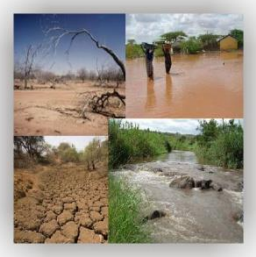
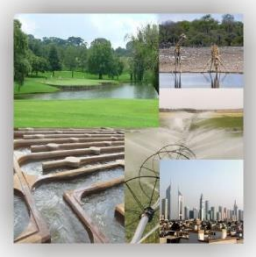
WRNA

W R Nyabeze and Associates

Research Development and Consulting





COMPANY PROFILE

Reg No : 2006/192211/23

Vat No : 4440232603

Head Office:
Block 9, Fourways Office Park
1st Floor
Crn Roos Street & Fourways Boulevard
Fourways, Johannesburg
P.O. Box 863, Witkoppen, 2068
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23 Craig Allen Road, New Ardbennie
Southerton, Harare,
P. O. Box 66727, Kopje

Date: April 2015

The founding principles of W R Nyabeze and Associates (WRNA) are to deliver complete solutions for resource planning, operation and management to clients in Southern Africa through deployment of a high level of technical, financial and management skills.

Focus

The focus of WRNA is in the following areas:

- Water Management
- Water Supply, Water Treatment and Waste Water Engineering
- Information Systems and Database Development
- Mining, Energy and Industry Water Use

WRNA has been involved in water resources studies, design, training, construction, construction management, procurement support, systems integration, systems development, testing and support for various projects in Southern Africa.

Values

- Efficiency, Accountability and Professional Conduct

Institutional Affiliations:

- Member – Consulting Engineers South Africa (CESA)
- Member – South African National Committee on Large Dams (SANCOLD)
- Member – South Africa Black Technical and Allied Careers Organisation (SABTACO)
- Member – Water Institute of South Africa (WISA)
- Member – Institute of Municipal Engineering of Southern Africa (IMESA)

Office

The head office of WRNA is located in the Gauteng Province, the industrial hub of South Africa, which locates it close to world class financial services and advanced communication systems. WRNA has a sub-office in Harare, Zimbabwe.

Auditors

Muza and Associates

Directorate

Washington R Nyabeze – Director

BSc (Hons) Eng, GDE (Wits), MSc (Eng) Wits, PhD (Wits), Pr Eng

Washington has 20 years of practical experience in energy, water resources, infrastructure development and project management. He started his career in 1988 with ZERO as a data manager after graduating with a BSc degree in engineering from the University of Zimbabwe. He then joined Sir William Halcrow and Partners as an Assistant Engineer responsible to the Managing Partner where he was involved in planning of small and medium sized irrigation schemes and dams. In 1992 he joined the Intermediate Technology Development Group (ITDG). The same year he obtained a certificate in hydro power engineering and management from SKAT in Switzerland. While with ITDG, Washington undertook several missions to Angola, Kenya, Malawi, Mozambique, Nepal, the Philippines, Sri Lanka, Swaziland and Tanzania on hydropower development. In 1998 Washington joined WEDS Development Services and was involved in water resources planning, hydropower and environmental management as well as strategic planning and management for the company. In 1999 he obtained an MSc degree in engineering from the University of the Witwatersrand and in 2004 he obtained a Doctor of Philosophy degree in engineering from the same university. During his PhD research he worked for Furumele Consultancy in Johannesburg. In 2004 he was one of the founding members Makgaleng Projects and in 2006 he founded W R Nyabeze and Associates. In South Africa he has been involved in assignments for various clients including the Department of Water Affairs (DWA) and the Department of Minerals and Energy. Recent assignments for DWA include strategic planning and annual operating analysis for water resource systems. Next to his consultancy work, Washington is active as an editor of international journals, lectures and he is an external examiner for different universities in Southern Africa. From 2006 to 2013 he served on the board of the Johannesburg Roads Agency a state owned corporation (SOC). Since 2012 he has been serving on the board of PikitUp SOC. He also served as a member of the National Water Advisory Committee from 2011 to 2013 inclusive.

Noxolo Hlongwane - Administrator

Noxolo Hlongwane holds an Advanced Project Management Certificate from Boston College and has 5 years of experience providing administrative support on various projects during which she has taken on roles as Administrator, Admin Assistant, Personal Assistant, Secretary.

Financial Management

WRNA employs a qualified accountant on a part-time basis with over 10years experience in the bookkeeping, financial management and auditing fields. She holds a Bachelor of Accounting Science degree from the University of South Africa. She has vast experience in setting up the organizations internal controls, budgeting as well as monitoring the organization's financial performance through

financial and business reports. She has worked in a number of business industries including Manufacturing, Service Provision and NGOs responsible for the full financial management of the organizations.

Other Support Staff

The directorate is assisted by a full-time receptionist, driver and office orderly.

Technical Staff

Apart from the directorate, WRNA has eight technical staff. Their resumes are as follows:

Paulo Kagoda – Manager: Research Business Unit BSc (Agric. Eng.), MSc (Eng) Wits. PhD (Wits)

Paulo has acquired 10 years' experience since completing his BSc Agricultural Engineering degree at Makerere University. He started his career in 2002 as an Engineering Management Trainee (EMT) with James Finlay (U) Ltd where he was until he enrolled on the MSc (Eng) program at the School of Civil & Environmental Engineering, University of the Witwatersrand in 2005 before proceeding to enroll for a PhD at the same University. He has since been involved in several research and consultancy projects in the area of water resources planning and management such as the evaluation and monitoring of bulk water systems, advances in catchment hydrological analysis and assessment of non-conventional water resources. Following a brief engagement in 2011 as a sub-contractor, Paulo formally joined WRNA in March 2012 and is spearheading WRNA's research activities.

