THUKELA WATER PROJECT DECISION SUPPORT PHASE

RESERVE DETERMINATION MODULE
CAPACITY BUILDING AND TRAINING REPORT

March 2004

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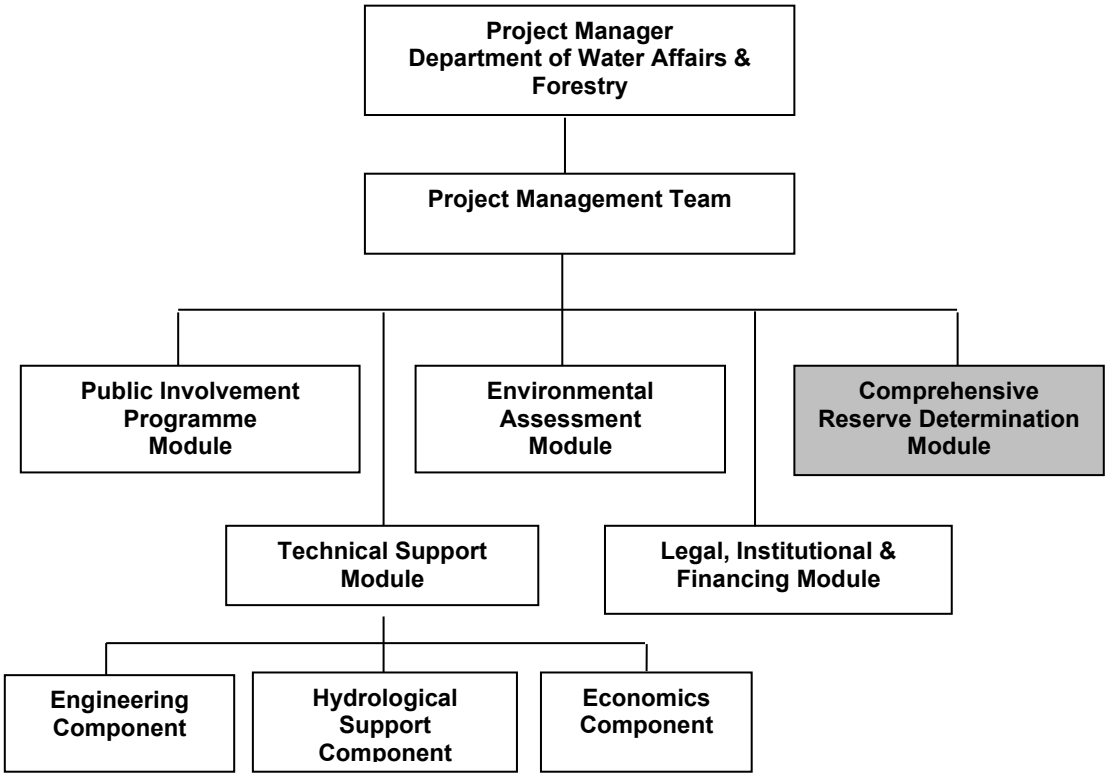
STRUCTURE OF DECISION SUPPORT PHASE



DEPARTMENT OF WATER AFFAIRS & FORESTRY
NATIONAL WATER RESOURCES PLANNING

THUKELA WATER PROJECT DECISION SUPPORT PHASE
RESERVE DETERMINATION MODULE
THUKELA SYSTEM CAPACITY BUILDING AND TRAINING REPORT

IWR SOURCE-TO-SEA **MARCH 2004**

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EXECUTIVE SUMMARY

The Thukela study provided a unique opportunity to undertake training and capacity building activities. One of the components of the Thukela Reserve determination module was therefore a capacity building exercise to try and extend the current specialist skills base in Reserve Determinations. Trainee and mentor teams were identified at the outset of the study, and training was primarily conducted through workshops, field trips and a final 'wrap-up' training session in the last quarter of the study. The training in each component, e.g. hydrology, water quality, estuaries was conducted following the most relevant format to that component. Common objectives, assessment criteria and reporting structures were distributed to all mentors at the beginning of the study, so as to work toward a common goal.

This report therefore presents training reports from each mentor (Sections 2–9), and includes contributions from trainees. Reports written by trainees are included as appendices. An important component of training evaluation was the preparation and assessment of trainee questionnaires distributed at the final training workshop in October 2003, and submitted anonymously (if so required) to an independent assessor. Results are shown in Section 10 of this report.

Section 11 concludes the report, and lists the main recommendations for future training. These can be summarized as follows:

- Budgets should be allocated specifically for training in future Reserve studies.
- Trainees and the client must have realistic expectations of the training process. The expectations must therefore meet the budget and skills level of the trainees.
- A combined rivers and estuaries training session should also be conducted at the outset of the study.
- All trainees should be involved from the beginning of the study, so as to be exposed to all the preparatory work before workshops and field surveys are initiated.
- The training programme must address the long pauses between workshops, meetings and field surveys, which leads to fragmentation of the training process.
- If Reserve training is to be successful, follow-up training e.g. inclusion in subsequent Reserve studies, should be offered to trainees. Trainees working on subsequent studies should be carefully selected, particularly in terms of specialist field and time they will be able to commit to the project while still fulfilling their other work commitments. Additional exposure and training is critical to expanding the specialist skills base in South Africa.
- More time and budget must be allocated to practice and proper learning. Due to deadline constraints and the pressures of a workshop environment, there is not enough time for trainees to practice on associated case studies, so as to develop their skills. It is possible that this type of training should be conducted outside of a specific Reserve study, but should be seen as a development tool for trainees specifically wanting to train as Reserve specialists.
- Trainees must be carefully selected. A recommendation is that DWAF: RDM Directorate develops a database of available trainees for Reserve studies – the inclusion of trainees on this database should be according to a set of coherent guidelines.
- Trainees must be encouraged to be proactive in their inclusion in future studies. A suggestion was that the Thukela trainees (either individually or as a group) approach the RDM Directorate with the request to be included on future Reserve studies.
- It must be acknowledged that there are two levels of training. (1) Specialist training, so that the trainee is proficient and has some experience in their particular field, and (2) application and further development of this specialist training and knowledge to the Reserve process.

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

DWAF	Department of Water Affairs and Forestry
IFR	Instream Flow Requirement
IWR	Institute for Water Research
RDM	Resource Directed Measures
SPATSIM	Spatial and Time Series Information Modelling
TSOFT	Time Series Display and Analysis Software
WRC	Water Research Commission

1 INTRODUCTION AND ASSESSMENT METHODS

1.1 BACKGROUND

The Reserve Determination module (Module 3 of 5 for the Thukela Water Project Decision Support Phase (TWPDSP)) was designed, *inter alia*, to meet the requirements of the *National Water Act No 36 of 1998*, which involves quantification of the water resource required to meet objectives for the Thukela system. In order to meet these requirements, a specialist support base is needed. The need for more trained Reserve determination specialists has become apparent and has been recognized by both the Department: Water Affairs and Forestry (DWAF) and service providers who have been involved in developing Reserve determination methods. It was recognised that the Thukela study provided a unique opportunity to undertake training and capacity building of identified trainees, and it was therefore agreed that one of the components of the Thukela Reserve determination module would be a capacity building exercise to try and extend the current skill base. Trainee and mentor teams were identified at the outset of the study, and training was primarily conducted through workshops, field trips and a final 'wrap-up' training session in the last quarter of the study. The training in each component, e.g. hydrology vs. water quality vs. estuaries, was conducted following the most relevant format to that component, resulting in a range of reporting formats depending on the training module. Common objectives, assessment criteria and reporting structures were distributed to all mentors at the beginning of the study, so as to work toward a common goal.

1.2 MENTOR AND TRAINEE TEAMS

The following mentor and trainee teams were identified at the outset of the project. Teams are listed per speciality field, and the affiliations of the mentors and trainees are listed for the project period.

- **Hydrology:** Prof Denis Hughes (Institute for Water Research (IWR), Rhodes University) and Ms Sihle Bukhosini (nee Ms Shange) of Umgeni Water.
- **Geomorphology:** Dr Roy Wadeson (private consultant, previously with IWR Environmental in Pietermaritzburg) and Mr Malixole Soviti of the Geography Department of Rhodes University. Mr Soviti completed his M Sc and moved on to a lecturing post at the University of the Transkei in 2002/2003.
- **Water quality:** Dr Patsy Scherman (Coastal and Environmental Services, previously of the IWR, Rhodes University) and Ms Ntomboxolo Valisa, a technician at the IWR, Rhodes University. Ms Valisa registered as a B Sc student in 2003.
- **Macroinvertebrates:** Dr Chris Dickens and Mr Tobile Bokwe (trainee), both of Umgeni Water.
- **Estuaries – macrophytes:** Dr Janine Adams and Mr Phumelele Gama (trainee), both of the University of Port Elizabeth's Botany Department.
- **Estuaries – zooplankton and macrocrustacea:** Ms Fiona Mackay and Mr Mdu Mzimela (trainee - zooplankton) and Mr Phinda Buthelezi (trainee - macrocrustacea), all of the Coastal Research Unit of Zululand, based at the University of Zululand.
- **Estuaries and the Reserve process:** Dr Jane Turpie – undergraduate student course at the University of Cape Town.

Informal training was also supplied by Ms Delana Louw to Ms Shael Koekemoer in the field of Reserve practitioner.

1.3 AIMS OF THE CAPACITY BUILDING PROCESS

The following information was distributed to the mentors at the outset of the project as the aims of capacity building and training. The main aim of the process was therefore to ensure that each trainee acquired the following information and skills, as pertinent to their specific discipline.

- A theoretical understanding of the Reserve concept and process.
- An understanding of the concepts related to their specific discipline.
- The ability to utilize the tools or software required by their discipline within the Reserve process, or understanding the use of these tools, e.g. time-series analysis, water quality modelling of field techniques.
- The ability to interpret information related to their discipline, particularly within the broader scope of the Reserve process. This includes data collection and analysis
- An understanding of the requirements of other specialists within the process.
- The ability to communicate this information to other specialists - both verbally and in a report format. It was recognized that this aim may be difficult to report on. Mentors were therefore requested to include their assessment of the trainee's input to the process, and understanding thereof.
- The ability to work in a team of specialists from different disciplines, but with a common goal.

1.4 GUIDELINES FOR TRAINING AND ASSESSMENT

The following guidelines for training and evaluating trainee progress were distributed to the mentors at the outset of the study

- Criteria listed in Section 1.3 should be scored and the trainee's ability to conduct the task evaluated. A list of tasks in which each trainee was involved should be included in the final assessment.
- An important aim of the capacity building process is for the trainee to be assisted with the future development of skills and capacity, where required. Regular feed-back sessions are therefore needed between mentor and trainee, for the mentor to correctly assess the level of skills and guide the trainee toward skills development. It is accepted that this process can only occur within the time and financial constraints of this project, but will assist in a final evaluation of the trainee regarding future independent Reserve work.
- It was recommended that trainees be given written tasks to perform, or be involved in the production of reports, e.g. the production of specialist templates (estuaries group). It was requested that these tasks be appended to each training report, or be reported on by the mentor.
- Evaluations of each trainee's progress were requested in October 2003, after the final 'wrap-up' training session, from both the mentors and the trainees. Evaluations by trainees are in the form of a confidential report-back form (Appendix A) that was compiled by Dr Scherman and Ms Lisl Griffioen, the Human Resources Manager of Coastal and Environmental Services. Questionnaires were submitted direct to Ms Griffioen, as Dr Scherman was part of the training process and confidentiality was to be ensured. Ms Griffioen then assessed the results and prepared a report for inclusion in the training report (Section 10). Completed questionnaires can be presented confidentially to the TWP management team upon request.
- It should be noted that the final evaluation comprises an assessment from both mentor and trainee as to the trainee's ability to function effectively in a Reserve team, and their abilities to conduct a Reserve assessment according to their discipline and the gaps in their knowledge to perform certain tasks.

This report is therefore a synthesis of both mentor and trainee perspectives of the training process, as well as the individual successes or failures thereof. The agenda of the final 'wrap-up' training session is included as Appendix B, and general comments made at this workshop, and other workshops throughout the project, are captured in Section 11. Sections 2 to 9 therefore present the individual training reports from the mentors, with trainee input where requested by the mentor.

2 CAPACITY BUILDING REPORT: RIVER - HYDROLOGY

D Hughes and S Bukhosini (nee Shange)

2.1 INTRODUCTION AND OBJECTIVES

Due to the difficulties associated with individuals and service providers trying to keep pace with Reserve developments taking place, it was agreed that one of the components of the Thukela Reserve determination module would be a capacity building exercise. One of the areas where the current skill base is relatively weak is the **hydrological support** provided to the other specialists. It is also a skill area that should be relatively easy to improve as the methods have become reasonably standardised and software tools to support the approaches have been developed.

