

FETWATER PHASE II

NOVEMBER 2007
TO
MARCH 2011

sharing
KNOWLEDGE



FETWATER

REPORT

BUILDING
capacity

INDEX

CHAPTER 1		3
1. INTRODUCTION		3
2. BACKGROUND		4
3. THE CAPACITY PROBLEM		5
4. OBJECTIVES OF FETWATER		5
5. BENEFICIARIES AND SERVICE PROVIDERS		6
6. FUNDING AND SUPPORT		6
7. MANAGEMENT		7
8. MOBILITY		8
9. WHY DID FETWATER EMBARK ON THE METHOD OF NETWORKING?		8
9.1 FETWATER PHASE II NETWORKS		9
9.2 NETWORK PARTNERS DURING PHASE II		9
9.3 NETWORK ACTIVITIES		10
9.4 STATISTICS FOR THE PERIOD 2007 TO 2011		10
9.5 VISIBILITY		11
9.6 CHALLENGES		11
9.7 LESSONS LEARNED AND SUSTAINABILITY		12
10. IMPACT ASSESSMENT OF FETWATER PHASE I AND PHASE II		13
CHAPTER 2	RESOURCE DIRECTED MEASURES NETWORK by Prof Janine Adams and Mr Dana Grobler	16
CHAPTER 3	GROUNDWATER NETWORK by Prof Ingrid Dennis, Dr Molla Demlie & Prof Kai Witthueser	24
CHAPTER 4	BENEFICIAL USE OF WATER NETWORK by Ms Retha Stassen	29
CHAPTER 5	WETLANDS AND RIVERS by Dr Wynand Vlok	36
CHAPTER 6	CATCHMENT MANAGEMENT AGENCY EXPERTISE DEVELOPMENT NETWORK by Dr Mark Dent	43
CHAPTER 7	CATCHMENT MANAGEMENT STRATEGY DEVELOPMENT NETWORK by Mr Johnny Beumer	51
CHAPTER 8	WATER RELATED DISASTER MANAGEMENT NETWORK by Mr Andries Jordaan	55



water affairs

Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA



United Nations
Educational, Scientific and
Cultural Organization

2

Flemish government



CHAPTER 1

1. INTRODUCTION

The National Water Act (Act 36 of 1998), and the National Water Policy that preceded it, have brought about fundamental new thinking of the integrated approaches to water resources management in South Africa. The emphasis changed from not only development of new water resources but also careful management of existing resources. Water has now become a common good and the use and management should reflect that. The Act required that water managers recognise and balance the basic human needs of present and future generations, the need to protect water resources, the need to share some water with other countries and the need to promote social and economic development through the use of water (National Water Act 1998: Explanatory notes to Chapter 1).

Significant challenges have been created by the new policy and legislation for the entire water sector. A new set of competencies and realigning of current competencies were central to the achievement of the goals of the national water policy and legislation. The policy explicitly recognises that the single most important factor in achieving wise and efficient water resource management is the “training and development of the full potential of the people who will work in this sector in all relevant organisations and agencies, at all levels”, White Paper on National Water Policy, April 1997. Although there were already very competent people in the water sector they required retraining to enable them to apply their knowledge in the new framework created by the National Water Act (NWA).

The process of implementing the National Water Act requires, among other things, the gradual devolution of authority and responsibility for managing water resources to lower-level institutions such as catchment management agencies (CMAs) and water user associations (WUAs). The shift in emphasis from the development of water resources to their management, and the strong commitment to achieving equity of access to the use of water, requires a range of new skills and competencies for water professionals. Training and capacity building at all levels in the water sector, particularly the development of a broad base of capacity at operational levels, is therefore seen as an essential requirement for success.

The Framework Programme for Research Education and Training the Water sector (FETWater) was established in 2002 to provide appropriate capacity building and training to practitioners in the water sector in South Africa through effective cooperation between universities, government departments, research institutions and the private sector.

The establishment of FETWater came after several years of consultation, collaborative planning and work between the Department of Water Affairs, the United Nations Educational Scientific and Cultural Organisation (UNESCO), the Flemish Government, the Water Research Commission and numerous education institutions and training providers in South and southern Africa.

FETWater was established to provide institutional and financial support to encourage the

creation of training networks as a method for effective co-operation between universities, research institutions, and the public and private sectors. One of the aims in this regard was to incorporate the new approaches required for water management into the curricula of collaborating universities.

2. BACKGROUND

In 1996 the then Department of Water Affairs and Forestry requested support from the United Nations Educational Scientific and Cultural Organisation (UNESCO) and the World Meteorological Organisation (WMO) to assess education and training needs in integrated water resources management in South Africa. These two organisations agreed, and the assessment was conducted in 1998 at national, provincial and community levels.

The assessment evaluated the education and training needs and capacities of the Department of Water Affairs and linked it with the needs of other government departments, non-governmental organisations and the private sector. The assessment took into account various imperatives, including South Africa being a country in transition, its affirmative action policy, staff and career development concerns, capacity building required for achieving sustainable development and the need to link and interact with efforts by southern Africa and the international community.

The conclusions of the assessment stated *inter alia* that:

- The implementation of South Africa's National Water Act would be seriously delayed unless human resource needs and related competencies in the water sector could be timely met.
- New concepts in water resources management have direct implications for South Africa's integrated water resources management approach, and education and training would be required for its practical implementation.
- Opportunities should be explored to promote further links with southern Africa and the international community to have South Africa's training, education and capacity building needs met.
- Although the education and training capacity of South Africa's tertiary institutions is of a relatively high standard, many gaps, weaknesses and threats were identified, relating mostly to:
 - a gap in structured consultation between water academics, the Department of Water Affairs and other employers about competency needs;
 - a gap in structured networking among water academics about curricula and employers' requirements;
 - uncoordinated proliferation of ad hoc education and training and continuing education and training products and their questionable cost-effectiveness and standards;
 - limited links with the private sector; and
 - bureaucratic approaches to qualification, certification and accreditation.

The conclusions of the assessment stimulated the Department of Water Affairs to embark on a concerted process of establishing a framework programme for effective cooperation for the provision of education, training and capacity building needs in the water sector.

3. THE CAPACITY PROBLEM

The major concern in South Africa at the time was the lack of appropriately-qualified individuals with sufficient experience to implement the provisions of the National Water Act, 1998 (NWA), in order to ensure the achievement of integrated water resources management (IWRM). New concepts were introduced such as Reserve and Classification that existing practitioners had to familiarise themselves with before they could implement it in terms of licencing requirements. Inadequate and fragmented implementation of transfer of knowledge and capacity has the potential to hinder endeavours to manage water resources in ways that address issues of equity, sustainability and efficiency, and contribute to social and economic development and the eradication of poverty.

The Department of Water Affairs (DWA) has initiated the establishment of Catchment Management Agencies (CMAs) in order to take the implementation of the provisions of the NWA further by decentralising responsibility for managing water resources to a catchment or regional level. The successful implementation of CMAs will also critically depend on the creation of capacity for IWRM.

In addition, successful cooperation between South Africa and its neighbouring countries with whom water resources are shared also requires improved capacity in these countries to facilitate and support the necessary degree of collaboration. These countries include South Africa's six immediate neighbours, namely Botswana, Lesotho, Mozambique, Namibia, Swaziland and Zimbabwe, as well as other countries in the Southern African Development Community (SADC).

4. OBJECTIVES OF FETWATER

FETWater was established with the following objectives:

- to familiarise existing practitioners with new concepts introduced by the NWA (1998);
- to provide opportunities to share knowledge;
- to develop effective co-operative approaches to building human resource capacity related to integrated water resources management;
- to assist the transformation process in the water sector by building the capacity of previously disadvantaged groups and individuals;
- to provide and facilitate capacity building, training and education opportunities in the water sector;
- to financially support networks that reflect the general principles and priorities identified within FETWater and for which no or insufficient funding is available elsewhere;

- to support and complement existing national initiatives, programmes and activities in line with the identified needs;
- to support innovative initiatives to address identified capacity building and training needs in the water sector;
- to strengthen national, sub-regional (SADC) and international co-operation of academic and research institutions and other human capacity development service providers to work towards a common goal;
- to contribute to unity, understanding and mutual respect amongst water specialists within the sub-region;

FETWater capitalised on existing education, training and capacity building activities in the water sector, but also strived to bring about new activities that were characterised by:

- being priority and demand driven;
- integrated approaches to improve interdisciplinary practices;
- bringing together the service providers and the beneficiaries of the intended knowledge transfer as well as the service providing institutions;
- strengthening the research and service capabilities of the knowledge generating and disseminating by the partners in different networks.

5. BENEFICIARIES AND SERVICE PROVIDERS

Beneficiaries of FETWater's training and capacity building outputs were institutions such as:

- the Department of Water Affairs, including regional offices,
- the Water Research Commission,
- catchment management agencies,
- water boards,
- other government departments, and
- other water management institutions.

Training and capacity building service providers included:

- universities,
- research institutions,
- organisations in the private sector and the public sector (other government departments).

Service providers submitted proposals to FETWater for the establishment of training and capacity building networks based on long-term co-operative networking between various providers.

6. FUNDING AND SUPPORT

The FETWater Programme has been financially supported during Phase I and Phase II by the South African Government through the Department of Water Affairs, the Water Research Commission and the Flemish Government, through the Flanders UNESCO Science Trust

(FUST) Fund and other financial sources.

The FETWater Phase I agreement provided financial support for the period 2002 to 2005 to the amount of \$527 200 (R3 690 400.00).

- FUST Fund: \$252 700 (R1 768 900.00)
- DWA: \$274 500 (R1 921 500.00)

In fact, in the end DWA contributed \$499 000 (R3 490 000.00)

The FETWater Phase II, 2007 to 2011, agreement made provision for financial support to the amount of \$2 544 700 (R17 812 900).

- FUST fund: \$928 000 (R6 496 000.00)
- DWA: \$1 616 700 (R11 316 900.00)

Again DWA contributed more, namely \$1 627 286 (R11 391 002.00)

The Flemish Government provided their funding through the FUST Fund, managed by UNESCO as the implementing agent.

For Phase II the Department of Water Affairs appointed the Water Research Commission as the implementing agent to manage the programme and the funding.

The FUST Fund also made money available through its small scale projects. One of these small scale projects, during Phase II, supported the development of training material related to sustainable rehabilitation of impacted infrastructure sites, wetlands and riparian areas. These manuals were completed and submitted to UNESCO. The agreement made provision that DWA North West would make money available to implement these manuals on the Hartbeespoort dam catchment. Unfortunately the manuals could not be applied to the Hartbeespoort dam due to the fact that DWA North West did not honour their commitment to provide funding for the implementation of the manuals. As part of this small scale project, five officials from DWA North West and its implementing agent, Rand Water, visited Belgium to familiarise themselves on how information centres at nature reserves are managed in Belgium.

7. MANAGEMENT

7.1 The Guideline document and record of decisions were developed to summarise the decisions of the FETWater decision making body and its partners during the negotiations in 2006 on how Phase II will be managed.

7.2 The decision making body of FETWater Phase II, was the Steering Committee. The Steering Committee comprised of representatives from:

- Department of Water Affairs
- Water Research Commission
- The Water Institute of Southern Africa (WISA)
- Academic institutions
- UNESCO
- South African National Commission for UNESCO

- UNESCO Chair, University of Western Cape
 - In addition, the FETWater Coordinator is an ex-officio Steering Committee member.
 - The Network Coordinators submitted their work and any other issues through the Network Coordinator to the Steering Committee for tabling at meetings.
 - Other members could be co-opted as necessary should the need arise.
- 7.3 In total 17 FETWater Steering Committee meetings were held and fully minuted during Phase II.
- 7.4 Four annual stakeholder and donor consultative meetings took place, one each in the Mpumalanga Province, the North West Province, the Limpopo Province and the Gauteng Province.
- 7.5 Fourteen representatives from Belgium and ten from UNESCO in total attended the four annual consultative meetings in South Africa.

8. MOBILITY

- 8.1 During Phase II five Network Coordinators were trained in Belgium.
- 8.2 Two students from South Africa attended the Rivers 21 training in Belgium and were exposed to international experts in IWRM.
- 8.3 Three civil engineer students in their final year from Ghent University visited South Africa to collect information for their Master studies in civil engineering. The Orange River and the Hartbeespoort dam were selected for this purpose. Dana Grobler and Dr Johan Wentzel provided guidance to these students.

9. WHY DID FETWATER EMBARK ON THE METHOD OF NETWORKS?

Networks were the backbone for all the activities within FETWater Phase I and Phase II. The seven networks supported by FETWater were formed by groups of experts who shared a common vision.

The question has been asked many times: why did FETWater decide to make use of the method of networks? The answer should be found in the fact that training networks have proved in many countries to be as cost effective vehicle to address opportunities for capacity development in a more sustainable manner and with greater impact. Networks are powerful mechanisms for sharing experience, information and knowledge and to reach the critical mass of expertise required to address the reform towards integrated water resource management. Networks offer an opportunity to build up relationships and commitment between government, private sector, international and multilateral organisations as a basis for sharing information and knowledge.

The purpose of networks is to transfer knowledge. It is about the pooling of expertise. Networks are important tools for effective co-operation. The objectives of a network should also be broad enough to be beyond the scope of any one group, and can only be addressed by pooling the expertise of several disciplines.

Networks are built on relationships and trust between people. This issue is key to the success of networks. The term network is used to describe the interaction between experts

who trust each other and who are prepared to share their knowledge. Professional scientists would only be willing to share their specialised knowledge if they are convinced that it is for the “common good.”

The FETWater Networks created a framework for partnerships and promoted effective long-term co-operation between the partners in the private sector, universities, government and research institutions. The co-operation within the networks had a lasting impact. The approach of the FETWater Networks was to ensure the effective co-operation of people with the same long-term vision, who work together to plan, design, implement, deliver, evaluate and assess network-based training and capacity building.

Each FETWater network was coordinated by a Network Coordinator. The FETWater Steering Committee supported rotation of network coordinators to build the necessary capacity. The Network Coordinator was responsible for the network proposal, the identification of the experts with the same long-term vision, capacity audit, the development of work plans and the management of the financial support from FETWater, and regular progress reports to the FETWater Steering Committee.

9.1 FETWATER PHASE II NETWORKS

The following networks were approved and supported during Phase II:

- Resource Directed Measures Network (2003);
- Groundwater Network (2003);
- Beneficial Use of Water Network (2004);
- Wetlands and Rivers Network (2005);
- CMA Expertise Development Network (2008);
- Catchment Management Strategy Development Network (2008);
- Water-related Disaster Management Network (2008).