Osborne Nyabeze –Software Developer BTECH Information Technology

Osborne Nyabeze has 8 years of practical experience in software development,software support, computer (ICDL) training, hardware monitoring and maintenance and has practical experience of developing in C#,PHP, JavaScript,Visual Basic,HTML. He has worked with MS SQL,Oracle and MS Access databases. He has experience in both desktop and web application development. He started his career in 2004 January as a computer (ICDL) teacher after completing his first year of National Diploma in Information Technology from Mutare Polytechnic, Zimbabwe, at the Computer Department of Prince Edward School. He has a H.N.D. in IT from Mutare Polytechnic which he obtained in 2005. On completion he joined the computer department at Prince Edward School from January 2006 where he worked as a trainer for ICDL. From 2004 to 2012 he was employed full time with WRNA. Since then he has provided support to WRNA on software and database development, web page development and maintenance on a part-time basis.

Livelethu Dlamini – Engineer (Research Associate)

Dip (SCOT), Dip (Damelin), BSc (Hons Eng) (UKZN), MSc (Eng) (Wits)

Livelethu started his career as a technician at Municipal Council of Manzini in 1999 after completing his diploma as Swaziland College of Technology. He then enrolled with Damelin for a diploma in Project

Management. Whilst at Municipal Council of Manzini he was involved in infrastructure maintenance for the city of Manzini. In 2004 he joined Steffanutti and Bressani contractors as an assistant site engineer after graduating with a BSc degree in engineering from the University of KwaZulu Natal. He was involved in construction of roads in Swaziland and South Africa. In 2006 he joined Municipal Council of Mbabane as a city engineer where he was involved in development and maintenance of carefully coordinated municipal infrastructure. In 2009 he joined Bicon Consulting Engineers where he was involved in various projects which involved roads, airport, water and sewer reticulation and bulk water supply infrastructure design and supervision. In 2011 he joined WRNA as a Research Associate whilst pursuing his MSc with University of Witwatersrand funded by WRNA on a project called DEWFORA project. He graduated in 2014 with a first class degree.

Associated Staff

Michael Tumbare – Civil Engineer/Dam Engineer/ Water Resources Engineer

BSc (Hons) Civil Engineering, MBA, PhD

Dr Tumbare has more than 30 years practical experience in energy and water resources infrastructure development and construction management. He worked for the Ministry of Energy and Water Resources Development in Zimbabwe from 1978 to 1989 during which he assumed various roles including data management, hydrological analysis, flood risk assessment, dam design and as a resident engineer on major dam construction projects. From 1989 to 1993 he worked as a Partner and Technical Director for Kuchi Construction (Pvt) Limited during which he was involved in project acquisition, marketing, contract management, and client liaison. Thereafter he joined the Zambezi River Authority (jointly owned by Zimbabwe and Zambia) as Chief Executive Officer and he was tasked with the operational analysis and management of the dams on the Zambezi River for hydropower production, flood management, and environmental protection among other objectives.

Rudo Sanyanga – Environmentalist/Limnologist

BSc, MSc, PhD

Dr Sanyanga has more than 20 years work experience in water resources management focusing on freshwater ecology. She holds a BSc degree in Biological Sciences and Biochemistry, an MSc in Applied Hydrobiology, and a PhD in Systems Ecology. She has undertaken various assignments on environmental impacts of water impoundments (dams), land use patterns, climate change, and mining on the various river basins including the Okavango, Limpopo, Zambezi, and Save.

Nosintu Manqoyi - Business Analyst

BSc (Computer Science), University of Transkei

Nosintu has 15 years working experience in system design, development, testing, maintenance, testing, business and system analysis in the IT industry. Nosintu joined WRNA in March 2006 as a business analyst for Water Resources Systems. She obtained a BSc (Computer Science) in 1996 from the University of Transkei. She joined Telkom as a consultant and was involved in programming for teletraffic engineering division. In 1997 she worked at CSIR Building and Construction Division as a programmer and she joined Dimension Data as a Software Developer in 1999. She worked on Telecommunications fault management, billing and system integration projects. She joined Siemens in May 2005 as a System Engineer involved in system support and maintenance of a voucher management system for prepaid subscribers.

Paiva Doge Alexandre Munguambe - Agricultural Engineer

BSc (Agric.) and MSc Natural Resources Management

Paiva is a lecturer at the University of Eduardo Mondlane in Mozambique and has 10 years of experience in water related research projects such as the evaluation of the irrigation water use efficiency; farming systems research in a community based natural resources management; assessing the impact of the 2000 floods in the Limpopo River Basin (characterization of floods, soil salinity and erosion in Chókwè Irrigation Scheme); development profile for the Chóchwè district based on crop, soil and water integrated

approach; field surveying for designing new irrigation schemes in Sofala Province; predicting the future water needs for the Pungwe River Basin based on IWRM principles; Drought sensitivity of irrigated wheat cultivars and its water use efficiency in South Africa (University of Pretoria); Soil and water management in land wetlands in the Limpopo River Basin under the umbrella of the Challenge Programs. Currently Paiva is doing his PhD deals with managing water and nutrients under different salinity conditions in Limpopo River Basin.

Mario Neves Goncalo Chilundo – Environmental Scientist BSc (Agric.), MSc, Environmental Science
Mario has 5 years of practical experience gained in research and consultancy in the broad area of water resources management. He is a lecturer in the Department of Rural Engineering at the University of Eduardo Mondlane in Mozambique. His areas of expertise include water management, water quality monitoring and management, environmental studies, irrigation and drainage design.