The objective of the hydrology capacity building programme was therefore quite straightforward, and was to train a single individual in all the aspects of the hydrological component of Reserve determinations such that they would be able to perform such tasks (more or less) independently in the future. It was recognised that such an objective was quite ambitious and that further support may be required when the trainee embarks on their first independent determinations. The trainer (Prof Hughes) has undertaken to offer this support as far as possible.

It is essential that the trained individual be given the opportunity and encouragement to put into practice the technical skills that they have learned and that this continues for a number of years into the future. Otherwise the technical skills will be lost and the time and effort put into the training programme will be largely negated.

The requirements for a suitable trainee were identified as the following:

- Have a reasonable background education in the field of hydrology and sufficient basic understanding of the characteristics of the flow regimes of South African rivers.
- Be able to dedicate enough time during the project (partly at their own expense and partly paid for by the project) to familiarise themselves with the various aspects of the hydrological component of Reserve determinations and attend the specialist workshops where necessary.
- Express sufficient interest in undertaking this type of work in the future so that the transferred skills become available to DWAF.

The most suitable trainee to emerge during the project initiation phase was Ms Siphesihle Bukhosini, who is employed as a hydrologist at Umgeni Water and received training in hydrology as part of her degree from the University of Natal, Pietermaritzburg. Umgeni Water also undertook to allow Ms Bukhosini sufficient time to participate in the training programme. Ms Bukhosini therefore satisfied all the requirements for the trainee position.

2.2 TRAINING COMPONENTS

There are three main components associated with the training of individuals in the hydrological aspects of Reserve determinations.

- Understanding of the role of hydrology and the hydrological specialist in the whole Reserve determination process. This includes the preparation and evaluation of relevant data, supporting the other specialists during the various workshop processes and ensuring that the final results are compatible with what is known about the natural hydrological regime.
- Familiarisation with the software that has been developed to support the Reserve determination process. The Water Research Commission (WRC) has invested quite heavily in the development of such software and it is important that the transfer of this technology outside the organisations involved in its development takes place as soon as possible. Most of the software has been developed to facilitate the application of some of

the methods that are currently used by the more experienced Reserve determination specialists. It is therefore very important that the trainee can use the software with confidence.

- The practical application of the methods and software in a workshop situation, where issues that are unique frequently arise and have to be solved. Some of these issues are related to the interpretation and use of the hydrological data and the hydrological specialists needs to be able to identify them and assist the other specialist in their resolution.

The following sub-sections are designed to highlight some of the most important aspects that should be covered in a training programme, without discussing how they should be dealt with in any detail (this document is a training report and not a training manual).

2.2.1 Understanding the Reserve determination process

From a hydrological perspective there are a number of clearly defined steps in the Reserve determination process:

The ***data preparation phase*** essentially involves consolidating all available hydrological information for the river(s) under investigation and preparing time series data and other summary material in a format that is suitable for later modelling and interpretation by the other specialists. In most cases this phase will involve the use of observed data as well as simulated data, both daily and monthly. In some cases this may involve the hydrologist in undertaking modelling studies, particularly where available data are not adequate. In other situations the data will have been already prepared for a water resource systems analysis by a different part of the study team. Modelling studies should be considered only when necessary and practical as they are frequently time-consuming and can exhaust project budgets very easily. A critical point is that any data generated and used within the Reserve determination should be compatible and consistent with flow data used by other groups working on parallel aspects within the same river or basin (especially the water resource systems analysts). If that is not the case then differences should be resolved well before the other specialists gain access to the flow data. During this phase it is normally required to estimate the extent to which the flow regime has changed from natural.

The ***data modelling phase*** (with respect to the Flow-Stressor Response approach that was used in the Thukela study) involves preparing initial Reserve estimates using either the Desktop Reserve model (monthly data) or the Daily IFR model. A decision on the time-step of data to use, based on the quality and reliability of the data that are available, has to be made. Clearly this phase involves a reasonable understanding of the operation of both models.

The ***data interpretation phase*** usually takes place in the specialist workshop, where the hydrologist can be required to offer many different types of interpretations of the hydrological data and often provides an interface between the ecological specialists and the water resource engineers. This is the phase that requires the most understanding of the Reserve models (either Desktop or IFR (In-stream Flow Requirements) model, or both), as the initial estimates made during the previous phase (and largely based on default model parameters) have to be modified to fit with the other specialists assessment of the stress characteristics required to maintain the river in defined ecological categories. If the other specialists are experienced at this task, the hydrologists task is easier. However, it is frequently necessary to ensure that the ecological signals that the specialists are getting from their studies of the river are not misinterpreted from a hydrological point of view. One of the difficulties of this component of the determination is the time constraints placed on all the specialists and given such pressures, it is very easy to make mistakes or miss problems that will have to be corrected later. At the end of this phase, the hydrologist is required to generate the outputs that will be passed on to the systems modelers for the next phase of the determination. It is also frequently necessary to generate some interpolated results to fill in the spatial gaps in a

large river system (for points where the ecologists have little or no site specific information).

The ***scenario design phase*** usually follows a specialist workshop. This phase involves a limited number of the specialists, the water resource system analysts and the hydrologist in specifying alternatives to the Reserve options that were determined in the previous workshop. These alternatives would normally be defined on the basis of system constraints or an attempt to increase the system yield by reducing the Reserve at critical points (in space and/or time). The hydrologist is then required to prepare new Reserve outputs on the basis of these defined scenarios. This is an office-based task and given a reasonable understanding of the models (Desktop or Daily IFR), should be straightforward. The systems model outputs are then returned to the hydrologist to prepare for the next phase.

The ***scenario analysis phase*** represents a return to a workshop situation, where the hydrologist is required to display the results of the original specialist workshop (stress regime characteristics calibrated for a range of ecological categories) and compare them with the results from the new scenarios. If the available software is reasonably well understood this becomes a relatively simple task. However, it should be remembered that in a large study (greater than 10 sites), there are a substantial number of options and careful preparation of the data is essential.

The hydrologist is often required to play a linking role between the water engineering disciplines and the ecological disciplines involved. It is therefore important that they understand as much about the system in its current and natural hydrological state as possible. It is also vital that they present the information with confidence, so that the other specialists can use the information with confidence. At the same time it is equally important that if there are uncertainties about some aspects of the hydrological information (as there frequently are), this is not kept from the other specialists.

2.2.2 Software familiarisation

The IWR at Rhodes, through the support of the Water Research Commission, have been developing a data management and modelling package (SPATSIM – Spatial and Time Series Information Modelling), whose design has been strongly influenced by Reserve determination requirements. This has now reached a development stage where virtually all the analyses that need to be carried out by the hydrologist (assuming that the Flow-Stressor Response approach is to be used) have been incorporated and therefore only one software system is required. This has the advantage of precluding the need for time-consuming data transfers between different systems and of not having to become familiar with several specialist software packages. However, because of the degree of flexibility required and the number of different analyses that have to be undertaken, SPATSIM can be quite confusing to use until practical experience has been gained.

Familiarisation with SPATSIM can be broken down into three main components. The first is familiarisation with the basic functionality of the software and the underlying database structure. This includes adding and manipulating spatial data (through shape files), managing, importing, displaying and editing attribute data of different types and setting up models and analysis procedures.

The second component involves the use of the TSOFT (Time Series Display and Analysis Software) utilities for displaying and analysing time series data. This facility is used frequently during data preparation and workshops to investigate and compare time series (from different sites or different sources). TSOFT is relatively straightforward to use and does not require a great deal of training.

The third (and biggest component) is familiarisation with all the models that are available with SPATSIM. One of the important aspects to understand is the way in which SPATSIM communicates data to the models and how the user establishes the links for a specific model

run. These are not always simple and require a reasonable degree of understanding of both SPATSIM and the individual models. The following models (or groups of models) may be required for a typical Reserve determination.

- Rainfall-runoff models or time series generation models. These include the Pitman monthly and VIT daily model in the first group and the Patching model in the latter group. They all require quite specialist knowledge to be able to use them successfully, although the Patching model is relatively simple to use. Only the Patching model was used in the Thukela study (to fill in some gaps in daily data availability) as the main flow data time series were supplied by the systems model consultants.
- Present day hydrological state model. This is a very simple model based on comparing flow duration curves of natural and present day flow regimes.
- Reserve generation models (Desktop monthly and daily IFR). It is very important that any person becoming involved with Reserve determinations using the Flow-Stressor Response approach is totally familiar with the Desktop model and preferably with the daily IFR model.
- Flow-Stressor Response model. This is an important model but not very difficult to use. The difficulties mainly lie in the interpretation of the results and explaining the analysis of stress under different flow scenarios to the other specialists.

Other software requirements are general familiarity with word processing and spreadsheet software for report writing and any general data manipulation that is not possible with SPATSIM.

2.2.3 Practical application

The practical application component of the training is required to further develop familiarisation with the procedures and the software and to be exposed to the workshop sessions in which quite unique problems can arise. It is also important that trainees do not learn all about the Reserve determination procedures related only to hydrology, and be isolated from the other disciplines and specialties involved. Attendance at the various workshops, and practicing the data modeling routines, are essential to develop confidence and experience. It is inevitable that participation in a single Reserve determination will not provide any individual with all the confidence and experience required to repeat the exercise, totally unsupervised, on another river. The workshop process is largely driven by expert opinion and the integration of the perceived objectives of several specialists. No two workshops are therefore the same, despite the fact that the processes followed are identical. Different issues are raised in different rivers and the hydrologist (as are the other specialists) is often required to respond to these at very short notice and sometimes with inadequate data. There are no hard and fast rules that can be laid down, except that the outcome of the determination has to be as soundly based on the available information and expertise as is possible.

Although the process is driven by scientific principles, there is often an ‘art’ to making the most out of limited data. This ‘art’ needs to be learnt from experience.

2.3 THUKELA HYDROLOGY TRAINING PROGRAMME

The Thukela training programme began with a 3-day course to introduce the Reserve concepts and methodology (based on the BBM and Flow-Stressor Response approaches). Ms Bukhosini and three other participants attended this course, which included exposure to the SPATSIM package and some of the models that are linked to it. Ms Bukhosini was provided with SPATSIM and the associated Thukela database (with updates at relatively frequent intervals, as both the software and the database were changing all the time) on the understanding that she would familiarise herself with some of the main software components at Umgeni Water. Further contact was maintained through e-mail and brief visits by Prof

Hughes to Umgeni Water.

Ms Bukhosini attended the two determination workshops (main river sites and tributary sites) as well as the scenario assessment workshop. She was also present at some of the shorter briefing meetings that were held in Pietermaritzburg.

Apart from formal contact, Ms Bukhosini was also advised to look through the publications that have been written about the hydrological aspects of the Reserve.

The final component of the training programme was for Ms Bukhosini to reflect on what had been learned and to contribute to this report.

2.4 TRAINING EVALUATION

The training evaluation part of this report attempts to critically assess the approach that has been adopted, as well as to evaluate the final result in terms of Ms Bukhosini's preparedness to undertake future Reserve determinations.

2.4.1 Understanding the Reserve determination process

There is a lot of documentation of the Reserve determination process available, but until the final version of the RDM Manual becomes available, this information is not very well integrated. While The BBM manual is useful, it has become a little dated and many of the procedures used by experienced Reserve teams have changed. The Thukela experience suggests that more time should have been spent on this aspect of the training at the beginning of the programme, to avoid, as far as possible, confusion during the practical experience sessions (see comments in Section 2.4.3). Despite this reservation, Ms Bukhosini appears to have developed a very good understanding of the process and the steps involved. There are still gaps in this understanding but they are not critical and should be filled through further exposure to the methodology in practice.

Relying on the workshops to explain the process as it is being experienced does not always work very well. The main reason for this is that there are time limitations during the workshop and it is not always easy for the trainer to take time out from providing information to the other specialists to explain the process in great detail to the trainee. This becomes a particular problem when problems arise at the workshop and many of the specialists are put under pressure to solve them quickly. This is exactly the type of experience that the trainee needs and yet there is often not enough time to explain what is happening (and how to solve the problem) in sufficient detail. One possible way of resolving this issue is to have a de-briefing session as soon after the workshop as possible. However, this will increase the training time and budget.