9.2 NETWORK PARTNERS DURING PHASE II included *inter alia*:

- University of Cape Town;
- University of Western Cape;
- Cape Peninsula University of Technology
- Nelson Mandela Metropolitan University;
- University of Rhodes;
- University of Free State;
- University of KwaZulu Natal;
- University of Venda;
- University of Pretoria;
- Tswane University of Technology;
- University of the Witwatersrand;
- University of Johannesburg;
- Stats SA;
- Department of Water Affairs;
- Water Research Commission;
- Private sector;

9.3 NETWORK ACTIVITIES

The network activities are described in the chapters following. The activities can be summarised as follows:

- Capacity audits;
- Development of training material and training manuals;
- Development of software to support training manuals;
- Development of modules as part of Masters programmes;
- Development of a Guideline for Community water Supply and Sanitation in Africa.
- Presentation of short courses;
- MSc programmes;
- Mobility of students to universities that presented courses not available at their specific institutions;
- Mobility of lecturers;
- Developed material for integration of groundwater into the school curriculum.
- Two groundwater tests sites were developed, one at the University of Pretoria and one at the University of KwaZulu-Natal.
- Equipment was bought for the Wetlands and Rivers Network as well as for the Water-related Disaster Management Network.
- The CMA Expertise Development network focused on high level decision-makers in business and other economic sectors. The Network promoted an appreciation of IWRM principles at this level. This approach played an important role in promoting sustainable management of water resources in South Africa (*Impact assessment of the FETWater Programme Phase I, 2002 to 2005 and Phase II, 2007 to 2010, N. Mjoli and L. Jonker*).
- The Water-related Disaster Management Network developed an early warning system using the web-mathematical programme. This system will benefit the National Disaster Management Centre.

9.4 STATISTICS FOR THE PERIOD NOVEMBER 2007 TO MARCH 2011

Training Network	Total	DWA	Other professionals	Women	Men	PDIs	Non PDIs
Resource Directed Measures Network	233	61	172	112	121	128	105
Groundwater Network	349	76	273	98	251	228	121
Beneficial Use of Water Network	391	205	186	134	257	270	121
Wetlands and Rivers Network	167	38	129	68	99	84	83
CMA Expertise Development Network	*	*	*	*	*	*	*
CMS Development Network	73	8	65	31	42	52	21
Water-related Disaster Management Network	27	4	23	8	19	17	10
TOTAL	1 240	392	848	451	789	779	461

During Phase II, 2007 to 2011, 1 240 professionals in the water sector were trained through the FETWater programme. Of these professionals, 63% were previously disadvantaged individuals, 32% of the trainees were employees in the Department of Water Affairs and 36% of the trainees were women.

*Readers will notice that the CMA Expertise Development Network does not appear in the above table. The reason for this is that the focus of this network was to engage not possible to depict the deep and meaningful efforts of this network in a tabular form. The exceptionally high level of many of the influential connections, their variety and potential impact can only be appreciated by reading the integrated narrative of this network's efforts in Chapter 6.

9.5 VISIBILITY

- FETWater developed a web site: www.fetwater.co.za which is maintained by WAMTechnology.
- During Phase II exhibition material in the form of a video, banners to represent all the networks, conference files and a FETWater brochure were developed.
- The different FETWater networks also undertook several activities to raise the profile of FETWater and to increase its visibility to a broader range of stakeholders. (See detail in each network report).
- The Water-related Disaster Management Network linked the FETWater web site to their newly developed website and more than 150 masters students from 15 African countries were exposed to the website during lectures.

9.6 CHALLENGES

- The progress of FETWater was hampered by managerial difficulties. These difficulties related to the transfer of funds from the funding agents to the implementing agent that were not available timeously for the implementation of the networks' work plans.
- A major challenge in the FETWater programme remains the start-stop-start trend which appeared at the end of Phase I and the long delay before the start-up of Phase II.
- Slow release and transfer of the funding to the implementing agent created a major challenge for the management of FETWater and for the networks that were unable to implement their approved work plan on time.
- The many delays with transfer of funds to the implementing agent resulted in the fact that the implementing agent could not sign contracts with the Networks before funding was secured.
- This problem occurred in the 2009/2010 financial year when the Networks developed work plans for a 12 months period. The work plans were approved by the Steering Committee, but due to the late transfer of funds to the implementing agent, the Networks had to deliver those work plans in a time period of 6 months.

- The short time frame of the contract also made it difficult to fit in all the planned deliverables.
- The problem was magnified in the 2010/2011 financial year when the 12 months approved work plans of the Networks could only be implemented after contracts were signed in October 2010 and the funds were only transferred on 31 March 2011 after the work plans were already implemented. In this financial year the budgets for the Networks' approved work plans were also reduced in October 2010.
- Dedicated leadership from the national Department of Water Affairs on the FETWater Steering Committee is indispensable to guide FETWater in terms of the demands and the priority capacity needs in the water sector.
- For almost all the network courses, the attendance by government officials remained a problem. Many officials registered and then did not arrive at the course or cancelled at the last minute.
- A number of training and other discussion meetings were postponed and/or cancelled due to the unavailability of DWA officials.
- Some of the networks felt that it is worrying that the response from DWA to attend short courses was negative in some cases and very poor, nearly non-existing in general. Some senior DWA officials also indicated that they won't grant leave for a five-day period for people who want to attend and further their qualifications.

9.7 LESSONS LEARNED AND SUSTAINABILITY

- The success of FETWater networks depended on the commitment and passion of the network coordinators and the network partners that share a common vision and trust among partners. The future institutional model of FETWater should nurture the commitment and passion of network partners in order to sustain their creativity.
- The support of network coordinators to visit Europe to learn from the European experience of using networks as tools for training and capacity building contributed to the successful implementation of the network concept in South Africa. However, FETWater should encourage the experienced network coordinators to act as trainers/mentors of new network coordinators. In this regards the Groundwater Network successfully rotated the Network Coordinator between four people in the seven years
- The importance of mentorship beyond course attendance was highlighted by DWA officials as a factor in their ability to implement Reserve Determination. A

once-off course attendance might not be adequate to enable young scientists to implement new concepts without support from mentors.

- FETWater training courses that were perceived to not meeting short-term needs of DWA struggled to attract participation of DWA officials. This demonstrated the importance of involving the DWA senior managers in the development of short courses in order to make sure that the courses responded to DWA demand for capacity. (Mjoli, Dr N and Jonker, J (Feb 2010), *Impact assessment of the FETWater Programme Phase I, 2002 to 2005 and Phase II, 2007 to 2010*).
- The Beneficial Use of Water Network learned an important lesson with the inclusion of DWA officials to participate in the water quality training. This capacitated the officials to provide ongoing training in future and ensured sustainability.
- The inclusion of some of the course material developed by the Beneficial Use of Water Network for the socio-economic approaches in the existing material used by the University of Pretoria also ensured that these approaches would form part of the training of students and contributed to sustainability.
- The CMA Expertise Development Network wrote in their chapter of this report: *“We have learned that there is an enormous latent desire in South Africa for bold leadership to strike out with intent and determination to transform our country into what it could be in the water field. More importantly we have learned that there is an encouraging acceptance that IWRM in the multi-sectoral crucibles of learning and that the CMAs are a key way for government, business and civil society to practice “Walking Together”.*

We have learned from the instability of the situation regarding DWA’s view and funding of the CMAs that for the FETWater Programme to make an impact we have to have sustainable CMAs in place. We know that the 1998 National Water Act, mandates funding by the Sectors who make up the CMA. Potential funding for sustaining and widening our capacity building endeavours is therefore critically dependant on the top leadership in the various Sectors of our South Africa society buying in to the concepts emphasised above”.

10 IMPACT ASSESSMENT OF FETWATER PHASE I AND PHASE II

During FETWater Phase II undertook an impact assessment of both FETWater Phase I, 2002 to 2005 and FETWater Phase II, 2007 to 2010 by Dr Nozi Mjoli and Mr Lewis Jonker. The Impact Assessment to FETWater Phase I and Phase II is attached to this report as **Appendix 1.10.1**

The study concluded that the decision to base the FETWater programme on the establishment of networks to bring experts across the water sector together in capacity building activities was successful. It also stated that most FETWater networks have adopted a two-pronged approach to the building of capacity needed to implement IWRM in South Africa, they have developed short courses that target DWA officials and water

sector professionals as a short-term intervention; medium term capacity needs were met with courses for Master's programmes and incorporation of IWRM into undergraduate courses. This was important to ensure that future university graduates would be better equipped to implement IWRM. The Groundwater network has included a long-term view and produced materials for attracting school children to careers in groundwater and also developed material for the integration of groundwater into the school curriculum. The CMA Expertise Development network has targeted a different niche for its activities; it has focused on high level decision-makers in business and other economic sectors. It is promoting an appreciation of IWRM principles at this level; this approach has an important role to play in promoting sustainable management of water resources in South Africa.

The assessment concluded that FETWater networks have developed training courses and trained many DWA officials and water sector professionals in principles of IWRM and some aspects of practical implementation of RDM (surface and groundwater). Most of the trainees who were contacted, indicated that they were already using the knowledge acquired in the implementation of IWRM such as Reserve Determination.

In terms of FETWater's contribution to transformation, the assessment indicated that the majority of people that benefited from FETWater training were the previously disadvantaged individuals (PDI's) including a significant number of women. However, the PDIs were poorly represented as leaders and trainers in FETWater networks.

The assessment reflected on management and funding problems as follows:

- Delays in the finalization of the Phase II contract hampered planned activities of FETWater and this had a negative impact on the achievement of objectives of networks that were established during Phase II.
- Slow release of approved budgets from UNESCO and DWA created a major challenge for the FETWater networks that were unable to plan their training programmes on time.
- DWA did not seem to prioritize the participation of its representative in meetings of FETWater Steering Committee and this has forced the Steering Committee to make certain decisions without DWA input.
- There was a lack of a performance measurement system for the FETWater programme and its networks.
- A database of people trained by the different networks did not exist.

The following recommendations are based on the findings of the impact assessment of FETWater Programme:

- The concept of networks as a tool for training and capacity building capacity should be retained and new networks should be established to meet the new needs.
- FETWater programme should provide incentives to encourage networks to leverage additional funds from other sources of funding for capacity building in the water sector.
- There was a need to review the high level FETWater strategy and the focus should be on addressing critical skills gaps, starting with DWA and then CMAs.
- Innovative approaches were required to address the historical imbalances in distribution of skills in the water sector; incentives could be considered to encourage

white males to mentor PDIs. Transformation should be central to the function of FETWater – a major intervention was required with clear targets and deliverables.

- Selection of a hosting institution for FETWater Programme should consider the benefits of an independent organization with regards to quick response to needs of FETWater networks and efficient flow of funds.
- Transparency and eligibility criteria in the approval of new networks should be addressed to deal with the perception of FETWater as an “exclusive club”.
- The format of the training should be short courses for meeting the short-term capacity needs of DWA and the water sector and coursework Master’s programme developed by FETWater networks for meeting medium to long-term needs. Academics should be trained to offer the coursework Master’s programme in their institutions without any further funding from FETWater programme.
- Monitoring and evaluation systems must be put in place to ensure that the right people are trained and they are able to apply new knowledge to implement IWRM. Options for mentorship programme for DWA officials beyond course attendance should be investigated.
- An audit of the capacity built since the establishment of the FETWater Programme should be conducted and the impact of training on water resource management should be evaluated.
- FETWater programme should be integrated into the capacity building strategies of DWA and be properly linked with other on-going capacity building programmes in the water sector.

This report will be used guide the Steering Committee in planning the future direction of FETWater.

CHAPTER 2

THE RESOURCE DIRECTED MEASURES NETWORK

PROF JANINE ADAMS and MR DANA GROBLER

2.1 The aim of the network:

During FETWater Phase II the RDM Network will purposefully focussed on training initiatives and project activities that increased the capacity and capabilities of all water resource role players responsible for the implementation of water resource protection measures with a special emphasis on estuaries from 2009.

2.2 Description of project activities undertaken during FETWater Phase II, November 2007 to March 2011:

2007

Olifants Doring Catchment Environmental Water Requirements Training (October 2007)

This course focussed on resource protection and integrated river management in the Olifants and Doring rivers, to improve understanding of the environmental, social and economic consideration in the management of a water resource, Western Cape Province. The course was conducted in close collaboration with the University of the Western Cape.

Berg River Dam Environmental Water Requirements – compilation, design, printing and distribution of information and public awareness material to demonstrate the implementation and compliance requirements of the Ecological Reserve from the Berg River Dam, Franschoek

Members of the RDM network made input into the regional office's Berg State-of-the-River report in order to update the sections referring to Environmental Water Requirements. The reprinting of the document was undertaken and 1000 high quality colour copies distributed to various stakeholders in the water sector.

2008

Dam operator's workshop (February 2008)

The purpose of the dam operator's workshop was to assess the needs of dam operators in terms of the operation of dams to implement the Ecological Reserve.

The workshop was attended by 13 technical staff members mostly from the Western Cape Province. The workshop addressed the needs of dam operators in terms of the information provided, and the mechanisms used to give effect to Environmental Water Requirements. The output of the workshop was provided to the RDM Chief Directorate to improve decision making and communication of the results emanating from Ecological Reserve determination studies. The attendees included regional staff members of the Department of Water Affairs and Forestry and technical staff members from consulting engineering firms.

SPATSIM training (February 2008)

Six professionals attended the first Spatsim training course, which was presented over a three day period. The course was presented by Prof Denis Hughes (Institute of Water Research, Rhodes University) and was attended by DWAF officials and members from consulting engineering firms. The course included the use of the SPATSIM software and two case studies were used to demonstrate the use of the software.

SPATSIM training (March 2008)

Five professionals attended the second Spatsim training course, which was presented over a three day period. The course was presented by Prof Denis Hughes and was attended by DWAF officials and members from consulting engineering firms. The course included the use of the SPATSIM software and two case studies were used to demonstrate the use of the software.

Water Resource Protection workshop (March 2008)

The RDM network organized and facilitated a workshop to discuss the implementation of water resource protection measures and to engage in a discussion of the way forward to address capacity building needs with regard to the implementation of Environmental Flow Requirements. The workshop was attended by 18 professionals from the national and regional offices of the Department of Water Affairs and Forestry and members from WWF South Africa office.

