technical capacity of water and sanitation services. The University of Benin Centre of Excellence in

Water Sciences and Technology shall be highly delighted and grateful if you kindly fill this questionnaire to elicit responses to identify skills and capacity gaps and related issues in the Nigerian water sector in particular and West African sub region in general.

1. Identification of the institution

- Country:
- Name of the institution:
- Address:
- Creation date:
- Head of the institution
- Phone contact: • E-mail: • Website:

2. What type of organization are you?

- ☐ Tertiary Education
- ☐ Research
- ☐ Water Utility
- ☐ Consulting
- ☐ Private Sector - Agriculture
- ☐ Private Sector – Energy
- ☐ Private Sector – Manufacturing
- ☐ Private Sector - Mining
- ☐ Local Government
- ☐ Regional Government
- ☐ National Government
- ☐ Non-Governmental Organization [NGO]
- ☐ Civil Society Organization [CSO]
- ☐ River Basin Organization
- ☐ Other, please specify

3. What are all your activities of your organization?

- ☐ Policy making
- ☐ Planning
- ☐ Teaching and training
- ☐ Water resource management
- ☐ Water service provision
- ☐ Finance
- ☐ Communications
- ☐ Research
- ☐ Operations and Utilities management
- ☐ Networking
- ☐ Other, please specify

4. What is your main/primary activity?

Select only one.

- ○ Policy making
- ○ Planning
- ○ Teaching and training
- ○ Water resource management
- ○ Water service provision
- ○ Finance
- ○ Communications
- ○ Research
- ○ Operations and Utilities management
- ○ Networking

5. Specify the main existing skills in your organization?

	SKILLS THAT EXIST IN IN YOUR ORGANIZATION
Agriculture/Agricultural Engineering	☐

Artisans and technicians e.g. boiler makers, welders, plumbers, drillers	☐
Agronomy	☐
Chemical Engineering	☐
Civil Engineering	☐
Climatology	☐
Coastal engineering	☐
Communications	☐
Conflict Resolution/Mediation	☐
Construction Project Managers	☐
Cultural and Social science	☐
Data Management	☐
Ecosystems and their management	☐
Environmental Health	☐
Environmental law	☐
Environmental	☐
Financial Management	☐
Forestry	☐
Freshwater systems	☐
Geographic Information Systems	☐
Geochemistry	☐
Geography	☐
Geology / Geophysics	☐
Groundwater	☐
Human Resources	☐
Hydrochemistry	☐
Hydrology	☐
Industrial Ecology	☐
Information Management Systems	☐
Institutional Management	☐
Marketing and communications	☐
Occupational health and safety skills	☐
Policy	☐
Planning	☐

Plant maintenance & operation	☐
Rainwater Harvesting technologies	☐
Research and Development	☐
Sanitation	☐
Sector Governance	☐
Project Management	☐
Water conservation	☐
Waste disposal	☐
Waste handling (including hazardous)	☐
Water treatment	☐

6a. YOUR CURRENT ORGANISATIONAL APPROACH TO SKILLSDEVELOPMENT:

Please select forms of skills development activities or interventions at your organization - and further select what interventions are needed in the WEST AFRICAN (WA) region.

	Interventions at your organisation	Interventions needed in West Africa
FET (Further Educational Training)	☐	☐
HET (Higher Educational Training)	☐	☐
In service training	☐	☐
Bursary support	☐	☐
Internships	☐	☐
Mentorship	☐	☐
Recognition of Prior Learning (RPL)Short courses	☐	☐
Capacity building strategy and financing	☐	☐
Other-Please specify below	☐	☐

If selected 'other', please specify here.

6b. Which institutions are conducting the training mentioned above?

☐ Further Educational Training (FET) institution

☐ Higher Educational Training (HET) institution

☐ Accredited Service Provider

☐ Other, please specify

7. **Are you aware of any capacity development strategies or skills audits that have been carried out in your country or in the West African region?**
   Please specify.

   – Do you have a formalized Knowledge Management System (KMS)? If so, what does it entail?

***Answer*:**

   – Do you have a specific group of stakeholders that use the KMS? If so, who are they?

***Answer*:**

   – Do you use a specific electronic and/or other platform(s) (e.g. workshops, conferences?

publications etc.) as your knowledge management strategy?
***Answer*:**

   – Is there a need for a West African Wide Knowledge information system? Why do you say that?

***Answer*:**

8. **a) COULD YOU SPECIFY THE NUMBER OF MEN AND FEMALE STAFF WORKING IN YOUR INSTITUTION:**

• Men _____ • Female _____

8.b. HOW DO YOU QUALIFY THE NUMBER OF THE STAFF WORKING IN YOUR INSTITUTION FOR THE TASKS LOAD ASSIGNED?

- Adequate ☐
- Acceptable ☐
- Not enough ☐
- Very poor ☐

8.c. LIST THE NUMBER OF VACANCIES IN VARIOUS DEPARTMMETS OF YOUR ORGANISATION

S/N	DEPARTMENT/UNIT	VACANT POSITIONS	NUMBER OF VACANCIES
1			

2			
3			
4			
5			

9. **WHAT ARE THE MAIN CONSTRAINTS YOUR INSTITUTION IS FACING WHEN ACCOMPLISHINNG ITS MISSIONS?**

- Inadequacy of resources materials ☐
- Insufficient human resources ☐
- Limited technical capacities ☐
- Other, specify

10. Do training institutions programmes in your country cover all water and sanitation themes?

- Yes ☐
- No ☐

If "No" could you specify areas to be covered by training institutions in your country.

11. **Does your institution have an appropriate budget allocated to training and reinforcement capacity activities?**

- Yes ☐

- No ☐

THANK YOU FOR YOUR CONTRIBUTION