2.4.2 Software familiarisation

The initial training session on SPATSIM and the models was essential and extremely valuable. In this particular instance, SPATSIM was still being developed and the current version has many more options and facilities than when the training programme started. In future the software design should remain more stable and it is anticipated that a series of training courses will be made available to a wider group of potential users. The IWR has already run some test courses and identified some of the typical issues that users have difficulty with. These will be addressed and incorporated into an updated training course structure which will be available during 2003.

Despite the rather 'fluid' design of the software during the Thukela training programme, Ms Bukhosini has learnt how to use the software very successfully. During the three workshops it was noticeable that her confidence in her ability to use the software and generate results efficiently increased all the time. If she continues to make use of SPATSIM and explore

some of the options that were not use that much in the Thukela programme, it is likely that she will become one of the more experienced users of the system.

Ms Bukhosini did not have much exposure to the hydrological models (VTI, Pitman and Patching models), however, she is familiar with the use of the ACRU model and therefore should not have too many problems with using other similar models in the future.

Ms Bukhosini had the most exposure to the Desktop and the Stress Response models, both of which she is very familiar with. She may need a little more training before she can make use of the daily IFR model with the same degree of confidence.

2.4.3 Practical application

During the first workshop, Ms Bukhosini acted as an observer, with Prof Hughes undertaking most of the tasks. During the second workshop, Ms Bukhosini performed many of the required analyses under supervision. Ms Bukhosini and Prof Hughes shared the work during the scenario assessment workshop, while Prof Hughes undertook the majority of the desk-based studies leading up to the workshops.

One of the problems experienced was during the second workshop when time became short and it was necessary for Prof Hughes to intervene. This is not meant as a criticism of the trainee, simply that any trainee will take longer to finalise an analysis than an experienced person. During parts of the workshop there was sufficient time for Ms Bukhosini to do things relatively slowly (and therefore developing confidence and understanding). At other times this was not the case and unfortunately this could have had a negative impact on a trainees confidence. There is no easy solution to this problem if 'real' workshops are to be used as training sessions. The alternative of training in 'artificial' workshops is unlikely to be of much benefit as the type of problems that occur in reality may not be suitably simulated.

Ms Bukhosini has not had a great deal of exposure to the pre-workshop preparation tasks. However, in the context of the Thukela project these were not substantially different to the procedures followed during the workshops. It is difficult to determine if Ms Bukhosini has enough experience at this stage to complete the preparation work for a similar study, but she should cope as long as she has access to a more experienced person for guidance when necessary.

While the training programme that was used for the Thukela has identified weaknesses, the final result was successful and the overall evaluation is that Ms Bukhosini is prepared for a future Reserve determination, as long as adequate support is available. That support can be from an individual experienced in the hydrological aspects, but it could also come from other experienced specialists (particularly the task leader and the facilitator) involved in future determinations.

2.5 TRAINEE OBSERVATIONS: Ms Bukhosini

2.5.1 Training

The first concentrated three-day training session was held on the 11–13 July 2001 in Grahamstown. This was followed by a number of telephonic and electronic communications with Prof Hughes about hands-on application of the models used in the hydrology part of the Reserve determination processes. The three-day training assisted me in understanding the theory behind the software in SPATSIM and the processes involved in determining the reserve using the specialists' input (stress vs. flow), how SPATSIM has been developed and is used in its entirety in the reserve determination processes. This laid a useful background as far as understanding the processes involved within the Reserve processes.

2.5.2 Software familiarisation

The software used in the Reserve determination processes are streamflow data generation models (Patching model, VTI daily model, Pitman monthly model), Reserve generating models (daily IFR, monthly Desktop model), TSOFT (time series display tool), and the Flow-Stressor Response model. This section of work was divided into three sub-components:

- Familiarisation with the software and underlying database structure. I was mainly involved in the attribute editing and displaying, model set-up and manipulating the spatial data.
- The use of TSOFT utilities for displaying and analysing time series data. This was mainly used in the workshop and I have a thorough understanding of how this functions and its usefulness in the workshop.
- Familiarisation with the models available within SPATSIM (Desktop model and Flow-Stressor model, Patching model, daily IFR model).

This mainly concentrated on the interpretation phase, where one gained exposure to using the Desktop model, Flow-Stressor response model and TSOFT.

2.5.3 Practical applications of the models

I attended two specialist workshops and some specialist meetings as part of the practical exposure to the Reserve determination processes. These meetings helped in improving my level of understanding of the processes involved.

I did not attend the IFR site visit that was scheduled at the beginning of the project, and also did not have full understanding of the operation of the catchment. I only had a vague idea of the catchment through GIS and flow manipulation. This made it difficult to understand the specialist analysis of all the IFR sites during the workshop. My recommendation in this regard would be that the trainees should be involved from the beginning of the project so that there would be a full understanding of all the information analysed and presented by other specialists.

In the first workshop I was an observer and this was my first time experience of the comprehensive Reserve determination processes. There is no easier way to train a person, the pressure of delivering mixed with confusion, makes it even harder to grasp all the important information. The even more confusing part was the fact that some of the processes were adjusted during the workshop, as many of the other participants were using some of the methods for the first time.

Knowing how the model works in theory and how to practically apply it, especially under tremendous pressure, are two different things. The second workshop was where I was doing most of the analysis using the stress-flow response tool. Being under time constraints made it more difficult, with limited time to work on the analysis. All the specialists had a full understanding of the processes, but manipulating data and interpreting it called for somebody who knows the catchment beyond the analysis in question.

In conclusion:

- I have confidence in the theory behind the models and the Reserve determination processes but need more exposure and guidance from the mentor.
- The practical application of some of the software is still rather unclear or requires an understanding of the effects of the stress on flow and some experience in the catchment processes.
- I did not have exposure to the pre-workshop preparation. I do not think that I will be able to conduct these processes on my own in future. This could be due to the physical distance between my mentor and myself, which made it difficult to share the

pre-workshop preparations, especially as some of the software being used was still under development. The time constraints between data preparation and the workshops made it impossible for me to do the pre-workshop preparations, as I was still training and it took a long time for me to do the exercise and compare the results with my mentor's results.

Solutions:

- It would be advisable for the trainee and the mentor to have similar data starting files even if the trainee's information will not be used in the workshop. The trainee can then conduct the same tasks as the mentor at the same time, thus gaining confidence in the process.
- The budget should be increased for the trainee to be able to visit the mentor on more occasions to grasp the depths of the project's involvement and be able to attend the planning meetings so that a full understanding of the process is maintained.
- The Trainee should attend all specialist meetings as part of training process.

2.6 CONCLUSIONS AND RECOMMENDATIONS: Prof Hughes

The overall conclusion is that the training programme was successful and that Ms Bukhosini is prepared to participate fully in future Reserve determinations. She still lacks confidence and experience, but they will come with time. The important issue is that future support should be made available to her so that she can consult with a more experienced person if there is a crisis, or if she comes across issues that she has not experienced before. Further formal training is not considered necessary, but it is now essential that she be given the opportunity to apply her new skills. It will not be advisable to put her on her next Reserve determination in a junior position again, as there is the chance that she will not gain the experience of working under pressure. That is exactly what is required for her to effectively complete her training and move ahead and gain personal experience.

3 CAPACITY BUILDING REPORT: RIVER - GEOMORPHOLOGY

R Wadeson

3.1 INTRODUCTION AND OBJECTIVES

The geomorphology report is presented as answers to a list of specific questions, and presents Dr Wadeson's assessment of Mr Soviti's understanding of, and contribution to, the Reserve process in general and the geomorphological component in particular. Mr Soviti was completing an M Sc in Geography, focusing on rural communities and water quality issues in the Kat River catchment of the Eastern Cape, during the Thukela project, and joined the University of Transkei as a lecturer in 2003.

3.2 TASKS IN WHICH MR SOVITI PARTICIPATED

- Task 4.2 - stream classification
- Task 4.5 – IFR site selection
- Task 5 – ecological classification
- Task 9.2 – data collection
- Task 9.6 – specialist IFR meeting

3.3 CONCEPTS AND THE RESERVE PROCESS

Mr Soviti joined the Thukela project as a trainee with a limited background in both water resource management and fluvial geomorphology. It was the aim of the mentor to expose Mr Soviti to the Reserve process and the role of geomorphology within the Reserve. I believe that we have achieved the original aims of capacity building for geomorphology. Mr Soviti has a basic theoretical understanding of the Reserve process and the role of fluvial geomorphology within that process.

3.4 TOOLS AND METHODS

Mr Soviti was an able and willing trainee who carried out all the tasks that were given to him. Mr Soviti was happy to carry out any task that required no specialist interpretation of results.

3.4.1 Stream classification

Mr Soviti was directly involved in the classification of the Thukela River and its division into different geomorphological "zones". Requirements for this task included the use of GIS ArcInfo for the digitising of the stream network together with the incorporation of contour data. Further analysis of this data required an understanding of the zonation concept as developed by Rowntree, Wadeson and O'Keeffe (2000).

3.4.2 IFR site selection

Mr Soviti participated in the IFR site selection process. The geomorphological zonation of a river forms an integral component for IFR site selection. Mr Soviti was led through the process of IFR site selection including the use of 1:50 000 scale maps, video footage and ground-truthing. Mr Soviti formed an integral part of the discussion regarding the assessment of the geomorphological components of each IFR site. At the end of this component Mr Soviti showed a good understanding of the geomorphological requirements for IFR site selection.

3.4.3 Ecological classification

Mr Soviti worked together with myself to determine the Ecological Reserve Category for various sections of the river within the Thukela basin. Mr Soviti was trained in the analysis of aerial photographs, the importance of channels gradient, the influence of historical conditions

and the need for flood flow data. All of this information was utilised to help provide a more accurate description of the geomorphological reference condition for each IFR site.

Present Ecological State was also assessed within this task. Mr Soviti was trained in the use of video analysis, the assessment of aerial photography, the use of 1:50 000 topographical maps and the general assessment of present day condition.

3.4.4 Data collection

Mr Soviti participated in the Upper Thukela site visit. This task included the collection of geomorphological data. Mr Soviti was shown how to interpret geomorphological data in the field to allow the accurate filling in of standardised data forms. Mr Soviti was given no training for the interpretation of that geomorphological data as this requires a considerable amount of experience and subjective analysis.

3.4.5 Specialist IFR workshop

Mr Soviti participated in a specialist IFR workshop. The trainee was a passive spectator at this workshop as a new sediment modeling method was being used to drive the geomorphology. As this tool was developed by Dr Evan Dollar, the focus was for Mr Soviti to observe and understand the principles of the new method.

3.5 INFORMATION INTERPRETATION, PRESENTATION AND COMMUNICATION

Geomorphology is a branch of science that requires a broad understanding of the complex links between environmental factors and their influence on stream behaviour. This understanding not only requires a considerable amount of training but also many years of experience and observation. Mr Soviti made it quite clear, early on in the training, that he did not feel confident to make specialist interpretations of geomorphological data. I must agree with this self-assessment as Mr Soviti is lacking in general geomorphological training.

3.6 PARTICIPATION IN A RESERVE TEAM ENVIRONMENT

Mr Soviti participated well within the Reserve team. He was initially rather intimidated by the whole exercise but this is to be expected when one considers his background and training.

3.7 REPORTS PREPARED BY TRAINEE

Despite numerous requests by myself for the trainee to provide progress reports after each task was completed, non were forthcoming. Because of this it is difficult to fully gauge how successful the various training exercises were.

3.8 CONCLUSION

I believe that Mr Soviti does have the ability to become a Reserve geomorphologist but he would require considerably more training before he could fulfill this role without supervision. I have reservations as to whether geomorphology is a role that actually interests the trainee.

At the present level of training and understanding, Mr Soviti could be considered a “geomorphological technician”. I would be happy to call on Mr Soviti to carry out some of the geomorphological tasks required for a comprehensive Reserve assessment, i.e. river classification and ecological classification.

4 CAPACITY BUILDING REPORT: RIVER - WATER QUALITY

PA Scherman

4.1 INTRODUCTION AND OBJECTIVES

Water quality assessments focus primarily on the magnitude of in-stream concentrations of selected water quality variables, and use current methods to provide a present state assessment of water quality per identified Quality Resource Unit. Toxicological studies provided additional information (if available) and flow-concentration modelling evaluate water quality conditions under various flow scenarios.

The principle of water quality in the Ecological Reserve is relatively straightforward, but the methods and application thereof are complex. An additional dimension is that methods were still under development at the initiation of the Thukela Reserve study. The study was therefore initiated using a particular set of methods (referred to as Approach 1), primarily based on the water quality methods of the RDM documents released in 1999, while revised methods became available during the study. An attempt was made to use best available methods, and Approach 2 (based on documents released in 2002) was followed. A number of problems were encountered with the methods outlined in the 2002 documents, particularly regarding unclear (e.g. the nutrient method) and incomplete methods (e.g. methods for toxics and pH). These uncertainties created particular challenges to the training process. It was decided that Ms Valisa would be part of certain components of the training process, but would not be required to conduct more advanced tools such as flow-concentration modelling, which were outside of her (and the mentor's) skills base and experience.