River 21 training programme in Europe (March 2008)

Ms Jeanne Gouws from CapeNature was nominated by the RDM network and she attended the River 21 training programme in Europe. Ms Hermien Roux from the North West Department of Agriculture, Conservation and the Environment was nominated by the Wetlands network.

Orange Senque and Fish River Integrated Flow Management (IFM) and Environmental Water Requirements (EWR) Training Course (August/September 2008)

Venue: Namibia, South Africa and Lesotho

A group of nine post-and under-graduate students from four SADC countries participated in the Orange Senqu Fish River Basin Integrated flow management and environmental water requirement training course. The participants were from Lesotho (2), Botswana (1), Namibia (1), Belgium (2) and South Africa (4). The course was undertaken under the auspices of FETWater, South Africa, with support funding from UNESCO. The main focus of the course was to place environmental water requirements (EWR) within the context of integrated water resource management (IWRM), with an emphasis on the use of alternative or non-conventional water resource management measures as a means of meeting the EWR for areas where water resources are limited. The course covered the Orange Senqu Fish River Basin as a case study for demonstrating integrated flow management (IFM) and EWRs in practice. The students were exposed to various aspects of IWRM and EWR in theory and then shown how that theory is working in practice.

2009

Student mobility (February 2009)

Students from various Universities participated in the Environmental Flow Assessment conference in Port Elizabeth

Three estuary training courses (June to September 2009) were completed, one in the Eastern Cape and two in KwaZulu-Natal. The courses provided participants with the necessary information to develop and participate in estuary management plans and the co-operative governance of estuaries. Effective management of South Africa's estuaries is necessary as they are threatened by freshwater inflow abstraction and changes in water quality. Training course material was updated with new legislation and topical issues for the particular study area. For example in the Eastern Cape a section on co-operative management of living marine resources was presented whereas in KwaZulu-Natal there was a presentation on climate change, sea level rise and coastal erosion.

2010

Estuary training course, Stellenbosch (March 2010)

The two day training course took place at the CSIR. There were 55 participants and five presenters. The theory covered in the course included structure and function of estuaries, activities that threaten estuaries, environmental water requirements, legal mandate, governance, management tools and developing an Estuary Management Plan. Each participant received a folder that contained a course assessment guide and workbook, background information to the FETWater initiative and a CD with copies of many publications relating to estuaries. Participants were assessed on three assignments that were completed after the presentation. The course is registered at the Nelson Mandela Metropolitan University as a short learning programme. Assessment is necessary so that the participants can receive a certificate of completion.

Training and capacity building for applying the DWA Environmental Water Requirements method for estuaries using a Rapid RDM study on the Bushman's Estuary (Eastern Cape) as a case study (March 2010)

The Bushmans Estuary was chosen as the study site because of interest in the management of the system from the Regional DWA Office. Senior scientists were asked to identify a specific trainee in their organisation. DWA personnel involved with previous estuary studies or FETWater activities were identified and invited to participate in this training exercise. A rapid environmental water requirement (EWR) study was completed which uses available information, no new field work or analyses are done.

Ms Nolu Jafta collated all the available information on the Bushmans Estuary together with the new information from four sampling trips and produced an MSc dissertation on "The botanical importance and health status of the Bushmans Estuary, Eastern Cape, South Africa." This document served as a background document to this EWR training study.

Trainees and specialists provided input on the EWR document, the details of which were then discussed at a 3-day workshop. All participants provide suggestions for future training activities.

2011

Training on the Environmental Water Requirements (EWR) method for estuaries using the Bot Estuary (Western Cape) as a case study

Training and capacity building for applying the DWA Environmental Water Requirements method for estuaries using a Rapid Resource Directed Measures study on the Bot Estuary as a case study was completed. Participants came from:

- the Department of Water Affairs;
- Department of Agriculture, Forestry & Fisheries;
- CapeNature;
- CSIR;
- Nelson Mandela Metropolitan University;
- Stellenbosch University;
- South African Environmental Observatory Network;
- Anchor Environmental consultants;
- the Overstrand local authority; and
- the Bot Estuary Environmental Forum.

The Bot Estuary was chosen as the study site because of interest in the management of the system from the local authorities and estuary management forum. There was a willingness to understand the processes driving change in the system and manage accordingly. EWR specialists were asked to identify a specific trainee who they could work with in their field of expertise. DWA personnel from the RDM Directorate and Western Cape Regional office were invited to participate in this FETWater training exercise. A rapid EWR study was completed on the Bot Estuary which uses available information, no new field work or analyses were done. A three day workshop including a field trip was held in Kleinmond from 28 February to 2 March 2011. All participants provided suggestions for future training activities.

Estuary RDM training workshop on Resource Quality Objectives

The original plan was for this workshop to take place at the Mzimkhulu Estuary RDM workshop as the Resource Quality Objective approach had been applied to the Mzimkhulu River. However there were delays in the planning of the Mzimkhulu Estuary workshop which made this impossible, therefore this discussion on RQOs took place at the Bot Estuary workshop. Presentations were given on “Management of water resources using RQOs” and “The proposed approach for the development of RQOs”. The application of the RQO approach to the Bot Estuary was discussed. It was recommended that future RDM studies include the RQO component so that this can be thoroughly tested for estuaries.

2.3 RDM Network statistics for the period November 2007 to March 2011

Training	Total	DWA	Other professionals	Women	Men	PDI's	Non PDI's
Olifants Doring EWR	10	4	6	3	7	9	1
Dam Operators training	13	6	7	3	10	6	7
SPATSIM	6	1	5	3	3	3	3
SPATSIM	17	5	12	4	13	9	8
Water Resource Protection workshop	18	12	6	8	10	8	10
Orange Senqu IFM	9	0	9	6	3	7	2
Estuary Management Training course (EC)	20	8	12	12	8	13	7

Estuary Management Training course (KZN)	48	7	41	19	29	29	19
Estuary Management Training course (WC)	55	6	49	31	24	28	27
Bushmans Estuary (EC) EWR/RDM Training	20	7	13	12	8	8	12
Bot Estuary (WC) EWR/RDM Training workshop including RQO for estuaries	17	5	12	11	6	8	9
TOTAL	233	61	172	112	121	128	105

2.4 Visibility

A newspaper article was published with a photograph indicating the field sampling at the Umgeni Estuary during the KwaZulu-Natal estuary training course. Articles also appeared in the WESSA (Wildlife and Environmental Society of South Africa) newsletter and magazine. The success of the course was reported back to the Provincial Coastal Committee in KwaZulu-Natal.

A booklet was completed on the characteristics of the Bushmans Estuary to be distributed to local authorities, residents, tour guides and other interested and affected parties. The booklet drew from the information that had been collated and presented at the RDM training study. The booklet provides detail on the importance, health and environmental water requirements of the Bushmans Estuary.

MSc Dissertation: Although not funded by this study an important document that was used in the RDM training study on the Bushmans Estuary was Ms Nolu Jafta's MSc study, "The botanical importance and health status of the Bushmans Estuary, Eastern Cape, South Africa."

The EWR study on the Bot Estuary included a field trip and one day training on the EWR method. All interested and affected parties were invited to attend. This was very successful with a total of 40 people being involved. This was an important activity in terms of visibility as it focussed attention on the conservation and management of the Bot Estuary emphasising the importance of co-operative governance. Local authorities and interested groups included the Department of Water Affairs, CapeNature, Overstrand Municipality, Bot Overstrand Catchment Management Agency, Overstrand Conservation Foundation and the Bot River Environmental Forum. This activity also showcased the good work of the DWA and sound approach that the DWA EWR studies provide on determining the health of an estuary, recommending the environmental water requirements and identifying ecological specifications and monitoring requirements. This is required for the effective management of an estuary and forms an important component of an Estuary Management Plan as required by the Integrated Coastal Management Act.

2.5 Difficulties and problems encountered and measures taken, any changes in implementation:

The Estuary Management training course held in the Western Cape in March 2010 was oversubscribed (55 people attended). There is a huge demand for this course because of the Integrated Coastal Management Act and the need to produce Estuary management Plans for all South African estuaries. FETWater has funded six courses, two in Kwazulu-Natal, three in the Eastern Cape and one in the Western Cape. It is recommended that future courses have 25 participants as this allows for better interaction and also permits a field trip.

The biggest challenge is the administration of the courses, while it is desirable to have only one contact person for the course, this person must be knowledgeable about the details of the course.

Not all the DWA personnel that were invited could participate in the Bushmans RDM training study due to other commitments and last minute changes in their work schedules. Two post-graduate students were involved quite late in the process to ensure that the full 20 participants budgeted for were accommodated. A course of this nature is always a major challenge because of the different levels of experience of trainees. It is therefore recommended that future training should involve mentorship.

2.6 Lessons learned and sustainability

The training courses were fully subscribed (\pm 20 people per course), probably because there was minimal cost involved. If future courses weren't sponsored more time would be needed to organise the course as it takes a long time for the government departments to sort out their funding. The courses drew strength from attracting lecturers who have years of experience in various disciplines of estuary management (e.g. specialists from government departments, consulting firms, CSIR, ecologists and hydrologists).

The Estuary management course has been registered as a short-learning programme at Nelson Mandela Metropolitan University (NMMU) and based on the positive feedback from the participants should be considered as a long-term method used to train people in estuary management issues. From the training course statistics it is clear that the course has evolved from that being presented to only Department of Water Affairs and Environmental Affairs officials to one that is sought after by a variety of individuals from different organizations. Estuary management plans and the establishment of estuary management forums have resulted in a need for estuary management training. The sustainable future of this course is that it may now be funded by CapeNature and the Department of Environmental Affairs.. Individual organisations may also fund a tailor made course. The Eden Municipality and Garden Route National Parks have separately asked for a course for their respective staff. FETWater is acknowledged for establishing this course and the demand has ensured that it will be sustainable into the future.

Trainees provided feedback on the Bot EWR training study. This is valuable information for future training activities. The conclusion from the study was that the trainees should be included in the next EWR estuary study to ensure continuation of their learning experience. Some trainees are ready to act as specialists on future EWR studies. Trainees indicated that they would like to be involved in all phases of the study i.e. field sampling, data analysis,

preparation of the EWR reports and presentation at the workshop. For this reason trainees need to be included on intermediate and comprehensive studies which involve field work. The training programme would be sustainable if linked to the EWR studies organized by the RDM Directorate. Each study should fund a training component and indeed this has been done for some Comprehensive Ecological Reserve assessments in the past.

2.7 Evaluation and recommendations

The course participants completed evaluation forms to provide feedback on the overall structure and planning of the course, the applicability of the topics and the way they were presented. When asked which section they particularly enjoyed, the Eastern Cape course participants highlighted the field excursions to the Swartkops and Sundays estuaries, working in discussion groups, the legal mandate section and applying the acquired knowledge in the course assignment which was to develop a management plan for the Swartkops Estuary.

The long-term impact of the training courses would be an improvement in the sustainable management of estuaries in South Africa. The training forms the basis towards this outcome and ideally should be followed up with support activities (e.g. field-based training in setting up an estuary monitoring programme). Further recommendations include:

- Run this estuary management course on an annual basis to allow more students to receive the training. This will increase the number of people who have an understanding of estuary management issues;
- Involve the participants in more specialised courses; and
- Provide assistance to participants who become involved in developing Estuary Management Plans.

Trainees would like to be involved with the EWR study from inception to completion. Mentorship is needed and trainees should be paired up with a specialist and go through the process in more detail. However training is most effective when the trainee is in the same organisation as the specialist as this allows for interaction. Follow up training is needed for specialist trainees, estuaries are different and diverse approaches are followed to determine the EWRs.

The development of a database of experts is necessary.

2.8 Annexures:

- | | |
|------------------------|--|
| Appendix 2.8.1: | Estuary Management training course in the Western Cape |
| Appendix 2.8.2: | RDM training study on the EWR of the Bushmans Estuary |
| Appendix 2.8.3: | Bushmans Estuary booklet |
| Appendix 2.8.4: | Report on the RDM training study on the EWR of the Bot Estuary and training workshop on Resource Quality Objectives. |
| Appendix 2.8.5: | Environmental Water Requirement report for the Bot Estuary. |
| Annexure 2.8.6: | Management of estuaries in South Africa. A short learning course. |

Annexure 2.8.7: Report on the two estuary training courses held in KwaZulu-Natal (including course invite, course programme, convenors reports, participation lists)

CHAPTER 3

THE GROUNDWATER NETWORK

PROF INGRID DENNIS and DR MOLLA DEMLIE

3.1 The aim of the Groundwater Network is to provide opportunities for the exchange of ideas, the transfer of knowledge, the improvement of competencies and capacity building in groundwater management.

The Groundwater Network partners included:

- University of Witwatersrand
- University of Pretoria
- University of Western Cape
- University of Free State
- University of Kwazulu Natal
- University of Venda
- Water Research Commission
- DWA officials
- Private sector

3.2 Description of project activities undertaken during FETWater Phase II, November 2007 to March 2011:

2007

Conducted three GRDM training courses, one in the Western Cape, one in Durban and one in Pretoria, based on the newly developed Groundwater RDM training manual. In total 33 professionals, from DWA and the private sector, were trained.

Conducted Geophysics training for students at the University of the Free State. Students who participated came from the University of the Free State, University of Pretoria, University of the Western Cape, University of Kwazulu Natal, and University of Venda.

Student mobility took place when they were trained in GIS and groundwater recharge short courses at the University of Western Cape.

Groundwater test site development and field training undertaken at the University of Pretoria. Two 40 meter deep boreholes were drilled and equipped next to existing abstraction boreholes within the experimental farms of the university.

Supported a total of 30 students to attend **the national bi-annual groundwater conference** in Bloemfontein, October 2007.

2008

Training on Groundwater Supply at municipal level and the management of a database for groundwater risk management.

Presented **Groundwater management short course** to DWA and other professionals.

Identified and developed a groundwater field training test site and used it as field training for students and new professionals: Boreholes drilled, test site established within the Research farm of UKZN.

Developed lecture material to **integrate Groundwater in the school curriculum.**

Provision of field equipment to a previously disadvantaged university, University of Kwazulu-Natal.

Initiated a **capacity audit** on groundwater capacity needs and training for SADC countries.

2009

The Guideline for community water supply and sanitation in Africa was completed, by Prof Eberhard Braune, University of Western Cape. The Guideline was also updated and launched during the Second African Water Week that was held in Pretoria.

The Groundwater RDM manual was updated to incorporate the national water resources classification system and associated resource quality objectives.