John Ndiritu - **Engineer** BSc (Hons) Civil Eng, University of Nairobi, 1987; MSc (Eng) Water Resources Engineering, University of Nairobi, 1993; PhD (Eng) Water Resources Engineering, University of Adelaide, 1998
John Ndiritu has been working on water related projects and research for 17 years and his experience includes water distribution, flood hydrology, hydrological modelling and water resources systems planning and analysis. His MSc was on comparison of storage yield analysis methods and his PhD was on the application of genetic algorithms for automatic calibration of hydrological models. Since then he has mainly been researching on the optimisation of reservoir system design and operation with a special focus on the incorporation of uncertainties. He has also been researching on the application of nonparametric methods of synthetic stream flow generation. Another area of interest has been the implications of climate change on water resources management.

Rachel Makungo – Hydrologist and Water Resources Specialist - Bachelor of Earth Sciences in Hydrology and Water, Resources (Equivalent to Honours), Masters of Earth Sciences (Hydrology)
Rachel Makungo has acquired 8 years experience since completing her Bachelor of Earth at the University of Venda. She started her career in June 2005 as a Student Tutor at the University of Venda. She then moved on to be a Part-time Lecturer at the University of Venda from October 2005 to July 2006. She progressed to become a Lab Technician from October 2006 to October 2010. She is currently a Lecturer at the University of Venda specialising in Earth Sciences in Hydrology and Water Resources. She is currently doing PhD in Environmental Sciences (Hydrology) where she is conducting studies towards a PhD degree in hydrology.

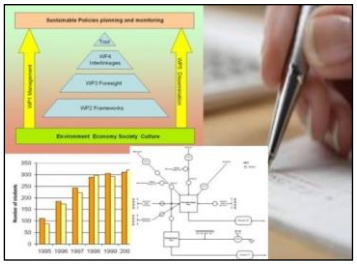
Water Management

Climate Change Impact Assessments and Disaster Mitigation

- Spatial and temporal assessment of climate variability
- Climate change and its impact on the water situation
- Flood and drought risk assessment studies
- Impact and management studies
- Storm water management
- Early warning systems

Operating Rules and Management Strategies

- Predefined operational and management objectives
- Resource protection
- Equitable access
- Environmental requirements
- Conjunctive resource use
- Infrastructure maintenance
- Water quality management
- Reduction of operational costs
- Demand scheduling
- Maximising yield availability



Monitoring Systems and Compliance Audits

- Design and evaluation of monitoring systems for water levels, flow, pressure
- Design and implementation of real time monitoring systems
- Compliance assessments

Feasibility Assessments, System Analysis and Optimization

- Project development, investigations and feasibility studies
- Analysis of existing projects/systems
- Intervention scheduling
- Options analysis and optimization

Water Supply, Water Treatment and Waste Water Engineering

Design of Water Supply Schemes and Bulk Pipelines

- Hydraulic design and optimisation of bulk water supply and distribution schemes
  - ♦ Intake works
  - ♦ Pump design
  - ♦ Bulk water pipeline design
  - ♦ Design of distribution networks
- Construction management

Design of Reservoirs

- Design of dams and bulk system storage structures
- Dam safety and reservoir inspections
- Construction management

Water Treatment Plant Design

- Design and assessment of drinking water treatment plants:
  - ♦ Process and hydraulic design of individual units and the treatment train
  - ♦ Operational optimization
  - ♦ Compliance auditing
- Construction management

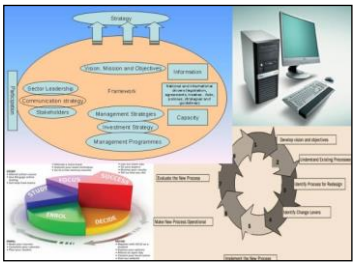
Waste Water Engineering

- Design and assessment of domestic and industrial waste water treatment plants
  - ♦ Process and hydraulic design of individual unit processes and the treatment train
  - ♦ Operational optimization
  - ♦ Compliance auditing
  - ♦ Sludge management
  - ♦ Energy recovery
- Construction management

Information Systems and Database Development

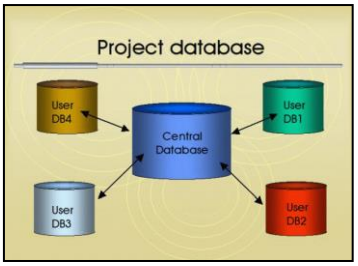
Real Time Water Accounting and Auditing

- Monitoring current water resource situation
- Assessment of water availability and demand
- Real time monitoring with telemetry
- Application of HDAM graphs on real time and for forecasting



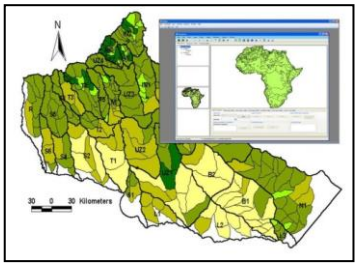
Database Development and Management

- Design of databases for data storage and retrieval of data
- Design and implementation of customised user friendly interfaces with multiple user access and change management features
- Database integration to allow sharing of information



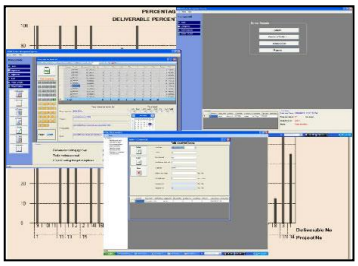
Resource Assessment Allocation and Monitoring

- Assessment of long term water resource availability, and demand
- Assessments for licensing and risk of supply failure
- Determination of management interventions



Project and Asset Management

- Tracking of resources (budget, time, people) and deliverables using the WRNA PMS (Project Management Software). The project manager can improve quality of outputs and interact within team members via the internet.
- Asset tracking using the WRNA Inventory Manager