Mr Phehello Mahasele, an M Sc student in the toxicology group of the IWR, was the first trainee selected to join the water quality team of the Thukela project. Mr Mahasele assisted with the first set of data collection, but was involved in a motor accident in July 2001 and sustained head injuries. A request was then made that Mr Mahasele be replaced as it was unknown how long his recovery would take.

As Ms Valisa has a diploma in chemical engineering and was working at the Institute for Water Research, Rhodes University, as a technician in the toxicology unit at the time, she was selected as the replacement water quality trainee in late 2001. In the third year of the project Ms Valisa embarked on a part-time B Sc while still working part-time at the IWR.

4.2 TASKS IN WHICH MS VALISA PARTICIPATED

Ms Valisa participated in a number of water quality tasks, and was exposed to others, so as to ensure an integrated picture of the water quality Reserve assessment process. In addition to mentor-trainee sessions, Ms Valisa took part in the following specific tasks:

- Task 4.6 – delineation of Quality Resource Units.
- Task 5 – ecological classification, including team workshops, data collection and a field survey. Ms Valisa was very involved in the production of toxicological information, used during present state assessments of water quality.
- Task 7.2 – production of the main water quality report, primarily in a review capacity.
- Task 9.6 – specialist IFR meeting, where Ms Valisa was exposed to flow-concentration modelling.
- Task 10.2 and 10.3 – scenario workshop, including a workshop in Grahamstown with the systems modeller on the project
- Task 14 – capacity building tasks, including the final 'wrap-up' workshop in Port Elizabeth in 2003.

Unfortunately Ms Valisa could not attend the ecospecs and monitoring workshop (Task 13) due to her commitments as an undergraduate student.

4.3 CONCEPTS AND THE RESERVE PROCESS

As shown by Ms Valisa's first report, Appendix D, she has a good grasp of Reserve concepts. The Reserve process was assessed and re-evaluated at a number of points during the training process, and Ms Valisa seemed to have an understanding of the process. It was expected that she would require on-going exposure to the process, considering her background and lack of experience in the field.

4.4 TOOLS AND METHODS

4.4.1 Data collection and manipulation, and present state assessment

Ms Valisa was a willing trainee, who assisted with the present state assessment of water quality per Quality Resource Unit, according to both Approaches 1 and 2. It was difficult for Ms Valisa to act as an independent researcher as many of the methods and approaches were new to all team members, and required specialist experience in the field to evaluate and assess methods. The water quality team worked together in data interpretation, although data manipulation was conducted by the specialist members of the team. Ms Valisa therefore acted largely as an observer learning the process by observation, rather than practice. Now that Ms Valisa has been exposed to the process, her next training exercise should include hands-on practice of data manipulation for the Reserve process. Although Ms Valisa was committed, she did not display the confidence or capacity (largely based on her apparent lack of experience in data manipulation) to function independently.

4.4.2 Flow-concentration modelling

Due to the complexity of this task, Ms Valisa was exposed to the principles of flow-concentration modelling and flow scenario generation on a number of occasions. She joined the rest of the water quality team in a workshop with the systems modeller, and attended an IFR workshop which introduced the Flow-Stressor Response method as well as flow-concentration modelling. By working through the meeting with the modeller, Dr Malan, Ms Valisa was able to gain an understanding of the approach followed. Ms Valisa produced a report (Appendix E) to demonstrate her understanding of these complex tasks.

4.5 INFORMATION INTERPRETATION, PRESENTATION AND COMMUNICATION

Ms Valisa will require more exposure to the Reserve process before she can communicate confidently. Although her writing has improved with practice, she has not had much opportunity to communicate verbally regarding Reserve principles and the water quality approach. Her understanding of the process has improved vastly, and she is committed to developing her abilities in this regard.

4.6 PARTICIPATION IN A RESERVE TEAM ENVIRONMENT

Due to the exposure she has received during the Thukela training exercise, Ms Valisa has a good understanding of the specialists required within a Reserve process and the interactions between them. She does not yet have the ability to function effectively within a Reserve team, as this was her first exposure to these activities. However, she is very committed and is interested in developing her skills within this field.

4.7 REPORTS PREPARED BY TRAINEE

Ms Valisa participated in a number of workshops and team meetings, and prepared the following two reports, in addition to her trainee questionnaire submitted to Ms Griffioen in October 2003. Although she did not assist in writing the final water quality report, her contribution was in terms of data assessment and review.

- Water quality team site visit, September 2001: Appendix D
- IFR workshop report, July 2002: Appendix E

4.8 CONCLUSION

Ms Valisa has proved herself to be a willing and interested trainee. Although her capacity is limited at present, based largely on her background and lack of experience, she has received adequate exposure to the Reserve process and could function quite ably at a number of water quality tasks, e.g. the delineation of Quality Resource Units and assistance with present state assessments. She is a good field biologist, and is therefore a very able assistant during field surveys and data collection. Her function would therefore be as a technician at present, but with experience she could develop and expand that position to a more specialist role.

5 CAPACITY BUILDING REPORT: RIVER - MACROINVERTEBRATES

C Dickens and T Bokwe

5.1 INTRODUCTION AND OBJECTIVES

Since June 2001 Umgeni Water has participated in the determination of the Ecological Reserve for the Thukela River. As part of the contract, Tobile Bokwe (at the time a Graduate Trainee at Umgeni Water, but now a Scientist) was positioned as a trainee under the mentorship of Dr Chris Dickens, also of Umgeni Water. The requirement was that he should participate in a real way in the contribution of invertebrate knowledge to the Reserve process.

The macroinvertebrate report is therefore presented as answers to a list of specific questions, and presents Dr Dickens's assessment of Mr Bokwe's understanding of, and contribution to, the Reserve process in general and the invertebrate component in particular. Mr Bokwe's assessment is included in Section 5.7.

5.2 TASKS IN WHICH MR BOKWE PARTICIPATED

The contract defined the extent of activities, in particular workshops and field visits, that Mr Bokwe could participate in. Given the very large size of the project his participation was limited so that in general only half of the sites were visited, and only half of the workshops attended. The idea was that he would be exposed to a portion of each step of the process.

More specifically Mr Bokwe was involved in the following:

- Collection of all chemical samples on behalf of Patsy Scherman as part of the water quality investigation.
- Participation in site visits where he assisted with the collection of invertebrate samples and the description of the sites.
- Participation in various workshops where he also participated in the documentation of aspects required for the Reserve determination. This involved applying a deeper understanding of river ecosystems, of invertebrates in particular, and the application of this understanding to the development of stressor-response information, investigating scenarios, the development of monitoring requirements etc. On several occasions Mr Bokwe was left to complete tasks on his own.
- Mr Bokwe was tasked with drafting the description of the historical and Present Ecological Status for all sites on the Mooi River.
- He also participated in the final day of training offered by IWR Source-to-Sea in Port Elizabeth. This was a summary of the entire Reserve process that had been followed.

5.3 CONCEPTS AND THE RESERVE PROCESS

Mr Bokwe was exposed to all of the processes that lead to the determination of the Reserve, although this was done in a moving environment where the project leaders themselves were adapting as the processes evolved.

5.4 TOOLS AND METHODS

Mr Bokwe was exposed to a sound method of incorporating invertebrate issues in the determination of the Reserve, limited as this was by budget constraints. Most useful was the reference to the good historical record that exists, drawing comparisons with the present condition. This gave an extra dimension of insight.

5.5 INFORMATION INTERPRETATION, PRESENTATION AND COMMUNICATION

Mr Bokwe was required to interpret invertebrate information, adding value to the Reserve process. This is an issue where there is no substitute for years of experience. He nevertheless has started out on this process, and has gained first-hand insight into how it works.

5.6 PARTICIPATION IN A RESERVE TEAM ENVIRONMENT

Mr Bokwe is a perceptive and searching person who made great efforts to come to grips with what is a very complex task.

5.7 REPORTS PREPARED BY TRAINEE

- Mr. Bokwe drafted the text on the Mooi River that forms part of the main Invertebrate Report. See Appendix C.
- Mr. Bokwe has written a report on his training as part of this project. This is reproduced below

5.8 REPORT ON TRAINING IN THE THUKELA RESERVE STUDIES – Tobile Bokwe

My participation in this study was stratified into the sub-studies mentioned below.

(a) Defining Resource Units:
My training in this project entailed involvement in the definition of Resource Units (RU) – these explained as sections of the river with enough differences from the rest to suggest a separate management/reserve. During this session videotapes of aerial photography of the river reaches were watched. This would allow for choosing of potential and good resource units. Further than this I was involved in the reconnaissance trips and fieldwork to observe how ground-truthing allowed for confirmation of the choice of units. Sections of rivers were visited, observations were made and discussions held with other specialists, on how much the chosen resource unit would cater for all the fields of specialization. Among the specialists were those who are 'drivers', e.g. geomorphology, hydrology, hydraulics, habitat integrity, water quality, and 'conformers', e.g. fish, invertebrates.

(b) Defining Ecological Reserve Categories:
This exercise entailed finding historical data on the sites, or establishing reference conditions for the site. A lot of historical data was accessed, and problems with such data included the method of capturing. The historical data highlighted the development of the biotic monitoring, as the data capture and field analyses show the evolution of these studies. Some informed 'estimates' on the historical state of some sites were made in some sites because they had never been sampled before.

Most of these sites were sampled 'recently' (in the last 3 years) and such recent data was used to establish their present ecological state. A comparison was then made on the trajectory of change associated with the changes in these 'assessment times', with possible causes of the trajectory, the speed and the extent of the change. The present ecological state was categorized in a range of 'A' – 'F', with category 'A' being natural and 'F' being grossly poor. However, management would be allowed down to a 'C', with 'D' being poor – so management at D would seek to improve such state.

From the trajectory questions, the ecological importance and sensitivity of the system was determined, with motivated confidence levels from us (the specialists). Eventually, this process tried to recommend actions against the drivers of change and recommend an appropriate ecological category.

(c) Ecological consequences of Operational Scenarios:
The causes of the trajectory as identified in the Ecological Reserve Categories, and assessment was made on whether these causes were flow/non-flow related, and the specialists had to provide their understanding of short and long-term changes, and the level of confidence in the information provided. On provision of all these data, a present ecostatus was determined. From this determination, a recommended ecostatus and an Attainable ecostatus that would mostly provide for all aspects were proposed. Impacts of the determined ecostatus on each field of specialization were recorded.

(d) Quantification of Ecological Reserve Scenarios:
This aspect was covered through Flow-Stressor Response studies (FS-R). These studies relied on specialist understanding of the relationship of biota to the flow and hydraulic habitat. Such understanding was translated to stress caused by different scenarios of flow and hydraulic habitat. The most sensitive biota became the 'biotic driver' of the stress-response because the flow regime had to cater for such biota.

(e) Implementation and design:
In this workshop the invertebrate specialists were assessing the implementation and management of the Ecostatus approved by DWAF. This involved analyzing the 'recent' biotic composition and investigating the sensitivity indicator species abundance, e.g. when there were 3 species of Hydropsychidae, or 6 mayfly families. The monitoring decision would recommend that an investigation should be undertaken if these families/species compositions are lessened by two in two consecutive field assessments. Another hypothetical condition could be 3 Hydropsychidae each with abundance of 'C' or 6 mayfly families each with abundance of 'C'. If, on two consecutive assessments, these abundances drop by two categories, this could point to a problem. This means that a recommendation was made to always keep the environmental conditions allowing as such fluctuations not to disturb these indicator species/families compositions – this is part of monitoring.

Overall:
I am grateful to all the funders, decision-makers and the organizers in this project, for allowing me the opportunity for this informative training. My sincere thanks are also due to my mentor for putting up with all the questions and suggestions I had; I know it has not been an easy one. Even though I have not been involved in all the steps throughout the project, I have been kept informed about where the project is or is going. Considering how involved this process is, one would appreciate any participation where possible.