Update of Groundwater RDM manual software. The groundwater RDM manual was updated and these changes in the manual was incorporated and reflected in the groundwater RDM manual software.

Sponsored 28 **students to attend the national bi-annual groundwater conference** in Somerset West, Western Cape Province, November 2009.

Training course and workshop on risk management of aquifers. A successful training workshop was held on 15 September 2009 at the University of Western Cape and has attracted a number of professionals from universities, DWA, municipalities and water boards.

2010

The Network liaised, advised and **developed material for integration into the groundwater school curriculum.**

The Network initiated a **capacity audit needs assessment for SADC countries.**

Groundwater Resource Directed Measures Course (December 2010)

This 2 day training course was held in Stellenbosch. Water is a natural resource and belongs to all the people of South Africa. South Africa is not a water-rich country and, as a result, water has to be managed and used wisely. Water management in South Africa is based on three key principles:

- Sustainability

- Equity
- Efficiency

The National Water Act (1998) provides a legal framework for the effective and sustainable management of South Africa's water resources. The National Water Act (NWA) therefore provides decision-making tools to achieve a balance between protecting and using South African water resources. Chapter 3 of the NWA focuses on protecting South Africa's water resources. Protection involves the sustaining of a certain quantity and quality of water to maintain the overall ecological functioning of rivers, wetlands, groundwater and estuaries. This Chapter 3 of the NWA therefore introduces series of measures which together are intended to protect all water resources. These measures are referred to as Resource Directed Measures and in the case of where it is related to groundwater, Groundwater Resource Directed Measures (GRDM). These measures include Classification, quantification of the Reserve and Resource Quality Objectives. This 2 day course included the latest methodologies applied in GRDM assessments and the updated version of the GRDM software.

2011

Groundwater and Geophysics Course (March 2011)

This 3-day course was presented by Dr Rainier Dennis and Mr Fanie de Lange in Bloemfontein. In many developed and developing countries there is not only a heavy reliance on ground water as a primary drinking supply but also as a supply of water for both agriculture and industrial use. The reliance on groundwater is such that it is necessary to ensure that there are significant quantities of water and that the water is of a high quality. The use of geophysics for both groundwater resource mapping and for water quality evaluations has increased dramatically over the last 10 years. This course provided an overview of current geophysical methods used in groundwater exploration in which participants will receive hands on training.

Risk Management of Aquifers (March 2011)

This course was presented by Mr Julian Conrad and Ms Marilie Carstens in Bloemfontein. Dr Rainier Dennis assisted with all technical issues such as software installations. GIS is a tool that can be used in most professions, including groundwater. This course presents an overview of the use of GIS in the field of hydrogeology with the focus on risk. The course was practical and allowed all delegates to obtain hands-on experience.

3.3 Groundwater Networks statistics for the period November 2007 to March 2011:

Groundwater activities	TOTAL	DWA trained	Other professional	Women	Men	PDIs	Non PDIs
Two National bi-annual groundwater conferences	55	0	55	8	47	30	25
Three GRDM training courses	58	24	34	18	40	28	30
Risk management of aquifers	65	0	65	11	54	48	17
Geophysics training course	32	0	32	12	20	20	12
Groundwater management course	10	3	7	2	8	7	3
Test site Pretoria	6	0	6	2	4	4	2

Risk Management of Aquifers	39	5	34	19	20	26	13
Groundwater sampling, hydrochemistry and environmental isotopes	24	24	0	10	14	23	1
GRDM training based on updated GRDM manual and software	12	7	5	4	8	6	6
Groundwater Resource Director Measures course	17	4	13	5	12	12	5
Groundwater and Geophysics course	22	8	14	5	17	18	4
GIS Risk Management of Aquifers course	9	1	8	2	7	6	3
TOTAL	349	76	273	98	251	228	121

3.4 Visibility:

As part of the student attendance of the 2009 National Groundwater Conference that was held from the 16 to 18 November 2009 in Somerset West (Western Cape Province), the FETWater logo was now displayed on the Biennial Groundwater Conference website (<http://www.groundwaterconference.com>).

A guideline for community water supply and sanitation in Africa which was developed and launched during the second African Water Week in Pretoria, South Africa.

Participants from a large number of institutions attended the courses. These included Universities, the Council for Geoscience, Water User Associations and groundwater consultants. For the first time a number of people from industry also attended the courses including BHP Billiton, Eskom and Klipspruit Colliery. This increased the exposure of the FETWater programme with many questions being asked concerning FETWater and future activities associated with the programme.

3.5 Difficulties and problems encountered and measures taken, any changes in implementation:

A major challenge in the FETWater programme remains the delays before contract agreements can be signed with the Networks. In some instances work plans for 12 months periods had to be delivered in a time period of 6 months. The short time frame of the contract also made it difficult to fit in all the deliverables. This problem was magnified with the long delay of transfer of money from the DWA to the WRC.

Attendance by some government officials remains a problem. Many officials have registered and then don't arrive at the course or will cancel at the last minute. Also because of the budget cuts, it was a struggle to manage courses within the allocated budget for an activity. As a result many of the courses were held at the Institute for Groundwater Studies as computers and lecture rooms were available at low or no additional costs.

3.6 Lessons learned and sustainability:

If the FETWater programme is serious to be successful, then one of the most important management lessons learned from Phase II is that contracts should be signed in time to allow the networks at least 11 months of work time. During Phase II the networks learned to avoid very optimistic work plans due to the delay in signing of contracts. Feedback from the participants indicated that there is a need for more practical sessions/ more “hands-on” time. This would only be possible if the course durations are extended.

3.6 Annexures:

- Appendix 3.6.1:** Training course on ‘Risk Management of Aquifers’, University of Pretoria, by Mr Julian Conrad.
- Appendix 3.6.2:** Training course on “Hydrochemistry and Environmental Isotopes”, Tshwane University of Technology, Pretoria by Dr Molla Demlie and Dr Mlindelwa Lupankwa.
- Appendix 3.6.3:** Summary report on changes to the Groundwater resources directed measures software by Dr Rainier Dennis.
- Appendix 3.6.4:** Updated Groundwater Resource Directed Measures Manual by Dr Johan Wentzel.
- Appendix 3.6.5:** Summary report on a groundwater RDM training course held in East London based on the updated groundwater RDM manual and software by Dr Ingrid Dennis.
- Appendix 3.6.6a,b,c:** A report for three test site boreholes drilled at the University of Venda by Prof John Odiyo.
- Appendix 3.6.7:** A list of University students sponsored to attend the biennial Groundwater Conference-2009 in Somerset West (Western Cape) from 16 to 18 November 2009.
- Appendix 3.6.8:** Summary of courses and course evaluations
- Appendix 3.6.9:** Training material Groundwater Resource Directed Measures Course
- Appendix 3.6.10:** Training material Groundwater and Geophysics Course
- Appendix 3.6.11:** Training material GIS Risk Management of Aquifers Course
- Appendix 3.6.12:** Sustainable Groundwater Resources within the Water Supply and Sanitation Environment in Africa
- Appendix 3.6.13 a,b:** School brochures on groundwater.

CHAPTER 4

THE BENEFICIAL USE OF WATER NETWORK

MS RETHA STASSEN

4.1 The Beneficial Use of Water Network aims to identify, support and facilitate training opportunities through which water sector managers as well as other stakeholders can be informed and educated in finding a “Balance between the social, economic and ecological use of water”.

4.2 Description of project activities undertaken during FETWater Phase II, November 2001 to March 2011:

Water Quality training:

Five courses were undertaken. Training was provided on the development of a vision for a catchment, setting Resource Water Quality Objectives (RWQO) and the allocation of water quality in a sustainable manner. Officials from the Department of Water Affairs (DWA), Water Boards and Local Municipalities in Pretoria, Kimberley, Durban and Cape Town attended the five courses.

Water Quality Objectives:

Two x one-day courses were undertaken with officials from DWA. Water Boards, Local Municipalities and private sector in Dullstroom (Mpumalanga) and East London (Eastern Cape). A total of 55 officials were trained.

Water Resource Economics:

Network partners attended the Environmental and Resource Economics (ERE) Conference and six students were sponsored to attend.

The network partners (StatsSA) established a reference group for Environmental Economics and it is foreseen that this group will meet twice a year to discuss the development, use and implementation of environmental economics in South Africa.

The course material on socio-economic approaches used within DWA has been finalised through discussions with officials from the Department, especially the Resource Directed Measures Chief Directorate. Discussions were also held with the University of Pretoria for the inclusion of some of the material developed as part of the course material on socio-economic approaches in existing material at the University.

National Water Accounts were developed by StatsSA and this will be used in future initiatives of the Network.

The second **reference group** meeting chaired by Statistics South Africa (StatsSA) was held on 2 March 2010. Representatives on the Advisory Committee are currently from Stats SA, Department of Environmental Affairs and Universities. They discussed progress with regards

to the environmental accounts (energy, fishery and mineral accounts); reporting on the 15th London Group meeting on Environmental Accounting; Beneficial Use of Water (BUW) Network activities; feedback on the development of biodiversity indicators (BICSAfrica); progress towards meeting the Millennium Development Goals (MDG) and the implementation of the International Recommendations on Water Statistics (IRWS). A specific recommendation was that a dedicated official from DWA should be included in the Reference Group. The BUW Network will assist with the implementation of the IRWS through meetings/workshops with DWA officials responsible for the collection of data for water statistics.

Documentation has been prepared from the detail guidelines on International Recommendations on Water Statistics that can be used for a planned workshop coordinated by StatsSA with assistance from the United Nations.

The **Water Economics two-day training course** as developed in 2009 was presented to DWA and StatsSA officials as well as a number of private consultants. The course equipped water managers with background information on how to commission and/or assess studies that deal with the economic assessment of water related matters in South Africa. A total of 15 people were trained. The course presentation was done with collaboration between StatsSA, University of Pretoria (CEEPA) and private consultants.

Water Economics two-day training course on the various methodologies available and how to use these methods to evaluate management options from a resource economics perspective was provided to officials from three large metros in Gauteng Province.

A **Water Economics training course** on the various methodologies available and how to use these methods to evaluate management options from a resource economics perspective, was provided to DWA officials, especially those from the Water Resource Classification section in DWA that are currently involved in the implementation of the Water Resource Classification System.

A **Water Economics Advisory Committee meeting** was held between StatsSA and BUW network partners on 1 December 2010 to discuss progress with the various identified initiatives and plan for future activities. Some of the main initiatives are the implementation of the International Recommendations on Water Statistics, planned update of the 2008 water accounts by StatsSA and the water economics training courses.

Position paper on the use of water economics on a regional and local level for decision making during water allocations and the possible impacts of these decisions on the local economy. The position paper has been developed to stimulate thinking on the use of water economics as a tool to assist with decision-making on a regional and local level. It provides background on the role of water economics in the process to allocate water.

Water Allocation Reform:

This activity included workshops/discussions with representatives from DWA (Institutional Oversight, Eastern Cape Regional Office (proto-CMA)) and Breede River CMA to evaluate the existing training material for updating/revising where necessary. It was proposed that a 2-

day course be developed to provide an understanding and interpretation of the NWA, with specific focus on water allocation and licensing, especially the understanding of Section 27 of the Act. The existing training material has been adapted to include these needs.

Develop a conceptual framework and update the revised training material developed as part of Water Allocation Reform. The conceptual framework was developed to investigate the training needs in terms of the concepts of beneficial use of water in the public interest as being used within integrated water resource management. The training material developed through FETWater (BUW, 2010) was compared to the needs as identified by DWA and CMA officials to ensure that all of these were addressed. These needs identified are in line with the National Water Policy and the provisions of the National Water Act. The main areas where training is required to enhance the skills of officials are on the following:

- Policy framework;
- Implementation of the NWA
- Linkages between policy and beneficial use of water concepts.

Water Use Efficiency:

A training manual was developed.

A two-day training course took place with Water User Associations and farmers to provide training on the efficient use of water.

Three x two-day training courses with representatives from Water User Associations, irrigation schemes, sugar and cane growers associations and other government departments were held at Pongola, Vredendal and Koffiefontein to provide training on the efficient use of water. A total of 62 people attended the course and were provided training on how water could be managed efficiently on-scheme and on-farm.

Water Resource Management:

A training manual was developed.

Three x five-day courses were held at Roodeplaat Dam for various officials from the DWA and Water User Associations. The main focus of the course is to provide these officials with a detail understanding of water resource management during the operation of the various systems.

Liaison with other initiatives:

Liaison with other initiative were identified as key for the Network, these include inter alia liaison with Masibambane; WIKI pedia, University of Pretoria, the CMA Network.

- University of Pretoria – inclusion of the material developed as part of the course material on water-economics. The University now co-present the course with StatsSA and other specialists.
- CMA network – the BUW network will work closely with this network when finalising and presenting the course on the NWA to reach the various role-players on the various levels as identified by the CMA network.
- University of Rhodes are interested to present parts of the course on water economics. A meeting between the University representative and the water

economics course presenters will be held during the last part of phase 2 FETWATER to discuss and finalise.

4.3 BUW Network statistics for the period November 2007 to March 2011

Training activities	TOTAL	DWA	Other professional	Women	Men	PODIs	Non PDIIs
Setting of RWQO and allocation of water quality in a sustainable manner	105	61	44	53	52	81	24
Environmental and Resource Economics Conference	13	0	13	7	6	10	3
Water Use Efficiency	86	9	77	19	67	38	48
Water Resource Management	73	67	6	13	60	49	24
Water Economics training	15	9	6	7	8	9	6
Resource Water Quality Objectives	48	37	11	23	25	39	9
Water economics training	15	0	15	6	9	14	1
Water economics training	15	13	2	5	10	14	1
Water Resource Management course	21	9	12	1	20	16	5
TOTAL	391	205	186	134	257	270	121

4.4 Visibility

The participation of the network partners at the ERE conference and the establishment of the reference group as well as the training provided by the various activities to groups included officials from not only DWA but also Water User Associations, Local Government and Water Boards and students.

The participation of representatives from the three large metros in Gauteng in the water economics course broadened the number of stakeholders that are participating in the activities sponsored by FETWater.

Involvement of BUW partners together with StatsSA with regards to the implementation of the guidelines on International Recommendations on Water Statistics also now includes assistance from the United Nations.