Energy and Industry Water Use

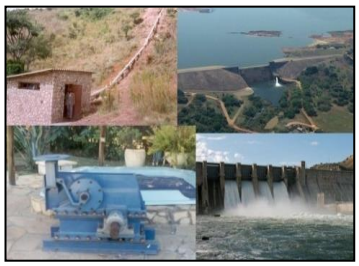
Water Cycle Management in Industry

- Water use evaluations
- Water re-use assessments
- Discharge monitoring
- Cleaner production
- Compliance audits
- Compilation and review of business strategies for water management
- Water resource and water use plans

Water Cycle Management in the Mining Sector

- Assessment of requirements
- Monitoring and compliance audits
- Design of water supply schemes
- Design of pump stations and water networks

Hydro Power Design and Management



- Design of micro and mini hydro power plants as stand alone or grid connected systems
- Rehabilitation assessment
- Operational management of power plants

Irrigation Design and Rehabilitation Assessments

- Design of irrigation systems (sprinkler, drip and flood technologies)
- Assessment of existing irrigation schemes to improve water use efficiently
- Salinity management

Project Experience 1

Assignment name: Analysis of water and its management in Cities	**Country:** South Africa
Country: South Africa Location within country: Gauteng Province	**Duration of assignment (months):** March 2014 – to date
Name of client: South African Cities Network (SACN)	**Approximate value of Services:** R 512,766.93
Address: **Client Contact Person:** Ms G Maree **T:**+27 (11) 407 6624 **C:** **E:** gillian@sacities.net **Client Address:** Joburg Metro Building 158 Loveday Street Johannesburg Republic of South Africa	
Start date (month/year): 03/2014 **Completion date (month/year):** On going	**No. of professional staff-months provided by associated consultants:** 0
Name of associated consultants, if any:	**Name of senior professional staff of your firm involved and functions performed:** 1. Water Resources Expert – WR Nyabeze 2. Water Resources Engineer – P Kagoda 3. Research Assistant/ Intern – M Moloi 4. Administrator – N Hlongwane
Narrative description of project: Project to undertake an analysis of the status of water resources, the adequacy of existing water infrastructure and human resources as well the adequacy of the existing resource monitoring systems in the SACN member cities so as to facilitate the determination of infrastructural and human capacity needs and allow for implementation of adequate resource monitoring protocols. The project would help SACN to assist these cities align themselves closely with the national imperatives of good water management to achieve food and energy security, ecosystems conservation and reduction of risks from water scarcity (climate change).	
Description of actual services provided by your staff within the assignment: 1. Situational assessment 2. Data collection and analysis 3. Assessment of status of existing water resources, water resources infrastructure and management 4. Development and implementation of framework for analysis of water resources management challenges and recommendations	

Project Experience 2

Assignment name: Development Of Drought)Operating Rules For Stand - Alone Dams/Schemes Typical For Rural/Small Municipal Water Supplies - Northern Cluster	**Country:** South Africa
Country: South Africa Location within country: Limpopo Province	**Duration of assignment (months):** 36
Name of client: Department of Water Affairs	**Approximate value of Services:** R2,211,369.45
Address: **Client Contact Person:** Mrs. L. Bapela **T:**+27 (12) 336 8324 **C:** +27 (82) 902 8161 **E:** BapelaL@dwa.gov.za **F:** **Client Address:** Department of Water Affairs Directorate: Systems Operations 185 Schoeman Street, Pretoria, South Africa	
Start date (month/year): 05/2010 **Completion date (month/year):** 04/2013	**No. of professional staff-months provided by associated consultants:** 0
Name of associated consultants, if any:	**Name of senior professional staff of your firm involved and functions performed:** 5. Water Resources Expert – WR Nyabeze 6. Water Resources Engineer – M Kubare 7. Groundwater Specialist – K Sami 8. Water Resources Expert – J Ndiritu 9. IT Specialist – M Manqoyi 10. Hydrologist – L Netshamavu 11. IT Specialist – O Nyabeze 12. Administration – S Ncube
Narrative description of project: The project entails the development of annual operating rules for standalone dams in the Northern part of South Africa for water allocations and drought management.	
Description of actual services provided by your staff within the assignment: 5. Situational assessment 6. Data collection and processing 7. Water availability assessment 8. Decision support system formulation 9. Reservoir operating analysis 10. Training and awareness workshop for operators 11. Implementation and support of stakeholder forum 12. Project management and coordination	

Project Experience 3

Assignment name: Updating the Polokwane Water Supply System Model 2010/2011	**Country:** South Africa
Country: South Africa Location within country: Limpopo Province	**Duration of assignment (months):** 12
Name of client: Department of Water Affairs	**Total no. of staff-months of the assignment:** 5
Address: **Client Contact Person:** Mrs. L. Bapela **T:**+27 (12) 336 8324 **C:** +27 (82) 902 8161 **E:** BapelaL@dwa.gov.za **F:** **Client Address:** Department of Water Affairs Directorate: Systems Operations 185 Schoeman Street, Pretoria, South Africa	**Approx. value of the services provided by your firm under the** **contract** R446,299.00
Start date (month/year): 12/2010 **Completion date (month/year):** 11/2011	**No. of professional staff-months provided by associated consultants:** 0
Name of associated consultants, if any:	**Name of senior professional staff of your firm involved and functions performed:** 1. Water Resources Expert – WR Nyabeze 2. Water Resources Engineer – M Kubare 3. Water Resources Engineer – F Henry 4. Groundwater Specialist – K Sami 5. Water Resources Expert – J Ndiritu 6. Hydrologist – L Netshamavu 7. Administration – S Ncube
Narrative description of project: This study was setup to update the existing water system diagrams to better understand and communicate the connectivity of its main elements, to update the model for the Polokwane system and capture the existing growing demands against strained supplies.	
Description of actual services provided by your staff within the assignment: 1. Conducting meetings with stakeholders to update spatial extent of supply area and obtain available data, 2. Development of a network diagram for the system to show connectivity of existing elements and proposed ones, 3. Updating the demands, water use priorities and demand patterns, 4. Confirmation of sources of water (current and future) and determine the state of water resources availability, 5. Development and testing of operating / supply scenarios that consider system constraints, water requirements and water availability, 6. Updating existing decision support system, 7. Operating analysis, 8. Documentation and reporting.	