5.9 CONCLUSION: DR C DICKENS

Gauging the success of this training initiative has been difficult due to the following:

- The process being followed, especially the Flow Stressor Response method, was new and ground-breaking for all participants. This meant that the mentors were also recipients of training.
- The entire process was very complex, and the long duration of the project meant that it was difficult to keep track of developments and to see how all phases fitted together. For this reason the final days training workshop was imperative and a good summary of what had taken place.
- It must be recognized that training needed to take place in two different spheres:
    - Most crucial was advancing the specialist knowledge of how invertebrates interact in the ecosystem as affected by altered flows and water quality. This type of training never ends but is the summation of life long dedicated learning. Participation in this project must have advanced this knowledge.
    - The second part of the training was in the Reserve process where the knowledge described above had to be extracted and put into a form suitable for the Reserve. The most difficult part of this was learning how to convert sometimes very poor data, into a new quantitative form that could be used as

part of the Reserve model. This entailed learning to suppress ones desire for scientific rigor but instead using specialist insights and intuition that could only be built up with experience. Mr Bokwe has now seen the beginning of this and will become more proficient as he acquires more experience. With regard to the actual Reserve process – there was little need to fully understand the overall process as the specialists were carefully guided by the project leadership, who alone were familiar with the overall task.

The inclusion of trainees in this project has been useful and will have benefited Mr Bokwe. The shear size of this project probably reduced the effectiveness of the training as the process became very complex and drawn out. It is recommended that projects smaller in size would be better training fields.

6 CAPACITY BUILDING REPORT: ESTUARIES - MACROPHYTES

J Adams

6.1 INTRODUCTION AND OBJECTIVES

The main aims of the capacity building programme are used to summarise the extent to which the trainee, Mr Phumelele Gama, has acquired the necessary information and skills. The Thukela Reserve study has provided Mr Gama with an understanding of the Reserve concept and process. This was achieved through active participation in the project as a specialist scientist and participant at Reserve workshops. The training course on 10 October 2003 also provided an overall perspective of the Reserve approach. In summary, the following points can be noted:

- Mr Gama has acquired an understanding of the Reserve concepts related to estuarine ecology. He participated as a specialist scientist on the microalgal component of the estuarine Reserve. Mr Gama is a junior lecturer in the Botany Department at the University of Port Elizabeth has an M Sc in botany from North Caroline State University, where he studied phytoplankton responses to a sediment-loading gradient in a mesotrophic reservoir. He is currently completing his research towards a doctoral degree on phytoplankton dynamics in the Maitland and Van Stadens estuaries and was therefore quite capable of compiling the specialist report. A new skill acquired was the integration of this knowledge into the Reserve process. This was achieved through completion of the estuarine Reserve templates and participation in the Reserve workshops.
- An understanding of the requirements of other specialists within the process was gained through participation in the Reserve workshops. The botanical specialist templates were completed prior to the faunal components so that they could use these interpretations. The important job of the botanical specialist was to interpret the response of the primary producers to the changes in the physico-chemical environment. Mr Gama has an appreciation of the multidisciplinary approach and links between the physical processes and biological responses.
- Mr Gama communicated specialist information verbally and in report format. In the future Mr Gama would be quite capable of communicating information relating to the Reserve process.
- Mr Gama has gained experience in working with a team of specialists from different disciplines.

6.2 TASKS IN WHICH MR GAMA PARTICIPATED

Mr Gama participated in the following tasks.

- Task 8 - Estuary classification and scenarios for alternative estuary states
- Task 10 - Yield scenarios and operational aspects
- Task 11 - Resource economics
- Task 13 - Resource quality objectives and monitoring protocols

Specific involvement was as follows:

Task 8.2 - Data collection

- A literature review was completed on available published information for the Thukela Estuary. The reference for this document is *Snow GC, PT Gama and JB Adams. 2002. Microalgae of the Thukela River Estuary.* (Gavin Snow is a Ph D student which assisted with the review).
- A once –off site visit was conducted to collect water samples from 7 sampling sites

for chlorophyll-*a* analysis and phytoplankton counts and identification.

- Data analysis included the measurement of phytoplankton biomass (chlorophyll-*a*) with a GBC-UV spectrophotometer. Phytoplankton were identified using a Zeiss inverted microscope and categorized into groups (e.g. diatoms, flagellates, greens).
- CSIR provided physico-chemical data on the Thukela estuary. These data were used to interpret the phytoplankton distribution and biomass.
- The results were written up and included in a specialist report on phytoplankton for the Thukela Estuary.
- Templates were received with physico-chemical data and descriptions of the estuary response for different scenarios. These data were analysed and interpreted in terms of a phytoplankton response. The present state was described for the phytoplankton based on a predicted reference condition. The response of the phytoplankton to different run-off scenarios was documented in the templates.

Task 8.4 - Estuary classification and scenario evaluation specialist meeting

- Mr Gama provided the information for the specialist meeting held in July 2002 but could not attend the workshop as he was overseas. The information included scores for the Estuarine Health Index assessed for the present state. The ecological implications of the future abstraction scenarios were also assessed and evaluated using the Estuarine Health Index.

Task 10.4 - Estuary specialist meeting

Additional scenarios were assessed at a specialist meeting in January 2003. Mr Gama participated in this meeting. Botanical templates were completed before the meeting. At the workshop the Estuarine Health Index and ecological consequences for each of the new scenarios were finalized. After the workshop the reports were updated and finalized.

Task 11.2 - Ongoing liaison of ecologists

The application of resource economics to the different estuary scenarios was discussed at the meeting in January 2003.

Task 13.3 - Design a monitoring protocol to measure compliance to the RQOs

Mr Gama attended the RQO and monitoring workshop (8 - 10 October 2003) where input was provided on the microalgae.

RQOs were defined for phytoplankton to enable measurable guidelines to be provided to assess compliance through monitoring. A monitoring programme to measure this compliance was designed.

6.3 CONCLUSION

Mr Gama has gained an understanding of:

- The linkages between the physico-chemical processes and the biotic response.
- The integration of the different components into a Reserve setting.
- The different steps in the Reserve process.
- How the estuary Reserve results are integrated into the Reserve for the Thukela.

Mr Gama is capable of participating in future Reserve studies as a microalgal specialist, particularly as his Ph D is on microalgae in temporarily open closed estuaries. He is therefore familiar with sampling methods, data analysis and interpretation, report preparation and current literature on microalgae in estuaries. Experience in Reserve studies will develop as involvement in future Reserve studies increases.

7 CAPACITY BUILDING REPORT: ESTUARIES – ZOOPLANKTON

F Mackay

7.1 INTRODUCTION AND OBJECTIVES

As Ms Mackay mentored two trainees, the candidates will be introduced separately. The bulk of Ms Mackay's reports are regarding the training of Mr Buthelezi, as he was the primary training candidate. The training of Mr Mzimela was largely around exposure to Reserve methods and process.

Trainee: Mr Mdu Mzimela

In 2001, it was the instruction of the Thukela coordinating team that two trainees be selected from the University of Zululand to undergo training in Reserve processes. Mr Mzimela was selected as the second trainee. His background is ecotoxicology with respect to fish physiology. At the outset this seemed problematic as CRUZ was selected to deal with the invertebrate and bird ecological aspects of the estuary. Mr Mzimela however agreed to undergo training and was at that time employed as a temporary lecturer in the Department of Zoology.

Mr Mzimela had no previous experience of the RDM process but it was decided that he could assist his mentor in the zooplankton aspects of invertebrate ecology of the Thukela Estuary.

At the outset it was realised that due to his work commitments, Mr Mzimela would find it difficult to take part at the same level of training as Mr Buthelezi. Nonetheless it was decided that at a minimum, this trainee should be part of the planning for the fieldwork necessary to meet the requirements of the Reserve as well as participate in the field surveys.

Several mentor-trainee informal sessions were held prior to any tasks to familiarise the trainee with the RDM process and discussion of techniques and methods to be followed.

7.2 TASKS IN WHICH MR MZIMELA PARTICIPATED

7.2.1 Field planning and surveys

The trainee was present for the low flow survey conducted in August 2001 and the high flow survey conducted in February 2002. He was briefed on the techniques and protocols to be followed for the collection of zooplankton samples. He showed the necessary capacity to collect these samples. Mr Mzimela did not involve himself in the analysis of these samples (identification and enumeration). It was the combined consensus of trainee and mentor that this is a highly specialised function and would involve considerable time and development of a high level of expertise.

7.2.2 Reporting and template production

Mr Mzimela did not participate in the production of either a specialist report or any of the templates relating ecological responses to the different flow scenarios. He was however instructed to read the outcome of these processes to familiarise himself with these concepts of the Reserve. He did this and after some mentor-trainee discussion, it was clear that Mr Mzimela understood the processes involved.

7.2.3 Yield scenario and monitoring protocol specialist meetings

This trainee attended all the specified workshops in June 2002, January 2003 and October 2003. His verbal communication regarding his experiences in these workshops was that he found them informative and he understood the logic of each step in the Reserve process.

His lack of active participation at these meetings may be directly attributed to his different field of specialisation and his lack in confidence at challenging specialists in other fields.

7.3 TRAINEE'S ABILITY TO CONDUCT THE TASKS

Despite his diminished participation in the entire process, I feel that Mr Mzimela has still gained considerable knowledge as to the purpose of the Reserve and the processes that must be followed at each level of determination. He has expressed a desire to be involved with the Reserve at a later stage. However, I feel that this trainee requires further mentorship and training in a discipline directly related to the Reserve determination process before this can happen.

7.4 DRAWBACKS OF THE PROCESS

The level of commitment that was required of the mentor to 're-train' this trainee in an alternative field of expertise was beyond the scope of this project. It was also not the express wish of the trainee to entirely leave his field of specialisation. These factors need to be carefully considered at the time when there is pressure to bring trainees on board the project.

8 CAPACITY BUILDING REPORT: ESTUARIES – MACROCRUSTACEA

F Mackay

8.1 INTRODUCTION AND OBJECTIVES

Trainee: Mr Phinda Buthelezi

In 2001, at the inception of this project, Mr Buthelezi was selected as an ideal candidate for mentorship and fully encouraged to participate in the Thukela Estuarine Reserve study. At that time he was a full-time student at the University of Zululand, but the Coastal Research Unit of Zululand (CRUZ) undertook a commitment to employ him as a research assistant for the duration of the project. It was decided that CRUZ would contribute the balance of his salary (other than the trainee fees allocated to him) for the period 2001-2003 for him to continue his training on the project. It was felt that he would obtain maximum benefit only if he was involved until the conclusion of the process.

We support the endeavors of capacity training and feel that our commitment of funds to retain Mr Buthelezi is testimony to this.

Mr Buthelezi had no previous experience of the RDM process but it was decided that he should put what knowledge he gained along the way to the test by applying the various steps in the process to a particular field of expertise – macrocrustacea. Although Mr Buthelezi has postgraduate training in the field of marine plankton, it was felt that he could also use this opportunity to broaden his field of expertise to estuarine macrocrustacea.

Mr Buthelezi was therefore encouraged to participate in all tasks. It was the idea that as his experience and confidence with the process grew he would be able to perform the tasks given with increasing independence. Several mentor-trainee informal sessions were held prior to any tasks to familiarise the trainee with the RDM process and discussion of techniques and methods to be followed.

8.2 TASKS IN WHICH MR BUTHELEZI PARTICIPATED

8.2.1 Collection of new and collation of historic data (Task 8.2)

Although data were available on the benthic macroinvertebrates from the initial study (April 1997 to March 1998), additional data on the macroinvertebrates and new data on the zooplankton and macrocrustacea of the Thukela Estuary were needed to fulfill the requirements of the level of the Reserve. These collections were conducted in August 2001 and February 2002. Mr Buthelezi was present on both field surveys and actively participated in the collection of samples.

Subsequent to field surveys, Mr Buthelezi was tasked with:

- Collation of all previous data and relevant information on the macrocrustacean component of the system.
- Laboratory analysis of macrocrustacean samples (including species identification).
- Macrocrustacean data analysis.

Trainee's ability to conduct the task
A large amount of contact time was necessary in the initial stages of this task. The trainee was competent at gathering data necessary for his specialist input although he showed some difficulty in understanding how the information would be used later in the process. Mr Buthelezi was encouraged by the responsibility given to him and was motivated to see his tasks through.

Drawbacks of the process
A large amount of mentorship was required initially, which was significantly over and above the time allocated for the mentor to complete her own tasks.

8.2.2 Collation of information in a specialist report

After a briefing session as to how the data should be presented, Mr Buthelezi was given sole responsibility of the production of a specialist report on the macrocrustacean component of the Thukela Estuary in May 2002. He was instructed that the report should describe the present condition of the estuary, in terms of his specialist component.

Trainee's ability to conduct the task
This task was completed in a competent manner and was orderly and scientifically executed. The trainee did have some difficulty in meeting the report deadline.