4.5 Difficulties

A number of training and other discussion meetings were postponed and/or cancelled due to the unavailability of DWA officials or busy work schedules. These were the Water Use Efficiency training; Water Quality training and the Water Allocation Reform Programme training. A two-day discussion on training was scheduled during July 2009, but was cancelled by DWA on short notice. A meeting was held with the officials and WRC to resolve the problems.

A meeting with the management committee of DWA (MANCO) was requested by StatsSA to present the national water accounts development before publication. After numerous attempts by the Network and StatsSA, this was abandoned and the water accounts were published.

The reduced budget on the development of the conceptual framework resulted in that the training material developed during 2010 was evaluated only and the approach of the training (using a case study as guidance throughout the training) should be 'tested' through a training course with officials from DWA and CMAs before the documentation can be finalized.

4.6 Lessons learned and sustainability:

An important lesson that was learned was the inclusion of DWA officials to participate in the water quality training. This capacitated the officials to provide ongoing training in future and ensured sustainability.

The initiative of StatsSA to form the reference group with assistance from the network ensured that this group will still meet in the long term, even when FETWater is not active.

Inclusion of some of the course material developed for the socio-economic approaches in the existing material used by the University of Pretoria also ensures that these approaches will form part of the training of students and contributes to sustainability.

The recently developed training material on the overview of the considerations of the NWA with specific focus on decision-making during water allocation for the most beneficial use of water in the public interest should be presented through the proposed approach of a case study. This will enable the further enhancement of the course material to include any other requirements as identified during the training.

4.7 Annexures:

Appendix 4.7.1: Efficient use of irrigation water training course.

Appendix 4.7.2: A summary progress evaluation based on the identified needs from the capacity audit.

Appendix 4.7.3: Determination of Resource Water Quality Objectives training course.

Appendix 4.7.4: Water Allocation Reform, Case Study Part I.
This case study was developed by DWA as part of another study. The BUW Network used it as is for the first training session and decided to update it where necessary after the training session and then include acknowledgement for FETWater.

Appendix 4.7.5: Water Allocation Reform, Case Study Part II.
This case study was developed by DWA as part of another study. The BUW Network used it as is for the first training session and decided

to update it where necessary after the training session and then include acknowledgement for FETWater.

- Appendix 4.7.6:** Training assessment criteria.
- Appendix 4.7.7:** Training manual: Water Allocation Reform.
- Appendix 4.7.8:** Resource Economics Conference report.
This report was compiled by the organisers of the Environmental Resource Economics Conference that some of the BUW Network partners attended in May 2009. The BUW Network decided to include it in this report to indicate where South Africa is with environmental resource economics and what are planned.
- Appendix 4.7.9:** Training manual: efficient water use for water user associations and farmers.
- Appendix 4.7.10:** Guideline: Resource Directed Management of Water Quality, Technical Summary.
DWA developed this technical guideline as part of the Resource Directed Management of Water Quality project. The BUW Network used this document as the basis for the determination of Resource Water Quality Objectives training documentation.
- Appendix 4.7.11:** Pamphlet: Resource Directed Management of Water Quality.
DWA developed this document as part of the Resource Directed Management of Water Quality project. The BUW Network used this document as the basis for the determination of Resource Water Quality Objectives training documentation.
- Appendix 4.7.12:** Training powerpoint presentation: Resource Water Quality Objectives Model.
- Appendix 4.7.13:** Training powerpoint presentation: Resource Directed Management of Water Quality.
- Appendix 4.7.14:** Training powerpoint presentation: Water Economics.
- Appendix 4.7.15:** Training powerpoint presentation: Determination of Resource Water Quality Objectives.
- Appendix 4.7.16:** Fact sheet: Beneficial Use of Water Network.
- Appendix 4.7.17:** Training course: Water Economics.
- Appendix 4.7.18:** Powerpoint presentation: Water Economics (1)

- Appendix 4.7.19:** Powerpoint presentation: Water Economics (2)
- Appendix 4.7.20:** Report on Water Economics training.
- Appendix 4.7.21:** Minutes of the Environmental Economic Accounting Advisory Committee meeting.
- Appendix 4.7.22:** Water Resource Management course.
- Appendix 4.7.23:** Water Economics training course material
- Appendix 4.7.24:** Water Economics Advisory Committee
- Appendix 4.7.25:** Position Paper on the use of water economics at a regional and local level for decision making during water allocations
- Appendix 4.7.26:** Conceptual framework on Water Allocation Reform
- Appendix 4.7.27:** Water Resource Management training course material
- Appendix 4.7.28:** Implementation of the UN Guidelines for Water Statistics

CHAPTER 5

THE WETLANDS AND RIVERS NETWORK

DR WYNAND VLOK

5.1 The Wetlands and Rivers Network aim to:

- Support integrated water resource and a biodiversity management approach that will enhance capacity to ensure effective implementation of the National Water Act (Act 36 of 1998), the National Environmental Management Act (Act 107 of 1998) and the Biodiversity Act (Act 10 of 2004).
- Enable in-service training of civil servants at various levels (single modules, certificate, honors or masters degree) in Integrated Environmental Water Resources Management.
- Produce standardised education material focused on the environment of southern Africa but still incorporating global trends and approaches.
- Raise awareness of the value of all wetlands types and rivers.
- Ensure an understanding of the complexity of the interaction between the terrestrial environment and aquatic ecosystems.
- Increase capacity to manage the diverse aquatic ecosystem types.
- Ensure that managers have capacity to rehabilitate wetlands and river ecosystems.

List and affiliation of Network Partners:

- Prof Victor Wepener – University of Johannesburg (UJ)
- Dr Jan Roos – Water Quality Consultants (WQC)
- Prof Nico Smit – University of Johannesburg (UJ)
- Dr Paul Fouche – University of Venda (Univen)
- Dr Wynand Vlok – BioAssets

5.2 Description of project activities undertaken during FETWater Phase II November 2007 to March 2011:

2007

After various delays since August 2005, the network got some positive feedback towards the end of July 2007. Final confirmation that the contract was renewed meant we could continue with planning of activities. The loss of time resulted in a shortened period to roll out the whole programme, but we were positive that we could still achieve it.

On the 15th September 2007, Prof Victor Wepener (University of Johannesburg), Dr Paul Fouche (University of Venda), Me Annette Wentzel (DWAF), Mr Ramogale Sekwele (DWAF), Dr Steve Mitchell (WRC) and Dr Wynand Vlok (Consultant) met at the WRC to put forward a work plan for the remainder of the 2007/2008 budget cycle and to get ideas on the modules that will be included into the programme. Dr Jan Roos (University of Free State) was attending an international conference and we discussed his earlier submissions during the meeting. We asked Me Wentzel to send a request to DWAF, DEAT, SANBI and Working for

Wetlands to give feedback, comments and/or suggestions to the proposed modules. No written comments were received.

Another meeting was held on the 2nd October 2007. The aim of the meeting was to discuss the final structure, teaching methodology and related matters for the first modules to be presented in 2008. Dr Jan Roos, Prof Victor Wepener and Dr Wynand Vlok were present and Dr Steve Mitchell attended to discuss some administrative issues with the meeting. Dr Fouche was unable to attend due to teaching activities at the University.

Towards the end of October 2007 a final meeting was held. Dr Jan Roos (University of Free State) was not able to attend and we have since brought Dr Nico Smit (UJ) onboard to help with the estuary and marine component of the programme. Dr Vlok had meetings with DWAF, DEAT and SANBI on 6, 7 and 8 November 2007 to discuss and explain the network, its aims and the layout of the modules for the proposed Coursework Master degree. All were positive and SANBI and DEAT wanted to get staff enrolled in 2009 into the programme as full paying students.

Towards the end of 2007 Module 1 and Module 2 were accepted by the Senate of the University of Johannesburg as part of the University's formal programme structure.

2008

The network partners finalised the development of the different modules. The main focus was to get the modules in the formal format, ensure it is approved by the Academic Structures at the University of Johannesburg and that it is sent for peer review. After the review process, the proposed changes will be evaluated and those agreed upon then implemented.

Modules 3, 4, 5, 6 and 7 were sent to the Senate of the University of Johannesburg early in 2008 to ensure the full programme structure form part of the institutional academic structure. This meant that the students could enroll for a part time Master degree from 2008.

For 2008, the Network phased in two modules (1 and 2) and used the opportunity to streamline the processes. Prof Wepener set up a secretariat at the University of Johannesburg to administer students' queries and marks. The Network ensured that all the network partners agreed on lecture methodology, assessment process and other components to ensure a uniform approach by all. This was essential, as the network partners were all from different institutions and it can be problematic if there are major differences in the approach to the teaching and assessment methodology. That doesn't mean that the individual style of each partner will be restricted.

Each module consisted of a week contact session at the appointed venue. During this time, lectures were presented, the students attended practical sessions, the students worked on assignments and presented oral presentations at the end of the course. Further assignments were completed and submitted for evaluation. All the marks counted towards the completion of the module. When successful the candidates received a certificate indicating which course was completed.

2009

Students could enrol for a full time Master degree in 2009.

All seven modules were presented in 2009.

30 students registered for modules 3, 4, 5, 6 and 7 at the University of Johannesburg

Module 3 Monitoring of Wetlands and Rivers;

Module 4 Estuaries and the Marine Environment;

Module 5 Wetlands, Rivers and the Law;

Module 6 Wetland and River Management;

Module 7 Wetland and River Rehabilitation Methods;

Modules 1 and 2 were moderated by Prof Luc Brendonck, University of Leuven, Belgium.

Modules 3 to 7 will be sent to Belgium for evaluation in November 2009.

Updated modules 1, 2, 3 and 4.

Students attended the annual Conference of the Parasitological Society of southern Africa.

2010

Updated Modules 5, 6 and 7. Prof Victor Wepener, Dr Jan Roos, Prof Nico Smit, Dr Paul Fouche and Dr Wynand Vlok were involved in the update of the modules.

Module 1: Wetland and river functional ecology was presented in January 2010 at the University of Johannesburg by Dr Paul Fouche.

Modules 1, 2, 3, 4, 5, 6 and 7 were updated by Prof Victor Wepener, Dr Jan Roos, Prof Nico Smit, Dr Paul Fouche and Dr Wynand Vlok.

Module 2: Water quality was presented in February 2010 at the University of Johannesburg by Dr Jan Roos.

Module 4: Estuaries and the marine environment was presented in March 2010 at the Tsitsikamma National Park, Eastern Cape Province by Dr Nico Smit.

Modules 3 to 7 were moderated by Prof Patrick Meire, University of Antwerpen, Belgium.

2011

Five students have enrolled for the Master degree. Three students' have submitted their MSc dissertations for examination and their results have been ratified by the University of Johannesburg Higher Degrees Committee. Two students will graduate during the May 2011 graduation ceremony. Two students will complete their studies towards the end of May 2011 and submit their dissertations.

A total of 31 students attended the various modules. A number of these students were from DWA and a number from the provincial environmental agencies.

Guest lecturers:

For Module 3, Ms Hermien Roux was involved in teaching and training of the students during the macro-invertebrate and water and habitat assessment section of the module.

For Module 4, Prof Janine Adams, Prof Brian Allanson, and Prof Gray Williams (Swire Marine Institute, University of Hong Kong) and Prof Richard Barnes (Cambridge University) were invited as guest lecturers during the course. They were also involved in the field work which forms an integral part of the module.

Mr Morne Viljoen presented the Law Module. He is a senior partner in a law firm in Gauteng and specialises in Environmental Law. The students thoroughly enjoyed the course and he was able to present them with many recent and relevant case studies as examples during the presentations and discussions.

For Module 6 the expertise of Mr Francois van Wyk from Randwater was used. He has many years of experience in water management at the largest water supplier in the country and his knowledge and expertise benefitted the students.

For Module 7 Mr Marius Snyders and Dr Ian Gaigher assisted Dr Vlok. Mr Snyders is an expert on wetlands and wetland rehabilitation and is currently employed by Sanparks as their wetland rehabilitation specialist (responsible for the whole of South Africa). Dr Gaigher has 45 years of experience in water related aspects and was involved in the formation of the Soutpansberg Biosphere Reserve. He was for many years a senior Professor and researcher at the University of Venda.

This process can only benefit the water sector in the long run and the network partners are of the opinion that the MSc course and short courses really fills a need in the water sector.

5.3 Project results achieved during FETWater Phase II, November 2007 to March 2011:

Year	Total	DWA	Other professionals	Women	Men	PDIs	Non PDIs
2008	12	2	10	4	8	7	5
2009	79	20	59	32	47	46	33
2010	31	7	24	13	18	12	19
2011	45	9	36	19	26	19	26
TOTAL	167	38	129	68	99	84	83

5.4 Visibility

A brochure detailing all aspects of the programme was sent to DWA towards the end of 2007. This document had final dates, course outlines, venues and accommodation options and other relevant information.

Network partners (Prof V Wepener, Prof N Smit, Dr Jan Roos, Dr P Fouche and Dr W Vlok) presented papers at the Sanparks Science Week Conference in April 2009; Annual Conference of the Parasitological Society of southern Africa in September 2009; and the annual Southern African Society for Aquatic Scientists Conference in June 2009. A number of the students enrolled in the FETWater modules and tutored MSc attended and presented research results. These students were Ms Sarah Dyke, Ms Sinazo Mngolozeli, Ms Hermien Roux, Mr Warren Aiken and Mr Piet Muller.

Module 4 on the ecology of estuaries and the nearshore marine environment has been presented in the Tsitsikamma National Park since 2009. During this course the three to four

postgraduate students from the University of Hon Kong (one of the top 20 internationally) also participated in the lectures and practical sessions. This provided both groups with the opportunity to learn of each other's research and perhaps more importantly, from each other's culture. The saltmarsh practical session was presented in Knysna Lagoon by Prof Brian Allanson (one of the most eminent freshwater and estuarine ecologists in South Africa) and during 2011 the students will have the unique opportunity to work with the world leading saltmarsh scientist, Prof Richard Barnes from Cambridge University. Indeed a unique opportunity to showcase South Africa's upcoming freshwater and wetland scholars.

5.5 Difficulties and problems encountered and measures taken:

Little problems with regard to the planning and completion of the modules were encountered. The lack of response from requests to evaluate the programme was the most serious problem encountered.

Attendance by some government officials remains a problem. It is worrying that the response from DWA is negative in some cases and very poor, nearly non-existing in general. Many DWA officials had registered over the period and then don't arrive at the course or will cancel at the last minute. Some senior DWA officials also indicated that they won't grant leave for a five-day period for people who want to attend and further their qualifications.