Project Experience 4

<table>
<tr><td colspan="2">Assignment Name: Establishment of Operating Rules For Glen Alpine Dam System</td><td>Country: South Africa</td></tr>
<tr><td colspan="2">Name of Client: Department of Water Affairs</td><td>Location within Country: Limpopo Basin</td></tr>
<tr><td colspan="2">Client Contact Person: Ms. L Bapela
T: +27 (12) 336 8613
C: +27 (82) 885 1942
E: bapelal@dwa.gov.za
F: +27 (12) 336 6731

Client Address:
Department of Water Affairs
Directorate: Water Resources Planning
185 Schoeman Street, Pretoria, South Africa</td><td>Duration of Assignment: 36 months</td></tr>
<tr><td colspan="2">Name of Senior Staff (Project Director, Team Leader, Experts) Involved and Functions Performed:
1. A Bailey – Project Manager and Hydrologist
2. WR Nyabeze – System Operation Expert
3. M Kubare – System Operation
4. K Grimmer – Hydrologist
5. R Kganedi – Hydrologist
6. O Nyabeze – Water Information Expert</td><td>No of WRNA Staff: 3</td></tr>
<tr><td>Start Date (Month/Year):

March 2009</td><td>Completion Date (Month/Year):

February 2012</td><td>Approx. Value of Services: R2,483,070.48</td></tr>
<tr><td colspan="3">Name of Associated Consulting Firms, If Any: SSI Engineers & Environmental Scientists</td></tr>
<tr><td colspan="3">Narrative Description of Project:
The project entails the development of annual operating rules for the Glen Alpine Dam System for water allocations and drought management.</td></tr>
<tr><td colspan="3">Description of Actual Services Provided by WRNA:
Services provided are through the following tasks:
1. Determination of water demand patterns and establishment of its accounting system
2. Determination of the state of water resources availability
3. Development of Decision Support System (DSS)
4. Operating Analysis
5. Implementation and monitoring coupled with training and capacity building
6. Presentation of results and dissemination of information
7. Project management and documentation</td></tr>
</table>

Project Experience 5

Assignment Name: Dam Synchronization and Flood Releases in the Zambezi River Basin	**Country:** Angola, Botswana , Malawi, Mozambique, Tanzania , Zambia, Zimbabwe
Name of Client: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH	**Location within Country:** Zambezi Basin
Client Contact Person: Mr. P Qwist-Hoffmann **T:** +267 310 2520 **C:** +267 7211 4639 **E:** peter.qwist-hoffmann@gtz.de **F:** +267 310 2526 **Internet:** www.gtz.de **Client Address:** Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) gtz Transboundary Water Management in SADC Fairgrounds Office Park, Plot 50362, Gaborone	**Duration of Assignment:** 15 months
Name of Senior Staff (Project Director, Team Leader, Experts) Involved and Functions Performed: 1. M J Tumbare – Project Manager 2. WR Nyabeze – Project Management, Team Leader, Dam Operation Expert, 3. R Sanyanga – Team Leader, Ecosystems Expert 4. M Kubare – Project Management, Dam Operation	**No of WRNA Staff:** 4

Start Date (Month/Year):	**Completion Date (Month/Year):**	**Approx. Value of Services:**
December 2009	March 2011	€784,149.30

Name of Associated Consulting Firms, If Any: SSI/DHV, SEED, RANKIN and DELTARES

Narrative Description of Project:
The Project involves investigation options to synchronize the operation of dams on the Zambezi Basin with due regard for the various functions of the basin including hydropower production, flood protection, environmental protection, tourism & navigation, and agriculture

Description of Actual Services Provided by WRNA:
Services provided are through the following tasks:

1. Establishment of long cycles of low and high flow and the impacts of climate change on dam operation
2. Identification and characterisation of wetlands, establishment of flood attenuation capacity and evaluation of options for enhancement
3. Evaluation of regulation methods (communication tools and operating rules) for existing large reservoirs. New/improved regulation methods are also developed.
4. Testing and evaluation of new modes of dam operation on the Zambezi
5. Evaluation of options for flood regulation and environmental protection in the Shire River/Lake Malawi system
6. Assessment of impact of new proposed dams on flood regulation and operation of the system
7. Conceptualisation and evaluation of options for dam synchronization
8. Project management and documentation

Project Experience 6

<table>
<tr><td colspan="2">Assignment Name: Tshepisong West- Construction of Sanitation</td><td>Country: South Africa</td></tr>
<tr><td colspan="2">Name of Client: The City of Johannesburg Housing Department</td><td>Location within Country: Johannesburg</td></tr>
<tr><td colspan="2">Client Contact Person: Mr. B Mohale
T: +27 11 407 7128
C: +27 73 256 8421
E: bernardm@joburg.org.za
F: 086 623 1243

Client Address:
The City of Johannesburg Housing Department
P.O. Box 1049
Braamfontein,2017</td><td>Duration of Assignment: 20 months</td></tr>
<tr><td colspan="2">Name of Senior Staff (Project Director, Team Leader, Experts) Involved and Functions Performed:
1. WR Nyabeze – Project Manager, Design
2. M Kubare – Design, Preparation of Drawings, Contract Management, Resident Engineer</td><td>No of WRNA Staff: 2</td></tr>
<tr><td>Start Date (Month/Year):