Drawbacks of the process
Beyond specialist mentorship, a large amount of standard review of the document was necessary such as proof reading, grammar correction etc.

8.2.3 Production of biological templates

As the trainee had extensive involvement in the collation of information on the macrocrustacean invertebrate component, it was decided that he should attempt to complete his own templates. Several mentor-trainee discussion sessions took place regarding the allocation of template scores and the background information that should be used to derive the scores and calculation of the estuarine health **index**.

Several concepts were introduced to the trainee such as Ecological Category, Present Ecological State Category, Estuary Importance Index score and modifying determinants such as desired protected area status. The ecological implications of the future abstraction scenarios were discussed prior to the trainee attempting the templates on his own. Some time was spent evaluating the future abstraction scenarios and the respective flow ranges so that the trainee fully understood the abiotic conditions associated with each scenario.

Subsequent to the submission of the specialist reports and templates, a briefing session was held to ascertain if Mr Buthelezi had fully understood the purpose of the templates and the importance of the order in which they were completed by each specialist.

Trainee's ability to conduct the task
Considering that the task was a completely unfamiliar process to the trainee, Mr Buthelezi undertook this responsibility with enthusiasm and a respectable level of competency. He was capable of integrating the information provided by other specialists to interpret his own discipline. However, he did have some difficulty in meeting the deadline and required some assistance in this regard.

Drawbacks of the process
Insufficient consideration was given to the time required for the mentor to provide guidance to the trainee as well as completing the required tasks at hand within the allocated deadline.

8.2.4 Scenario evaluation workshop (Task 8.4)

The trainee was informed prior to the workshop what was expected of him and was given some assistance with the production of a presentation to communicate his findings. It was decided that it would be beneficial to Mr Buthelezi's progress if he presented his own results and was able to discuss them directly with the other team members. A large amount of time was allocated to the trainee to re-familiarise himself with the RDM process and how the tasks completed contribute to the final result.

A discussion session was held post-workshop for the mentor to evaluate the trainee's understanding of the reasons for evaluating each scenario and interpreting them with integrated abiotic and biotic information.

Trainee's ability to conduct the task
Mr Buthelezi was at first tentative in his verbal interpretation of the scenarios but with some assistance, adequately completed this task. Although it became clear when changes to scores made prior to the workshop were required, it was difficult for the trainee to simultaneously assimilate new information and interpret it in terms of his own discipline. With some assistance, however, he was able to continue and showed increasing confidence with his own ability as the workshop progressed.

Drawbacks of the process
None.

8.2.5 Production of additional yield scenario templates (Task 10)

Drawing on Mr Buthelezi's previous experience with the understanding of different flow regimes and their effects on the macrocrustacea, he was given his own additional yield scenarios to evaluate and present in template form.

Trainee's ability to conduct the task
Mr Buthelezi showed considerable improvement in his ability to integrate and interpret this multidisciplinary information. He also showed great progress in the time required for him to complete this task.

Drawbacks of the process
None

8.2.6 Additional yield scenario workshop (Task 10.4)

Mr Buthelezi showed an increased confidence in working independently and required significantly less assistance with preparing his findings. His participation in the workshop in January 2003 was more active and he was more inclined to argue the case of his discipline when it was required of him. He was also able to integrate his yield scenario predictions into the range of scenarios that were assessed during the previous task.

Trainee's ability to conduct the task
Mr Buthelezi showed considerable improvement in his ability to integrate and interpret this multidisciplinary information. He also showed great progress in the time required for him to complete this task.

Drawbacks of the process
None

8.2.7 Resource Quality Objectives and monitoring protocol specialist meeting (Tasks 13.2 and 13.3)

Since no preparation was required prior to the specialist meeting in October 2003, other than specialists being required to re-familiarise themselves with the accepted scenario and the ecological condition associated with the selected flow regime, several mentor-trainee discussions were held between Mr Buthelezi and Ms MacKay. The trainee was made aware of new concepts such as ecological specifications, their associated Thresholds of Potential Concern (TPCs) and the requirement for monitoring of the Reserve. Mr Buthelezi was given the ecological specifications and TPCs for the recently completed Mhlathuze Reserve as an example.

Trainee's ability to conduct the task
The trainee showed an interest and willingness to participate at this level of the process. However, he required some assistance with the setting of ecological specifications and did not play a role in setting up the monitoring protocol for his discipline.

Drawbacks of the process
This stage of the process required additional time for the trainee to understand the concept of selecting biological indicators to monitor the Reserve. There was little time during the workshop for mentor-trainee discussions and this was perhaps a shortcoming of the capacity training.

8.3 CONCEPTS AND THE RESERVE PROCESS

Mr Buthelezi attended the training session prior to the Scenario Evaluation Specialist Meeting in June 2002. He found training to be informative, helpful and put tasks in perspective with regards to the Reserve process from acquisition of data to interpreting flow scenarios. Mr Buthelezi has since extensively consulted the workshop handouts.

The final 'wrap-up' training session on the 10 October 2003 was a valuable exercise in that the trainee felt he was free to express his opinion regarding his experience with the Reserve determination process.

Mr Buthelezi has obtained the necessary information and training to understand the RDM process. He is keen to undertake a similar exercise in the future and with a little assistance would complete the process adequately.

8.4 TOOLS AND METHODS

Mr Buthelezi has shown that he can utilise the appropriate collection methods, data processing software and provide a basic interpretation of results to take part in any RDM process. His understanding of the use of these tools is good. However, he would require some assistance on overall project planning and time allocation management of his discipline.

8.5 INFORMATION INTERPRETATION, PRESENTATION AND COMMUNICATION

Mr Buthelezi is now familiar with the Estuarine Reserve methodology and can interpret information pertaining to his discipline in a fully integrated manner. He has no problem with the process up to the level of scenario evaluation. However, he still requires some assistance and guidance at the level of determining ecological specifications, TPCs and beyond. Should he receive any further training, it must be focused on this area and place emphasis on how a monitoring programme fits into the broader scope of the Reserve process.

Besides some grammatical and editing errors, Mr Buthelezi can with ease present his findings in a report format. His logic and interpretation is scientifically sound. Mr Buthelezi's verbal communication to his peers regarding his role in the RDM process has improved over the past two years and with some guidance he could participate in a RDM workshop environment.

8.6 PARTICIPATION IN A RESERVE TEAM ENVIRONMENT

Mr Buthelezi's confidence to communicate to other Reserve team members has increased and he may, with a low level of mentorship, in future perform the tasks allocated to him independently. From the beginning it was the objective that Mr Buthelezi be given the opportunity for as much 'hands on' experience as possible. He was given the encouragement and assistance where necessary to attempt all steps in the Reserve process

on his own and it is my feeling that this objective has been achieved successfully.

8.7 PARTICIPATION IN REPORT / TEMPLATE PRODUCTION

Mr Buthelezi was given the opportunity to play an active role in the production of his own specialist report and templates prior to the scenario evaluation specialist meetings. He has the ability and knowledge to carry out these tasks adequately.

8.8 CONCLUSION

I feel confident that the training that Mr Buthelezi received from myself and from the project as a whole was adequate and I feel confident that he could take a more active role in a Reserve determination. There is a requirement for some additional training, particularly with regards to concepts concerning monitoring of the Reserve.

I support the idea of capacity training in theory, however I feel that there was a large amount of responsibility placed on the mentor over and above the role expected in the Reserve process and this placed enormous time constraints on the project at times. This did improve as the trainee's understanding of the process improved. There should also be some consideration as to how trainees are retained. In a university environment few trainees will be permanent employees of the institution, rather senior postgraduate students. Often the lifecycle of the Reserve process will outlast the duration of the trainee's time at the institution. In this instance an active decision was made on the behalf of the research unit to pay the student to stay on as a research assistant after graduation. This may not be financially possible in every case.

9 CAPACITY BUILDING REPORT: ESTUARIES – RESERVE PROCESS

J Turpie

Dr Turpie teaches a comprehensive, month-long (full-time) module in environmental and resource economics to M Sc coursework students in Conservation Biology at the University of Cape Town. In 2002 there were 11 students on the course, most of whom come from a scientific (zoology or botany) background, and several of whom are from other African countries, including Lesotho. Part of this course deals with issues around water allocation. In 2002, she explained the RDM methodology for the determination of the Reserve, including the economics aspect, which is still under development. The latter was discussed in some detail, using the Thukela case study as an example. It was originally hoped to get the students to make some calculations based on the data on flows and prawns, but unfortunately these data were not yet available by the time the course was run in August. It is envisaged that the subject matter will be repeated in the future, this time with some of the actual data used in the study.

10 CAPACITY BUILDING REPORT: TRAINEE EVALUATIONS

PA Scherman and L Griffioen

10.1 INTRODUCTION AND OBJECTIVES

At the outset of the training component of the Thukela Reserve study, it was acknowledged that the training evaluation would have to be two-fold, i.e. input from the mentors and trainees. A number of the mentor reports contain assessments provided by the trainees, as well as reports produced by the trainees. It was however necessary to provide a forum in which trainees could clearly and explicitly state their requirements of training, assessments of the training given, and criticisms and comments regarding future training. It was decided to develop a training questionnaire to be distributed after the final 'wrap-up' training session in October 2003. The questionnaire (Appendix A), was compiled by Dr Scherman, with the assistance of Ms Griffioen, the Human Resources Manager of Coastal and Environmental Services, who has extensive experience and qualifications in developing and evaluating training questionnaires. The questionnaire was completed anonymously if so chosen, and completed questionnaires were sent directly to Ms Griffioen for evaluation. As Dr Scherman was herself a mentor, Ms Griffioen provided a report on the completed questionnaires. Completed questionnaires are available to the Project Management Team if required.

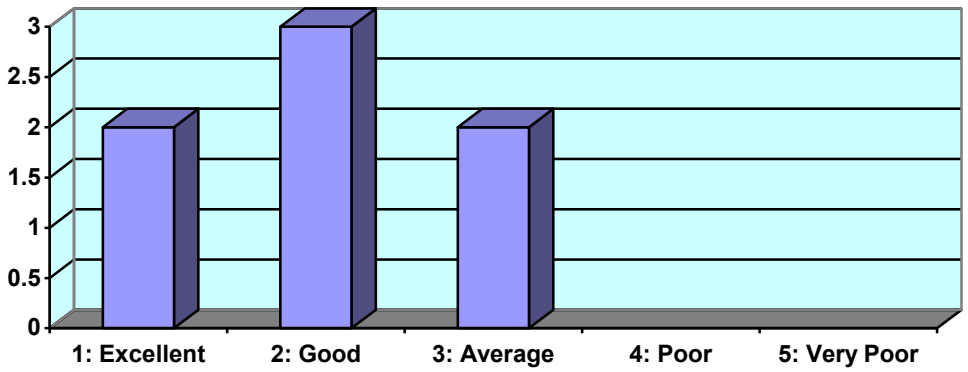
10.2 CONFIDENTIAL ASSESSMENT BY TRAINEES: COMPILED BY MS GRIFFIOEN

This document provides an overview of the evaluation forms returned by each of the seven trainees on the Thukela project, rather than a statistical analysis of opinions, and should be read in consultation with the questionnaire in Appendix A.

Histograms are used to synthesise responses to the first thirteen questions / statements. Individual comments related to each question / statement are also provided, as well as answers to the open-ended questions 14 to 16.

General comments are made in the final section. For the sake of accuracy, all comments have been reported verbatim.

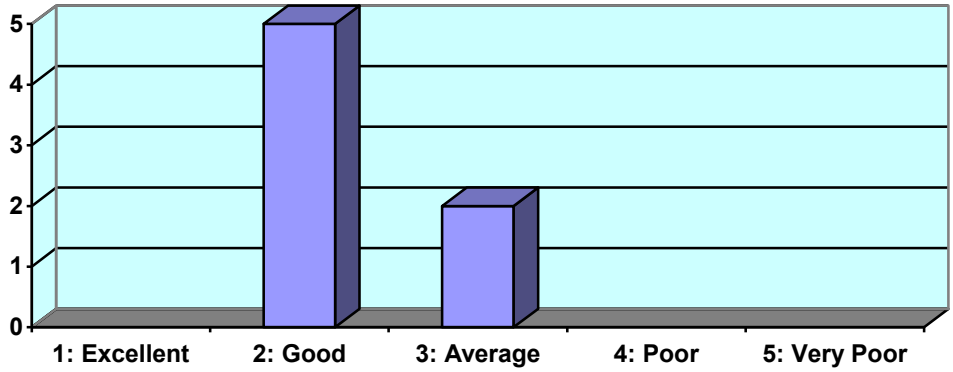
1. How would you score your understanding of Reserve *concepts*?