The courses were developed as short courses and splitting it into two three-day sessions would not be viable. Even for students doing the Masters degree, this will mean two trips to complete one module and costs for students and lecturers will increase dramatically.

5.6 Lessons learned and sustainability:

Based on discussions with many sectors within DWA it is evident that there is a need for the Masters degree. Future funding for the short courses can be a problem if the DWA don't buy into the program. Although the Learning Academy (DWA) has indicated interest in several of the short courses, internal factors have prevented officials from attending. It would appear that there is no coordinated structure within DWA when it comes to training and attendance of courses by professionals.

In an effort to address unnecessary duplication in short course content a meeting was held at the University of Cape Town (UCT), early September 2009, between Prof Wepener (University of Johannesburg), Dr Vlok (Network Coordinator) and Prof J Day (UCT) and Dean Ollis (UCT) in attendance. The course content was compared and a strategy agreed on to obtain greater synergy between the modules developed by UCT (as part of the RDM Network) and those developed by the Wetlands and Rivers Network. It was concluded that joint presentation of modules with similar content would be initiated e.g. exchange of staff to help with teaching, as well as the inclusion of RDM modules, where applicable, in the current programme mix of the tutored MSc at the University of Johannesburg. Mechanisms for recognition of module credits obtained at UCT within the Wetland and Rivers Network coursework MSc were also discussed. These were incorporated into a document outlining the potential options.

The Network wanted to ensure that the University of Venda implements the proposed Diploma and Bachelor's programmes as soon as possible. This will increase options for

students, especially those with insufficient qualifications to enrol for the Master's programme.

The Network is of the opinion that they are providing more opportunities to students to enroll. The fact that the Network offers the Master's degree on a part-time/short course model, makes it accessible to more students. The model is also something that not all Universities can offer and the Network ensures that more institutions are involved, that students from across the country can register and still complete the project in their own backyard. This model further ensures that supervisors and co-supervisors from different expertise fields can be used to ensure that the candidate do a project suited to his/her specific needs.

The Network acknowledge that there is some overlap in the modules that were developed, but do not see this as a problem, as certain aspects are given more emphasis in the University of Johannesburg (UJ) modules, whereas other aspects are given more emphasis in similar modules at University of Cape Town (UCT), but the fundamentals are covered in both these modules.

The envisaged accreditation of the UCT modules will allow students to complete similar modules either through UJ or UCT and get credits that are recognized at either institution. With similar modules being offered through UJ and UCT, it allows for a wider geographical spread for the teaching and capacity building.

The Network would like to work more effectively with the DWA Learning Academy.

In future both institutions, UCT and UJ, would like to see the development of modules at different levels, e.g. management level vs. technician level that carry different credits.

The development of material to assess potential participant's competency levels with basic skills such as map reading, working with numbers and graphs and scientific reading and writing and to build capacity in these fundamentals where it is lacking would benefit both programmes. This could be an online facility.

5.7 Annexures:

Appendix 5.7.1: Module 3: Monitoring of Rivers and Wetlands
This module is a very practical orientated module. It has a short introduction to the different indices and the students spend more time in the field learning to "do the work".

Appendix 5.7.2: Module 4: Estuaries and the Near-Shore Marine Environment
For Module 4 the following module outlines were submitted during FETWater Phase I and should be added to/read with the current submitted material:

Appendix 5.7.3: Module 5: Legislative aspects related to Rivers and Wetlands

Appendix 5.7.4: Module 6: Wetland and River Management
For Module 6 the following module outlines were previously submitted for FETWater Phase I and should be added to/read with the current submitted material:

Appendix 5.7.5: Module 7: Wetlands and River Remediation and Rehabilitation

CHAPTER 6

THE CATCHMENT MANAGEMENT AGENCY EXPERTISE DEVELOPMENT NETWORK

DR MARK DENT

6.1 The CMA Expertise Development Network aim:

The aim of this network is to develop the Catchment Management Agency related expertise needed for successful implementation of integrated water resources management (IWRM) in the SADC region. The focus of the network is on government, business and civil society, including academics.

In the time period since the CMA Expertise Development Network objectives were formulated, much has happened in the socio-political life of South Africa. As a consequence, the environment surrounding this Network has been exceptionally uncertain, complex and dynamic. This has meant that the five partners in the FETWater CMA Expertise Development Network have had to develop and display considerable flexibility, trust and understanding of each other and the project leader, in particular. The team has had to “*practice what it preaches*”, namely: highly adaptive management and rapid social learning. Through these experiences, the team has developed a sense of mission and destiny for the water reform process. In addition, the team has shown a deep commitment to the Network and the greater cause of water-related capacity building in South Africa. The narrative that explains the imperative for our change in operational tactics during the reporting period is explained below.

6.2 Description of project activities undertaken during FETWater Phase II, November 2007 to March 2011:

The other networks have a more conventional approach to capacity building which finds expression in lectures, seminars, short courses and post graduate courses. The recipients of the benefits of the training are thus called trainees. In the case of the CMA Expertise Development Network, we have conceived of our capacity building role somewhat differently to that of the other networks. We believe that the capability for CMA expertise already exists (albeit latent at this stage) in the body of CMA Sector Stakeholders; Government (especially but not exclusively DWA); Sector stakeholder advisors and Civil Society, to truly manage our common water resources in a sustainable; equitable and economically efficient, integrated manner. The CMA Expertise Development Network therefore focuses specifically on facilitating network formation and development to leverage and enhance the relational capital needed. It does this by working directly with individuals and groups as outlined below, and viewing them as partners in an exploratory, learning journey. This is done at the same time as we are fulfilling the more formal role of executing and reporting on our set deliverables.

The work of network development began in November 2007 with a launch workshop where we brought together advisors from a number of stakeholder sectors.

This was followed by a series of learning history workshops and more individual engagements with the Inkomati CMA (ICMA) Board and also ICMA Staff. The ICMA Board Chair Ms Patience Nyakane-Maluka is well placed to comment on the impact of this work by John Colvin, Sam Chimbuya, John Goss, Mark Dent and Mark Everard (of the Watercourse Team and now the FETWater Team).

A turning point in the development of the CMA Expertise Development Network happened when the partners met in Johannesburg on Saturday, 18th July 2009.

It was already becoming evident that the Network would have to step forward boldly and in faith to create opportunities for growth in our mission to develop CMA expertise. Previously planned pathways to securing the ear of stakeholder sector specialist advisors and also the ear of other FETWater Network Coordinators were being hampered severely by the uncertainty within the DWA on the question of CMAs. Furthermore, the suspension of the DWA Director General shortly after our July meeting effectively shut down those opportunities for capacity building that were opening up following the engagements that the Network Coordinator, Dr Dent had undertaken at the Water for Growth and Development (WfGD) workshop three weeks earlier.

The WfGD workshop had been organized with a strong sector theme. Discussions had been partitioned into sector specific sessions. Dr Dent presented a paper on IWRM and CMAs under the broad heading of cross-cutting issues. It was clear from the brief of the organisers and from the way the workshop was structured, as well as from the discussions that emerged during the workshop, that sectors were crucial to the success of IWRM, the CMAs and water management in South Africa. A strong theme that emerged from the WfGD workshop was the need for Water Demand Management (WDM) and in this regard the sectors would play a huge role. Another all-pervasive theme that emerged was the matter of knowledge and skills capacity. It also became clear that the time frames did not permit education and gathering of experience through the normal channels to be the only option. An exceptionally strong call emerged to fast-track learning. Dr Dent promoted the notion of the specialist advisors to stakeholder sectors. The CMA Expertise Development Network partners believe that the multi-sectoral crucible for social learning, the CMA, holds huge potential benefits for the Water Demand Management process and for coping with the knowledge demands of WDM.

The WfGD workshop indicated the value of both the work and the approach being adopted by the CMA Expertise Development Network.

As a result of the above meeting and insights developed through August 2009 the CMA Expertise Development Network made a most significant connection with the stream of efforts flowing from the Dinokeng Scenarios. This connection has seen Dr Mamphela Ramphele and her team and the CMA Expertise Development Network team working together to develop the concept and practice of "Walking Together for Water". Out of this has flowed several very high level meetings including a most successful meeting with the Minister of Water and Environment Affairs in November 2009; the emergent form of a very high level stewardship group drawn from Government, Business and Civil Society; and strong connections with a number of international figures. International approaches for funding for

a specific project related to “Walking Together for Water” which will greatly assist the managing of our common water resources through inclusive, integrated processes involving all stakeholders at all levels as envisaged by the excellent 1998 NWA, have also been made, arising out of this work.

A list of network activities:

- **The selection and recruitment of the learning community** by involving selected IWRM ‘champions’ and understanding their needs.
- **Analysis of the expertise development needs** and how these matched with the needs of the newly formed CMAs.
- **The ‘learning contract’** developed by, and to be serviced by, the learning community.
- **The development of the learning architecture and material.**
- **How the Network adapted the learning design** that has been developed through the British Foreign and Commonwealth Office (FCO)-funded Watercourse programme.
- **Facilitation of the Learning Communities:**
 - Specialist Advisors to Sectors
 - Inkomati CMA Governing Board (ICMA)
 - ICMA Senior Staff
- **Lessons learned from the process** in a document. This documentation will be a key element of the sharing of experiences and a means to communicate experiences to world class endeavours of a similar nature in other countries.
- **Support to the CMA Governing Boards on governance issues.**
- **Report on Australian Seminar Tour**
Through the work of FETWater and the CMA leadership Letters Dr Dent was invited by the International Centre of Excellence in Water Resources Management, the CRC for Irrigation Futures, the National Water Commission, the Natural Resources Commission of New South Wales, the Western Australia Department of Water, the Australian Water Association, CSIRO Water for a Healthy Country, CSIRO Land and Water and the University of KwaZulu-Natal to conduct a series of seminars around Australia in March 2008. 10 seminars were held in 6 cities during the visit. The report on this seminar tour formed part of the CMA Expertise Development Report series. Regular contact has been maintained particularly with Dr Keith Bristow, CSIRO.
- **Meetings with influential and knowledgeable contributors** to CMA Expertise. This is a short report which sketches some the details and the reasons for a number of *ad hoc* meetings and presentations that took place in the carrying out the networking activities of this project. Leverage and synergies are what one looks for in tackling a task as big as the CMA Expertise Development Network on a limited budget and with severe time constraints due to a very full academic schedule. Two of the primary reasons for most of these meetings were to introduce some of other aspect of the FETWater work and also to spread a new language describing paradigms that are used in many highly successful integration endeavours in business, but which one hardly hears in the realm of water management.
 - Meeting with Senior Anglo American Environmental Managers
 - Meeting with Dr D Roux Monash, Australian University in South Africa
 - Meeting with Dr M Burns Sustainability Science CSIR, Stellenbosch
 - Meeting with Dr C Colvin Groundwater CSIR, Stellenbosch
 - Meeting with Dr A Weaver Sustainability Science Consultant

- Meeting with Mr A Chapman, Sustainable Development Consultant, One World
- Meeting with Dr J. Smit, School of Architecture, Planning & Geomatics, UCT
- Meetings of the Umsundusi Catchment Management Forum (MCMF)
- **Presentations to schools on the BASINS 4 Schools River Health Initiative**
- **Meetings and presentation** to the United Nations University Regional Centre of Excellence in Environmental Education (UNU-RCE)
- **Interactive learning from maps to information.** This was conducted in partnership with:- Roger Davis, Isikhungusethu Environmental Service; Jim Taylor, Director of Education, Wildlife & Environment Society of South Africa (WESSA); Pat Hoffman, Wildlife & Environment Society of South Africa (WESSA)

2010

Synthesis report on key learning from research and network activities 2005 to 2011. The Network partners produced this report covering the Watercourse and the FETWater work to develop the Walking Together for Water initiative. The report also includes a design for leadership retreat for senior DWA staff based on these learnings.

The Network partners designed and developed the next phase of the Mvoti multi-stakeholder social learning and systemic dialogue including in the context of payment for ecosystem services. This was followed by intensive work on a report of developments in the context of the Mvoti pathfinder, September 2009 to January 2011. There was insufficient time to deliver any stakeholder workshops due to late signing of the contract.

The Network partners produced a synthesis report on key learning from the Watercourse and FETWater activities over the past three years. Due to late signing of the contract, there was insufficient time to plan and schedule a workshop to review lessons learned with CMA board members, sector representatives and DWA officials.

6.3 Project results achieved during FETWater Phase II, November 2007 to March 2011:

The capacity building approach of this network was based not on training but on networking, action learning, action research and trans-disciplinary research.

Engagement with Circle Capital to facilitate capacity building:

In light of the urgency and in view of the discussions above, the network partners realised that, if they were going to meaningfully advance the cause of capacity building in Sector stakeholders around IWRM and CMAs, they had to make some bold moves to break through the 'glass ceiling' into the very top echelons of business and civil society.

The CMA Expertise Development Network made a bold move and approached Dr Mamphela Ramphele (a key figure in the Dinokeng Scenarios) with our need. The aim was to utilise her good standing and wide network of leaders to encourage the top business and civil society leaders in South Africa to see the opportunity to create a regenerative economy through engagement in IWRM within the policy, legal and institutional frameworks that DWA has worked so hard to craft over the past 15 years.

Dr Dent met with Dr Mamphela Ramphele and Dr Alex Blumentals of Circle Capital on 20 August 2009. They discussed the water situation in South Africa and in the SADC region. In particular, the discussions focused on the opportunities afforded by the policy, legislation

and institutional frameworks introduced since 1994 for Sector groupings in business and civil society to engage in the capacity building for IWRM. There was agreement on the following:-

- that the challenge is so large that no single Sector, Government body or civil society group can possibly tackle it on its own;
- the urgency of the need for such ‘Walking Together for Water’;
- the key role that business, government, civil society could play in the wider transformation of South Africa into a regenerative economy if they ‘walked together’ for water ;
- the knowledge and capacity building enhancements that such a ‘Walking Together’ arrangement would bring;
- the mutual benefits that this could bring to all countries in the SADC region;
- the window of opportunity for FETWater afforded by Dinokeng and subsequent follow up; and
- in view of the above, that the challenge must be approached as a multi-sector and very serious process of continuous engagement.