October 2008</td><td>Completion Date (Month/Year):

May 2010</td><td>Approx. Value of Services:

R5,344,574.80</td></tr>
<tr><td colspan="3">Name of Associated Consulting Firms, If Any: None</td></tr>
<tr><td colspan="3">Narrative Description of Project:

The project involves the design and construction supervision of a sewer reticulation system to serve 750 households in Tshepisong West.</td></tr>
<tr><td colspan="3">Description of Actual Services Provided by WRNA:
Services provided are through the following tasks:
1. Designs and preparation of design report
2. Preparation of working drawings
3. Obtain approval of design and drawings from relevant regulatory authority
4. Preparation of tender documentation and adjudication
5. Contract management
6. Construction supervision
7. Project management and documentation</td></tr>
</table>

Project Experience 7

<table>
<tr><td colspan="2">Assignment Name: Business support for the development of a reservoir operating system</td><td>Country: South Africa</td></tr>
<tr><td colspan="2">Name of Client: Department of Water Affairs</td><td>Location within Country: All provinces of South Africa</td></tr>
<tr><td colspan="2">Client Contact Person: Mrs. C Ntuli
T: +27 (12) 336 8613
C: +27 (82) 885 1942
E: ntulic@dwaf.gov.za
F: +27 (12) 336 6731

Client Address:
Department of Water Affairs
Directorate: Water Resources Planning
185 Schoeman Street, Pretoria, South Africa</td><td>Duration of Assignment: 45 months</td></tr>
<tr><td colspan="2">Name of Senior Staff (Project Director, Team Leader, Experts) Involved and Functions Performed:
3. WR Nyabeze – Team Leader
4. J Ndiritu – Training Expert, Water Resources Modeller (Sub-consultant)
5. K Sami – Hydrologist, Training Expert (Sub-consultant)
6. M Ncube - Hydrologist
7. N Manqoyi – Water Information Expert/Business Analyst
8. FA Mchibwa – Hydrologist</td><td>No of WRNA Staff: 4</td></tr>
<tr><td>Start Date (Month/Year):

January 2006</td><td>Completion Date (Month/Year):

September 2009</td><td>Approx. Value of Services:

R2.9 Million</td></tr>
<tr><td colspan="3">Name of Associated Consulting Firms, If Any: None</td></tr>
<tr><td colspan="3">Narrative Description of Project:

The project involves hydrological research, business analysis and development support to the DWAF Sub-Directorate: Systems Analysis. The support is in terms of domain research to identify opportunities for system enhancement and upgrading, software modification and updating, documentation, training of software users and quality management. The business analysis for information management systems for reservoir operating systems is also done on this project.</td></tr>
<tr><td colspan="3">Description of Actual Services Provided by WRNA:
Services provided are through the following tasks:
1. Conceptual analysis of the fractional water allocation approach
2. Ad-hoc support to the DWAF on reservoir operational analysis
3. Business requirements for reservoir operating rule information management system
4. Business process analysis for reservoir operating information management system (ROAIMS)
5. Support to the development of a reservoir operating information management system
6. Obtaining data and populating the information management system
7. Testing of the information management system
8. Documentation and training support
9. Collection of reservoir operating tools and data: (Systems, datasets, documentation, training material)
10. Business requirements and business process analysis extension for integration of reservoir operating systems, and improved results communication with users
11. Business requirements and business process analysis extension for tracking of operating rule implementation
12. Capacity building and training
13. Assessment of existing status of reservoir operating rules</td></tr>
</table>

Project Experience 8

Assignment Name: Reviewing and updating of operating rules for the Middle Letaba Water Supply Area		**Country:** South Africa
Name of Client: Department of Water Affairs		**Location within Country:** Limpopo Province
Client Contact Person: Mr. P Sinha **T:** +27 (12) 336 7665 **C:** +27 (83) 639 0348 **E:** qda@dwaf.gov.za **F:** +27 (12) 336 6731 **Client Address:** Department of Water Affairs Directorate: Water Resources Planning 185 Schoeman Street, Pretoria, South Africa		**Duration of Assignment:** 20 Months
Professional Staff Provided by WRNA (profiles): 1. Project Manager- WR Nyabeze 2. Hydrologist- F Mchibwa 3. Water Information Expert- N Manqoyi		**No of WRNA Staff:** 3
Start Date (Month/Year): April 2008	**Completion Date (Month/Year):** December 2009	**Approx. Value of Services** R337,890.58
Name of Associated Consulting Firms, If Any: None		
Narrative Description of Project: The project involves reviewing and updating existing operating rules in the Middle Letaba Water Supply Area. This includes the monitoring of dam operating rules and provision of decision support to the Stakeholder Forum for the Middle Letaba and Nsami Sub systems.		
Description of Actual Services Provided by Your Staff: Services were provided through the following tasks: 1. Updating information on user requirements, user and resource priorities, water resources data, ecological requirements, and existing infrastructure 2. Preparation of data for input into models and updating the operating rule 3. Monitoring available water in the dams, supply levels to water users, inflows and water demands. 4. Development of a decision support tool to assist the Middle Letaba stakeholders Forum in their decision making 5. Providing assistance on the implementation of the operating rule as well as frequent monitoring of the system 6. Monitoring and reporting 7. Project management and documentation		