Comments:

- I think it can only be excellent after having practicalised the concepts learned during all the workshops we held.
- The Reserve concept as a whole was clear and enabled one to follow and apply the broad objectives of the programme.
- I think I've had a good understanding of the meaning and the applicability of the terms in this project.

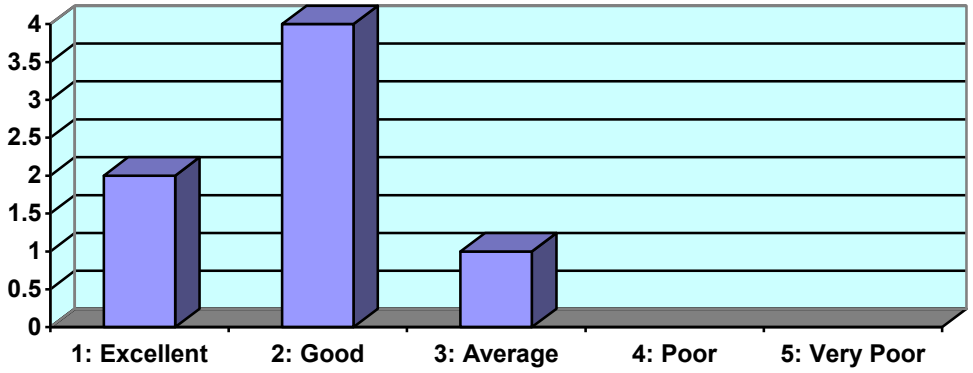
2. How would you score your understanding of the Reserve *process*?



Comments:

- I believe that I would have an excellent understanding if I am included in a similar project in future.
- It would be average if I consider the determination for both the river and the estuary. For the estuary on its own, it would be good. In fact, the way in which everything was arranged in terms of scoring and classification made everything much easier, I suppose.
- Certain aspects of the scoring were not clearly laid out and I felt they required further explanation and additional time (e.g. determination of particular index scores and associated weightings given to them).
- I feel confident about the required involvement in the process.

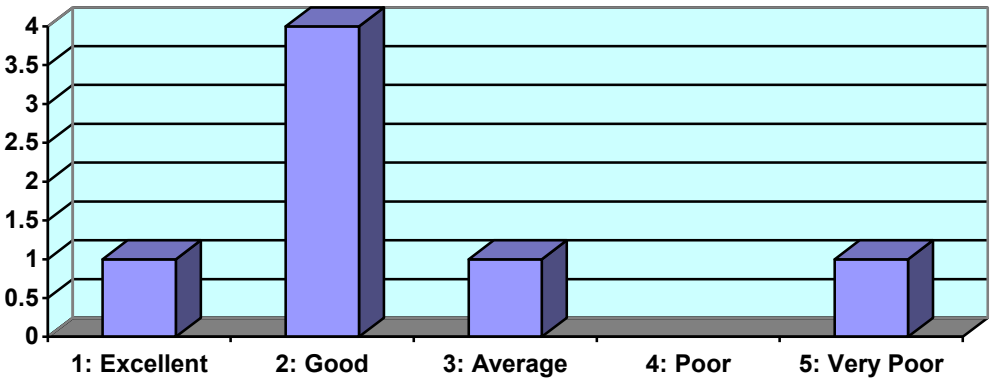
3. How would you score your understanding of concepts related to your specific discipline?



Comments:

- I think these were fairly clear.
- I am happy with the concepts and their use.

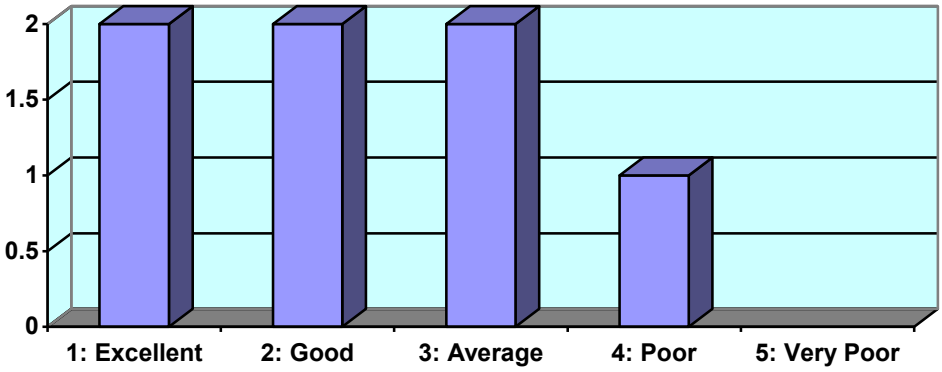
4. How would you score your ability to use tools related to your specific discipline, e.g. modelling?



Comments:

- I have been actively involved in the use of the tools/decision-making during the process.

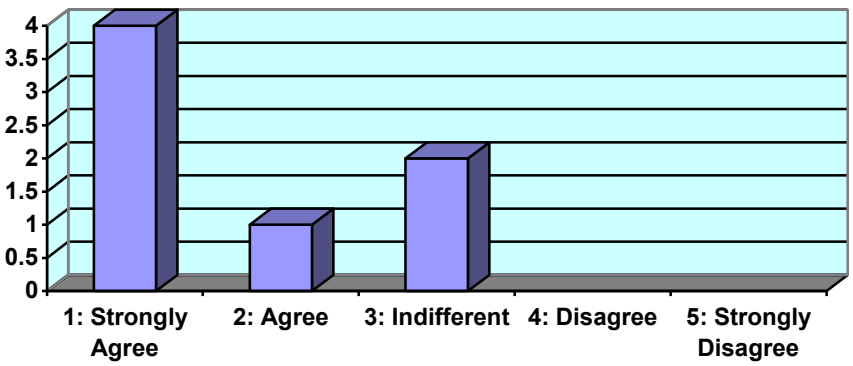
5. How would you score your understanding of the requirements of other specialists within the Reserve process?



Comments:

- Certainly my understanding and appreciation of requirements of other specialists has improved, although perhaps not to the depth and or degree one could possibly achieve given the relatively brief periods we had available to interact with other specialists.
- The picture on some of the driving determinants, e.g. hydrology, geomorphology, water quality was clear enough. Some human aspects were also understood.

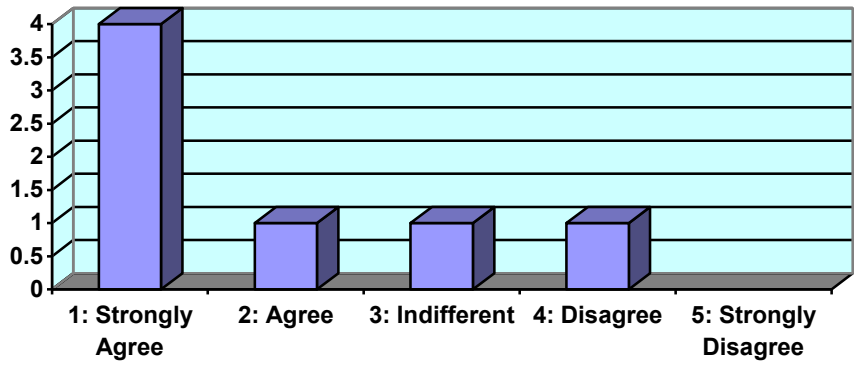
6. I would feel confident relating my understanding to colleagues in a *written* form.



Comments:

- No comments made.

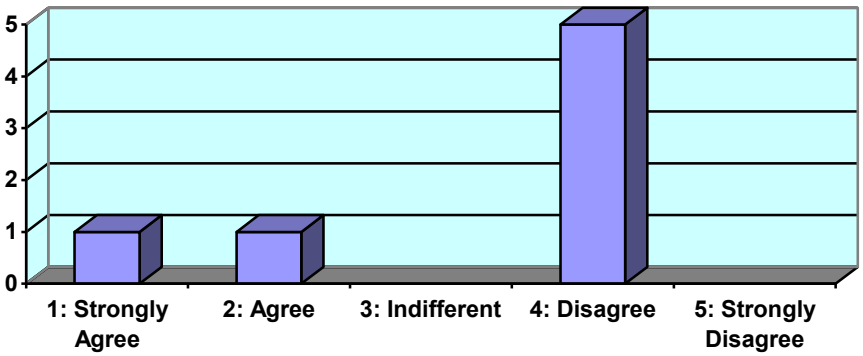
7. I would feel confident relating my understanding to colleagues as a *verbal* presentation.



Comments:

- During my participation sessions I sometimes 'took the reigns' from my mentor by asking that he allows me to make the decisions and get his opinion after the exercise. This allowed a 'hands-on' experience on my side. The 'decision' was then forwarded.
- I think I have to do more training before I can be confident relating my understanding to colleagues as a verbal presentation.

8. I believe that enough time was realistically allocated to training.

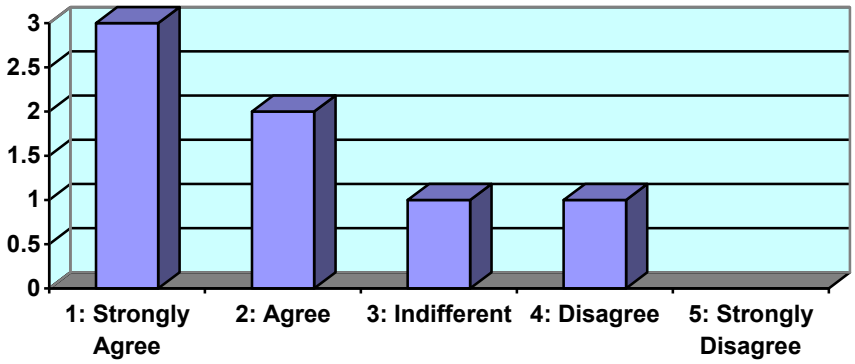


Comments:

- There was enough time for training but there was not much time between the mentor and the trainee.

- It is only the period in between training that was a little bit of a problem.
- I feel more time should have been made available at the beginning in order to explain the complete layout of the Reserve process (river and estuarine components).
- Training forms part of a succession in planning any future-oriented organisation, and I feel more time could have been allowed for training. However, I suppose that active participation in the few times when training was allowed is better than nothing. If possible, it would be better if more training sessions (literally throughout all the processes) could be assigned.

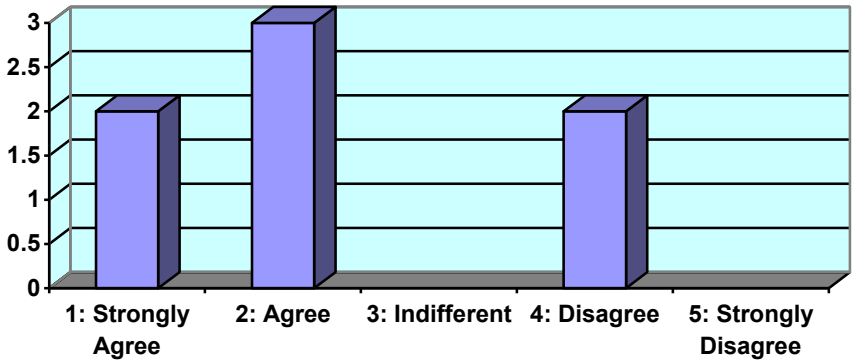
9. My mentor kept me informed of developments within the project, even when dedicated training time was not available.



Comments:

- I always knew what was going on in the project, and the outcomes were shared. However, this has been a complicated process, so hearing the activities of the session from one specialist did not make life easier, but it is still better than no communication at all.

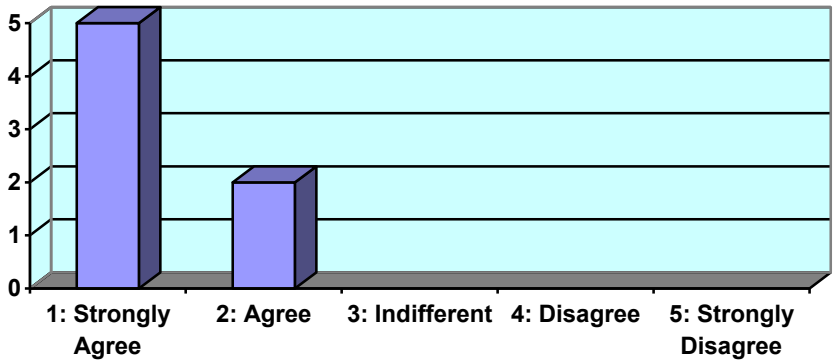
10. I was informed of the goals of training.