6.4 Visibility:

The list of publications below is designed to compliment our direct engagement in capacity building endeavours. The full text of these publications appears in the annexures:-

- Water for Growth & Development Workshop Paper
- Governance for sustainable environmental management
- 1 book Chapter Mark Dent

All of the above publications have key elements which are designed to provide material to enhance the ability of CMA Board members to gain insight into their roles and responsibilities. In addition they are designed to take up synergistic opportunities (funded by other sources) to engage with senior personnel in DWA. Given the magnitude and urgency of the challenge and the small project budget it has been necessary to leverage off every opportunity to influence and build capacity. We believe that this is in the true spirit of the FETWater networking initiative as was intended by those who conceived it.

To start to develop an approach to ‘Walking Together’ in the context of water, a series of meetings was arranged in early September. These included meetings between the CMA Expertise Development Network partners and Dr Aleks Bulmentals and then with an expanded group that included Mr Rashid Khan (Director of Water Affairs, Western Cape Region) and Mr Dennis Laidler (Western Cape Provincial Government) and Dr Blumentals.

The transformational change strategic process was broadly mapped out to include sector leadership in all three broad categories of government, business and civil society. The Berg River Improvement Programme (BRIP) is emerging as the prototype for practicing the multi-sector engagement for social learning that is at the core of IWRM capacity building.

Dr Ramphela is working steadily with a wide range of informal meetings and communications to engender high level buy in to the concept of supporting the policies, legislation and institutional frameworks developed by DWA. These and the subject of water as a cornerstone of a regenerative economy she sees as valuable practice field for the

‘Walking Together’ envisaged in the Dinokeng scenarios. The outcome of this new energy will be wise, effective and timely transformation which after all is what we are all striving for.

The Network worked intensively with a network of partners across universities and NGOs in South Africa, and with international partners in the UK Australia and China.

6.5 Difficulties and problems encountered and measures taken:

In the introduction and context to this report we describe the difficult operating environment which necessitated a change in our tactics to achieve the broad aims of the Network. The route that these problems have forced us to take has led to significant gains in terms of sustainability of the capacity building and resources for capacity building.

The question could however be asked: What was holding things up?

- Some significant players in DWA believe that DWA can manage all on its own. In this they were getting confused in the interpretation of their mandate of responsibility as maintaining bureaucratic control as opposed to developing ‘response ability’ in stakeholder sectors and government combined.
- The links between Water Demand Management (WDM) and the potential stakeholder processes in the CMAs were not being seen by many role players.
- Up until now, the dangers of the sectors making water-based strategic growth plans alone had not been seen, or at least the potential IWRM activities in CMAs were not being seen as a solution to unrealistic demands.
- Water Allocation Reform (WAR) appears to be stuck and, unfortunately, it is still being viewed as necessary to complete the WAR before CMAs can really begin to function. Future revenue streams that are supposed to come from sectors to fund the operation of CMAs are tied up with the water allocation reform question.
- The practice of outsourcing to consultants is problematic particularly when the Terms of Reference and study boundaries need to be very clear and hence reductionism is proliferating and holistic integrated endeavours hamstrung.
- The collective body of sector stakeholders, including government, do not effectively own the key information. They may nominally own it but, in practice, this means very little. The information power is predominantly in the hands of the consultants who regularly get to do the analysis work on specific catchments and have effectively created a customer ‘lock-in’ situation.
- Sector stakeholders, particularly the formerly advantaged, appear reluctant for real change and re-allocation. They are playing a particularly astute game of slowing down the pace of real change, all in the name of moving ‘sensibly’ to avoid ‘chaos’. In this, they appear to be being assisted by the DWA who appear to not be openly encouraging and facilitating meaningful sector engagement in the social processes of allocation in and through the CMAs.

The difficult operating environment of the stop-start nature of the FETWater programme; the development in DWA and the paralysis of the Inkomati CMA, necessitated a change in the Network’s tactics to achieve the broad aims of the Network. The route that these problems have forced the Network to take has led to significant gains in terms of sustainability of the capacity building and resources for capacity building in the longer terms.

Following the very positive meeting with Minister Sonjica in November 2009, DWA (Western Cape) was tasked with putting together a funding package for the development of the Walking Together for Water initiative as a next step in the development of the Network. Despite the private sector coming to the table with funding, DWA failed to deliver on its commitment.

DWA officials in Pretoria also offered funding to support the development of the next stage of the Mvoti WUA business planning process as part of a wider international bid for Ecosystem Services for Poverty Alleviation (ESPA) funding, but again failed to deliver on these commitments.

Both of the above are addressed in the relevant reports, as part of a wider pattern of behaviour by DWA, which demonstrate significant barriers to supporting the kinds of systemic innovation needed to make collaborative and adaptive water governance a reality.

The other main difficulty encountered was the very late signing of the contracts. This made scheduling of Network activities extremely difficult and resulted in an unacceptably pressure on the Network to deliver 12 months approved work in three months' time.

6.6 Lessons learned and sustainability:

The water policy and legislation that inspired the study tour by UNESCO and the WMO in 1998, is still able to inspire change, this time in the business community. They are, we believe, the key to sustainability of this capacity building.

For the project team the lessons learned have been to be flexible and adaptive to the dynamic situation. We have also learned that to make things happen it is necessary to be bold in our efforts to position IWRM in its rightful place in a range of other discourses namely:-

- sustainability;
- sustainable value creation;
- risk;
- biodiversity conservation;
- climate change adaptation;
- creating a regenerative economy and
- the “*Walking Together*” Scenario from Dinokeng,

We have learned that there is an enormous latent desire in South Africa for bold leadership to strike out with intent and determination to transform our country into what it could be in the water field. More importantly we have learned that there is an encouraging acceptance that IWRM in the multi-sectoral crucibles of learning and that the CMAs are a key way for government, business and civil society to practice “*Walking Together*”.

We have learned from the instability of the situation regarding DWA’s view and funding of the CMAs that for the FETWater Programme to make an impact we have to have sustainable CMAs in place. We know that the 1998 National Water Act, mandates funding by the Sectors who make up the CMA. Potential funding for sustaining and widening our capacity building

endeavours is therefore critically dependant on the top leadership in the various Sectors of our South Africa society buying in to the concepts emphasised above.

Despite significant investment in the sustainability of Network activities, failure of DWA to come to the table to provide match funding in a timeous fashion has been a significant barrier.

6.7 Annexures:

- Appendix 6.7.1:** Development of pathfinder activities in the Berg catchment, September to December 2009
- Appendix 6.7.2:** Development of pathfinder activities in the Berg catchment and wider networking activities, January to March 2010
- Appendix 6.7.3:** Synthesis report of the work of the CMA Expertise Development Network
- Appendix 6.7.4:** Synthesis report of the work of the ICMA Watercourse and FETWater activities
- Appendix 6.7.5:** Report on researching transdisciplinary approaches in the Mvoti sub-catchment as a means to progress an ecosystem services approach to poverty alleviation in South Africa.

CHAPTER 7

THE CATHCMENT MANAGEMENT STRATEGY DEVELOPMENT NETWORK

MR JOHNNY BEUMER

7.1 The aim of the CMS Development Network is to ensure that Catchment Management Agencies (CMAs) comply with the National Water Act (NWA) requirement of establishing catchment management strategies (CMSs). The CMS Development Networks was initially part of the CMA Expertise Development Network. Early during the course of FETWater Phase II, it was decided to rather form a separate network with its own specific objectives.

In order to achieve this, the CMS Network set for itself two main objectives, namely:

1. To build capacity among the involved role-players of already established and functional CMAs;
2. To establish mechanisms that would spread the knowledge further to all the CMAs in the country.

Four courses on CMS Development were planned to achieve objective 1.

For CMS development training and capacity building it was envisaged to progressively introduce academic institutions to the course material, train the trainers, to enable them to take responsibility for lecturing this material to their students in integrated water resource management. This would then serve to achieve objective 2.

7.2 Description of project activities undertaken during FETWater Phase II, November 2007 to March 2011

2008

CMS Development course.

A five day course was held for the Inkomati CMA stakeholders in Nelspruit. The attendees represented the following institutions:

- Catchment Management Forums;
- Water User Associations;
- Irrigation Boards not as yet transformed into WUAs;
- Provincial and Local Authorities;
- DWA Regional Office;
- University of the Witwatersrand.

For the Inkomati course, the Network was advised by the Inkomati CMA to invite the University of the Witwatersrand and to sponsor one of its professors in the field of Integrated Water Resource Management for attending the course. The Inkomati CMA had a close relationship with the Witwatersrand University and Dr Kevin Rogers knew the area well. It was therefore agreed to invite Dr Rogers and he attended the course for the full duration. Dr Rogers undertook to incorporate the CMS Development course material as introductory lectures at undergraduate level and specific elements for a new Masters level course on

Natural Resource Management.

2009

CMS Development course.

A four day course was held for the stakeholders of the Breede-Overberg CMA. The candidates represented a similar mix of institutions as in the case of the Inkomati course but this time the course was attended by a number of professional service providers who were interested in assisting the Breede-Overberg CMA with the tasks.

For the Breede-Overberg course, all four academic institutions in the area were approached:

- Cape Town University;
- Stellenbosch University;
- University of Western Cape; and
- Cape Peninsula University of Technology.

Of these institutions, the University of the Western Cape and Cape Peninsula University of Technology showed an interest to become involved. It was therefore decided to sponsor both these institutions in terms of free attendance of the course. The University of Western Cape had already incorporated some of the CMS Development course material into its post graduate courses.

2010

CMS Development course.

This course was planned for the three WMAs in the Kwazulu Natal Province.

The following tertiary institutions in Kwazulu-Natal were approached:

- University of Zululand (UZ);
- Durban University of Technology;
- University of Kwazulu Natal (UKZN);
- Mangosuthu University of Technology.

An invitation letter, which explained the objectives of the course and the longer term aims was drafted and sent out to each of these institutions. Two of the institutions expressed their interest and desire to be sponsored to attend the course, namely the University of Zululand and the University of Kwazulu Natal. Although the budget allowed for the sponsoring of only one person, it was decided to give both UZ and UKZN the opportunity to send a representative, fully sponsored by the project.

The Assagay Hotel near Hillcrest was booked. This venue would create an “island situation” for the training. The same presenters as the group for the Breede-Overberg course were available and willing to participate in this course.

7.3 Project results achieved during FETWater Phase II, November 2007 to March 2011 (Please provide statistics):

Both the Inkomati and Breede-Overberg CMS Development courses were highly successful. The Inkomati course was attended by 34 trainees. The Breede-Overberg course was attended

by 39 trainees.

Both the University of Witwatersrand and the University of Western Cape gave the undertaking to incorporate the CMS Development course material into their post graduate courses.

The contract for the Kwazulu Natal course was split into two parts as a result of budget constraints and the first part, which included the preparation of training material, was completed. The second part of the contract was not approved on time and the course had to be cancelled. It is expected that the University of Zululand and the University of Kwazulu-Natal will also buy in after the presentation of the CMS Development course in the Kwazulu-Natal Province.

Year	Total	DWA	Other professionals	Women	Males	PDIs	Non PDIs
Inkomati	34	2*	32	14	20	28	6
Breede-Overberg	39	6*	33	17	22	24	15
TOTAL	73	8*	65	31	42	52	21

7.4 Visibility:

FETWater banners were displayed at the CMS courses.

The CMS Development component of the FETWater website were up dated and several people who wanted to see the course material were referred to the website.

7.5 Difficulties and problems encountered and measures taken:

There had been two major problems for the Network, namely the funding available for a much shorter period than the planned and approved 12 months' work plan, and secondly the DWA Regional Office Manager who was uncomfortable to sign the letter of invitation.

When the Network Coordinator phoned Mr Vusi Kubheka, DWA Regional head of the Kwazulu-Natal Regional Office, in November 2008 to get his confirmation that the Network could go ahead with the course, he was positive and welcomed the fact that Kwazulu Natal would be the next area where the course will be presented. However, when the draft letter of invitation for the stakeholders to attend the course was submitted to Mr Vusi Kubheka, he did not sign the letter because "nobody in DWA top management has spoken to him in this regard or consulted him".

The problem had been referred back to DWA head office and discussions were held. The DWA also expressed in principle a problem that course fees would be charged for its officials to attend a FETWater training course. The Department's position was that the FETWater programme was already sponsored by the Department and if the Department had to pay for course fees for its officials, they would pay twice for the same service. This position of DWA resulted in a deadlock situation between the implementing agent and the service providers. After the formal withdrawal of the service provider, a further meeting between the DWA, WRC

and the service provider was held in January 2010, where an agreement was reached. The Kwazulu-Natal course that was scheduled for November 2009, was now planned for May 2010.

At the FETWater annual stakeholder meeting in February 2010, the FETWater Steering Committee decided that they will no longer make use of the current Network partners and requested the University of Western Cape and the Cape Peninsula University of Technology to take the responsibility for the CMS Development Network.

7.6 Lessons learned and sustainability:

The course on catchment management strategy development is both beneficial and necessary for the integrated management of our water resources. However, the process of shifting the goal posts by DWA, one of the sponsors, during the project implementation carries financial and legal risks to the service providers and the credibility of the WRC, DWA and the course as a whole.

The hourly rate limitation of R400.00 by the WRC is not a market related rate at all, especially for companies who are dependent on their profits to survive. Furthermore, this rate has not escalated over the full duration of the FETWater Phase II period from 2007 to 2011, despite the inflation rate. The situation might be somewhat different in academic institutions, but it certainly hurts the private sector if it is expected from them to continue at this remuneration.

7.7 Evaluation and recommendations:

Participants who attended the course completed a course evaluation. A summary of some of the many ideas follows:

- The two courses that were held were a great success and it was recommended that the two remaining courses should be held as soon as possible;
- Further knowledge transfer apart from the FETWater courses should take place through formal learning by academic institutions, stakeholder advisor interactions, cross CMA learning, staff movements between CMAs and the possible establishment of an association of CMAs.
- Proper representation from municipalities needs attention. Assistance from SALGA may be necessary in future.

7.8 Annexures:

Appendix 7.8.1: Brochure developed for training course

Appendix 7.8.2: A Workbook: Guidelines for Catchment Management Strategies in South Africa

Appendix 7.8.3: Course on Catchment Management Strategy Development for the Kwazulu Natal Water Management Area

CHAPTER 8

WATER RELATED DISASTER MANAGEMENT NETWORK

MR ANDRIES JORDAAN

8.1 The Water-related Disaster Management Network aims to provide in educational and training needs to increase capacity amongst professional decision makers and volunteers through linkages with educational institutions and support in education and research.

The objectives of the Network are:

- To mobilise and link experts in the fields of water related disasters;
- To identify training, education and research needs in WRDM;
- To link national and international experts;
- To support education, training and research in WRDM where needed.