Project Experience 9

<table>
<tr><td colspan="2">Assignment Name: Letaba River System Annual Operating Analysis</td><td>Country: South Africa</td></tr>
<tr><td colspan="2">Name of Client: Department of Water Affairs</td><td>Location within Country: Limpopo Basin</td></tr>
<tr><td colspan="2">Client Contact Person: Dr B Mwaka
T: +27 (12) 336 8188
C: +27 (82) 807 6621
E: qda@dwaf.gov.za
F: +27 (12) 336 6731

Client Address:
Department of Water Affairs
Directorate: Water Resources Planning
185 Schoeman Street, Pretoria, South Africa</td><td>Duration of Assignment: 16 Months</td></tr>
<tr><td colspan="2">Name of Senior Staff (Project Director, Team Leader, Experts) Involved and Functions Performed:
1. WR Nyabeze – Team Leader
2. J Ndiritu – Water Resources Modeller, Training Expert
3. K Sami – Hydrologist
4. N Manqoyi – Water Information Expert
5. M Ncube – Hydrologist</td><td>No of WRNA Staff: 5</td></tr>
<tr><td>Start Date (Month/Year):
February 2005</td><td>Completion Date (Month/Year):
June 2006</td><td>Approx. Value of Services
€ 50,000.00</td></tr>
<tr><td colspan="3">Name of Associated Consulting Firms, If Any:
1. Semenya Furumele
2. Water For Africa
3. Clear Pure Water</td></tr>
<tr><td colspan="3">Narrative Description of Project:
The main objectives of this study were as follows:

1. Performing a situation assessment of the area defining user requirements, current operational context within the catchment, water demand patterns, and state of water resources availability
2. Developing an appropriate decision support system that will operate at the appropriate time and space scales required
Three separate models were run in the Letaba catchment and assessed from a usability, functionality, transparency and communicability perspective.</td></tr>
<tr><td colspan="3">Description of Actual Services Provided by Your Staff:
Services provided through the following tasks:

1. Convene workshop on status of available data and identify gaps
2. Collect and collate additional information on water use data, water resource data, ecological requirements, restrictions and penalties
3. Format the data for input into the Water Resources Yield Model (WRYM)
4. Run the WRYM for historical and stochastic analysis and obtain critical drought periods
5. Set up Water Resources Planning Model (WRPM)
6. Run WRPM for operating rule and document results
7. Format the models results for presentation and for operation use
8. Annual Operating Analysis and capacity building
9. Project management and documentation</td></tr>
</table>

Project Experience 10

Assignment Name: Inkomati Water Availability Study		**Country:** South Africa
Name of Client: Department of Water Affairs		**Location within Country:** Inkomati Basin
Client Contact Person: Mr. N van Wyk **T:** **C:** +27 (82) 808 5651 **E:** IDA@dwaf.gov.za **F:** +27 (12) 336 8295 **Client Address:** Department of Water Affairs Directorate: Water Resources Planning 185 Schoeman Street, Pretoria South Africa		**Duration of Assignment:** 6 Months
Professional Staff Provided by WRNA (profiles): 1. Hydrologist- WR Nyabeze 2. Water Resources Modeller- M Ncube		**No of WRNA Staff:** 2
Start Date (Month/Year): October 2004	**Completion Date (Month/Year):** February 2006	**Approx. Value of Services** R200 000.00
Name of Associated Consultants, If Any: 1. Water for Africa (main consultant) 2. WRP 3. DMM		
Narrative Description of Project: This project involved an assessment of the water resources of the system and reconciling them with the present and projected future water demands.		
Description of Actual Services Provided by Your Staff: Services provided during this assignment included establishment of the system configuration and a yield analysis of the reservoirs and sub-systems. This involved the following tasks: 1. Catchment discretisation 2. Establishment of reservoir characteristics 3. Formatting and setting up demand data for input into the models 4. Establishment of existing system infrastructure and constraints 5. Establishment of demands supplied by existing system 6. Project management and training		

Project Experience 11

Assignment Name: Improvement of water resources management systems for Swaziland – specialist hydrological support		**Country:** Swaziland
Name of Client: European Union		**Location within Country:** The whole country
Client Contact Person: Mr. S Nkomo **T:** +268 404 8032/3 **C:** +268 612 2199 **E:** wr6-wcon@realnet.co.sz **F:** +268 404 2019 **Client Address:** Ministry of Economic Planning and Development Finance Building, Hospital Hill Mbabane Swaziland		**Duration of Assignment:** 19 Months
Professional Staff Provided by WRNA (profiles): 1. Hydrologist - WR Nyabeze		**No of Staff:** 1
Start Date (Month/Year): October 2008	**Completion Date (Month/Year):** July 2010	**Approx. Value of Services** €60,000.00
Name of Associated Consulting Firms, If Any: ILF Consulting		
Narrative Description of Project: The main objective of the project is improved integrated water resources management and land use planning in Swaziland. The specific objective of this assignment is to enhance the level and quality of water resources planning.		
Description of Actual Services Provided by WRNA: Services provided through the following tasks: 1. Review of the reliability of the national river gauging stations 2. Updating unreliable stations 3. Assessing sediment impact at two reservoirs 4. Setting up a pilot monitoring programme 5. Developing a sediment monitoring manual 6. Capacity building and training 7. Scientific research on impact of sedimentation on Swaziland's surface water resources 8. Planning, liaison and documentation		

Project Experience 12

<table>
<tr><td colspan="2">Assignment Name: Strategy and Guideline Development for National Groundwater Planning Requirements</td><td>Country: South Africa</td></tr>
<tr><td colspan="2">Name of Client: Department of Water Affairs</td><td>Location within Country: All provinces of South Africa</td></tr>
<tr><td colspan="2">Client Contact Person: Mr. F Fourie
T:
C: +27 (83) 801 5598
E: Fourie@dwaf.gov.za
F:

Client Address:
Department of Water Affairs
Directorate: Water Resources Planning
185 Schoeman Street, Pretoria, South Africa</td><td>Duration of Assignment: 36 months</td></tr>
<tr><td colspan="2">Professional Staff Provided by WRNA

1. Water Resources Expert- WR Nyabeze
2. Water Resources Engineer- M Ncube</td><td>No of WRNA Staff:
2</td></tr>
<tr><td>Start Date (Month/Year):

October 2008</td><td>Completion Date (Month/Year):

November 2010</td><td>Value of Project:

R10,697,588.60</td></tr>
<tr><td colspan="3">Name of Associated Consultants, If Any:

1. Iliso Engineers
2. Groundwater Africa, Water Geosciences Consulting</td></tr>
<tr><td colspan="3">Narrative description of the Project

The objectives of this assignment are: (1) development of the national groundwater strategy for the whole of South Africa, (2) roll out of the artificial recharge strategy, and (3) development of a generic guideline for hydrological assessment, planning and management.</td></tr>
<tr><td colspan="3">Description of Actual Services Provided:
Services were provided through the following tasks:
1. Contribution to institutional assessment.
2. Development of a framework for groundwater assessment methodologies.
3. Contribution to planning and management.
4. Marketing strategy
5. Capacity building
6. Groundwater Strategy
7. Contribute to Project management</td></tr>
</table>

Project Experience 13

Assignment Name: Low Level Bridge		**Country:** South Africa
Name of Client: South African National Botanical Gardens		**Location within Country:** Roodeplaat
Client Contact Person: Thompson Mutshinyalo **T:** **C:** +27 (0) 82 389 2292 **E:** t.mautshinyalo@sanbi.org.za **F: +27 86 555 9064** **Client Address:** **South African National Botanical Gardens** **P O Box 2194** **Wiltro Park, 1731**		**Duration of Assignment: 8 months**
Professional Staff Provided by WRNA 1. Civil Engineer- W R Nyabeze 2.Civil Engineer- Michael Kubare		**No of WRNA Staff: 2**
Start Date (Month/Year): October 2011	**Completion Date (Month/Year):** Current	**Value of Project:** R800 000.00
Name of Associated Consultants, If Any: None		
Narrative description of the Project: **The project involves the design and construction supervision of a low level bridge across a stream.**		
Description of Actual Services Provided: Services were provided through the following tasks: Survey Design and detailing Tender documents and adjudication Construction Supervision Project Management		

Project Experience 14

Assignment Name: DEWFORA	**Country:** Africa
Name of Client: European Union	**Location within Country:** Limpopo
Client Contact Person: T: +31 (0)15 285 8643 E: micha.werner@deltares.nl F: +31 (0)15 285 8582 **Client Address:** Deltares Rottedam Weg 185 2629 HD Delf Netherlands	**Duration of Assignment:** 36 Months
Professional Staff Provided by WRNA W R Nyabeze - Team Leader, Water Resource Engineer /Hydrologist M Kubare - Water Resource Engineer J Ndiritu - Water Resource Engineer M J Tumbare - Water Resource Systems Engineer M Chilundo - Water Scientist P Mangaumbe - Agricultural Engineer O Nyabeze - Water information and data base developer S Ncube - Administration	**No of WRNA Staff:** 8
Start Date (Month/Year): January 2011	**Completion Date (Month/Year):** December 2013	**Value of Project:** € 215 856.00

Name of Associated Consultants, If Any:

Deltares	- Netherlands
UNESCO-IHE Institute for Water Education	- Netherlands
Faculty of Engineering, University Eduardo Mondlane	- Mozambique
Council for Scientific and Industrial Research	- South Africa
WaterNet Trust	- Botswana

Narrative description of the Project

To develop a framework for the provision of early warning and response through drought impact mitigation for Africa and also address existing capabilities for drought monitoring in Africa. To develop improved drought indicators that consider the wider domain of water use and water users and their dependence on variable water resources.

Description of Actual Services Provided:

Project Management and Communication

Review existing capacities in Africa at local, regional and continental scale for

Monitoring

Forecasting

Early Warning

Mitigation

Adaptation

Gap analysis to identify constrains and opportunities for improvement

Software Systems

Software System	Main Functions	Experienced Staff
Water Resources Yield Model (WRYM)	Performs yield analysis using a network mass balance approach (at nodes) with flow and storage control.	3
Water Resources Planning Model (WRPM)	Performs yield analysis for changing conditions using a network mass balance approach (at nodes) with flow and storage control.	1
Water Resources Simulation Model 2000 (WRSM 2000)	Conceptual rainfall-runoff model. Generates runoff for natural and developed conditions.	3
Hydrological Drought Analysis Model (HDAM)	Semi-distributed rainfall-runoff model. Generates runoff for developed and natural conditions. Performs hydrological drought analysis.	4
Food Analysis Model (FAM)	Food Analysis	1
DHI Mike Basin	Performs Network Analysis using mass balance	1
DHI Mike 11	River flow and storm water flood analysis	1
DELFT-FEWS	Flood early warning system	1
HEC-RAS	River flow analysis	2
MODFLOW	River flow analysis	1
MODBRNCH	River flow analysis with surface-ground water interaction	1
WEAP	Rainfall runoff modeling and network analysis	1
HYDSTRA	Database of reservoir data and stream flow time series.	2
Arc View GIS, Quantum GIS, Planet GIS	Geographic Information Systems	5
Microsoft Project	Scheduling of activities, staffing and mile stones.	4
WRNA Performance Management System	Project Management	8
Auto-Cad	Engineering Draughting	2
Microsoft Office	• Power point, Word • Spreadsheets and database.	8
Visio	Schematic	4