Comments:

- I feel that the expected outcomes were not very clear regarding post-training.
- Not in clear-cut terms but I have always had an understanding of what I need to know after the training sessions.

11. I feel that I have gained knowledge.



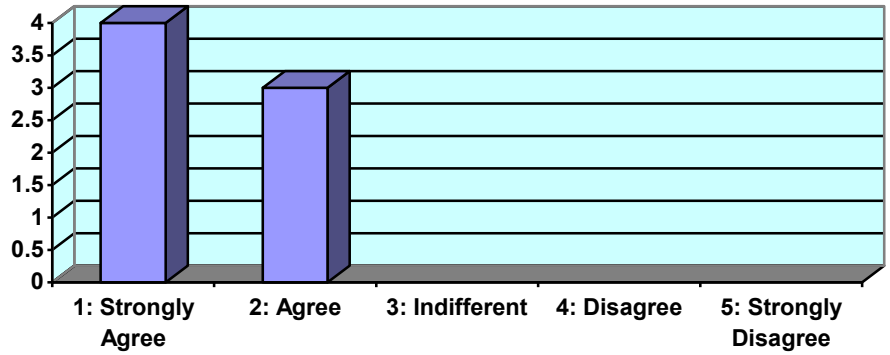
Comments:

- I gained knowledge in this process but I would be more confident if I was going to

use it frequently.

- I have gained good knowledge regarding the Reserve process, however feel that I may not really get to use this newly gained knowledge unless I'm part of a consultancy group.
- Although I cannot say exactly what knowledge at this stage, in a practical situation I would be able to follow, with understanding, all the steps I was involved with in the process. I feel I have gained hands-on experience.

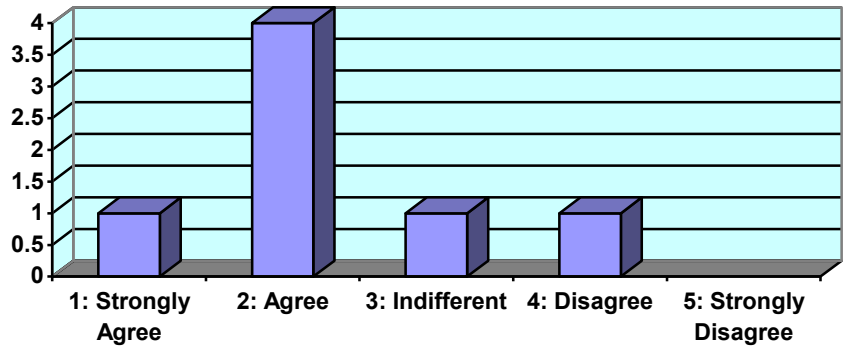
12. I feel that I have gained skills.



Comments:

- I have gained good skills regarding the Reserve process, however feel that I may not really get to use these newly gained skills unless I'm part of a consultancy group.

13. I would feel confident acting as a specialist in a Reserve team.



Comments:

- I managed to go through training with the help of my mentor without any problem, and doing everything expected of a specialist.
- I do feel confident acting as a specialist in a Reserve team, but I also feel that greater involvement in other Reserve studies would certainly further improve one's skills.
- I need more training before I can be confident acting as a specialist in a Reserve team.

14. Do you feel that additional training is required, and do you think this will be provided?

Yes. I feel that training time was not enough to allow for effective skill and knowledge transfer. There was no opportunity for trainees to evaluate themselves through case studies or similar exercises. Additional training that will focus on an integrated approach should be

provided, and I believe this will be provided.

Additional training is definitely required. However, I am not too confident that it will be provided.

Not actually training, I think more experience in the subject increases confidence.

Yes, I feel it is required so that we can be more confident when we work as a team.

In terms of the intermediate, a definite no, but I feel that the training we had was adequate.

I do feel additional training might not necessarily be needed, but I also think more involvement in different Reserve determination studies would prove more beneficial.

Mainly exposure / hands-on experience.

15. What was your favoured training method (e.g. mentor-trainee meetings, specialist workshops, field surveys)?

Specialist workshops:

I was able as a trainee to relate my discipline to what other specialists were doing.

Field surveys:

Mentor-trainee meetings. Even though one could learn more during the workshops, and working under pressure made it difficult for the mentor to explain things, it is still best to learn by doing.

Mentor-trainee meetings and field surveys:

Specialist workshops. That is where everything was discussed and you could relate to every component of the estuarine ecosystem.

Each has its merits, so I cannot say there was one method that stood out above the rest.

With my mentor we tended to mix all 3 settings because I asked questions and queried the principles on which decisions were made, but I could put it like a 'Mentor-trainee meeting in the Specialist workshop'.

16. Do you feel that the capacity building component of the Thukela Project was comprehensive?

Yes.

Yes, I think that it was comprehensive. However, I would also like to note that there is huge room for improvement.

Yes, we had a chance at the end to have a bigger picture of all the components involved in the Reserve determination process.

Yes.

Yes, because not only did it include other components of the estuarine system, it even included the river. Everything in the estuaries section was discussed in detail.

I'm not sure I get this question. Does it mean comprehensive in terms of what we were

exposed to or in terms of representation of all the specialists fields and disciplines together with trainees that would be associated with those fields and disciplines? To the former, I think yes, as far as time and monetary constraints could allow; to the latter, I feel more trainees could have been involved from other disciplines (i.e. economic, social and political spheres).

It was acceptable but could be improved.

General comments:

I am indebted to all specialists (mentors) for providing us with the necessary skills and knowledge. I would like to suggest that trainees should be provided an opportunity in the Reserve determination for other systems. I also request that I be considered for training in other disciplines such as water quality / eco-toxicology because they are my fields of interest and I gained basic skills and knowledge as a student.

The involvement of trainees in the workshop was too fragmented. Also, too long periods elapsed between phases of the process, thus it was quite hard to make sense of anything that was happening. I was quite impressed by the recent two-day workshop that was organised for the trainees. The content presented was summarising the whole process, thus simplifying a very complex and sometimes technical process of Reserve determination. However, the material was still comprehensive enough to give a broader picture of the whole process. Thus whilst during training one focused on one's area of specialisation, the workshop afforded one an opportunity of understanding what other people are doing within the whole process. However, I wish that a similar workshop had been organised at the beginning of the process to prepare and equip us.

I would like to say well done to the team for putting together such a good training programme; it was worth it. There is no better way to train than hands-on training. I hope the comments provided will assist in improving training for the next projects.

1) Was this exercise designed such that if you're an environmental expert in a consultancy group you stand a better chance of doing a similar project than if you're an environmental expert on the outside looking in?
2) I would like to point out that at specialists meetings some sensitivity regarding groups of different needs should be borne in mind when social functions are planned and put together and that more innovative ways need to be considered to encourage cross-cultural interactions.
3) I believe that this training initiative was a positive step toward addressing the concerns of educational and socio-economic redress and should be encouraged and fully supported in future studies.
4) It is rather hard to remain anonymous if the e-mail address of the sender will be known or the address from where questionnaire is mailed, however one relishes the chance and time given for feedback.

I am grateful to the Specialist Team to have identified me as one of their trainees, and look forward to being actively involved with projects of this nature. I believe in succession planning, so I see these training opportunities as the right step in ensuring that capacity is built in the field of the management of the environmental resources. My mentor was the best (he also happens to be my boss at work, but this is no reason for me to say he was the best in these studies), in that he allowed all sorts of questions in ensuring that I had a clear understanding of what was going on. My thanks go to the client for allowing and seeing it necessary that there be trainees in this project; it was well worth it for the trainees.

11 CONCLUSION

This conclusion attempts to summarize the main points of the Thukela training programme, and highlight issues important for future training. Relevant comments made in the mentors reports and trainee evaluations will be highlighted, as well as input at a number of specialist meetings and workshops.

The main training tools used in this programme were the attendance of trainees at workshops and meetings, field surveys, and mentor-trainee one-on-one training sessions. A capacity building and training budget was set up for the study, with budget allocations for each mentor and trainee team. In some instances organizations made extra provision for trainees to receive additional training, e.g. Mr Buthelezi's training was partly sponsored by the Coastal Research Unit of Zululand. Other organizations allowed trainees extra time to spend on Thukela training activities. This contribution is seen as a positive indication of commitment to training, both to building capacity of trainees and increasing the specialist skills base of organizations.

One of the most successful training tools appears to have been the final 'wrap-up' training session in October 2003 – providing a useful overview of the study to trainees and mentors alike. Credit must go to the Technical Team Leaders for organizing this workshop, as it was considered a useful addition to training conducted throughout the project. It served the purpose of placing the separate components of the Reserve study in context, and gave the river and estuaries trainees an opportunity to interact and gain an overview of each discipline within the study. As the Reserve studies are complex and long-term, it is difficult to allocate enough time for inter-disciplinary interactions, and this workshop assisted in alleviating this issue.

A number of recommendations arose from both mentors and trainees.

11.1 RECOMMENDATIONS FOR FUTURE TRAINING

- Allocated budgets for training, either as a sum of money to be allocated to training or as a percentage of the overall Reserve budget. A training budget allowed for successful training in the Thukela Reserve study, but a similar process has not been followed for the Reserve studies initiated in 2003.
- Trainees and the client must have realistic expectations of the training process. The expectations must therefore meet the budget and skills level of the trainees.
- A combined rivers and estuaries training session should also be conducted at the outset of the study, so as to allow trainees time to understand the process they will be conducting.
- All river trainees should attend an IFR site visit, including the hydrological trainee. The water quality trainee may chose to rather accompany the water quality team on the survey of the study area.
- All trainees should be involved from the beginning of the study, so as to be exposed to all the preparatory work before workshops and field surveys are initiated.
- The training programme must address the long pauses between workshops, meetings and field surveys, which leads to fragmentation of the training process. Mentors must be encouraged to remain in close contact with their trainees during these times, and update them regarding progress. A suggestion may be that progress reports be distributed to trainees, so as to keep them updated. The final main report of the Thukela study should also be distributed to all trainees.
- The training programme should be more structured – possibly with general feedback on the progress of the study through one person.
- If Reserve training is to be successful, follow-up training e.g. inclusion in subsequent Reserve studies, should be offered to trainees. It must be understood by the trainee that training in the Reserve process will require commitment and hard work, particularly as mentors carry additional demands of meeting deadlines and fulfilling

the tasks required of them. Trainees working on subsequent studies should be carefully selected, particularly in terms of specialist field and time they will be able to commit to the project while still fulfilling their other work commitments. Additional exposure and training is critical to expanding the specialist skills base in South Africa.

- More time and budget must be allocated to practice and proper learning. Due to deadline constraints and the pressures of a workshop environment, there is not enough time for trainees to practice on associated case studies, so as to develop their skills. It is possible that this type of training should be conducted outside of a specific Reserve study, but should be seen as a development tool for trainees specifically wanting to train as Reserve specialists.

- Trainees must be carefully selected. If a trainee is selected for a particular discipline on the basis of some previous or associated exposure to the subject, it cannot be expected that they develop as independent Reserve specialists. These trainees often feel abandoned by the process, partly because they do not have the specific background in the field. There is a vast amount of background knowledge and experience that is required to be a successful specialist, and this cannot be taught in workshops and field surveys. This is perceived to be an important shortcoming, primarily due to the lack of trainees available to specialists. One recommendation is that DWAF: RDM Directorate develop a database of available trainees for Reserve studies – the inclusion of trainees on this database should be according to a set of coherent guidelines.

- It is acknowledged that changes do take place in mentors and trainees careers over a 3 year study, and that this contributes to the fragmentation of the training process, e.g. Mr Soviti completing his M Sc and taking up a lecturing post at the University of Transkei, and Ms Valisa embarking on a part-time B Sc while working at Rhodes University.

- Trainees must be encouraged to be proactive in their inclusion in future studies. A suggestion was that the Thukela trainees (either individually or as a group) approach the RDM Directorate with the request to be included on future Reserve studies.

- It must be acknowledged that there are two levels of training. (1) Specialist training, so that the trainee is proficient and has some experience in their particular field, and (2) application and further development of this specialist training and knowledge to the Reserve process.

Although a number of training issues were recorded during the Thukela study, which require improvement, mentors and trainees alike have described the process as successful. A number of trainees have been described by their mentors as ready to act as Reserve specialists – either with or without minor supervision. Trainee readiness has often been disputed by the trainee, with confidence and experience being the most likely cause of this discrepancy. The promising trainees noted during this study should be given every opportunity to further develop their skills and confidence levels. If this is achieved, the Thukela training programme would have succeeded in its goal of widening the specialist skills base in South Africa and building new capacity.