8.2 Description of project activities undertaken during FETWater Phase II, November 2007 to March 2011:

2008

An audit of relevant WRDM training and education in terms of short courses and materials in South Africa for the private and public sector was developed. The full report has been made available on the FETWater website.

Two workshops were held with network members in order to exchange ideas and to evaluate program progress.

The first workshop was held in Pretoria in October 2008. There was an overview of the deliverables of 2008 and certain issues and topics were dealt with. Geraldine Schoeman discussed the 2025 Vision for HRD Capacity Building and Skills Development Plan for the Water Sector. Dr Dewald van Niekerk, University of North West, presented his FETWater/WRDM Network research project report.

The second took place in November 2008 in Germany, where Mr Andries Jordaan met Prof Janos Bogardi, Dr Fabrice Renaud, Ms Vilma Hossini, Dr Juan Carlos Villigran, Dr Thomas Zocke and Prof Dusan Sakulski at the United Nations University. This visit resulted also in the development of a short course on vulnerabilities towards disasters that was presented in South Africa during the first week of July 2009. A delegation of 3 persons from the UNU also attended the WRDM Network workshop on 28 May 2009 as a result of this visit.

Contribution towards coordination and monitor of early warning systems for water related disasters which will create a database for all information regarding WRDM.

This was completed in December 2008. The objective is to advance and communicate knowledge on disaster risk reduction through early warning, disaster prevention and mitigation, disaster preparedness, response, and recovery. Using an all-hazard and interdisciplinary framework, the Centre fosters information sharing and integration of

activities among researchers, practitioners, and policy makers from Africa and the rest of world; supports and conducts research; and provides educational opportunities for the next generation of disaster risk reduction scholars and professionals. The Centre focuses its research on early warning, mitigation and prevention in the following specialist fields:

- Floods and water pollution;
- Droughts;
- Fires;
- Food security;
- Conflict and the impacts of violent conflict on vulnerabilities;
- Community and national vulnerabilities

Identified gaps and duplications in relevant university graduate modules on WRDM at all universities in South Africa. Recommendations should improve quality and availability of current WRDM graduate training in a tertiary education setting including diplomas, undergraduate and post graduate degrees. The full report is available on the FETwater website. Audit results shows that all 23 universities are offering some courses and modules with water or hydrology content curriculum but only a few are offering courses, modules and programmes focused on relevant WRDM training and education courses and materials. The audit reveals that there is no University with a Faculty, School or Department for Disaster Management or WRDM but Universities have established Units, Centres or Institutes under these faculties, schools or departments which run academic and research programmes in Disaster Management and WRDM training and education courses and materials. It also reveals that Academic and Research programmes in relevant WRDM training and education are at diploma, undergraduate and post graduate level and short courses although the majority are running these programmes at post graduate level.

The audit showed that most of the units, centres and institutes running WRDM research and academic programmes are in need of adequate staff with a strong knowledge and research base in the field of disaster management to initiate and sustain university WRDM training and education courses and materials. All Universities which are not running Disaster Risk or WRDM have Centres for Environmental Management or faculties, schools, departments, units, centres or institutes which can easily include Water Related Disaster Management (WRDM) training and education courses and production of materials in their curriculum.

This research project made recommendations on how to overcome the current gaps and duplication that exist and how to improve quality in relevant graduate modules in WRDM training and education through increased collaboration, consultation, networking and funding at institutional and national level.

Identified training needs for RWDM amongst all sectors in South Africa

This deliverable was undertaken by the National Disaster Management Centre (NDMC). They took full responsibility and no financial support from FETWater was necessary. The NDMC appointed a private company to conduct the research at a cost of more than R300 000 and the results are available at the NDMC.

Two workshops held with network members in order to exchange ideas and to evaluate program progress. This workshop was attended by representatives and experts from the

United Nations University. Future collaboration with UN organizations and international experts working in Water-related disaster were discussed and agreed upon.

Progress with mentorship for five Masters students busy with WRDM research

The following students are being supported in their WRDM research:

M E Chirashi	Flood disaster risk reduction in the Lower Zambesi River by the creation of an inland navigable waterway.
O Kunguma	Alleviating effects of water scarcity on rural women in Kadoma Battlefields Zimbabwe through traditional mitigation strategies
T Mugogovhali	Using community-based strategies to mitigate drought in Makhado municipality
S Nkoana	Artificial neural network models for flood disaster early warning system
V Nonjola	Using GIS and remote sensing as tools for mapping and assessing flood vulnerability in Taung, North West Province

Development of an information system for WRDM which includes computer hard-and software, as well as input from knowledgeable experts for information system development. The execution of this depends on the expert inputs of Prof Sakulski. The University of the Free State offered him the necessary accommodate. In order to support the DWAF early warning system, the software package Web mathematica was needed together with appropriate hardware. Prof Sakulski is primarily responsible for the maintenance of the system but the fact that it is now located within the disaster early warning centre open the opportunity for students to get the necessary exposure to the program and its applications.

Development of specialist modules for WRDM at Masters level through the use of a peer review panel. The development of a master's module with a focus on water related disasters (NQF level 8) was a need identified by current masters students and specialist already in 2007. The module is prepared and will be submitted to the Faculty Board of the Faculty of Natural and Agricultural Sciences at the University of the Free State for final approval. This module will be lectured as an elective model in the current disaster management Master's program at the University of the Free State and then made available for use by all universities in South Africa. A masters degree in Water Management is being developed. The WRDM module will be used as one of the modules in this new degree. Specialists inputs for the development of this module was obtained from Prof Sue Walker, Prof G Viljoen, Prof D Sakulski, Mr A Jordaan, Mr C Swiegers, Mr S Steyn, and Me G Schoeman.

2009

The development and finalisation of training material for a five day course and a three day course. The Network managed to obtain the expertise of the United Nations University and other UN experts. Each expert developed a specialist module for the course. The course consists of the following modules:

- Weather: Eugene Poolman from the S.A. Weather Service (SAWS) and Prof Sue Walker (UFS).
- Drought: Prof Sue Walker (UFS), Dr Herman Fouche (Agricultural Research Council)(ARC) and Mr S Steyn (UFS).

- Floods: Prof G Viljoen (UFS), Mr C Swiegers (Water Engineer) and Dr H Booysen (Netgroup).
- Water Contamination and Water Diseases: Prof R Bragg (UFS).
- The editing and re-writing of the course material according to HEQA-guidelines, is done by Me Geraldine Schoeman.

Workshop with specialists in Bonn, Germany. Visit to UN Water Decade and UNU-EHS: As a result of linkages between UFS-Dimtec and UNU-EHS the FETWater specialists were invited to visit the UN offices in Bonn. Mr Mmaphaka Tau (Senior Manager: Disaster Management Capacity Builder and Research – National Disaster Management Centre), Mr Chris Swiegers and Mr A Jordaan represented FETWater in Bonn. The purpose of this visit was to link South African experts in WRDM with international experts working in the same field. The following meetings were held:

- Cologne flood protection centre (22/09/09);
- Meeting with Ambassador for Congo Brazzaville (22/09/09);
- Meeting with the German Committee for Disaster Reduction (23/09/09);
- Meeting with United Nations: Water Decade Programme on Capacity Development (23/09/09);
- Meeting with UNU staff (23/09/09);
- Meeting with UN spider (24/09/09);
- Meeting with UNISDR (24/09/09);
- Meeting with Bonn University (25/09/09)
- Meeting with the Federal Office of Civil Protection and Disaster Assistance (25/09/09);
- Attend the signing of MOU between the UFS and UNU (25/09/09);
- Meetings at University of Novi Sad (i.e. Faculty of Technical Sciences and Department of Environmental Engineering) (28/09/09);
- Meeting with the Centre for Flood Prevention and Disaster Management of the South Eastern European Area (29/09/09)

The development of an information system for water related disasters based on the straw dog systems of Department Water and Environmental Affairs, which includes computer soft and hardware as well as professional support and inputs from specialists. The Web-Mathematical III Software Program has been purchased. This open-source mathematical program is the best of its kind in the world and is now accessible to students and experts.

Finalisation of five day and three day course material on WRDM

Experts completed the modules and identified key-issues for the course. They also identified the need for co-ordination between government departments and municipalities. The first training course was planned for 2010 for municipalities in North West Province.

Workshop with specialists in Bonn, Germany. Visit to UN Water Decade and UNU-EHS

As a result to the visit to Bonn, the UNU and UN-Spider (United Nations Platform for Space-based Information for Disaster Management and Emergency Response) decided to visit South Africa in the first quarter of 2010 in order to participate and provide training to experts in the field of Water Related Disaster Management. UN-Spider also committed themselves to the development of a short course and Master module in space-based information

technology. Mr A Jordaan was invited to visit UN-Spider in Bonn during 2009 to finalize the contents of the new Masters Module and short course to be presented in Africa in 2010.

The Delegation learned much in terms of Water and Flood Management and the visit contributed greatly to increased knowledge and understanding to how WRD are managed in other parts of the world. Good linkages were also established.

Development of information system for Water related Disasters - based on straw dog systems of DWA which includes computer soft and hardware as well as professional support and inputs from specialists.

Prof Sakulski is developing and maintaining the information system. This program is instrumental in using and linking the straw-dog system of DWA in order to increase accessibility to disaster early warning to the public of southern Africa. Prof Sakulski and Mr A Jordaan trained 65 masters students during 2009 in the use of information systems and data management for disaster risk reduction. Another 50 students are to be trained during February 2010 in the use of these early warning data and information systems.

2010

Development of information system for disaster manager scientists and practitioners.

The websites <http://dimtecrisk.ufs.ac.za> and <http://dimtecrisk.ufs.ac.za> were developed during the past two years and are already in use by several scientists, lecturers and practitioners. The website use the main server from the University of the Free State and the software (webmathematica) purchased with FETWater funding is installed on the University server. We negotiated the services of the “superfast computer” of the University to be used for the mathematical calculations that are conducted “on the fly”. The web facility is currently used to display the disaster risk assessment results for the Northern Cape Province. Continuation of research and updating of data is key to the success of the program. We negotiated with the University of the Free State to pay the annual license fee for the software (R20 000.00 per annum) and we are currently in negotiations with the Department of Agriculture to fund one full time researcher who will be responsible for data capturing and updating.

Training course to officials and practitioners at district and municipal level in the field of disaster management. The course was postponed due to the uncertainty of available funding. We were requested by the Mopani District Municipality to present the course to personnel from the municipalities in that region. Towns included **Tzaneen, Baphalaborw, Giyani, Letaba and Maruleng**. The disaster manager at Mopani DM requested us to present the course after the municipal elections and a date was set for the second week in June 2011.

Meeting with DWA after floods in the summer rainfall areas in South Africa 2010/11. Prof D Sakulski, Mr C. Swiegers and Mr A Jordaan spent two days during January 2011 discussing water related disasters, specifically the floods in South Africa, with professionals at DWA and the National Disaster Management Centre (NDMC). We found the poor management and the lack of coordinated planning during the height of the floods alarming. Neither the disaster management personnel at the NDMC nor the disaster management section at the DWA were activated and informed about the floods in South Africa. Few informed professionals at DWA

could provide us with information regarding the floods and we were shown the management system of the big dams by the Engineer section.

We came to the conclusion that disaster management is under staffed and the few people at the NDMC and at the disaster management section at DWA do not have the capacity to handle major disasters.

8.3 Project results achieved during the FETWater Phase II, November 2007 to March 2011:

Experts completed the modules and identified key-issues regarding WRDM issues for the course. They also identified the need for co-ordination between government departments and municipalities. As a result of this, the project is not fully completed as the necessary buy-in from government institutions is still in process.

As a result to the visit to Bonn, the UNU and UN-Spider (United Nations Platform for Space-based Information for Disaster Management and Emergency Response) decided to visit South Africa in the first quarter of 2010 in order to participate and provide training to experts in the field of Water Related Disaster Management. UN-Spider also commits themselves to the development of a short course and Master module in space-based information technology. Mr A Jordaan was invited to visit UN-Spider in Bonn during December 2009 to finalize the contents of the new Masters Module and short course to be presented in Africa in February 2010.

The delegation learned much in terms of water and flood management and the visit contributed greatly to increased knowledge and understanding to how water related disasters are managed in other parts of the world. Good linkages were also established. In the process to develop an information system for water related disasters it became clear that this open-source mathematical program is a powerful tool to increase the accuracy of quantitative risk assessments. Prof Sakulski is under contract from the National Disaster Management Centre to provide early warning indicators for South Africa and this program is instrumental in using and linking the straw-dog system of the Department of Water Affairs in order to increase accessibility to disaster early warning to the public.

	Total trained	DWA	Other professionals	Women	Men	PDIs	Non PDIs
WRDM training Western Cape	27	4	23	8	19	17	10

8.4 Visibility:

FETWater is shown on the newly developed website and more than 150 masters students from 15 African countries were exposed to the website during lectures. The FETWater programme and how it is using networks as a method for capacity building was also explained to the students during contact sessions.

During the meeting in Bloemfontein between the experts in WRDM and the UNU lecturers, the role of FETWater, including the FETWater video, was presented to the overseas delegation.

The FETWater delegation from South Africa reported to all the contacts in Europe about the FETWater activities in South Africa and the financial support received from FETWater in making it possible. Prof Janos Bogardi, one of the initiators of the FETWater program, was very pleased to also host the delegation in Bonn.

The FETWater banners were exhibited and pamphlets were handed out to more than 300 delegates at the annual DMISA conference in Durban.

A FETWater exhibition was held at the ISDR international conference in Welkom.

8.5 Difficulties and problems encountered and measures taken

The changing budget and insecurity of continuation of the programme make proper planning nearly impossible.

The development and finalization of the short course material took longer than expected due to interest shown by government departments in the course material.

Experts in the field of water related disasters are over-committed and scarce in South Africa. Availability and coordination of their diaries in order to obtain their contributions are a challenge.

8.6 Lessons learned and sustainability

Availability in experts in WRDM in South Africa is very limited.

It is very difficult to motivate experts to participate in the FETWater activities, since they are all already overloaded with work because of a lack of expertise in South Africa.

8.7 Annexes

Appendix 8.7.1: Masters degree in Water Related Disaster Risk Management, NQF Level 9

Appendix 8.7.2: Report on official visit to Bonn, Freiburg and Serbia

Appendix 8.7.3: Capacity audit

Appendix 8.7.4: Brochure 1

Appendix 8.7.5: Brochure 2